

1,396,501.

Fig. 1.

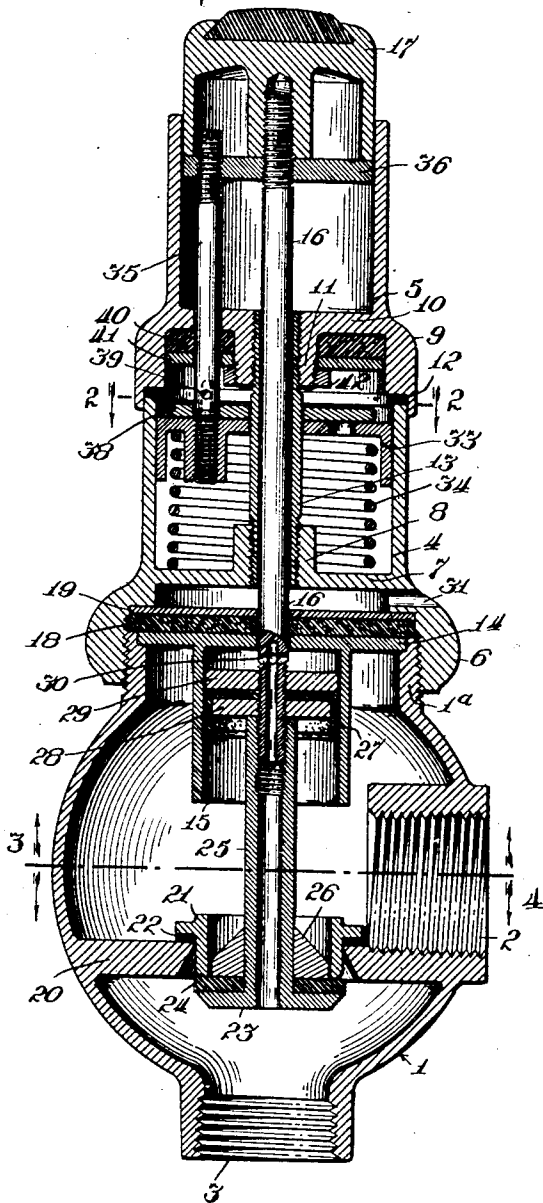


Fig. 2

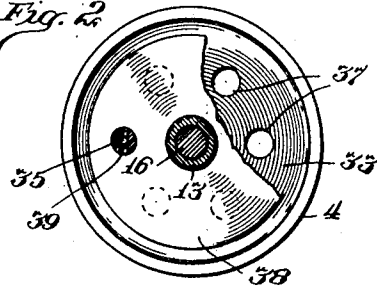


Fig. 5.

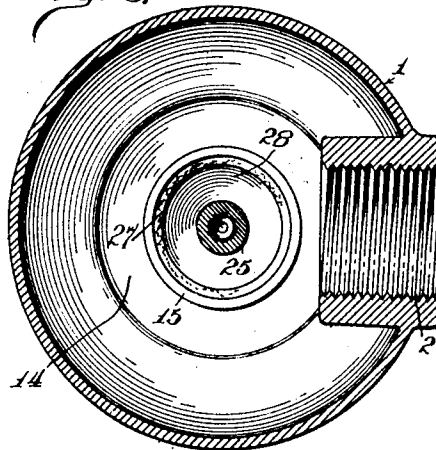
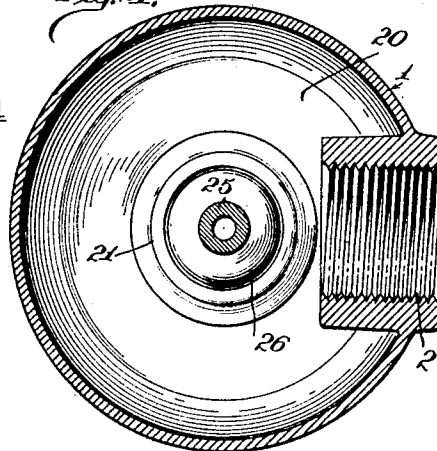


Fig. 4.



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UNITED STATES PATENT OFFICE.

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FLUSHING-VALVE.

1,396,501.

Specification of Letters Patent.

Patented Nov. 8, 1921.

Application filed May 23, 1919. Serial No. 299,123.

