R. G. FERGUSON.

FLUSH TANK VALVE.

APPLICATION FILED FEB. 9, 1912.

1,087,227.

Patented Feb. 17, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

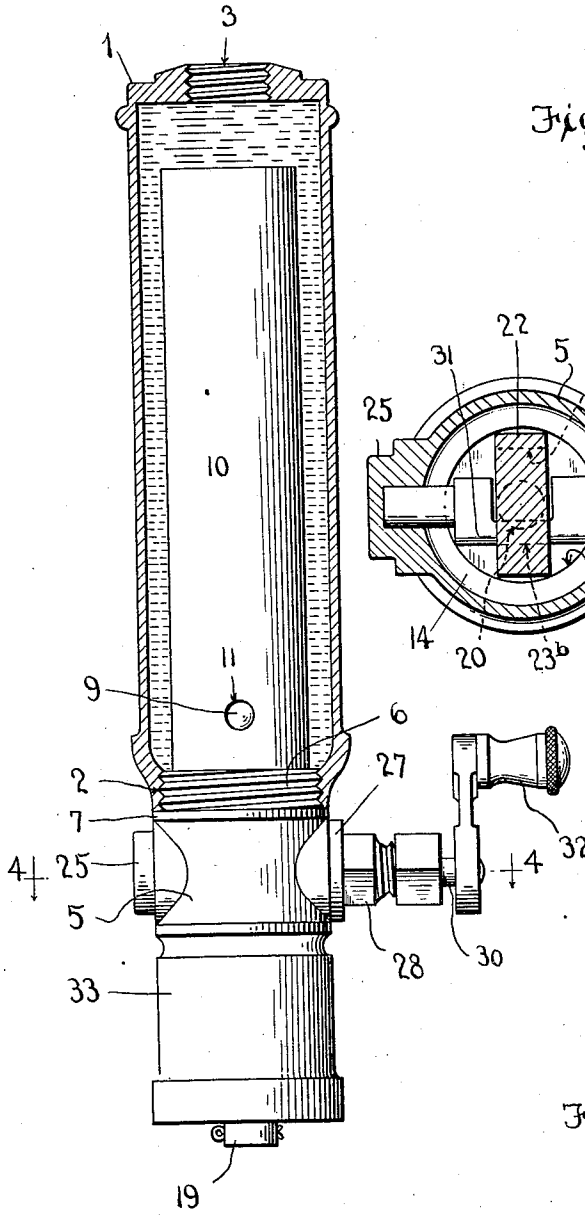


Fig. 4.

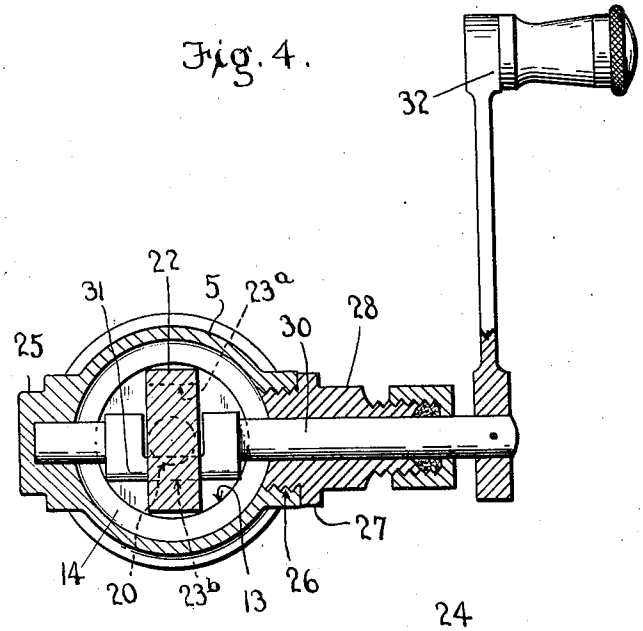
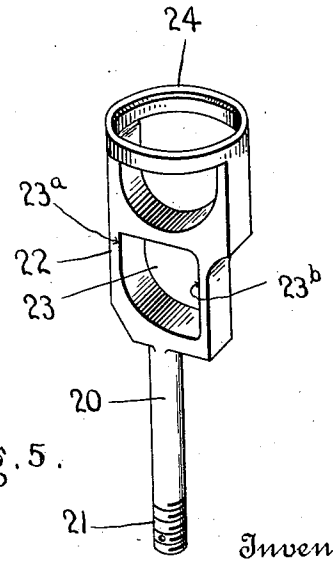


Fig. 5.



