This invention relates to a valve assembly for flush tanks and the like and more particularly a valve assembly which is automatically operable at predetermined intervals to allow the water to flow from the flush tank and flush the means with which it is operative.

The advantages of having an automatically operable valve assembly to operate the discharge of water from a container have long been recognized. For example, the advantageous use of the same in public lavatories is obvious. Therefore, however, such automatically operable valve assemblies have been expensive to produce containing many mechanical parts, and have been difficult to assemble and maintain.

It is an object of the present invention to provide an automatically operable valve assembly for flush tanks which will allow the discharge of water at predetermined intervals.

It is a further object of the present invention to provide a valve assembly for flush tanks which comprises a unitary assembly which is easy to install and maintain.

It is a further object of the present invention to provide a valve assembly for flush tanks which is simple to operate and construct.

It is still another object of the present invention to provide a valve assembly for flush tanks having all the desired advantages but which is nevertheless inexpensive to manufacture.

Other objects and advantages of the present invention will appear in greater detail in the following specification taken in conjunction with the accompanying drawings, in which:

Fig. 1 is an elevational view of the valve assembly in accordance with the present invention in a broken-away portion of a conventional flush tank;

Fig. 2 is a vertical section taken through a portion of Fig. 1; and

Fig. 3 is a fragmentary vertical sectional view of a modified form of the present invention.

Referring to the drawings, there is shown by way of example, a portion of a closet flush tank 10 having an outflow pipe 11 with the unitary flush valve assembly 12 of the present invention wherein said flush tank and in communication with said outflow pipe 11. While for clarity the description of the valve assembly of the present invention is set forth in connection with a closet flush tank, it will be understood that the valve assembly will be operable in any place where automatic discharge of water at predetermined intervals is desired, as for example, bathtubs and the like.

The valve assembly 12 comprises a cylindrical body portion 13 preferably circular in cross section. At the lower end of said cylindrical body 13 there is provided an outlet 14 comprising a multiplicity of lateral ports 15 and a seat 16. The cylindrical body 13, which is shown as being hollow, has apertures 17 centrally disposed at each end thereof to form a bearing for rod 18 which extends through the said apertures 17. Secured to the lower end of the rod by means of a threaded con

nection or any other suitable means is a valve member 19 preferably globular and constructed of resilient material such as rubber. While this construction is shown as preferential, any other suitable shape or material may be utilized for the valve member 19. The valve member 19 is adapted to rest in the seat 16 to close the same whereby, as shown, when the valve assembly is inoperative, water will not escape from the flush tank. The rod 18 is provided at its upper end with a float 20 secured by means of a threaded connection or by any other suitable means to the rod 18. The rod 18 has guided up-and-down movement with respect to the cylindrical body 13 through the bearing apertures 17. The rod 18 is sufficiently long so that when the valve member 19 is on the seat 16, a portion of the rod projects above the upper end of the body 13, as shown. It will be understood that the seat 16 is beveled, as at 21, to accommodate the valve member 19 and provide a fluid-tight seal when the valve member 19 is resting in the seat 16. The parts described above are assembled into a unit which is then placed on the fixture to be assembled with the flush tank 11.

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The valve member 19 under the action of gravity will engage the seat 16 and thus prevent the outflow of liquid from the tank through the outlet 14, as shown in Fig. 1. When the liquid entering the tank reaches the level to buoy the float 20 and raise the same, the valve member 19 through the interconnection of the rod 18 will be moved out of engagement with the seat 16 allowing a quantity of the liquid to flow out of the tank through the outlet 14 into the pipe 11. It will be understood that during this discharge, the lateral ports 15 permit substantial quantities of water to flow into the pipe 11, there being no barrier presented to the discharge of the water when the valve assembly 19 is raised as aforesaid. When a sufficient amount of the water is discharged, the valve member 19 under the action of gravity will return to its position seated in the seat 16 preventing further discharge of the water within the tank. It will be understood that at periodic intervals discharge of the water may be determined by the rate at which the water is allowed to flow into the tank by any suitable means, to raise the water level until the float 20 is buoyed.

In the modification shown in Fig. 3, a beveled disk 22 is provided at the end of the rod 18 adapted to rest in the seat 16 to provide a fluid-tight seal. The action of the valve assembly of this construction is similar to the action of the float shown in Figs. 1 and 2; viz., when the water is at a level to buoy the float 20, the beveled disk 22 will move upwardly to permit the discharge of the water from the tank and thereafter under the action of gravity, will return to the position shown in Fig. 3 wherein the beveled disk 22 rests in the seat 16. While the invention has been described and shown in definite shapes for exemplary purposes, as for example, the valve member 19 comprising a rubber ball, it will be understood that other shapes may be utilized to accomplish the same result using the principle set forth in this description.

Variations and modifications may be made without departing from the spirit of the invention or the scope of the appended claims.

1. A unitary flush valve assembly comprising an elongate, upright body having a liquid outlet on the lower end thereof and a seat surrounding said outlet, a valve member which cooperates with said seat to control the outflow of liquid through said outlet, a rod extending through the body, means on said body which guides said rod for up and down movement, said valve member being rigidly
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3 joined to the lower end of the rod for movement with the rod, and a float comprising a vessel having a closed bottom, rigidly joined to the upper end of the rod and responsive to the rise and fall of the liquid to cause up and down movement of said rod and a corresponding movement of said valve member with respect to the seat to open and close said outlet, the weight of the rod, valve, and float and the buoyancy of the float being so related that when the assembly is immersed in a body of water the float will overcome the total weight of the valve, rod and float and also the downward pressure of water on the valve, thereby to raise the valve and open the said outlet.

2. A unitary flush valve assembly as set forth in claim 1, wherein said valve member consists of a beveled disk and said seat is beveled to receive the disk.

3. A unitary flush valve assembly as set forth in claim 1, wherein said rod projects above said body and the float extends above the upper end of the rod.

4. A unitary flush valve assembly comprising an elongate, upright body having a liquid outlet on the lower end thereof, having one or more laterally opening ports, and a seat surrounding the lower end of said laterally opening ports, a valve member which cooperates with said seat to control the outflow of liquid through said outlet, a rod extending through the body, means on said body which guides said rod for up and down movement, said valve member being rigidly joined to the lower end of the rod for movement with the rod, and a float comprising a vessel having a closed bottom, rigidly joined to the upper end of the rod responsive only to the rise and fall of the liquid to cause up and down movement of said rod and a corresponding movement of said valve member with respect to the seat to open and close said outlet, the weight of the rod, valve, and float and the buoyancy of the float being so related that when the assembly is immersed in a body of water the float will overcome the total weight of the valve, rod and float and also the downward pressure of water on the valve, thereby to raise the valve and open the said outlet.

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