To all whom it may concern:

Be it known that I, ROBERT A. BROOKS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Flushing-Valves, of which the following is a specification.

My invention relates to slow-closing oil regulated flushing valves such as are used to cause a regulated flush of water through the bowl of a water closet, and the general object of the invention is to provide an accurate, simple and cheaply constructed valve of this class which shall operate efficiently and with certainty and exhibit various advantages in construction and operation as compared with prior similar devices known to me. I have so constructed and designed my improved valve that the parts of the water-flushing valve and of the oil regulating valve operate in direct vertical alignment, and certain features of my invention relate to this structural arrangement of the parts; another relates to a construction of the oil chamber and piston and associated parts which is designed to prevent any leakage of oil by a simple and effective structural arrangement of the parts; another relates to a novel arrangement of valve members for governing the flush of water through the valve; and other features relate to details of construction of the various parts intended to produce an efficient and desirable device. In the appended claims I have pointed out the essential features of my invention, it being understood, however, that my invention is capable of modification and variation, and that except as required by the specific subject matter of particular claims, my invention is not limited to the specific construction and arrangement shown, but may be varied in the form and proportion of parts, or by the substitution of equivalents, or by reversal of the relationship of certain parts, without departing from the spirit of my invention or the scope of the claims.

Figure 1 of the drawing is a central vertical section of my improved flushing valve; Fig. 2 is a horizontal section of the same on the line 2—2 of Fig. 1; and Figs. 3 and 4 are sections on the line 3—4 of Fig. 1, looking upwardly and downwardly respectively, and with the parts above the section lines shown in elevation in Fig. 3, and the parts below such line similarly shown in Fig. 4.

The same reference characters indicate

the same parts in all the figures of the drawing.

The casing of my novel valve comprises a valve body 1 formed with an inlet connection 2 and an outlet connection 3, a lower oil casing member 4, and an upper oil casing member 5. The member 4 is formed with a base portion 6 which makes screw-threaded connection with a threaded boss 1^a at the top of the valve body 1, and a partition 7 formed with a rising central screw-threaded hub 8 which constitutes the bottom of the oil chamber, and a cylindrical upper portion. The upper member 5 is of somewhat similar general shape, being formed with a base portion 9, a partition 10 formed with a depending screw-threaded hub 11, and an upper cylindrical portion. The members 4 and 5 are clamped together against an interposed oil-proof washer 12 by means of a hollow bolt or tube 13, threaded at its opposite ends to engage the threads of the hubs 8 and 11, and which forms a tubular partition or wall extending vertically from top to bottom of the oil chamber continuous with the partition walls 7 and 10.

The upper wall of the water chamber of the valve body 1 consists of a circular plate 14 seated in an internal annular shoulder in the boss 1^a of the valve body and formed with a central depending tubular portion 15 which forms a cylinder for the reception of a piston on the lower end of the operating stem 16 of the device. This operating stem is equipped with a push-button or operating knob 17 at its upper end and passes slidingly through the tube 13 before mentioned, and also through the plate 14, a liquid-tight joint around the stem being provided by a water-proof packing washer 18 interposed between the upper face of said plate and a backing plate 19, all tightly clamped together by means of the threaded connection between the valve body and the lower oil casing member 4.

The valve body 1 of the device is formed with a horizontal partition 20 between the inlet and outlet connections, which partition is provided with a central flared valve opening the inner side or upper face of the partition adjacent the opening forming a seat upon which is arranged to seat the peripheral flange 21^a of an annular valve member 21, an annular washer 22 of leather or other suitable material being provided to make water-tight contact with the seat upon the

partition. The lower edge of the central tubular portion of the member 21 which depends into the opening in the partition, forms a seat upon the outer side of such member for the main valve 23, which latter is formed with a disk-shaped head equipped with a washer 24 of leather or other suitable material and with a hollow stem 25 which makes screw-threaded engagement with the lower end of the operating stem or rod 16 and forms a continuation thereof. Above the washer 24 is arranged a block 26, which has a throttling action in the closing of the valve, as hereinafter explained. The maximum diameter of the main valve and parts carried thereby is less than the opening through the partition 20, enabling the entire valve mechanism to be removed from the valve body as a unit.