Witnesses

L. B. James

S. M. McCall,

Inventor

R. G. Ferguson

by A. Bellinson & Co

Attorneys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

Fig. 2.

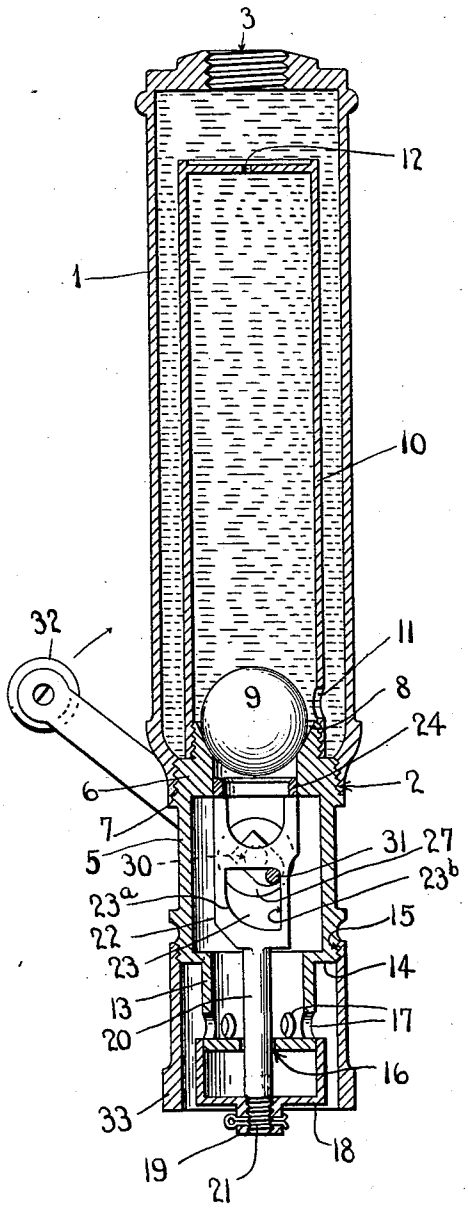
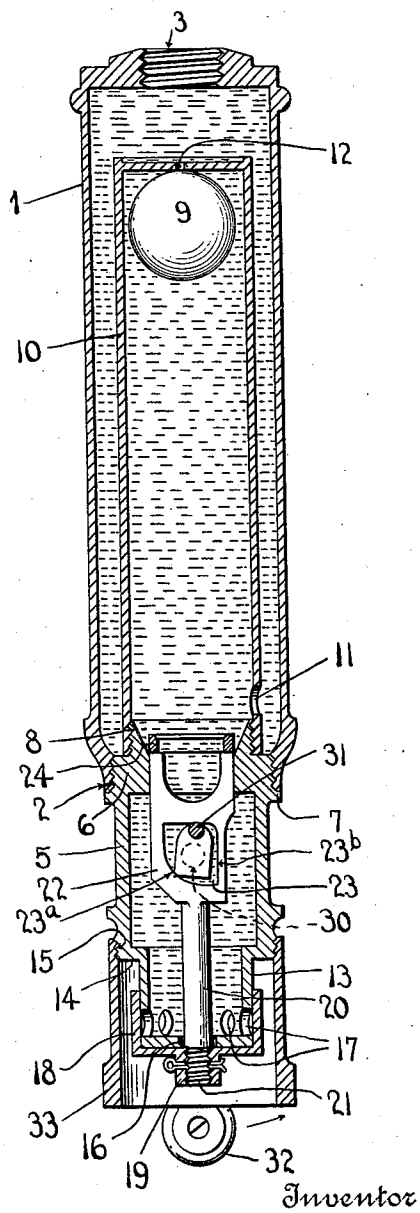


Fig. 3.



