April 13, 1926. 1,580,481

A. L. P. GAVIN

FLUSH VALVE

Filed Nov. 1, 1921

Fig. 1.

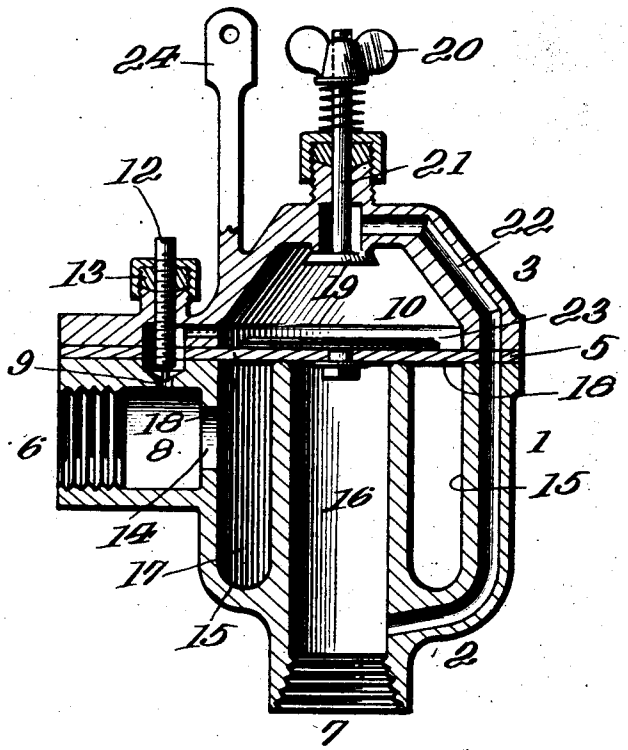
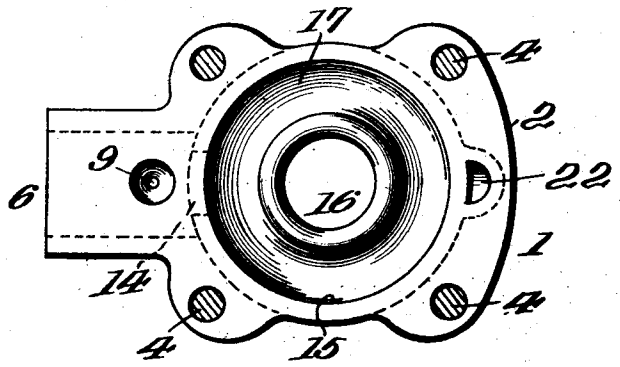


Fig. 2.



Inventor

ARTHUR L. P. GAVIN.

By Wilkinson & Mageniss,

Attorneys

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UNITED STATES PATENT OFFICE.

ARTHUR L. P. GAVIN, OF SCRANTON, PENNSYLVANIA.

FLUSH VALVE.

Application filed November 1, 1921. Serial No. 511,986.

To all whom it may concern:

Be it known that I, ARTHUR L. P. GAVIN, of Scranton, in the county of Lackawanna and State of Pennsylvania, a citizen of the United States, have invented certain new and useful Improvements in Flush Valves; and I do hereby 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.

My principal objects are to reduce the number of parts and to improve the relative dispositions and formations of the valve chamber, the diaphragm and the pressure chamber.

In the drawings Figure 1 is a vertical section of the valve, and Figure 2 a top plan view of the lower body portion.

As illustrated, the casing 1 is formed of but two parts, a lower body portion 2 containing the pressure chamber, and an upper cap member 3 constituting the valve chamber. These two parts are united as by bolts 4 and the diaphragm 5 is appropriately held between the two parts. A simple and effective arrangement is thus provided.

The body portion 2 is provided with inlet and outlet spuds 6, 7. In the spud 6 is a water receiving space 8 from which a by-pass 9 leads to the valve chamber 10. This by-pass is controlled by an adjustable screw 12 in a stuffing box 13. The port 14 leading from space 8 into the body of the valve is contracted to form a retarding element.

