Aug. 20, 1935. F. C. BINNALL 2,012,255

FLUSH VALVE

Filed Oct. 7, 1930

Fig. 2.

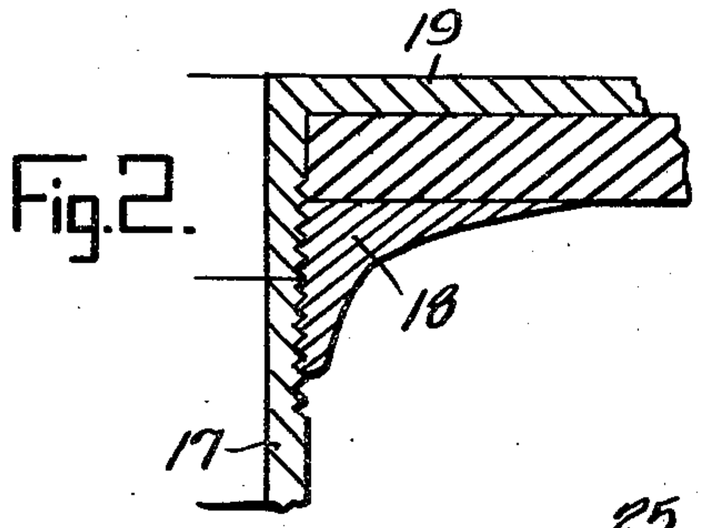


Fig. 1.

Fig. 3.

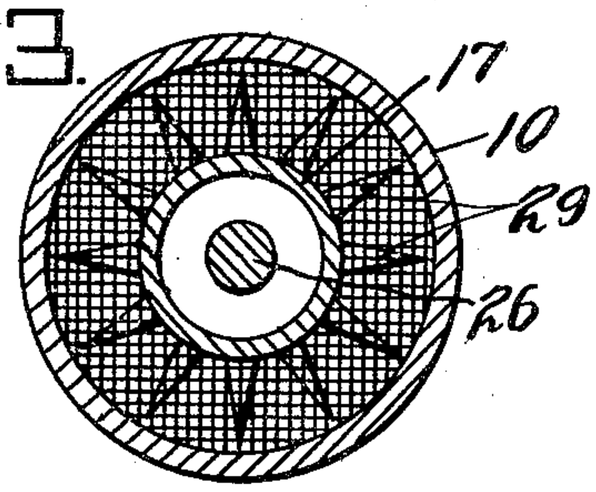


Fig. 4.

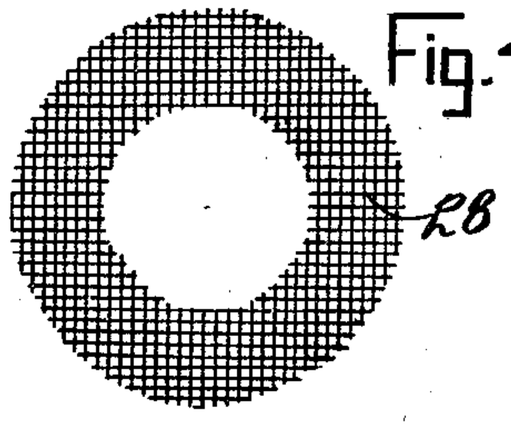
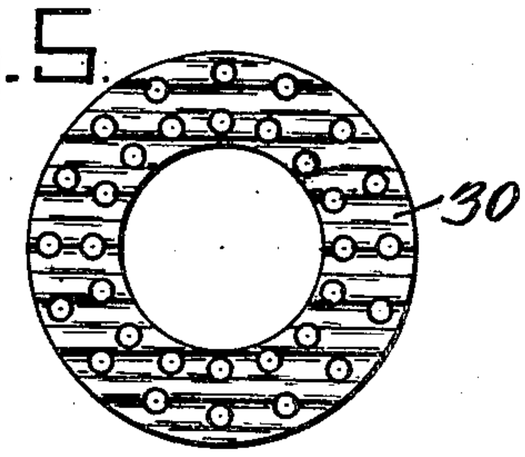


Fig. 5.



