July 15, 1924. 1,501,318

E. F. DONNELLY

FLUSH VALVE

Filed May 15, 1920

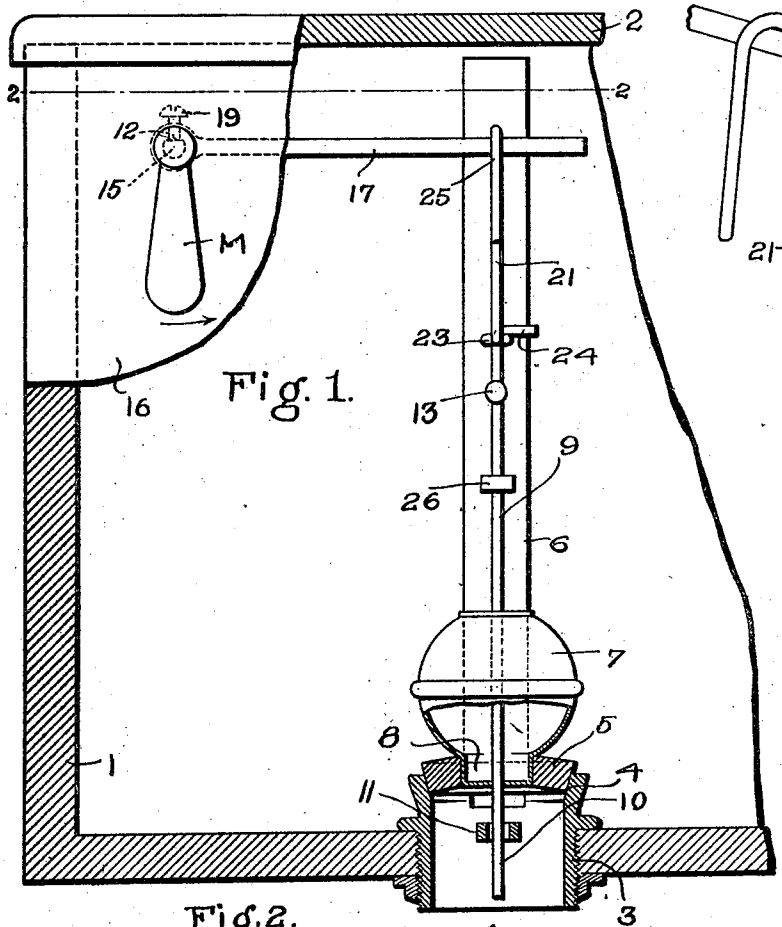


Fig. 1.

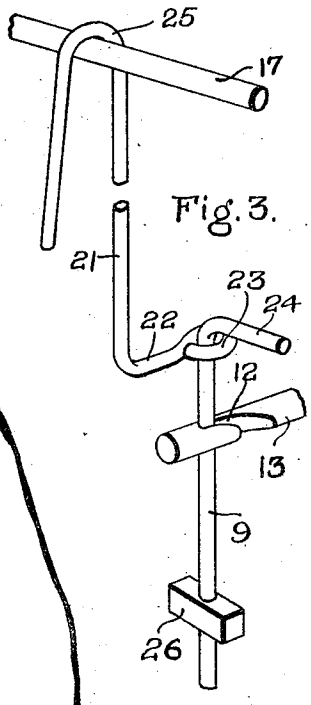


Fig. 3.

Fig. 4.

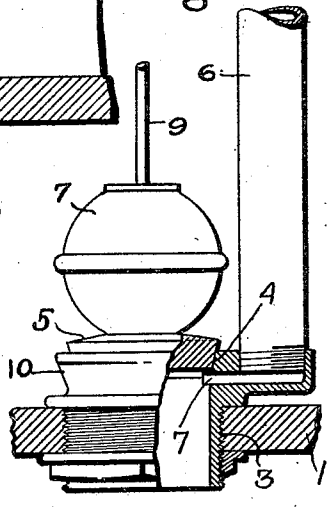
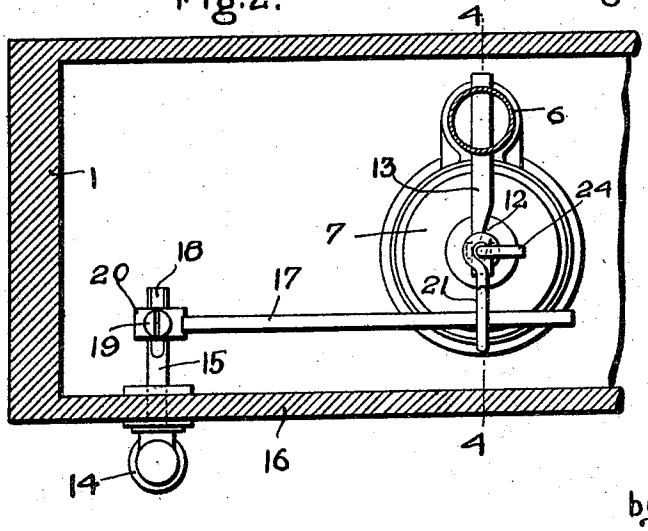


