No. 871,859. PATENTED NOV. 26, 1907.

R. A. BROOKS.

FLUSHING VALVE.

APPLICATION FILED OCT. 26, 1905.

2 SHEETS—SHEET 1.

FIG. 1

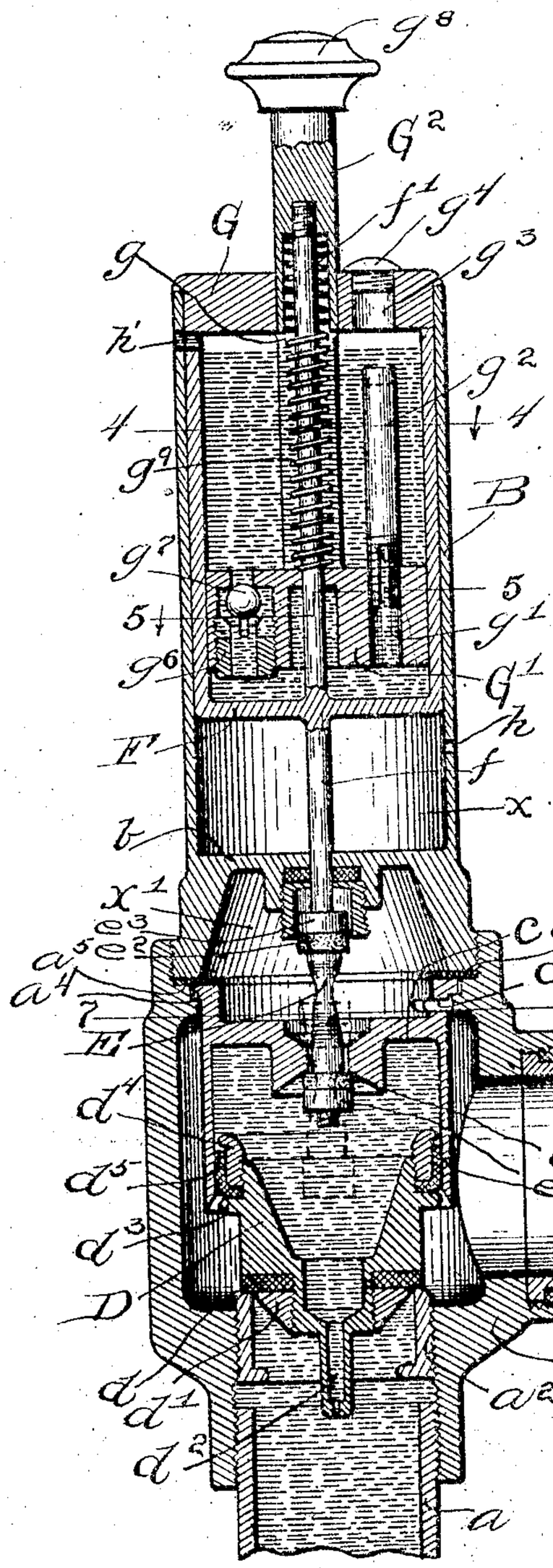


FIG. 3

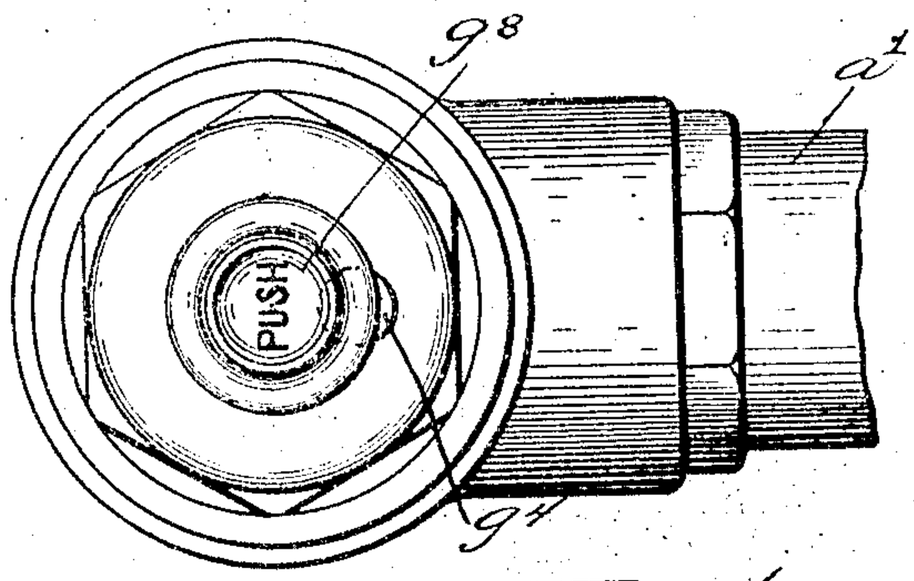


FIG. 4

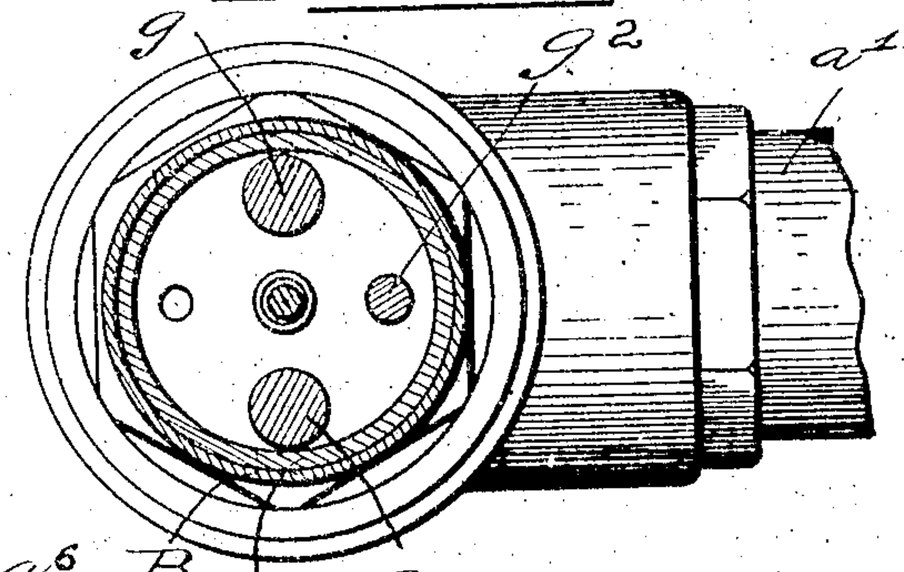
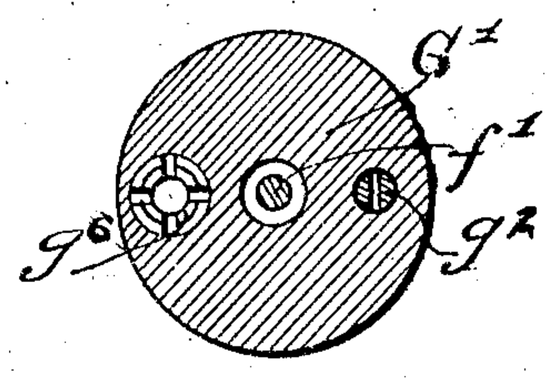


