To all whom it may concern:

Be it known that I, Edward Thiry, a citizen of the United States, and resident of Pasadena, in the county of Los Angeles, State of California, have invented new and useful Improvements in a Flushing Device for Closets, of which the following is a specification.

This invention relates to improvements in flushing devices for toilet tanks and particularly to flushing control means for "low down" tanks that are used in connection with closet bowls.

The primary object of this invention is to provide details of improvement upon the invention disclosed in Patent 1,160,083, granted to me November 9, 1915. It is the common practice to employ flush valves for tanks of this type, in which rubber valves, rubber seats, mercury seals, and carefully machined valves and seats of metal are employed. The efficient life of rubber under such conditions is short and early renewal of parts is required. Furthermore, leakage occurs, and where metal seats and seats are used a grain of sand or other foreign matter may deposit itself on the seat or valve holding it open sufficiently to cause leakage. The expense of maintenance of mercury seals is so great as to make them objectionable. The present invention contemplates the use of air as a seal. Another object of my invention is to provide a device of the class described, which may automatically flush the tank upon the level of the water therein reaching a predetermined point. The invention may be embodied in a device adapted for use as an automatic flushing device, or where the flushing operation is manually initiated, it will operate to prevent overflow of the tank due to the supply valve becoming stuck in open position or leakage of the supply valve occurring.

These objects together with other objects and corresponding accomplishments are obtained by means of the embodiment of my invention illustrated in the accompanying drawing, in which:

Fig. 1 is a vertical section view taken through a flush tank and through a closet bowl connected therewith, the bowl being turned at an angle to more clearly show the flush tank and its connection to the bowl, the flushing mechanism being shown in sealed position; Fig. 2 is a section similar to that shown in Fig. 1 showing the flushing mechanism in unsealed position ready to flush the bowl; Fig. 3 is a section of the bells and head of the discharge pipe on an enlarged scale to more clearly show the contracting of the bells, when the tank is full of water ready for flushing; Fig. 4 is a plan view of the siphon bell and discharge tube, a part of the bell being broken away to better show the discharge tube construction.

Referring more particularly to the drawing, 5 indicates a flush tank adapted to be mounted upon a wall or otherwise suitably supported, a slight distance above the bowl 6 of a toilet closet. Connecting the flush tank 5 and the closet bowl 6 is a fitting which comprises a water trap. A pipe 7 extends downwardly and opens at its lower end into a jacket 8 forming therewith an annuller space. Extending from the jacket adjacent its juncture with the pipe 7 is a pipe 9 which is connected to the bowl. Pipe 7 is tapered, being smaller at its lower end for a purpose later described. Extending upwardly from the bottom of the tank is a discharge pipe 10 which is connected to the pipe 7 of the trap. The upper end of the pipe 10 flares outwardly, as indicated by 11, best shown in Fig. 3. Extending inwardly toward the center of the pipe is an apron 12. Mounted upon the lip of the pipe 10 are lugs 13 to space the siphon bell 14 which nests thereover. Bell 14 is made of considerable depth and the dome thereof is dished as indicated by 15. An air tube 16 is secured to the bell opening through a constricted aperture 17 to the dish 18 of the bell. Disposed over siphon bell 14 is a control bell 18 having its inner upper end conforming in shape to the dish portion 15 of the bell 14. Ribs 19 are disposed upon the dashed portion of bell 14 to provide a slight clearance space between the bells when seated upon each other. Secured to control bell 18 and extending into the air tube is a stem 20 serving the purpose of aligning the bell and preventing displacement relative to one another. The stem 20 extends through bell 18 and has an eye at the upper end by which it is connected to a link 21 forming a member of a
link mechanism leading to a convenient operating lever or button by which the flushing of the tank is manually controlled.

The tank 5 may be provided with any suitable valve 22 for controlling the supply of water to the tank. As shown herein the valve is operated by a float 23 connected to the valve by a lever 21. The valve 22 controls the flow of water from a service pipe 25. A refill 26 may also be provided, this refill acting in the manner well known in the art.