Fig. 2.



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UNITED STATES PATENT OFFICE.

EDWARD F. DONNELLY, OF MALDEN, MASSACHUSETTS.

FLUSH VALVE.

Application filed May 15, 1920. Serial No. 381,577.

To all whom it may concern:

Be it known that I, EDWARD F. DONNELLY, a citizen of the United States, residing at Malden, county of Middlesex, State of Massachusetts, have invented an Improvement in Flush Valves, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to flush valves and has for its objects to provide an improved flush valve which is simple in its construction and inexpensive to manufacture; which is constructed so that it can be easily disconnected from its guiding means and from the actuating handle whenever it is necessary to remove the valve from the tank for any purpose, and which has various other features of novelty all as will be more fully hereinafter set forth.

In order to give an understanding of my invention, I have illustrated in the drawings a selected embodiment thereof which will now be described, after which the novel features will be pointed out in the appended claims.

In the drawings, Fig. 1 is a partial sectional view through a flush tank having my improved valve;

Fig. 2 is a section on the line 2—2, Fig. 1;

Fig. 3 is a perspective view of a portion of the mechanism for opening the valve;

Fig. 4 is a reduced section on the line 4—4, Fig. 2.

1 indicates a flush tank of any suitable construction and 2 is the removable cover therefor. Extending through the bottom of the flush tank is a combined valve seat member and outlet member 3, said member being provided with a valve seat 4 which is engaged by a valve member 5. 6 is the usual overflow pipe which leads to the port 37 in the member 3 and through which the water overflows if it rises too high in the tank 1.

The parts thus far described are or may be of any suitable construction and form no part of my present invention.

The valve herein shown is of that type which has associated therewith an air chamber of sufficient size so that when the valve has once been raised from its seat and the pressure has been substantially equalized on both sides of the valve, the buoyancy of the air chamber will hold the valve open until the water has been substantially drawn out from the tank. The air chamber is shown at 7 and will be hermetically sealed and may be made of copper, brass, or any suitable non-corrosive material. This air chamber has a cylindrical extension or hub 8 at its lower end and the valve member 5 has an annular shape and fits over the hub 8 and is secured thereto. I will preferably make the valve member 5 of rubber or some similar yielding material which will readily fit the valve seat 4 to make a tight joint, and when this valve member 5 is made of rubber it can be readily cemented to the hub 8.

The valve has associated therewith a valve stem 9 which is shown as extending through the air chamber 7, the lower end 10 of said valve stem depending below the valve and being guided in a suitable bridge-piece 11 that extends across the opening in the member 3, and the upper end of the valve stem being received in a slot 12 formed in a guiding arm 13 that extends from the overflow pipe 6. This slot 12 is preferably an open slot so that the valve stem can be entered thereinto by a lateral movement, and I propose to make the mouth of the slot of slightly less width than the diameter of the stem 9 so that a little force will be required to pass the stem laterally through said mouth of the slot. The arm 13 is secured to the overflow pipe 6 in any suitable way and the slot 12 will preferably extend in an inclined direction from the end of the arm 13 and have an opening at the side of the arm, although this is not essential to the invention.

The flush tank herein shown is of the type which is situated directly back of the closet bowl and is provided with a handle 14 by which the valve may be opened.

