No. 882,944. PATENTED MAR. 24, 1908.

P. HAAS.

WATER CLOSET VALVE.

APPLICATION FILED JUNE 22, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

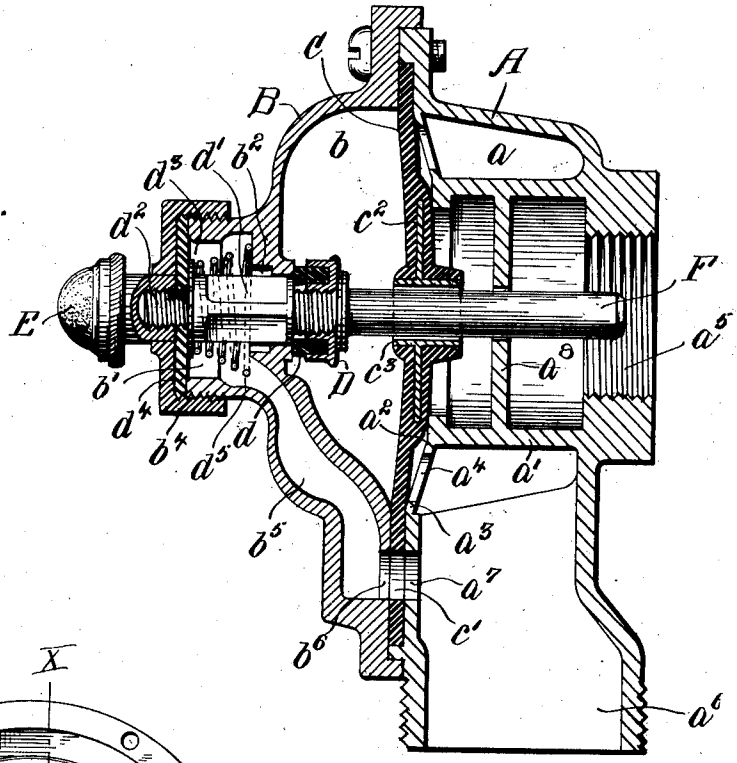
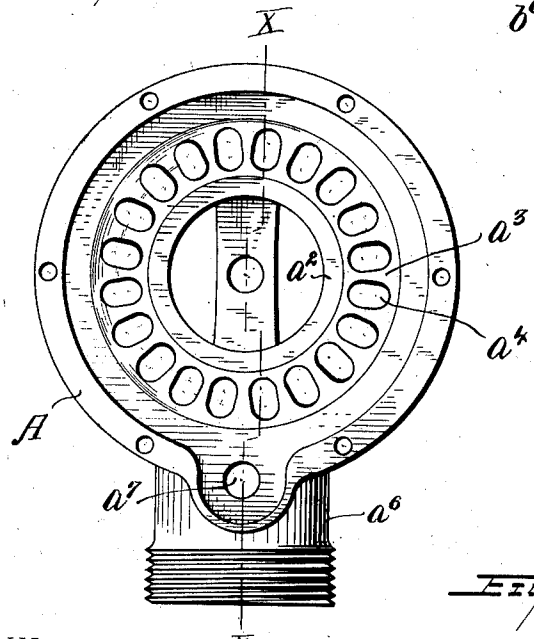
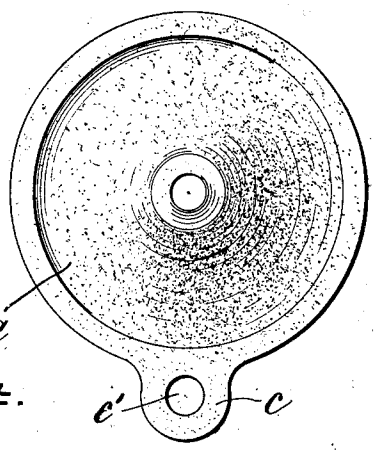


Fig. 2.





WITNESSES:

Wm. F. Hoff & Co.

J. T. Moore

INVENTOR:

Philip Haas,

BY

Whittemore & Hopkins Attorneys

No. 882,944. PATENTED MAR. 24, 1908.