Witnesses

L. B. James

L. M. McColl.

Inventor

R. G. Ferguson

by H. B. Williamson & Co

Attorneys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ROBERT G. FERGUSON, OF LAKEWOOD, NEW JERSEY.

FLUSH-TANK VALVE.

1,087,227. Specification of Letters Patent. Patented Feb. 17, 1914.

Application filed February 9, 1912. Serial No. 676,534.

To all whom it may concern:

Be it known that I, ROBERT G. FERGUSON, a citizen of the United States, residing at Lakewood, in the county of Ocean and State of New Jersey, have invented certain new and useful Improvements in Flush-Tank Valves; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in flush tank valves.

One object of the invention is to provide a flush tank having an improved arrangement of valve and means for opening it, said valve closing automatically and noiselessly when water is discharged from the tank.

Another object is to provide a discharge valve for flush tanks which is located entirely outside of the tank and which will be simple, strong, and durable in construction, efficient and reliable in operation, and well adapted for the purpose for which it is designed.

With this and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts as will be more fully described and particularly pointed out in the appended claim.

In the accompanying drawings; Figure 1 represents a vertical section of a portion of a tank showing this improved discharge mechanism connected therewith, said mechanism being shown in side elevation; Fig. 2 is a central vertical sectional view of the valve embodying this invention and with the parts in normal position; Fig. 3 is a similar view showing the position of the parts when the valve is being opened or lifted from its seat; Fig. 4 is a horizontal sectional view on an enlarged scale taken on the line 4—4 of Fig. 2; Fig. 5 is a detailed perspective view of the lifting element.

In the embodiment illustrated a closed flush tank 1 is shown which may be of any suitable or desired construction and in the lower side of which is formed a discharge opening 2 with which is connected the upper end of the valve casing 5 through which the water from the tank is discharged.

This tank which surrounds the valve communicates with the water main without any valve between them and is normally filled with water under the same pressure as the water in the main.

This tank is connected watertight at its lower end to a valve casing 5 being preferably provided with an internal screw thread which engages an exteriorly threaded upper end of said casing 5. Above the thread on the casing 5 is a reduced exteriorly threaded extension 6 having a shoulder 7 at the base thereof. The inner face or wall of this extension 6 is inclined to form a flaring valve seat 8 for a ball valve 9. This valve 9 preferably consists of a hollow ball formed of copper or other suitable material and having a covering of rubber or similar material whereby said valve is adapted to form a watertight engagement with its seat. The lower internally threaded end of a valve cage or guide 10 is engaged with the extension 6 and the lower end of said cage rests on the shoulder 7 when the parts are assembled. This valve cage or guide 10 is shown in the form of a cylinder closed at its upper end and having a water inlet 11 near its lower end, the closed top thereof being provided with an air outlet or vent 12.

The valve casing 5 which is in the form of a tubular casting has a reduced tubular extension 13 at the end opposite the extension 6 and in alinement therewith, a shoulder 14 being formed at the base of said extension 13 and exteriorly threaded as shown at 15 for a purpose to be described. The free end of the extension 13 is closed except for a central aperture 16 for the passage of the stem of a valve actuating member to be described. The periphery of this extension 13 is provided with a plurality of water outlets 17 the purpose of which will be described hereinafter. A cup-shaped valve 18 is mounted to slide on said extension 13 and when in one position covers the discharge outlets 17 and cuts off the water from the closet, and when in its other position uncovers said outlets and permits the water to flow freely therethrough. This valve 18 has a centrally disposed internally threaded outwardly extending nipple 19 which registers with the central aperture 16 in the extension 13 for a purpose to be described.