One of the features of the invention relates to the connection between the handle 14 and the valve, which connection is of simple nature and has such a construction that the valve can be readily disconnected therefrom if it is necessary to remove the valve from the tank. The handle 14 is rigid with a rock-shaft 15 which is journaled in the front side 16 of the tank 1, and said rock-shaft has an arm 17 fast thereon. The rock-shaft is shown as having a flattened portion 18, and the arm 17 has a hub 20 which is slipped over the flattened portion of the rock-shaft, said hub being provided with a clamping screw 19 to engage the flattened portion thereby to rigidly con-

nect the arm to the shaft. The valve stem 9 is connected to the arm 17 by means of a link member 21. The lower end of this link member is bent laterally, as shown at 22, and is provided with an eye 23 through which the valve stem 9 extends, the upper end 24 of the valve stem being bent laterally to form a head with which the eye 23 has engagement. The upper end 25 of the link 21 is formed into a hook which is hooked over the arm 17.

When the handle 14 is turned in the direction of the arrow, Fig. 1, the arm 17 will be raised thereby acting through the link member 21 to lift the valve through the valve stem 9. The upward movement of the valve is limited by a stop 26 secured to the valve stem and which co-operates with the arm 13 for this purpose. So long as the valve is closed, the pressure of the water thereagainst will offset the buoyant effect of the air in the chamber 7 and the valve will remain closed, but when the valve has once been lifted off its seat so that the pressure above and below the valve is substantially equalized, then the buoyant effect of the air in the chamber 7 will hold the valve open until the water has drained from the tank to the level of the air chamber. The manner of connecting the valve stem on the arm 17 and the manner of guiding the valve stem are such that the valve can be readily removed from the tank, for it will be observed that the operation of removing the valve involves simply that of disconnecting the hooked end of the link 21 from the arm 17 and the shifting of the upper end of the valve stem laterally through the open slot 12, after which the valve can be raised from its seat and removed from the tank. If it is not convenient to disconnect the link 21 from the arm 17, then the arm can be readily removed from the shaft 15 by simply loosening the set-screw 19, and after this is done then the valve is free to be removed from the tank. At the most, therefore, the removal of the valve involves simply the loosening of the screw 19.

It will, therefore, be seen that my device is simple in construction and can be manufactured at a relatively small cost and that it is easy to keep in repair because the valve can be readily removed.

The guiding arm 13 is fixedly secured to the overflow pipe 6, and I will preferably sweat this overflow pipe into the valve seat member 3. By means of this construction it is not possible for the arm 13 to be thrown out of its proper position and, therefore, the valve stem will always be held in proper vertical position. The guiding arm 13 is shown in Fig. 2 as extending through the overflow pipe 6 and thereby being rigidly held in position.

I claim:

1. The combination with a flush valve having an outlet provided with a valve seat and an overflow pipe, of a guiding arm extending from the overflow pipe and provided with an open slot having its open end directed away from the end of the arm, a valve for the valve seat, said valve having a stem extending through and guided by said slot, a handle having a rock shaft journalled in the side of the tank, and a readily-detachable connection between the rock shaft and valve stem which tends to hold the stem at the closed end of the slot.

2. The combination with a flush valve having an outlet provided with a valve seat and an overflow pipe, of a guiding arm extending from the overflow pipe and provided with an open slot having its open end directed away from the end of the arm, a valve for the valve seat, said valve having a stem extending through and guided by said slot, a handle having a rock shaft journalled in the side of the tank, an arm fast on the rock shaft situated beyond the end of the guiding arm, and a link connected at one end to said valve stem and having a hooked end which loosely engages said arm, the relative position of the parts being such that upward movement of the arm lifts the valve stem and also draws it towards the closed end of the slot.

3. The combination with a flush valve having an outlet provided with a valve seat and an overflow pipe, of a guiding arm fastened to and extending from the overflow pipe and provided with an open slot having its open end directed away from the end of the arm, a guide below the valve seat, a valve for the valve seat, said valve having a stem extending above and below the valve, said stem being guided by said slot above the valve seat and by said guide below the valve seat, a stop firmly secured to the valve stem for engagement with the fixed arm to limit the upward movement of the valve, thereby to retain the valve stem always in engagement with said guide, a handle having a rock shaft journalled in the side of the tank, an arm fast on the rock shaft situated beyond the end of the guiding arm, and a link connected at one end to said valve stem and having a hooked end which loosely engages said arm, the relative position of the parts being such that upward movement of the arm lifts the valve stem and also draws it toward the closed end of the slot.

In testimony whereof, I have signed my name to this specification.

EDWARD F. DONNELLY.