

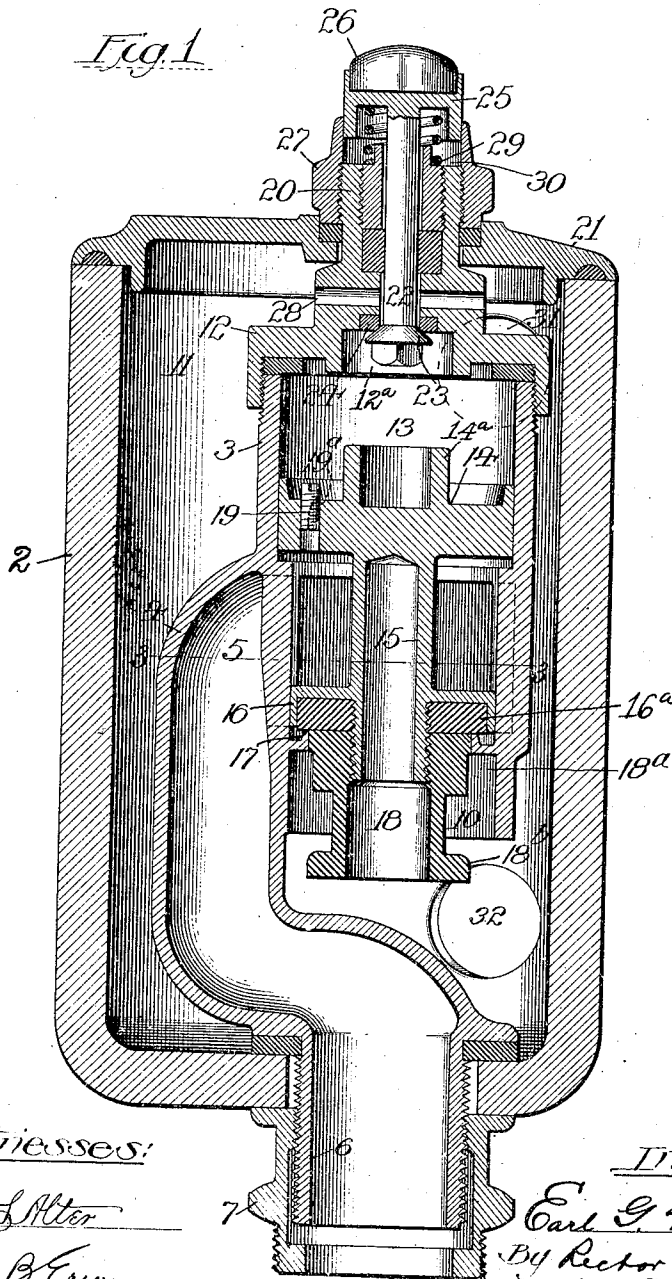
No. 870,000.

PATENTED NOV. 5, 1907.

E. G. WATROUS.  
WATER CLOSET.

APPLICATION FILED OCT. 17, 1904.

2 SHEETS—SHEET 1.



*Witnesses:*

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*Inventor:*

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*His Attorneys*

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2 SHEETS—SHEET 2.

*Fig 3*

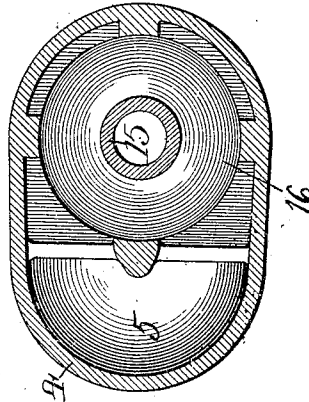
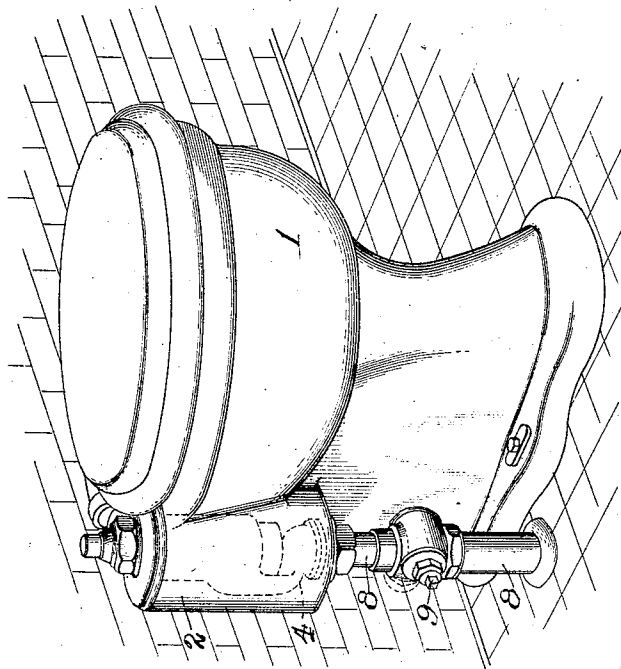


*Fig 2*



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# UNITED STATES PATENT OFFICE.

EARL G. WATROUS, OF CHICAGO, ILLINOIS.

## WATER-CLOSET.

No. 870,000.

Specification of Letters Patent.

Patented Nov. 5, 1907.

Application filed October 17, 1904. Serial No. 228,838.

To all whom it may concern:

Be it known that I, EARL G. WATROUS, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Water-Closets, of which the following is a specification.

My invention relates to water closets and consists in a novel combination of the flushing valve with the closet bowl, as well as in a novel construction of the valve itself.