In Fig. 1, the parts are shown in position with the flush tank full and ready for flushing the bowl. The float 23 is in position such that valve 22 is closed. Air is entrapped in pipes 7 and 10 between the level of water in the lower end of pipe 7 and the water under siphon bell 14. The air pressure is equal to the head of water above the level of water in bell 14. This will be equal to the difference of level of the water in the jacket 8 and pipe 7 of the trap. The air tube 16 is sealed by the water under bell 18. Suppose it is desired to flush the tank. The mechanism is manipulated to raise link 21 and lift control bell 18 to the position shown in Fig. 2. This relieves the pressure of the air entrapped in pipes 7 and 10, and the head of water will raise the level of the water under the bell 14 until it overflows into pipe 10. Water may also pass over the top of bell 14 into the dished portion. The apron 12 upon the top of pipe 10 directs the water so that it forms a plug which rushes into pipe 7, starting a siphon. Water in the dished portion 15 of bell 14 serves to momentarily seal the air tube 16. Suppose the dish is not present. When the control bell 18 is raised and dropped back suddenly, the following effects take place; first, there is a relief in the pressure of the entrapped air, water starts to rise in bells 14 and 18; before sufficient water in bell 14 has overflowed the top of the discharge pipe 10, the control bell 18 has returned to its position on bell 14 and the pressure of the entrapped air restored preventing the siphon starting. With the dished dome and constricted opening 17, water flows into the dish and momentarily seals the opening so that the effect of increased pressure and the sudden dropping of control bell 18 will be delayed until the water in bell 14 has overflowed into pipe 10 an amount sufficient to start the siphon. Thus, quick tripping of the link mechanism starts flushing. By tapering pipe 7 at its lower end the sensitiveness of the device is increased. The pressure upon the entrapped air depends upon the head of water in the tank above the level of water in bell 14, this being equalized in the water trap by the difference of levels of the water therein. To relieve the pressure sufficiently so as to start the siphon, a certain increase in the volume of the space for entrapped air is provided for by lifting bell 18. By decreasing the diameter of the pipe 7 in the trap, the amount of air to be displaced by water rising therein to any determined level is decreased. Thus, a less volume of air has to be displaced for a given decrease in the difference of water levels in the trap with a smaller diameter of pipe than a larger.

As the height of the water in bell 14 is exactly proportionate to the difference in levels in the water trap, a less lift of bell 18 is required for raising the water to overflow pipe 10 than would be required with a pipe of uniform diameter.

The siphon having been started, it is immaterial whether bell 18 is maintained in its upper position or lowered upon bell 14 in its original position. Water will continue to be siphoned around under the edge of bell 14 and through pipe 10 until it reaches the level of holes 27, air then entering and gradually breaking the siphon, so that when the water level has reached the lower edge of the bell it will be completely broken and with a minimum of noise. The level of the water in the flushing tank is then such that the float will have actuated the valve 22 and water will begin to enter the flushing tank. The water rises until it reaches the lower edge of bell 18, then entrapping the air in pipes 10 and 7.

Assume a manually operated flush tank, such as shown herein, is installed. The parts are so designed that at the normal full level of the tank, tube 10 will be air sealed. If the tank is filled above this level, the level of water under bell 14 will be raised and finally overflow tube 10 starting the siphon and flushing the tank. Thus, the mechanism may be adjusted to prevent overflow of the tank due to any cause. If it is desired to automatically flush the tank, no float and valve are installed, the flushing occurring just as soon as the water reaches a sufficient height in the tank.

What I claim is:

1. In combination with a flush tank, a discharge tube extending upwardly into said tank, said tube being open at the top thereof, a water trap connected to the lower end of said tube, a siphon bell nesting over said tube, said tube and bell being arranged so that the tube and interior of the bell communicate, said bell being dished at the top, an air tube secured to said bell extending into said discharge tube and communicating with the dome thereof at the low point of the dished surface, and a control bell nesting over said siphon bell.

2. In combination with a flush tank, a discharge tube extending upwardly into said
tank, said tube being open at the top there-
of, a water trap connected to the lower end of said tube, a siphon bell nesting over said tube, said tube being provided with means to space the dome of said bell above the top of said tube, said bell being dished at the top, an air tube secured to said bell extending into said discharge tube and communicating with the dome thereof at the low point of the dished surface, and a control bell nesting over said siphon bell.

3. In combination with a flush tank, a discharge tube extending upwardly into said tank, said tube being open at the top there-
of, a water trap connected to the lower end of said tube, a siphon bell nesting over said tube, said tube and bell being arranged so that the tube and interior of the bell communicate, said bell being dished at the dome, an air tube secured to said bell extending into said discharge tube and communicating with the dome thereof at the low point of the dished surface, a control bell nesting over said siphon bell, and ribs spacing the dome of said control bell and the dished surface of said siphon bell.

4. In combination with a flush tank, a discharge tube extending upwardly into said tank, said tube being open at the top there-
of, a water trap connected to the lower end of said tube, a siphon bell nesting over said tube, said tube being provided with means to space the dome of said bell above the top of said tube, said bell being dished at the dome, an air tube secured to said bell extending into said discharge tube and communicating with the dome thereof at the low point of the dished surface, a control bell nesting over said siphon bell, and ribs spacing the dome of said control bell and the dished surface of said siphon bell.

5. In combination with a flush tank, a discharge tube extending upwardly into said tank, said tube being open at the top there-
of, a water trap connected to the lower end of said tube, a siphon bell nesting over said tube, said tube and bell being arranged so that the tube and interior of the bell communicate, said bell being dished at the dome, an air tube secured to said bell extending into said discharge tube and communicating with the dome thereof at the low point of the dished surface, a control bell nesting over said siphon bell.

6. In combination with a flush tank, a discharge tube extending upwardly into said tank, said tube being open at the top there-
of, a water trap connected to the lower end of said tube, a siphon bell nesting over said tube, said tube and bell being arranged so that the tube and interior of the bell communicate, said bell being dished at the dome, an air tube secured to said bell extending into said discharge tube and communicating with the dome thereof at the low point of the dished surface, a control bell nesting over said siphon bell.

In witness that I claim the foregoing I have hereunto subscribed my name this 29th day of July, 1921.

EDWARD THIRY.