P. HAAS.

WATER CLOSET VALVE.

APPLICATION FILED JUNE 22, 1906.

3 SHEETS—SHEET 2.

FIG. 2.

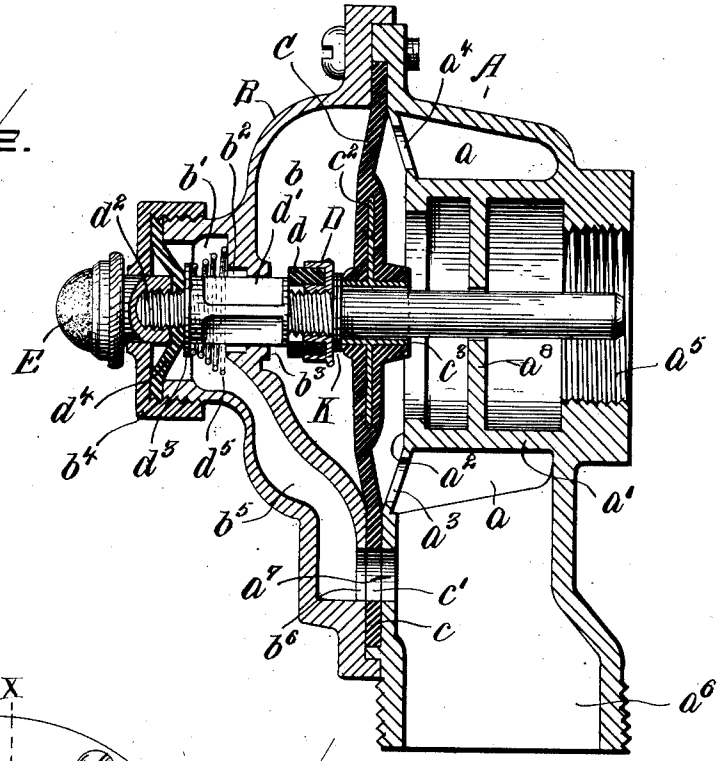


FIG. 5.

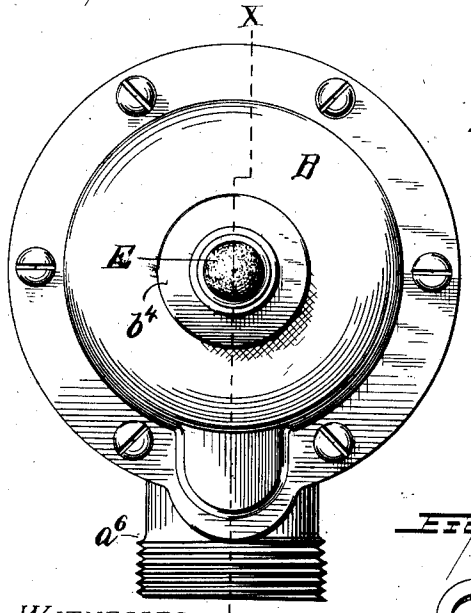


FIG. 3.

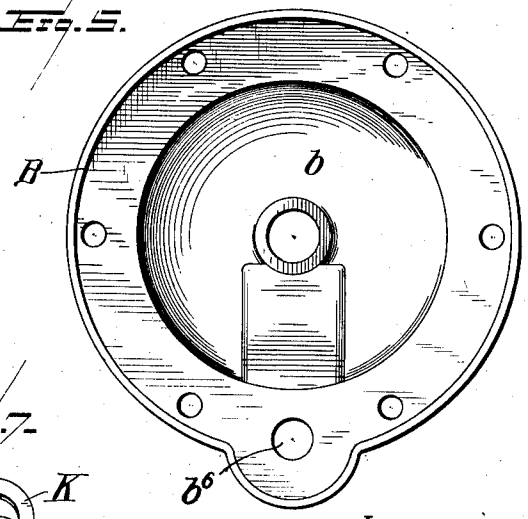
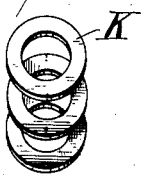


FIG. 7.