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2,012,255

FLUSH VALVE

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Application October 7, 1930, Serial No. 487,050

10 Claims. (Cl. 137—93)

This invention relates to flush valves and particularly to means for reducing the noise made by flush valves as they close.

The invention further provides improved means for mounting the valve stem so as to eliminate unnecessary noise and without the necessity of making such valve stems fit so accurately as has been heretofore necessary.

Referring to the accompanying drawing, which is made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is a vertical section of a flush valve showing my invention applied thereto.

Figure 2 is an enlarged section showing the assembly of the diaphragm forming a part of the valve,

Figure 3 is a section on line 3—3 of Figure 1,

Figure 4 is a detail view of the porous or foraminous valve-silencing means forming a part of the preferred valve construction;

Figure 5 is a detail view of a modified form of porous or foraminous valve-silencing means.

In the drawing numeral 10 indicates the body of the valve having an inlet chamber 11 and an outlet chamber 12. A cap 13 screw-threaded upon the body 10 confines a diaphragm 14 to provide a pressure chamber 15 above the diaphragm. A by-pass passage 16 is provided through the diaphragm for admitting pressure from the inlet passage to the chamber 15. A valve stem 17 depends into the outlet chamber 12. The upper end of this valve stem has a flange 18 secured thereon as by screw threads and a cap 19 is screw threaded into this flange, the cap 19 and the flange 18 being threaded down against the inner edge of the diaphragm 14. The valve stem 17 is hollow and a valve 20 seats within the portion 19 to seal the valve stem to prevent fluid from flowing from the pressure chamber 15 through the valve. The lower end of the valve stem 17 is supported in an annular series of lugs 21 which are formed on the inner side of the body 10 of the valve and which hold the stem 17 against lateral movement to prevent it from oscillating during operation, thus eliminating any sound due to such oscillation. A manually operable lever 22 is positioned in a cap 23. The inner circular portion of the handle rests against a pin 24 which pin is normally urged outwardly by means of a spring 25. Movement of the handle 22 in any direction will move the pin 24 inwardly to strike against the lower end of the stem 26 depending from the valve 20. This will lift one side of the valve 20 from its seat and release the pressure of water in chamber 15. Pressure of water in the chamber 11 therefore will lift the diaphragm 14 to permit water to flow down around the seat 27 of the valve into the outlet chamber 12. As soon as the handle 22 is released the valve 20 resumes its position on its seat and pressure builds up in the chamber 15 by means of water flowing thrcugh the restricted port 16. As soon as the pressure in the chamber 15 has become great enough the diaphragm 14 will be pressed to its seat 27. As the diaphragm nears its seat 27 restricting the flow of water from high pressure region 11 to low pressure region 12 it causes its velocity to increase as it passes through the restriction. This increased velocity tends to produce a hissing sound which is highly objectionable in use; in fact it is so objectionable that flush valves of this type are seldom suitable for use in private homes. One object of this invention is to provide means for reducing this hissing sound. This is done by providing means for reducing the velocity of the water as the diaphragm 14 approaches the valve seat 27. This is done by mounting upon the under side of the diaphragm 14, a porous or foraminous member consisting of a plurality of wire gauze or screen washers 28 around the valve stem 17, which foraminous or porous member, when the diaphragm flexes downwardly, approaching the valve seat 27, extends well into the outlet port defined by said valve seat and materially reduces or dissipates the tendency of the fluid to flow between the diaphragm 14 and the seat 27 at high, sound generating velocity, thus eliminating the final sounds common to valves of this type and constituting the principal objection thereto. The screens 28 rest upon an annular series of pointed fins 29. Instead of the screens as shown at 28 I may provide a plurality of perforated corrugated plates 30 as shown in Figure 5.

It will be obvious to those skilled in the art that various changes may be made in my device without departing from the spirit of the invention and therefore I do not limit myself to what is shown in the drawing and described in the specification, but only as indicated in the appended claims.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:

1. A flush valve comprising a casing having inlet and discharge openings therein, a valve seat, a diaphragm movable to rest upon said seat to cut off the flow of water through the valve, and means supported by and movable with said diaphragm for reducing the velocity of the water

flowing through the valve as the valve nears its seat in closing, said means comprising a plurality of screens positioned in the path of the water flowing through the valve whereby the velocity of the water is decreased.