A valve operating plunger 20 is mounted to move vertically in the casing 5 and comprises a shank or stem 21 having its free lower end threaded for engagement with the nipple 19 of the valve 18, whereby, said valve is connected with said member 20 and

is moved therewith. At the upper end of the shank or stem 21 is a head 22 having an opening 23 extending transversely therethrough for the passage of the valve actuating shaft 30 to be described. This opening 23 has one side wall 23ª curved to form a cam wall and the other side wall straight as shown at 23ᵇ to provide for the turning of the actuating shaft in one direction and to prevent its turning in the other direction. At the upper end of this head 22 is formed an annular valve seat 24 which is designed to support the ball valve 9 and by means of which said valve is raised and lowered on the raising and lowering of the member 20.

The valve casing 5 is provided in one side wall with a bearing 25 for one end of the actuating shaft 30 and at a diametrically opposite point with an internally threaded opening 26 in which is mounted a tubular outwardly projecting bearing 27 for the other end of the shaft 30, said bearing being preferably provided with suitable means for inserting it in and removing it from the opening 26, an annular member 28 being here shown for this purpose.

The shaft 30 has a crank 31 formed therein which operates in the opening 23 in the member 20 and when engaged with the upper wall of said opening raises the member 20 thereby simultaneously raising the valve seat 24 and the valve 9 thereon and closing the valve 18, thereby, permitting the water to flow from the casing 4 through the aperture 11 in the valve cage and beneath the lift valve 9, thereby, causing the latter to float upwardly in the cage, said valve gradually lowering as the water is drawn from the tank until it comes into engagement with the seat formed at the upper end of the extension 6 in which position it is held by the suction on the lower side thereof.

The crank shaft is provided with an operating handle 32 which may be turned at will to raise or lower the plunger or actuating member 20 and when said member is raised as above described, to lift the valve 9 the supplemental cup shaped valve 18 is simultaneously raised to momentarily close the openings in the extension 17 while the valve 9 is being lifted and floats to the top of its cage. As soon as the handle 32 is released it will drop downward thereby turning the crank 31 and disengaging it from the upper wall of the opening 23 in the member 20, whereby, the weight of the cup shaped valve 18 will cause it to drop down and uncover the openings in the extension 13 and thus discharge the water from the tank to the pipe leading to the closet.

A coupling 33 in the form of a sleeve of greater diameter than the extension 13 and cup valve 18 is detachably engaged with the lower end of the valve casing 5 being preferably threaded thereon. This coupling is designed to be connected with the pipe which leads to the closet.

The tank 1 is provided at a suitable point with an inlet passage 3 to which is adapted to be connected a water supply pipe not shown, whereby, the pressure of the water in the tank will be the same as that of the water main.

By arranging this valve and its operating mechanism entirely outside of the tank there will be no danger of the parts becoming rusted or otherwise affected and thus rendered inoperative and they are also rendered readily accessible for repairs when necessary.

I claim as my invention:

The combination with a flush tank having a discharge opening, of a tubular valve casing mounted in said opening and depending from the tank, said casing having a ball valve seat at its upper end and located within the tank, a valve cage over said seat, a ball valve in said cage and adapted to rest on said seat, the lower end of said casing being provided with discharge openings, a cup shaped valve slidably mounted upon the lower end of the casing and adapted to open and close the openings in the same, a plunger rod extending through the casing, the lower end of which is detachably secured to the bottom of the cup shaped valve, a plunger head on said rod having a valve seat for engagement with said ball valve, said head also having an opening extending transversely therethrough and provided with a cam wall and an opposite upright stop wall, an actuating shaft mounted in said casing and having a crank operable in the transverse opening of the head thus formed, whereby the shaft is permitted to turn in one direction only for alternately opening and closing the valves at the opposite ends of the casing.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROBERT G. FERGUSON.

Witnesses:
W. C. O'LEARY,
WM. E. NOWLAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."