WITNESSES: X

Wm. F. Hoffa.

J. K. Moore

INVENTOR:

Philip Haas,

BY

Whittaker & Prout Attorneys

No. 882,944. PATENTED MAR. 24, 1908.

P. HAAS.

WATER CLOSET VALVE.

APPLICATION FILED JUNE 22, 1906.

3 SHEETS—SHEET 3.

Fig. 8.

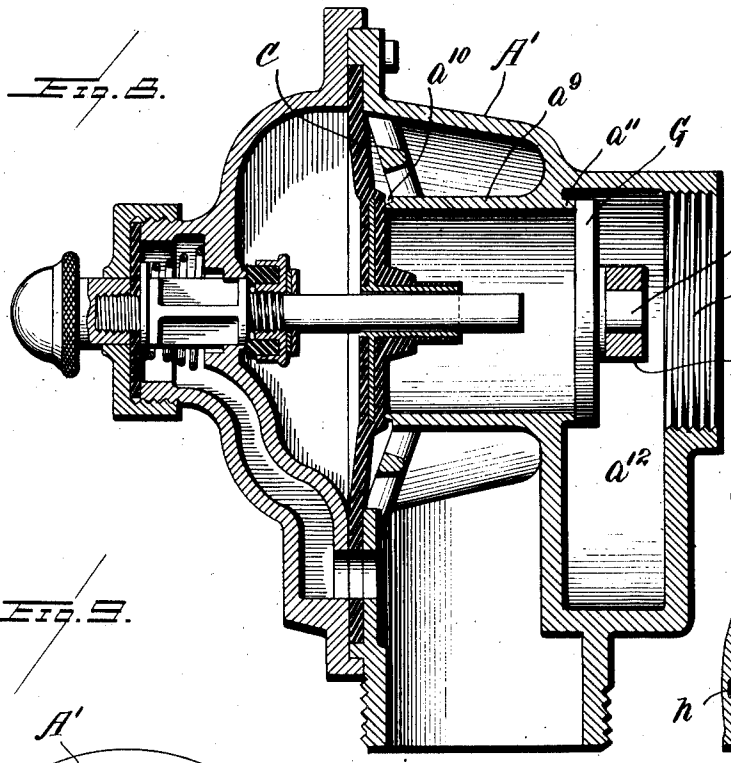


Fig. 10.

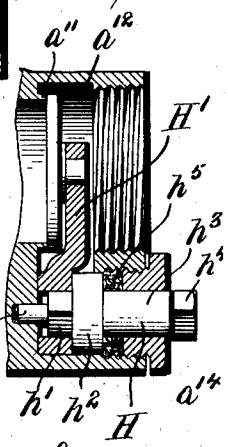


Fig. 9.

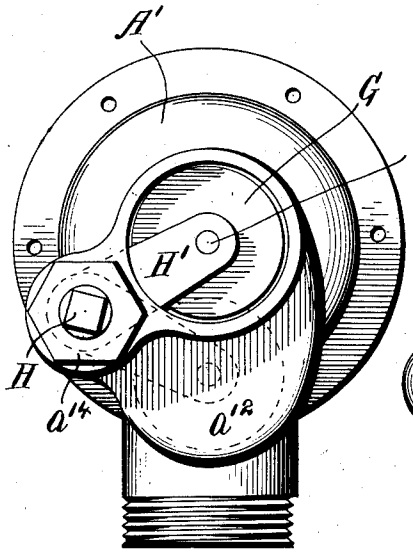
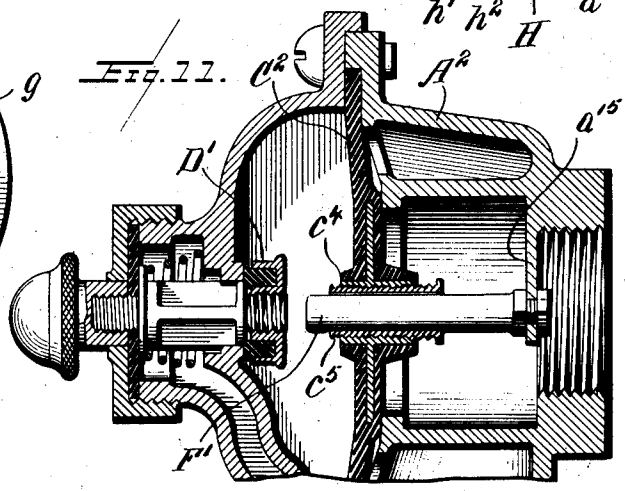