FIG. 5



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2

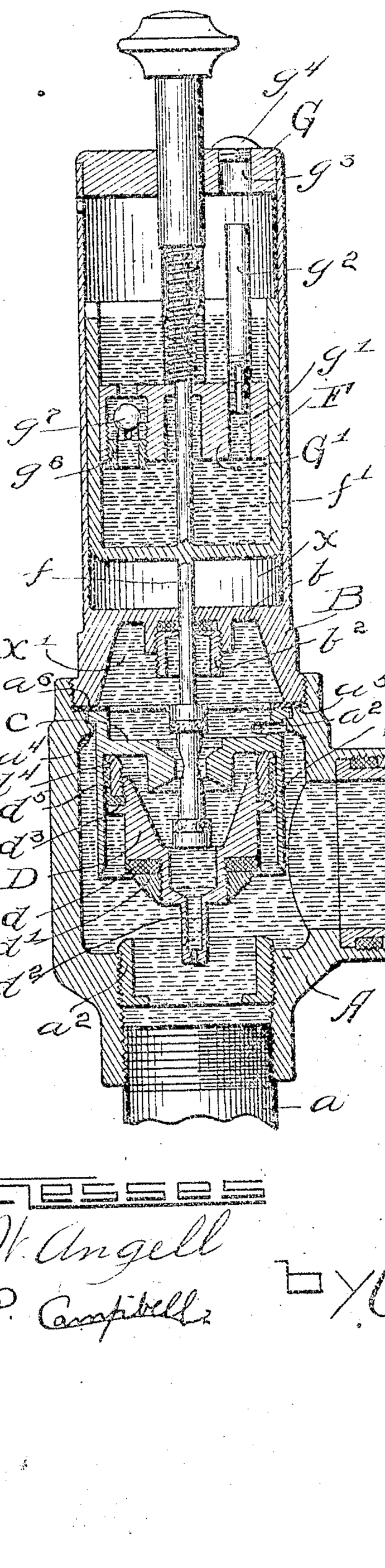


Fig. 6

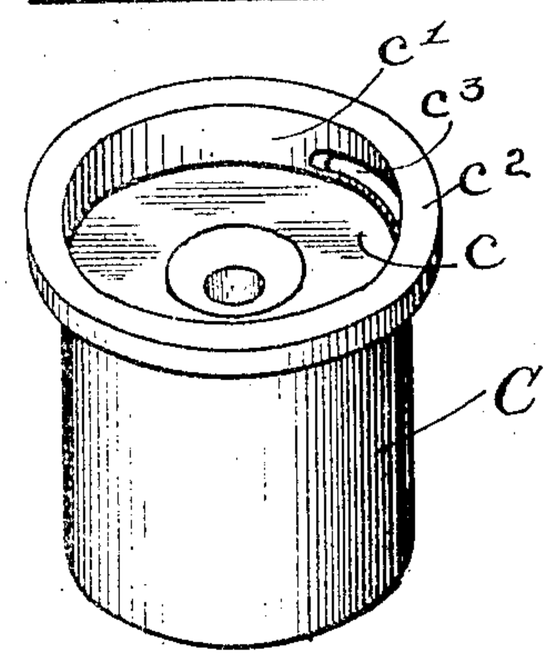


Fig. 7

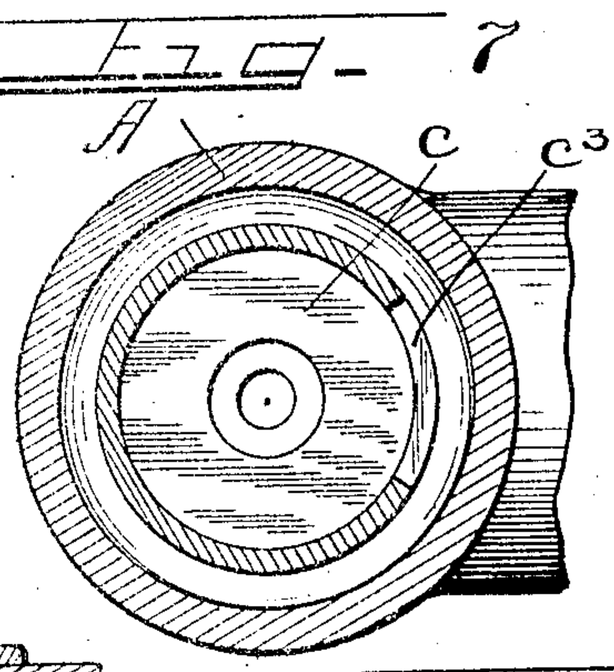
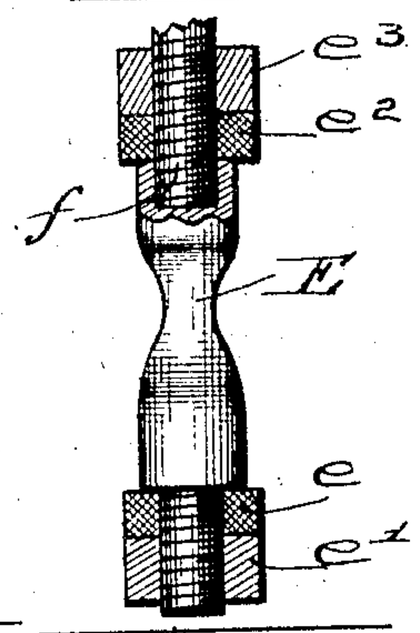


Fig. 8



Witnesses

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UNITED STATES PATENT OFFICE.

ROBERT A. BROOKS, OF CHICAGO, ILLINOIS.

FLUSHING-VALVE.

No. 871,859. Specification of Letters Patent. Patented Nov. 26, 1907.

Application filed October 26, 1905. Serial No. 284,543.

To all whom it may concern:

Be it known that I, ROBERT A. BROOKS, a citizen of the United States, and a resident of the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Flushing-Valves; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to flushing valves and more particularly a manually opening but self closing flushing valve, adapted for use in flushing water closets and other fixtures. Flushing valves for this purpose have usually closed with the pressure and have heretofore been regulated or timed in closing by utilizing a part of the flushing liquid therefor. This has proven unsatisfactory inasmuch as the flushing liquid often contains sediment which soon closes the passage preventing the proper timing of the flush. Furthermore valves closing with the pressure frequently water hammer soon wearing out the seat and closure and necessitating repairs.

The object of this invention is to afford a flushing valve closing against the pressure and in which the timing of the flush is regulated by other means than the fluid delivered through the flushing valve. Furthermore to afford means operated by but against the pressure for closing the flush valve.

It is also an object of the invention to afford fluid regulation whereby the construction is much simplified and the controlling mechanism so constructed as to prevent the escape or loss of regulating fluid.

It is a further object of the invention to afford a construction adapted to be quickly assembled and one though unlikely to get out of repair yet capable of quick repair should it ever be necessary.

It is a further object of the invention to provide a construction whereby if the actuating mechanism is held down the flush is prevented until released.

The invention consists in the matters hereinafter described and more fully pointed out and defined in the appended claims.

In the drawings: Figure 1 is a vertical central section of a device embodying my invention showing the valve closed. Fig. 2 is a similar view showing the valve fully open. Fig. 3 is a top plan view of the same. Fig. 4 is a section taken on line 4—4 of Fig. 1. Fig. 5 is a section taken on line 5—5 of Fig. 1. Fig. 6 is a perspective view of the inner valve casing showing the same removed from the water chamber. Fig. 7 is a section taken on line 7—7 of Fig. 1. Fig. 8 is an enlarged fragmentary detail partly in section of the closures on the lower end of the valve stem.