Within the cylinder 15 is arranged a piston, the inner or pressure face of which consists of a cup-leather washer or valve 27 clamped between a filling washer 28 and a backing washer 29, both screw-threaded on the operating stem 16. A vent hole 30 is formed in the stem 16 immediately above the washer 29 connecting an axial bore in the lower end of such stem. A drain hole 31 is also preferably formed in the lower oil casing member 4 immediately above the backing plate 19 for the escape of any water which may leak past the packing washer 18.

Within the oil cylinder 4 is arranged a centrally orificed piston 33 which slidably engages the connecting tube 13 and is pressed upwardly by a helical spring 34. The top of this piston is adjustably connected with the operating knob 17 by means of a bolt 35 formed with screw threads at its opposite ends, the lower end of such bolt being seated in an internally threaded boss formed on the piston and the slotted upper end engaging a threaded seat formed eccentrically in a connecting plate or disk 36 which is centrally formed with an internally threaded orifice engaging the threaded upper end of the operating stem and forming the base of the operating knob. The head of the piston is formed with orifices 37, communication through which is controlled by a check valve 38 slidably engaging the stem 16 and bolt 35. The lower end of the bolt is bored to form a passage communicating with the oil chamber beneath the piston and terminating in a by-pass opening 39 which opens into the space above the check valve. By adjustment of the bolt the size of the opening exposed above such check valve may be regulated as desired. The joint in the top of the cylinder space above the piston and around the bolt 35 is packed by means of an oil-proof packing washer 40, backed by a washer 41 and clamped by a nut 42 against the bottom of the partition 10.

The effective pressure area of the cup-

leather valve 27 tending to hold the main valve seated is greater than that exerted through the opening in the annular valve member 21 upon the main valve 23 and tending to open it outwardly, while the pressure on such annular member tending to hold it seated on the partition and against the stress of the cup-leather valve exerted on the main valve exceeds the difference in pressure between the cup-leather valve and main valve. As a result of this construction and the differential action on the valves, the water pressure in the valve body will normally maintain the annular valve in closed position, and also the main valve, but preferably with the opposed pressures somewhat nearly balanced. The spring 34 in the normal closed position of the valve is preferably near the limit of its expansion, and its lifting effect, whatever it may be, is overcome by a preponderance of downward pressure on the annular valve 21.

Because of the differential pressure on the valves just described the main valve may be very easily opened by slight pressure on the push button 17, air and a small amount of water passing from below the main valve to the space above the cup-leather valve and the oil in the cylinder 4 passing through the head of the piston 33 past the check valve 38 into the space above the piston. When the push button is released, the power stored up in the spring 34 and the pressure on the cup leather valve preponderating over that on the main valve will cause the latter to rise as fast as permitted by the escape of oil through the by-pass port 39 from the space above to the chamber below the piston 33, the block 26 acting to throttle and diminish the flow as it enters the opening in the annular valve 21, and thus produce an "after fill" of the closet bowl.

I claim:

1. In a flushing valve having a valve body provided with an inlet for water under pressure and an outlet and a partition between said inlet and outlet formed with a valve seat on its inner side, an annular valve adapted to cooperate with said valve seat and having on its outer side a valve seat, a manually-operable main valve opening outwardly and cooperating with said last mentioned seat, a cylinder, and a piston in said cylinder exposed to water pressure and connected to said main valve and having a greater pressure area than said main valve, the effective pressure area of said annular valve being greater than the difference between the pressure areas of said main valve and said piston.

2. In a flushing valve having a valve body provided with an inlet for water under pressure and an outlet and a partition between said inlet and outlet formed with a valve seat on its inner side, an annular valve adapted-

ed to cooperate with said valve seat and having on its outer side a valve seat, a manually-operable valve, an outwardly-opening main valve equipped with an operating stem and arranged to cooperate with said last mentioned valve seat, a cylinder, a piston in said cylinder, secured to said main valve stem and having a face of greater area than said main valve exposed to water pressure, the effective pressure area of said annular valve being greater than the difference between the pressure areas of said main valve and said piston.

3. In a flushing valve having a valve body provided with an inlet for water under pressure and an outlet and a partition between said inlet and outlet formed with a valve seat on its inner side, an annular valve adapted to cooperate with said valve seat and having on its outer side a valve seat, a manually-operable valve, an outwardly-opening main valve equipped with an operating stem and arranged to cooperate with said last mentioned valve seat, a cylinder, a piston in said cylinder secured to said main valve stem and having an inner face of greater area than said main valve exposed to water pressure, said operating stem being hollow at its lower end and formed with a relief opening adjacent the outer face of the piston, and the effective pressure area of said annular valve being greater than the difference between the pressure areas of said main valve and said piston.