Fig. 11.



WITNESSES:

Wm. F. Hoyle.

E. K. Moore

INVENTOR

Philip Haas,

BY

Whitaker & Prevost

Attorneys

UNITED STATES PATENT OFFICE.

PHILIP HAAS, OF DAYTON, OHIO.

WATER-CLOSET VALVE.

No. 882,944. Specification of Letters Patent. Patented March 24, 1908.

Application filed June 22, 1906. Serial No. 322,892.

To all whom it may concern:

Be it known that I, PHILIP HAAS, citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Water-Closet 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 invention consists in the novel features hereinafter described, reference being had to the accompanying drawings which illustrate one form in which I have contemplated embodying my invention and certain modifications thereof, and said invention is fully disclosed in the following specification and claims.

Referring to the said drawings, Figure 1 is a vertical sectional view of a water closet valve, embodying my invention, showing the parts in normal or closed position. Fig. 2 is a similar view showing the positions of the parts, as they would appear after the push button has been operated, and the main valve opened to flush the closet. Fig. 3 is a front elevation, drawn to a slightly reduced scale, of one of the parts of the casing or shell of the apparatus, showing the inner face thereof. Fig. 4 is a detail elevation of the main valve. Fig. 5 is an elevation of the other part of the casing, showing the inner face of the same. Fig. 6 is an exterior view of the entire apparatus. Fig. 7 is a detail view of three of the washers used for adjusting the apparatus to regulate the duration of the flow. Fig. 8 is a sectional view similar to Figs. 1 and 2, and drawn to the same scale, showing a slightly modified form of my invention, and including a cut off valve for the water supply. Fig. 9 is a rear elevation of the apparatus shown in Fig. 8 drawn to the same scale as that used in Figs. 3 to 6 inclusive, and showing said cut off valve. Fig. 10 is a detail sectional view of the devices for supporting and operating said cut off valve. Fig. 11 is a partial vertical sectional view similar to Figs. 1 and 2 and drawn to the same scale, showing another slightly modified form of the invention.

Referring to the form of my invention shown in Figs. 1 to 7 inclusive, the casing of the apparatus is conveniently formed in two parts A and B, between which are clamped, the marginal portions of the main valve C, the latter being composed of rubber, and constructed as hereinafter described. The part A of the casing is provided with a hollow chamber a within the same, surrounding an annular flange a' forming a water inlet passage. On the inner face of the annular flange a' is formed a valve seat a^2, and said valve seat is connected to the outer wall of the part A by an annular web a^3 provided with numerous apertures or slots a^4 communicating with the interior chamber a. This annular perforated web a^3 performs an important function in supporting the portions of the main valve C, surrounding the central portion, and thus prevents the bulging and bursting of the valve, as will be clearly seen in the drawings. The rear wall of part A is provided with a water inlet aperture a^5 (preferably screw threaded to receive a pipe connected to the water main or supply); and the lower portion of part A is provided with a tubular extension a^6 externally threaded for connection to the closet bowl. The part A is also provided on its inner face near the extension a^6 with an aperture a^7, the purpose of which will be hereinafter explained.

The part B of the casing is provided with a chamber b, which I term the back pressure chamber, and which is located on the front side of the main valve C. The part B is also provided with an exterior chamber b' of reduced diameter which communicates with the chamber b, by an aperture b^2, having a valve seat b^3 on its inner face, and the exterior of said extension is threaded as shown to receive a cap b^4. b^5 represents a bypass formed in the part B exterior to the chamber b, and extending from the exterior chamber b', to an aperture b^6, adapted to register with the aperture a^7 of part A of the casing.