As shown in said drawings: A indicates the casing forming the water chamber and into the lower end of which opens the inlet pipe a. The flushing or outlet pipe a' opens from the side thereof. Said casing is cored to afford a relatively large interior water chamber open and internally threaded at its upper end and provided below the thread with a peripheral rib or flange a^4 above which is a flat peripheral seat a^5 adapted to receive a packing washer a^6. In the lower end of the water chamber is a removable valve seat a^2, comprising an externally threaded sleeve, threaded into the inner end of the inlet orifice and which is shaped at the upper end for engagement with a complemental closure. Engaged on said inwardly directed rib a^4 in the water chamber is an inner valve casing or sleeve C, provided slightly below its upper end with a closed head c and at the said upper end of which is provided an outwardly directed peripheral flange c^2 which engages upon the rib a^4 which affords a support therefor. As shown also the upper wall c' of said sleeve is provided with a large port c^3 opening to the water chamber.

Within the sleeve or inner valve casing C is the valve closure for the seat a^2 at the inner end of the inlet pipe. Said valve closure comprises as shown a body indicated by D open at its upper end and slidable in said sleeve and at its lower end reduced in size and threaded to receive the packing d, to engage the valve seat, and the jam nut d' whereby the packing is held in place. Below said central body of the closure is provided a tubular stem d^2, which extends axially below the valve seat a^2 and into the inlet orifice and permits the flow of water therethrough into the inner valve casing above the closure. A peripheral flange d^3 is provided on the body D, of the closure above which the same is threaded to receive a cylindric nut d^4, whereby hydraulic packing d^5 is engaged against the flange d^3 and be-

tween which and the side of the sleeve, said packing extends upwardly affording a fluid tight joint from above but permitting said closure to slide upwardly or downwardly in the sleeve in closing and opening the valve.

The partition or head *c* in said inner valve casing is provided with a central axial bore, or aperture and as shown is of increased thickness thereat adapting the head to be shaped at each end of the aperture, above and below the partition *c* to afford a valve seat thereby adapting said aperture or passage to be closed either from above or from below as the valve is operated.

The casing B is threaded at its lower end into the top of the lower casing A, and is provided with a transverse partition *b* dividing the same into an upper chamber *x* and a lower chamber *x'*. Slidable vertically in the chamber *x* is a cup F adapted to contain a liquid conveniently glycerin or any liquid not frozen readily. Secured to the bottom of the cup is a stem *f* which extends through a suitable stuffing box b^2 in the partition *b* and has threaded engagement at its lower end with a double valve closure for the valve in the partition *c* and comprises a connecting stem E extending through said aperture in the partition *c* and approximately its lower half is cylindric and but slightly smaller in diameter than the aperture in said partition and of small size at its middle part and to near its upper end. Said connecting stem is screw threaded at its lower end to receive the packing washer *e* and the nut *e'* thereon which holds the washer in place and whereby the inner seat in said partition is closed when the cup is elevated. Secured on the upper end of said connecting stem E, is a packing washer e^2 and nut e^3 positioned to close the upper seat in the partition *c* when the cup is at its lowest position. A stem *f'* in axial alinement with the stem *f* projects upwardly from the bottom of the cup, and is of a length as shown to extend normally above the casing B, and through a flanged cover G which closes the upper end of the casing when secured in place.

Rigidly connected with said cover by means of the integral arm, or rod *g*, one in each side of the cup, is a piston G' through which the stem *f'* passes and through which is provided a vertical passage way *g'* in which is threaded a stud pin g^2, longitudinally slotted at its lower end to vary the opening from the passage. Said stud pin is slotted at its upper end to afford engagement with a screw driver or other suitable tool inserted through an aperture g^3 in alinement therewith in the cover G, normally closed by a plug g^4. Within said piston and opening downwardly therethrough is a valve as shown comprising a chamber in the piston into which a relatively small aperture opens centrally through the top, and in the bottom of which is threaded a sleeve g^6 slotted at its upper end and shaped to afford a seat for a ball g^7 which when resting on said sleeve permits the contents of the cup to flow downwardly through the piston but prevents upward flow therethrough by closing the upwardly opening passage.

Threaded on the stem *f'* and extending through the top of the cap G, is a push pin G^2 provided with an enlarged head g^8 for manual engagement. As shown, a strong spring g^9 engages at one end on the piston and at the other engages beneath said push pin G^2 which as shown is recessed at its lower end to receive the upper end of the same and acts to hold the cup F, normally elevated as shown in Fig. 1 with the passage through the partition *c* of the inner valve casing closed from below.