The body 2 is circular on its inner surfaces. Its wall 15 alines with the wall of the cap member. I have shown a cylinder 16 extending upright centrally in the body 2, its upper end being open and its lower open end in alinement with the spud 7. This cylinder is concentric with the wall 15. The intermediate space 17 constitutes the pressure chamber in communication with the water supply through the retarded port 14. The cylinder 16 constitutes the discharge pipe. Its upper end normally forms a seat for the diaphragm 5. The advantage of this feature is that the force of the water in pressure chamber 17 acts on the diaphragm near its edge that is near the points 18 where it is secured between the two complementary valve body parts, and not on its central surface which latter construction naturally subjects the diaphragm to great strain requiring various retaining expedients as disclosed by the prior art.

The cap member 3 is equipped with a release valve 19 actuated by a nut 20 on its spring held stem 21. The passage 22 controlled by this valve extends from the chamber 10 down through the walls of the cap member 3 and body 2 to the lower end of the discharge cylinder 16.

The diaphragm is appropriately reinforced by a metal plate 23 extending virtually over its effective surface and secured by a bolt and nut. The casing is equipped with a bracket 24 to render it adapted to a rod and float construction.

The large spacious chamber provided in the cap member enables me to depend upon the compression there to hold the diaphragm without the necessity for metallic supports. This leaves the diaphragm free to act responsively to the pressure. The direction of travel of the water on the pressure side is through space 8 and port 14 to chamber 17. This direction is parallel to the plane in which the diaphragm rests. In consequence the force of the flow is against cylinder 16 and not directly against the diaphragm.

The pressures in valve chamber 10 and pressure chamber 17 are equal when the valve is closed. The space 8, with retard port 14, distributes the water to chamber 17 and to 10 through by-pass 9. This occurs away from the diaphragm and is not interfered with by the direction of the pressure resulting from opening the valve. This equality of pressures when the valve is closed, together with the function of the retard port 14, compensates for sudden changes in pressure. The pressure chamber 17 is cylindrical and deep. This allows of expansion and prevents hammering. It is thus an expansion chamber as well as a pressure chamber.

The pressure in chamber 17 will recede through retard port 14 more readily and in greater volume than that in chamber 10 through port 9. Upon turning on the water pressure its flow from space 8 to 17 is retarded at 14. This causes the flow to be carried through by-pass 9 into valve chamber 10 sufficiently to offset the pressure in chamber 17, because the water pressure in chamber 10 has twice as much surface area of

diaphragm to act on as that in chamber 17. This tends to prevent opening of the valve by other than direct operation.

When valve 19 is unseated and the water in chamber 10 passes through 22 to the outlet spud 7, thus relieving the pressure in 10 and causing that in 17 to lift the diaphragm, the course of the water is not directly against the diaphragm, as in the usual types of valves. It is along the face of the diaphragm. The cylinders 15 and 16 being concentric the flow from 15 to 16 is toward the center of the valve body or into outlet 16 where gravity aids the rapid discharge. By this means the diaphragm is relieved of excessive pressure.

The construction described is adapted for use with combination adjustable automatic or rod and float controlled valves, adjustable self closing faucets, flushometers, and sink, lavatory and bath faucets.

I claim as my invention:

A valve comprising inner and outer integral cylindrical bodies having their major portions spaced from each other to form an annular cushioning chamber, the outer body being formed with a lateral inlet branch and the inner body being formed with an outlet branch, a cap entirely covering said inner and outer bodies and secured to said outer body and having a chamber, a diaphragm confined between said cap and said bodies and dividing said first and second-named chambers, said diaphragm being normally in engagement with the entire surface of the upper ends of said bodies and being provided with a central reinforcing plate in line with said inner cylindrical body, there being a by-pass between said inlet branch and the chamber of said cap, means controlling the flow of fluid through said by-pass, said outer body and said cap being provided with a by-pass between the outlet branch and the chamber in said cap, and means controlling the flow of fluid through said second-named by-pass.

In testimony whereof I have signed this specification.

ARTHUR L. P. GAVIN.