C represents the main valve of the apparatus which is in the form of a diaphragm and is preferably composed of rubber, the marginal portions being clamped between the two parts A and B of the casing and also serving as packing therefor. The valve C has an extension c at one point, perforated as at c' which aperture c' registers with the apertures b^6 and a^7 in the parts A and B of the casing, as clearly shown in Figs. 1 and 2. The valve C has its central portion constructed to engage the valve seat a^2 and I prefer to reinforce the central portion of the rubber valve, with metal, so that when it

seats, it will practically do so throughout, and thus avoid the fluttering of the valve, or portions thereof which might otherwise occur. I prefer to reinforce this valve by means of a flat circular disk or ring c^2 which is molded and vulcanized in the body of the valve, and is preferably of such diameter as to extend over the seat a^2, although the valve may be reinforced in other ways. In this instance the valve C is shown provided with a central aperture, having a metallic bushing c^3 therein, and I prefer to form this bushing integrally with the reinforcing disk or ring c^3 as shown in Figs. 1 and 2, and vulcanize the same in the rubber portion of the valve, although they need not of necessity be integral.

D represents the relief valve, for the back pressure chamber b, and is preferably formed as shown in Figs. 1 and 2, the valve being formed of a metal shell provided with a central threaded aperture, and with an annular recess surrounding said aperture, in which is located an annular rubber packing d, which is preferably molded and vulcanized into the metal shell, and projects from the shell on one side thereof. The valve D is screwed upon a stem d' consisting of radially disposed wings, leaving passages between the same, and said stem is provided with an exterior threaded portion d^2 which extends through a washer d^3 and a rubber diaphragm d^4, and is engaged by an exterior push button E, the stem of which extends through a central aperture in the cap b^4. The rubber diaphragm d^4 has its marginal portions clamped between the cap b^4 and the end of the extension or chamber b', and serves the function of preventing leakage, while permitting the longitudinal movements of the push button E and valve stem d', without the use of a stuffing box. d^5 represents a spring interposed between the inner wall of chamber b' and the washer d^3 in rear of diaphragm d^4, which presses the valve stem d' outwardly and holds valve D upon its seat.

In order to render the apparatus operative, it is necessary to provide for a reduced passage for water from the water supply passage (within the flange a') to the back pressure chamber. I provide this passage in this instance by means of the central aperture in the sleeve or bushing c^3, in the main valve, which I term the controlling sleeve, and a controlling stem F which extends through said bushing but is of slightly less diameter than the aperture in the bushing, thus providing an annular passage, (which is merely an infinitesimal crevice) between the stem and bushing. In the drawings I have been obliged to greatly exaggerate the showing of this annular passage, in order that its location may be properly understood, but in practice it is found that if the engagement of the stem F, and bushing or sleeve c^3 is what is termed by mechanics, a "loose or easy fit", that the annular passage so formed is sufficient. In Figs. 1 and 2 the controlling stem is shown as attached to and forming part of the valve stem d' of the relief valve D, and this is my preferred construction at the present time although the said stem may be otherwise supported if desired, one other arrangement for this purpose being shown in Fig. 11, and hereinafter described.

In the form of my invention shown in Figs. 1 and 2 the annular flange a', is shown provided internally with a spider or cross bar a^8 having a guiding aperture therein for the controlling stem F but this is not essential.

I will now describe the operation of my invention having special reference to the form shown in Figs. 1 to 7 inclusive. The apparatus being connected to the water supply pipe and closet bowl, as before indicated, the water enters the casing at a^5, into the water space within the annular flange a', and also trickles or forces its way through the annular controlling passage, between the stem F and sleeve c^3, into the back pressure chamber b, from which it cannot escape so long as the relief valve D is closed. As soon as the chamber b becomes filled the pressure therein will equal that within the water inlet passage, and chamber b being of the greater diameter, the pressure therein will be exerted upon nearly the entire area of the main valve C, thus closing it and maintaining it against the pressure of the incoming water. This position of the parts is shown in Fig. 1 and is the normal condition of the apparatus, no water being permitted to flow to the closet.