The operation is as follows: The cup F is filled with oil or any suitable fluid preferably one that will not readily freeze, and the flushing valve being connected with the supply pipe *a* and the flush or discharge pipe *a'*, the water or other fluid to be controlled flows inwardly through the aperture in the closure filling the chamber formed in the inner valve casing C and closure D, as shown in Fig. 1. If the push pin be forced downwardly against the pressure of the spring the valve in the inner side of the partition *c* is opened permitting the water from said inner chamber to flow therethrough and the pressure being reduced above the closure D, the direct upward pressure from the inlet pipe raises the closure D forcing the same into the sleeve or inner valve casing C and starting the flush. The downward movement of the cup causes the regulating fluid to flow through the piston, the ball valve in the piston facilitating the flow. When the push pin is released the spring forces the cup upwardly, this forces the fluid upwardly through the piston, but as the ball valve immediately closes the fluid must pass through the restricted passage in the piston which as before described is controlled by the stud pin g^2. This retards the upward flow of course permitting the cup to rise at a rate dependent on the delivery through the piston. The flush will continue until the cup rises sufficiently to close the valve on the innerside of the head *c*. As the cup rises the vent valve in the upper valve casing is opened and inasmuch as the smaller part of the connecting stem is then in the vent passage or aperture in the partition *c* the valve closure D rises into the casing quickly and the flush will continue with full force until the larger part of the connecting stem enters said aperture. This retards further flow through the vent and the closure D begins to descend soon decreasing the flow sufficiently to break the siphon in the closet flushed but permitting enough water to pass to afford the after fill.

The flow for the after fill will continue until the closure is forced slowly and gently down upon the casing. A portion of the water from the inlet pipe now is forced inwardly through the small aperture d^2 at the bottom thereof, into the inner water chamber, quickly forcing the closure downwardly into its seat and against inlet pressure. Should the cup be held down the vent valve in the partition is closed from above preventing flushing, except as the cup rises or is intermediate its extreme positions.

To prevent resistance through air pressure an aperture h is provided in the casing B below the normal position of the cup to permit the escape of air therethrough when the cup is forced downwardly, in a like manner registering apertures h' are provided near the top of said casing and in the top of the cup to permit the escape of air from above the same and to permit a tool to be inserted to hold the cup from rotation when it is desired to unthread the push pin, in separating the parts or assembling the same.

The regulation is secured by adjusting the plug or push pin g^2 outwardly or inwardly in the piston thus increasing or restricting the passage therethrough as described. It being obvious that increasing the delivery through said passage decreases the flushing period while decreasing the rate of delivery therethrough extends the flushing period.

While I have described my invention as embodied with a non-movable piston and a movable cup either may be movable relatively to the other. I therefore do not purpose limiting this application otherwise than necessitated by the prior art as many details of construction may be varied without departing from the principles of my invention.

I claim as my invention:

1. In a flushing valve of the class described the combination with a casing having a water chamber therein, of an inlet and an outlet pipe connected in said casing, a valve slidably engaged in said chamber, means admitting water pressure directly on the top of said valve and adapted to seat it automatically to close the inlet pipe, and means operated by a fluid other than that delivered through said valve adapted to control the pressure on the valve.

2. In a device of the class described the combination with a chamber affording a water chamber of an inlet and an outlet pipe opening therethrough, a valve seat at the inner end of the inlet pipe, a valve closure seating automatically to close said inlet pipe and fluid operated means physically disconnected from the valve closure and acting to time the closing of the same.

3. In a device of the class described the combination with an outlet and an inlet pipe of means acting automatically to close the inlet pipe and embracing a valve closure having a downwardly opening chamber therein and opening to the inlet pipe, connected valves controlling an aperture in the top of said chamber and fluid controlled means operated independently of the flushing fluid for actuating said valves in said chamber.

4. In a device of the class described the combination with a casing having an inlet pipe opening in its bottom, an outlet opening from the casing, a removable seat in the inlet pipe, a valve closure therefor comprising a bottom member having a restricted passage opening into the inlet pipe, a valve controlled passage opening above the closure and fluid controlled means operated independently of the flushing fluid for opening and closing the valve in said passage.

5. In a device of the class described a water casing, a chambered valve closure fitted in the casing and controlling the inlet opening, a downward extension on said closure projecting into the inlet pipe, a passage opening from the top of the closure, valve seats at each extremity of the passage and valves rigidly connected, adapted to seat thereon.

6. The combination with a casing of a water chamber therein, a fluid containing cup movable above the water chamber, a valved piston extending into the fluid cup, a stem connected rigidly with the cup and extending into the water chamber, actuating means for the cup, a hollow closure for the inlet passage to said chamber and provided with a bore opening into said inlet passage and a valve carried on said stem and controlling a passage above the top of the closure and acting to regulate the pressure.

7. In a device of the class described the combination with a casing affording a water chamber of an inlet and an outlet pipe opening thereinto and therefrom, a sleeve supported in said water chamber axially above the inlet pipe, a partition dividing the same transversely, a passage opening axially through said partition and affording a valve seat on each side thereof, a hollow valve closure slidable in the sleeve and adapted to close the inlet passage, a restricted passage opening therefrom into the inlet passage and actuating means comprising a stem extending through the passage in said partition, a valve closure thereon on each side of the partition adapted to seat when said stem is at its inwardly and its outwardly limits of movement.

8. A valve comprising a casing having an inlet opening in its bottom and having an outlet of a hollow closure for the inlet pipe and opening thereinto and having a passage opening thereinto from the casing, a stem extending through said passage and a plurality of valve closures thereon and closing said passage at either limit of movement longitudinally.