4. A flushing valve according to claim 2 in which said annular valve member consists of a peripheral portion seating on the opening in the partition and a tubular depending portion arranged to form the seat for the main valve.

5. A flushing valve according to claim 2 in which the maximum diameter of the main valve member is smaller than the opening in the partition, whereby said main valve may be removed through such opening.

6. A flushing valve according to claim 2 in which said cylinder is formed as part of a removable plate and such plate constitutes a portion of the wall of the valve chamber of said valve body.

7. A flushing valve according to claim 3 in which said main valve is formed with a hollow stem threaded upon and forming a continuation of the hollow portion of the operating stem and said piston is a cup-leather valve including a filling washer and a backing washer threaded upon such operating stem.

8. In a flushing valve having a valve body provided with an inlet for water under pressure and an outlet and a partition between said inlet and outlet formed with a valve seat on its inner side, an annular valve adapted to cooperate with said valve seat

and having on its outer side a valve seat, a manually-operable main valve opening outwardly and cooperating with said last mentioned seat, a cylinder, a piston in said cylinder exposed to water pressure and connected to said main valve and having a greater pressure area than said main valve, the effective pressure area of said annular valve being greater than the difference between the pressure areas of said main valve and said piston, and spring means connected to said main valve and tensioned by movement in a direction to open it.

9. In a flushing valve having a valve body provided with an inlet for water under pressure and an outlet and a partition between said inlet and outlet formed with a valve seat on its inner side, an annular valve adapted to cooperate with said valve seat and having on its outer side a valve seat, a manually-operable main valve opening outwardly and cooperating with said last mentioned seat, a cylinder, a piston in said cylinder exposed to water pressure and connected to said main valve and having a greater pressure area than said main valve, the effective pressure area of said annular valve being greater than the difference between the pressure areas of said main valve and said piston, and retarding means connected to said main valve including a cylinder, a body of liquid therein, a piston, said piston or cylinder being formed with a by-pass, a check valve, and a spring, said spring being tensioned by movement of said main valve in a direction to open it.

10. In a valve of the character described and having a valve body inclosing flushing mechanism including a valve connected to a vertical operating stem, retarding means including a lower casing member forming a cylinder arranged to receive a body of oil and having a bottom partition, an orificed piston in said cylinder, and a tube connected to said partition surrounding said stem and extending through said piston.

11. In a valve of the character described and having a valve body inclosing flushing mechanism including a valve connected to a vertical operating stem, retarding means including a lower casing member forming a cylinder arranged to receive a body of oil and having a bottom partition, an orificed piston in said cylinder, an upper casing member, and a tube connected to said partition surrounding said stem and extending through said piston and cooperating with said upper casing member to clamp it to said lower casing member.

12. In a valve of the character described and having a valve body inclosing flushing mechanism including a valve connected to a vertical operating stem, retarding means including a lower casing member forming a cylinder arranged to receive a body of oil and having a bottom partition, an orificed

- piston in said cylinder, an upper casing member, a tube connected to said partition surrounding said stem and extending through said piston and cooperating with said upper casing member to clamp it to said lower casing member, an operating knob secured to said stem and slidingly mounted in said upper casing member, and a bolt connecting said knob and said piston.
- 10 13. In a valve of the character described and having a valve body inclosing flushing mechanism including a valve connected to a vertical operating stem, retarding means including a lower casing member forming a cylinder arranged to receive a body of oil and having a bottom partition, an orificed piston in said cylinder, an upper casing member, a tube connected to said partition surrounding said stem and extending through said piston and cooperating with said upper casing member to clamp it to said lower casing member, an operating knob secured to said stem and slidingly mounted in said upper casing member, and a bolt having screw-threaded engagement at its opposite ends with said knob and said piston, said bolt being hollow at its lower end and formed with a by-pass between opposite sides of the piston and said by-pass being adjustable by turning the bolt.
- 15 14. A structure according to claim 11 in which said upper and lower casing members are cylindrical in form and said operating stem and hollow tube are arranged in axial alinement with such members.
- 20 25 30

ROBERT A. BROOKS.