To flush the closet, the push button E is pressed inwardly, thus opening the relief valve D, and allowing the water in the back pressure chamber b to discharge through the by pass b^5. The pressure of water on the other side of the valve C will instantly open the valve, and the water from the main will pass through the apertures a^4 a^4 into chamber a and thence to the closet, thus providing a practically unobstructed passage of large area. When the main valve opens it moves quickly into engagement with the rear face of the relief valve D under the pressure of the water in the main, and tends to close said relief valve. If the pressure of the water is sufficient it will instantly close the relief valve even against the pressure of the finger on the push button, otherwise as soon as the pressure is removed from the push button the spring d^5 will seat the relief valve. The closing of the relief valve closes the exit from the back pressure chamber, which will slowly fill up by the percolation of water through the annular controlling passage and gradually accumulating pressure until the valve C is forced into closed position, thus cutting off the flow.

It is obvious that the duration of the flow will depend upon the size of the annular con-

trolling passage, and the pressure of the water in the main. I desire to make the size of the passage as minute as possible for high pressure water service so that there will be no sudden slam or shut off of the valve, and I prefer to provide, for the purpose of regulating the duration of flow under different water pressures, a number of washers K (preferably of brass) shown in detail in Fig 7, a suitable number of which can be placed upon the stem F between the outer end of the sleeve c^3 and the relief valve D to limit the opening movement of the valve C at the proper point. It will be understood that the greater the distance which the main valve C opens, the more water will be discharged from the back pressure chamber and the longer it will take to refill said chamber, and the longer the flushing action will continue. By limiting the opening of the valve more or less the duration of flow can be regulated to suit the pressure of the water in the main with which the apparatus is connected.

For low water pressures, it may sometimes be desirable to increase the size of the annular controlling passage, which can be done by slightly reducing the controlling stem with emery paper or otherwise. It is to be noted that by providing a controlling passage between the sleeve c^3, and the stem F, a very important function is performed each time the device is operated, to wit the cleaning of the controlling passage.

In the form of the invention shown in Figs. 1 to 7 inclusive, several relative movements take place between the sleeve c^3 and stem F each time the device is operated, the relative movement of the parts and the consequent exposure of the previously covered surface of the stem F to the water serving to keep this passage free from accumulation or sediment, no matter how much solid matter may be contained in the water. Thus (1 and 2) when the push button is pressed in the stem F is pushed rearwardly through the sleeve c^3; (3) the opening movement of the valve C causes the sleeve c^3 to slide forwardly over the stem; (4) the closing of the valve C after the relief valve D is closed, causes the sleeve c^3 to slide rearwardly over the stem. The relative movements of the controlling sleeve and stem and the consequent exposure of the portions of the stem, normally within the sleeve to the water will thus keep this passage clean and insure a perfect operation of the device, even if it has not been used for a considerable time, and I consider this a very important feature of the invention. Obviously, it is not essential that the aperture in the sleeve and the exterior of the stem should be round (thus forming an annular passage), as the same result would be accomplished if the stem is given a different form in cross section, and the aperture in the sleeve is shaped to correspond therewith.