9. In a device of the class described, a cas-

ing affording a water chamber, an inlet and an outlet pipe opening thereinto and therefrom, a valve seat at the inlet passage, a closure therefor comprising a downwardly opening sleeve supported axially above the inlet opening and having a passage in the upper end thereof, a valve seat at each extremity of said passage, a hollow closure slidably engaged in the sleeve and open in its inner end and affording a restricted passage through the outer end opening into the inlet pipe, a stem projecting through the passage in said sleeve, a plurality of valve closures thereon one adapted to seat on each seat at the extremity of said passage and controlling the passage in said sleeve and acting to relieve pressure within the closure and sleeve to lift the closure and when closed acting to restore pressure seating the closure.

10. In a device of the class described a self closing valve comprising the combination with a casing of an inlet passage, a cylindric sleeve in said inlet pipe and projecting from the upper end thereof affording a valve seat, an inner valve casing having a water passage opening therethrough at its inner end and provided with a valve seat on each side thereof, a hollow valve closure complemental with the seat in the inlet pipe and slidably engaged in said inner valve casing and having a restricted water passage opening thereinto from the inlet pipe, a chamber above said valve casing, a cup therein, a valved piston in said cup, a stem integral with said cup and projecting downwardly into said inner valve casing, and valve closures on said stem controlling the pressure on said valve closure in the casing.

11. In an automatically closing flushing valve the combination with a casing of an inlet and an outlet pipe, a removable seat in said inlet pipe, a sleeve in said casing having a partition near the top thereof, a closure in said sleeve adapted to close the inlet pipe, a chamber in the top of said casing, a cup therein, an apertured piston in said cup, means rigidly engaging the piston to the top of said casing, a stem on said cup and projecting upwardly through the top of the casing and downwardly into said sleeve, a plurality of valve closures on said stem, a valve seat on each side of said partition for said closures and means engaged in the apertures in said piston adapted to regulate the period of flushing.

12. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a sleeve in said casing, a hollow closure movable longitudinally of the same and having a passage opening into the inlet pipe, a casing above the aforesaid casing, a cylindric cup therein, a piston in said cup, a stem projecting upwardly and downwardly from said cup, means on the lower end of said stem for regulating the pressure on said hollow closure, a spring bearing against said piston adapted to return said cup to its normal position and means in said piston for regulating the period of flushing.

13. In a device of the class described the combination with a casing of an inlet pipe and an outlet pipe opening thereinto and therefrom, a chamber within said casing a valve closure slidable therein and having a restricted passage opening into the inlet, a passage opening through the top of said chamber and connected simultaneously movable valve closures adapted either to close said passage for regulating the pressure on the inlet closure.

14. In an automatically closing valve the combination with a casing of an inlet and an outlet pipe therefor, a chamber in said casing, a chamber within said chamber opening into the inlet, a valve closure slidable in said last named chamber adapted to seat to close the inlet pipe and means for regulating pressure on said closure controlled by fluid other than the flushing fluid.

15. In a device of the class described the combination with a casing of a water chamber therein, an inlet and an outlet pipe communicating with said casing beneath the water chamber, a differential valve closure in said water chamber for said inlet and normally held in closed position by water pressure above the same and means in the top of said casing movable independently of said closure and controlled by fluid other than the inlet fluid for regulating the pressure thereon

16. In a device of the class described the combination with a casing of an inlet and an outlet pipe connected therein, a valve closure adapted to normally close said inlet, a pressure chamber above said closure and communicating with the inlet through said closure, a chamber in the top of said casing, a controlling fluid therein and operating means controlled by said fluid and disconnected from said closure and adapted to regulate the pressure in said pressure chamber.

17. In a flushometer the combination with a casing of an inlet an outlet orifice, a differential closure adapted to seat to close the inlet, a plurality of alined valve seats in said casing, connected valves adapted to seat thereon to control the pressure on the closure, a cup above the closure, a fluid therein, a downwardly directed stem engaged thereto and rigidly engaged to one of said valves, a rigid apertured piston in said cup, an upwardly directed stem engaged to said cup and extending through the piston and means for manually operating said cups in one direction to open said inlet closure.

18. In a flushometer the combination with a casing of an inlet an outlet orifice, a differential closure adapted to seat to close the inlet, a plurality of alined valve seats in said casing, connected valves adapted to seat

thereon to control the pressure on the closure, a cup above the closure, a fluid thereon, a downwardly directed stem engaged thereto and rigidly engaged to one of said valves, a rigid apertured piston in said cup, an upwardly directed stem engaged to said cup and extending through the piston and means for manually operating said cups in one direction to open said inlet closure, means automatically moving said cup in the opposite direction to close the inlet closure and means controlling the flow through said piston to control the movement of said cup.

19. In a flushometer the combination with a casing having an inlet and an outlet orifice of a chamber therein, a closure movable in the chamber to control the flow from said inlet to the outlet, valves adapted to control the pressure on said inlet closure to control the movement of the same, a movable cup above said valves, a stem engaged thereto and to one of said valves, a rigid apertured piston extending into the cup and a fluid contained in said cup and movable through the piston to control the rate of movement of said closure.