2. A flush valve comprising a casing having inlet and discharge openings therein, a valve seat, a diaphragm movable to rest upon said seat to cut off the flow of water through the valve, and means supported by said diaphragm for reducing the velocity of the water flowing through the valve as the valve nears its seat in closing, said means comprising a plurality of perforated corrugated disks positioned in the path of the water flowing through the valve to reduce the velocity of the water.

3. A flush valve comprising a valve casing having fluid inlet and outlet ports therein, a diaphragm, a valve seat upon which said diaphragm rests to close the inlet from the outlet ports, a stem on said diaphragm, means on said stem for reducing the velocity of the water flowing through said valve as the diaphragm approaches its seat, said last named means comprising a plurality of screens mounted in superposed relation on said stem and positioned in the path of the water flowing through said valve to reduce the velocity of the water whereby the sound ordinarily caused by high velocity of the water flowing through the valve is eliminated.

4. A flush valve comprising a valve casing having fluid inlet and outlet ports therein, a diaphragm, a valve seat upon which said diaphragm rests to close the inlet from the outlet ports, a stem on said diaphragm, means on said stem for reducing the velocity of the water flowing through said valve as the diaphragm approaches its seat, said means comprising a plurality of perforated corrugated disks mounted on said valve stem in the path of the water flowing through the valve to reduce the velocity of the water to eliminate the sound ordinarily caused by the high velocity of the water issuing through the valve.

5. A flush valve comprising a casing having inlet and outlet ports, a valve seat secured in said casing, a diaphragm valve secured in said casing said valve having a valve stem depending through the valve seat, a spider mounted in said casing adapted to guide said valve stem and support it against lateral movement, and means on said valve stem adapted to reduce the velocity of water flowing through the valve as the valve approaches the valve seat, said reducing means comprising a plurality of screen disks mounted in superposed relation upon said stem within the path of the water flowing through the valve.

6. A silent fluid control valve comprising a casing having a fluid passageway therethrough, a valve seat in said casing passageway, a disk valve cooperative with said valve seat to close said passageway, means for moving said valve to control fluid flow through said passageway, and a highly porous flow-restricting member carried by said valve and associated with the walls of said passageway, said flow-restricting member having such porosity as to permit but materially reduce fluid flow between said seat and said valve as said valve approaches said seat.

7. A silent fluid control valve comprising a casing having a fluid passageway therethrough, a valve seat in said casing passageway, a disk valve cooperative with said valve seat to close said passageway, means for moving said valve to control fluid flow through said passageway, and a flow-restricting member composed of wire mesh carried by said valve and associated with the walls of said passageway, said flow-restricting member having such porosity as to permit but materially reduce fluid flow between said seat and said valve as said valve approaches said seat.

8. A silent fluid control valve comprising a casing having a passageway therethrough, a valve seat in said casing passageway, a disk valve cooperative with said valve seat to close said passageway, means for moving said valve to control fluid flow through said passageway, and a flow-restricting member comprising a plurality of perforated corrugated disks carried by said valve and associated with the walls of said passageway, said flow-restricting member having such porosity as to permit but materially reduce fluid flow between said seat and said valve as said valve approaches its seat.

9. In a valve, a casing having an inlet port, an outlet port and a valve seat intermediate said ports, a valve member movable with respect to said seat to control the flow of fluid from said inlet to said outlet port, and a highly porous flow-restricting member movable into and out of close, flow-restricting relation with the casing wall defining said outlet port, said flow-restricting member being so coupled to and movable with said valve member as to be in least effective flow-restricting relation with said outlet port when said valve is wide open, and to be in close, flow-restricting relation with said wall when said valve is nearly but not completely seated.

10. A silent valve for liquid supply lines, comprising: a valve casing having a liquid passageway therethrough, which casing is provided with an internal shoulder constituting an annular valve seat, a disk valve co-operative with said seat, and means for precluding the emission of sound due to liquid flow through the space between said seat and valve when unseated, said means comprising a foraminous member concentrically attached to the seating side of said disk valve within the confines of its annular seating face and snugly but freely receivable within the internal shoulder of said valve casing when said valve is in partially seated position.

FREDERICK C. BINNALL.