In Fig. 8 I have shown a sectional view of a slight modification of the invention in which a quick acting cut-off valve is provided within the casing for the purpose of closing the inlet passage by means of a hand operated device extending to the outside of the casing, so that the apparatus can be disconnected from the water supply to permit of examination or repair when necessary, without cutting off the water supply of the entire building in which the device is located. A rear view of the apparatus illustrated in Fig. 8 is shown on a smaller scale in Fig. 9, and Fig. 10 shows a detail section of the cut-off valve and its operative connections. Referring to these figures, the rear part of the casing, here lettered A′, is constructed substantially like the part A shown in the other figures except that the annular flange a^9, which for convenience is termed the inlet passage, is provided at its inner end with the seat a^{10} to receive the main valve C′ and at its outer end with an exterior valve seat a^{11} to receive the cut-off valve, and said casing section A′ is provided with an elliptical chamber a^{12} which contains the cut-off valve. The rear face of this valve chamber a^{12} is provided with a threaded aperture a^{13} to receive the water supply pipe. Within the valve chamber a^{12} is located a quick acting gate valve including among its members the following elements. G represents the valve proper which is preferably a metallic disk provided on its rear face with a central stem g. H represents the pivot stem of the valve which is provided at its lower end with a reduced bearing stud h, see Fig. 10, above which is a squared portion h' of larger diameter, above which is preferably an enlarged bearing portion h^2. Above the bearing portion h^2 is a bearing portion h^3 of less diameter than the part h^2 and extends through a stuffing box a^{14}. Outside of the stuffing box, the pivot stem is provided with suitable means for turning it by hand, consisting in this instance of a squared portion h^4 adapted to receive a socket wrench or handle or other device by which it may be turned. The pivot stem is fitted in the part A′ contiguous to the valve chamber a^{12}, as shown in Fig. 10 and a suitable packing h^5 is interposed between the stuffing box and the bearing portion h^3, as shown. H′ represents an arm or lever having at one end a squared opening fitting the squared portion h' of the stem, and at its other end a circular aperture engaging the stem g of the valve G. It is obvious that by applying a suitable tool to the exterior squared portion h^4 of the stem H, the gate valve G can be instantly swung into or out of engagement with the exterior seat a^{11} of the inlet passage, thus cutting off the apparatus from the water supply or connecting it therewith, as may be desired. The other portions of the apparatus shown in Fig. 8 are substan-

tially identical in construction and operation with the corresponding parts illustrated in Figs. 1 to 7 and will not be again described.

In Fig. 11, I have illustrated another slight modification of the invention, in which the controlling stem here lettered F′ is supported independently of the relief valve, here lettered D′, and in this instance it is secured to a bracket arm a^{15} cast upon the rear part of the casing, here lettered A^2, and projecting into the inlet passage so as to bring the stem in alinement with the center of the main valve here lettered C^2. In using this construction, it is necessary to provide a slightly different means for adjustably limiting the valve C^2 in its opening movement, as the washers, previously described with reference to Figs. 1 to 7, could not be used. In this instance, therefore, I make the main valve C with an exterior sleeve c^4 extending through the central portion of the same and provided with an interior threaded opening considerably larger than the stem F′. Into this threaded sleeve is screwed the controlling sleeve c^5, the bore of which fits around the stem F′ with a "loose fit" as previously described with reference to the sleeve c^3. It is apparent that by turning the controlling sleeve c^5, the outer end of the sleeve, that is the end nearest the relief valve, can be adjusted toward or from the relief valve so as to limit the opening movements of the main valve C^2 adjustably for the purpose heretofore described. The other parts of the mechanism shown in Fig. 11 are identical in construction and operation with the corresponding parts shown in Figs. 1 to 7 and will, therefore, not be again referred to.

What I claim and desire to secure by Letters Patent is:—

1. In a water closet valve, the combination with the casing provided with an inlet passage extending into the same and provided with a valve seat, a discharge chamber surrounding said inlet passage, a discharge passage communicating with said chamber, and a back pressure chamber opposite said inlet passage and discharge chamber, of a diaphragm valve interposed between the back pressure chamber and the inlet passage and discharge chamber, and having a central portion for engaging said valve seat, a reinforcing metal disk molded in the seat engaging portion of said diaphragm, and provided with a metal sleeve extending through both faces of the valve and forming a central aperture therethrough, said aperture forming the only communication between the inlet passage and the back pressure chamber, a controlling stem mounted independently of said diaphragm valve, and extending through said sleeve, with an easy fit, a relief valve for said back pressure chamber, and a manually operated connection from said relief valve, independent of said stem extending to the exterior of said casing, substantially as described.