20 In a device of the class described the combination with a casing of an inlet and an outlet therefor, an inner casing in said casing opening downwardly, a closure movable therein adapted to close the inlet, a valve controlling said closure, a movable cup adjacent the valve, fluid contained therein, a stem connecting said cup and valve, an immovable piston extending into the cup, a stem projecting through the piston and engaged to said cup, manually operated means adapted to move the cup whereby the fluid flows through said fixed piston in one direction and a spring adapted to move the cup to force the fluid through the piston in the opposite direction.

21. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a chamber in said casing, a differential closure for the inlet pipe fitting closely and movable in the chamber and of greater area in the chamber than in the inlet and having a restricted passage opening from the inlet into the chamber, a partition in the upper part of said chamber, a passage therethrough, a valve seat on each side of the partition at the extremities of said passage and rigidly connected valves simultaneously movable, one for each seat and adapted either to close said passage.

22. In a device of the class described the combination with a casing of an inlet and an outlet pipe opening thereinto and therefrom, a chamber therein, a differential closure movable in said chamber with its smaller end closing the inlet pipe, a port in the upper end of said chamber provided with a seat at each end thereof, a valve closure for each seat, a stem rigidly connecting the same and means for actuating the stem to close said port by either valve closure.

23. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a chamber in said casing, a valve seat in the inlet pipe, a differential closure movable in said chamber and adapted at its smaller end to close on said seat and having a restricted passage opening from the inlet into the chamber, a passage opening through the upper end of said chamber, a valve seat at each extremity of said passage, connected oppositely disposed valve closures each adapted to close said passage at one limit of movement thereof whereby except at said limits releasing the pressure on said differential closure.

24. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a chamber in said casing, a differential valve closure movable therein and having a restricted passage opening thereinto from the inlet, a passage opening through the top of said casing affording an outer and an inner valve seat, oppositely disposed connected valve closures spaced a distance apart and acting to close said passage at opposite limits of movements of the closures thereby releasing the pressure from said chamber when either are moving from their seat.

25. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a chamber therein, a differential valve closure closely fitting and slidable in said chamber and having a restricted passage therethrough connecting the inlet pipe and chamber, a port opening through the top of said chamber, connected valve closures spaced a distance apart and adapted respectively to close said port at opposite limits of movement whereby pressure is released from said chamber at any intermediate positions of said valve closures thereby opening the differential valve by inlet pressure.

26. In a device of the class described the combination with a casing of an inlet pipe and an outlet pipe therefor, a chamber therein, a valve seat on the inlet pipe, a differential valve closure slidable in said chamber and normally seated by fluid pressure from above, a partition in said chamber, having a passage therethrough, a valve seat on each side of said partition, connected inwardly facing valve closures for said seats adapted either to seat to close said passage and adapted when either is moving to or from its seat to open said passage to regulate the pressure on said inlet closure.

27. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a chamber therein, a differential valve closure fitting closely and slidable in said chamber and normally seat-

ed by fluid pressure in said chamber to close the inlet pipe with its smaller end, a passage through the head of said chamber, inwardly facing valve closures spaced a distance apart, connected through said passage and adapted one to close the outer end and the other the inner end of said passage at opposite limits of movement and adapted when both are unseated to open said passage to regulate the pressure on said inlet closure.

28. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a chamber in said casing, a valve seat on the inlet pipe, a closure slidable relatively of said chamber adapted to close the inlet and normally held to its seat by pressure and against pressure and means affording a gradual seating of said closure when open, a partition in the upper end of said chamber having a passage therethrough, a valve seat on each side of said partition, a valve closure for each seat adapted both to close said passage and adapted both to open said passage and normally having one of said closures seated for regulating pressure in said chamber.

29. In a device of the class described the combination with a casing of an inlet and an outlet pipe opening thereinto and therefrom, a chamber in said casing, a normally seated differential valve closure closely fitting and slidable therein and adapted to seat to close the inlet, a partition at the upper end of said chamber having a passage opening therethrough, a valve seat on each side of said partition, connected valve closures adapted either one or the other to seat at both limits of movement of the same and adapted both to release the pressure from said inlet closure when moving to their seats.

30. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a chamber in said casing, a valve seat, a normally seated valve closure thereon adapted to admit fluid slowly into said chamber, a port in the upper end of said chamber provided with valve seats on each side thereof, connected valve closures, one projecting in said chamber and one above the same, adapted one to open said port when the valve closures are moving in one direction and the other to open said port when moving in the opposite direction.

31. In a device of the class described the combination with a casing, of an inlet and an outlet pipe therefor, a chamber in said casing, a valve closure movable independently thereof, a passage through said chamber above said closure, valve seats at each end of said passage, valve closures adapted to seat to close said passage and means connecting said valve closures adapted to release the pressure from said chamber and first mentioned closure when said valve closures are actuated.

32. In a device of the class described the combination with a casing of a chamber therein, a closure movable independently of said chamber, a passage in said chamber, a valve seat at each end thereof, connected valve closures movable to close said passage and adapted to control the pressure in said chamber.

33. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a chamber in said casing, a valve closure movable relatively of said chamber adapted to close the inlet pipe, a passage through a wall of said chamber, valve seats, one at each extremity of said passage, valves, one for each seat adapted each at one limit of its movement to close said passage, means extending through said passage and rigidly connecting said valves adapted to admit fluid through said passage when both valves are unseated to release the pressure from the inlet closure.

34. In a device of the class described the combination with a casing, of an inlet and an outlet pipe therefor, a chamber in said casing, a closure movable in said chamber, a passage opening through said chamber, a seat at each end of said passage, connected valve closures for said seats, one movable in and the other out of said chamber and both tapering and having a narrow connection centrally between the same and means holding one of said closures normally seated.

35. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a chamber in said casing, a valve closure closely fitting in said chamber and movable relatively thereof, a passage through said chamber, a valve seat at each end thereof, a valve closure for each seat, a stem connecting the same and tapering inwardly and having its least diameter approximately centrally between said valves and adapted to release pressure from the chamber when said valves are traveling to and from their seats.

36. In a device of the class described the combination with a casing having an inlet and an outlet pipe of a chamber therein, an outlet passage in said chamber, a valve seat at each end of said passage, rigidly connected valve closures adapted to close said passage and one of said valve closures normally seated, means connected to the same for controlling the pressure in said chamber and a hollow closure closely fitting said chamber adapted to close the inlet.

37. The combination with a casing having an inlet and an outlet orifice, a partition dividing said casing into a plurality of chambers, one of which is a pressure chamber, a passage through said partition, a valve seat at each end of the passage, rigidly connected valve closures one in each chamber and each adapted to seat on its respective seat to close

said passage thereby controlling the pressure in said pressure chamber and an independent closure in said pressure chamber and the movement thereof controlled by said rigidly connected valve closures.

38. In a device of the class described the combination with a casing of an inlet and outlet therefor, a partition in said casing dividing the same into a plurality of chambers, a closure movable in the lower chamber to close the inlet and at all times affording communication between said chamber and inlet, a passage through said partition, a valve seat at each extremity of said passage and connected valve closures one in each chamber adapted either to close the passage.

39. In a device of the class described the combination with a casing of an inlet and an outlet pipe therefor, a partition dividing said casing into a plurality of chambers, a valve closure closely fitting in one chamber and adapted to close the inlet by inlet pressure and having a passage adapted to permit the inlet fluid to flow into said chamber, a passage in said partition, valve seats, connected closures for said seats adapted only when both are unseated to release pressure from said first mentioned closure and means affording communication between the other chamber and outlet pipe.

40. In a device of the class described the combination with a casing of an outlet and an inlet pipe therefor, an upper and lower chamber in said casing, a closure in said chamber and adapted to close the inlet pipe by inlet pressure, a passage connecting said chambers, and connected valve closures adapted to seat at opposite ends of the passage to control the inlet pressure on said inlet closure.

41. In a device of the class described the combination with a casing of an inlet and an outlet therefor, an upper and lower chamber in said casing, a passage connecting the upper chamber and outlet pipe, means in said lower chamber adapted to open the inlet by inlet pressure, a passage connecting the lower and upper chamber and simultaneously movable valve closures adapted either to close said passage to control the pressure on said closure.

42. In a device of the class described the combination with a casing of an outlet and an inlet therefor, chambers in said casing, a closure movable in one of said chambers, having faces of different areas exposed to inlet ptessure and adapted to close and open the inlet by inlet pressure, a passage affording communication between said chambers and rigidly connected valve closures adapted to seat at opposite ends of said passage to close the same at either limit of the operating stroke to regulate the pressure on the faces of the inlet closure.

43. In a device of the class described the combination with a casing and the inlet and outlet therefor, chambers in said casing and one of the same communicating with the outlet, a closure movable in one of said chambers and having different areas exposed to inlet pressure, a passage connecting said chambers, connected valve closures controlling said passage thereby governing the inlet closure and means operated by fluid other than the inlet fluid to control the movement of the connected valves.

44. In a device of the class described the combination with a casing and its inlet and outlet, communicating chambers therein, a differential inlet closure movable in one of said chambers, simultaneously movable valves adapted to control the pressure on said inlet closure and inclosed fluid operated means adapted to control said valves.

45. In a device of the class described the combination with a casing of an inlet and an outlet therefor, a chamber in said casing, a closure therein adapted to close the inlet, a passage through a wall of said chamber, connected valve closures adapted to close said passage, a stationary apertured piston and means forcing fluid therethrough to control the movement of said connected valve closures.

46. In a device of the class described the combination with a casing of a chamber therein, an inlet closure, a passage opening through a wall of said chamber, rigidly connected simultaneously movable valve closures one adapted to seat at each end of said passage and adapted to control the movement of the inlet closure, a cylinder connected to said casing, an apertured piston therein and means adapted to force fluid other than the inlet fluid through the piston to control the period of opening of the inlet.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

ROBERT A. BROOKS.

Witnesses:
W. W. WITHENBURY,
WM. C. SMITH.