2. In a water closet valve, the combination with the casing provided with an inlet passage extending into the same, and having a valve seat at its inner end, an annular web surrounding said valve seat, connected to the walls of said inlet passage, and extending to the walls of the casing and provided with water apertures, an annular discharge chamber surrounding said inlet passage, and communicating with the apertures in said web, a discharge passage communicating with said discharge chamber and a back pressure chamber located opposite said inlet passage and discharge chamber, of a diaphragm valve located between said back pressure chamber and the inlet passage and discharge chamber, having a central portion for engaging said valve seat, and annular portions adapted to engage said web to prevent injury to said valve, said diaphragm valve having a single aperture therethrough forming the only communication between said inlet passage and the back pressure chamber, a stem mounted independently of said diaphragm valve, and engaging said aperture, a relief valve for said back pressure chamber, and a manually operated device extending to the outside of said casing for operating said relief valve, substantially as described.

3. In a water closet valve, the combination with the casing provided with a water inlet passage extending into said casing and having a valve seat at its inner end, a discharge chamber surrounding said inlet passage, a discharge passage communicating with said discharge chamber, a back pressure chamber, located opposite to said inlet passage and discharge chamber, a relief aperture for said back pressure chamber, a by-pass extending from said relief aperture to said discharge passage, and an annular web extending from the walls of said casing to the inlet passage adjacent to the valve seat thereof, and provided with water apertures, of a diaphragm valve extending between said back pressure chamber and the inlet passage and discharge chamber, having a central perforated portion for engaging the valve seat of the inlet passage, a reinforcing disk molded within the central portion of the diaphragm valve, and having an integral sleeve at its center extending through both faces of the diaphragm, and forming a central aperture therethrough, a spring operated normally closed relief valve for said relief aperture, a push button for operating said relief valve, and a controlling stem secured to said relief valve, and fitting within said sleeve of the diaphragm valve, with an easy fit, substantially as described.

4. In a water closet valve, the combination with the casing provided with a water inlet passage, a discharge passage, a back

pressure chamber, a main valve interposed between the inlet passage and the back pressure chamber, means for permitting the passage of a small quantity of water at all times from the inlet passage to the back pressure chamber, a relief valve for the back pressure chamber, a manually operated device extending outside of the casing for operating the relief valve, and an adjustable stop for limiting the opening movement of the main valve to regulate the volume and duration of flushing, substantially as described.

5. In a water closet valve, the combination with the casing provided with a water inlet passage, a discharge passage, a back pressure chamber, a main diaphragm valve interposed between the inlet passage and the back pressure chamber, a controlling stem engaging the aperture in the diaphragm valve, with an easy fit, a relief valve for the back pressure chamber, a manually operated device connected to said relief valve and extending outside of the casing, and an adjustable stop for said main valve, surrounding said stem, for limiting adjustably the opening movement of said main valve to regulate the volume and duration of flow, substantially as described.

6. In a water closet valve, the combination with the casing provided with a water inlet passage, a discharge passage, a back pressure chamber, a main diaphragm valve, interposed between the inlet passage, and the back pressure chamber, and provided with a central aperture, a relief valve for said back pressure chamber, a stem fitting said aperture in the main valve with an easy fit and forming a passage surrounding said stem, said stem and valve having relative movement with respect to each other, and a removable stop on said stem, adapted to be engaged by said valve to limit its opening movement, substantially as described.

7. In a water closet valve, the combination with the casing provided with a water inlet passage, a discharge passage, a back pressure chamber, a main diaphragm valve, interposed between the inlet passage and the back pressure chamber and provided with a central aperture, a relief valve for said back pressure chamber, a stem fitting said aperture in the main valve with an easy fit and forming a passage surrounding said stem, said stem and valve having relative movement with respect to each other and a series of washers, removably engaging said stem for limiting the opening movement of the main valve, whereby the duration of the flushing operation may be regulated by the number of said washers, substantially as described.

In testimony whereof I affix my signature, in the presence of two witnesses.

PHILIP HAAS.

Witnesses:
L. P. WHITAKER,
J. K. MOORE.