In the accompanying drawings, Figure 1 is a vertical section through the valve mechanism and its inclosing water chamber; Fig. 2 a perspective view of a water closet having my invention applied to it; and Fig. 3 a horizontal section through the valve casing on the line 3-3 of Fig. 1.

The same letters of reference are used to indicate corresponding parts in the several views.

The water closet proper comprises the earthenware bowl portion 1 having the usual rim flush and jet. Formed integrally upon the side of the bowl 1 near its rear end is a cylindrical chamber 2 which incloses the valve mechanism for controlling the admission of water to the closet bowl for flushing purposes. The outline of this valve mechanism is indicated by the dotted lines in Fig. 2, but is shown in enlarged sectional detail in Fig. 1; and as also shown in the latter figure the water chamber 2 is provided at its upper end with an outlet opening 31 which communicates with the rim flush of the closet bowl and at its lower end with another outlet opening 32 which communicates with the jet thereof.

The valve proper operates within a cylindrical casing 3, into which opens at 5 the upper end of an integrally formed depending water supply pipe 4 whose exteriorly threaded lower end 6 projects through an opening formed for it in the bottom of the chamber 2. The pipe 4 is flanged above the bottom wall of the chamber and a packing ring is interposed between said flange and bottom wall. A nut 7 screwed upon the depending lower end of the pipe 4 serves to clamp the parts tightly together, and also provides a coupling for the connection of the upper end of the main water supply pipe 8, in which latter there is in the present instance shown a stop cock 9 for permanently cutting off the water supply when desired.

The upper end of the valve casing 3 is closed by a screw cap 12 and its interior forms a piston chamber in which travels a piston 14 having an integrally formed depending stem 15 carrying the valve 16. This valve 16 is composed in the present instance of a flanged disk formed integral with the valve stem 15 and having seated in it a ring 16<sup>a</sup> of suitable flexible material adapted to seat, when the valve is closed, upon an annular valve seat 17 formed upon the inner wall of the valve casing 3. The ring 16<sup>a</sup> is held in place within the flanged

disk by means of a cylindrical nut 18 screwed upon the threaded lower end of the valve stem 15. This nut is turned to the several external diameters indicated, to form the cylindrical portions 18<sup>a</sup> and 18<sup>b</sup> at its extreme upper and lower ends; adapted to snugly fit the valve seat 17, and an intermediate reduced portion adapted to permit the free passage of water around it when the valve is in position for such reduced portion to be within the valve seat.

As will be understood from the foregoing, the valve 16 cooperating with the seat 17 controls the passage of water from the inlet 5 at the upper end of the water supply pipe 4 through the valve casing to the interior of the water chamber 2 and thence through its discharge openings 31 and 32 to the rim and jet of the closet bowl. As will also be understood, when the valve is closed the water supply and pressure are entirely cut off from the interior of the chamber 2, so that the latter is wholly relieved from pressure. This is of the utmost importance where the chamber is formed integral with the earthenware closet bowl, (and consequently of the same material) as in the present instance, and is of sufficient size to hold any considerable quantity of water, since under such circumstances if the interior of the chamber were in open communication with the water supply when the valve is closed the pressure within it would tend to develop leakages and might in some cases be high enough to burst the chamber.

The piston 14 is of larger diameter than the valve 16, so that the water pressure normally admitted from the water supply pipe 4 to the interior of the valve casing 3, between the valve and piston, would lift the latter and open the valve but for the fact that provision is made for permitting the water to pass to the upper side of the piston and prevent such upward movement. This provision consists in the present instance of a hole formed in the piston and containing a screw 19 provided with a tapered slot 19<sup>a</sup> permitting restricted flow of water from the under side to the upper side of the piston. Under normal conditions, therefore, there is always pressure within the chamber above the piston 14, which counterbalances the upward pressure against the under side of the piston and enables the downward pressure upon the top of the valve 16 to hold the latter securely to its seat. Upon relieving the pressure at the upper side of the piston, however, the preponderating pressure against its lower side (due to the fact that the piston is larger than the valve) will lift the piston and open the valve; and I will now describe the means provided for thus relieving the pressure at the upper side of the piston, for the purpose of permitting the pressure against its lower side to lift it and the valve and open the latter.

The upper end of the water chamber 2 is closed by a cap 21 provided with an opening through which projects a tubular extension 20 of the screw cap 12 which

closes the upper end of the valve casing 3. A nut 27 screwed upon the threaded upper end of this extension 20 and resting at its lower end against a packing ring in an annular seat surrounding the opening in the cap 21 serves to secure the parts in place and clamp the cap 21 tightly against the upper end of the water chamber 2, suitable packing being interposed between them to form a tight joint. Through a central bore in the tubular extension 20 extends a valve stem 22 which carries at its lower end a valve 23 seating upwardly against a valve seat consisting of a ring of flexible material 24 in an annular recess in the under side of the screw cap 12. At its upper end the valve stem 22 is provided with a head 25 recessed in its top to receive a push button 26. This head 25 fits and is guided within the extended upper end of the nut 27, within which latter is confined a coiled spring 29 whose lower end rests upon a plug screwed in the tubular extension 20 and bearing at its lower end upon a ring of packing material surrounding the valve stem 22 therein. The upward pressure of the spring 29 against the head 25 of the valve stem 22 serves to hold the valve 23 normally closed. The tubular extension 20 of the screw cap 12 is provided, just above said cap, with radial passages 28 communicating at their inner ends with the central bore through which the valve stem 22 passes; and as that bore is of a larger diameter than the valve stem, when the latter is depressed and the valve 23 unseated the water pressure within the valve casing 3, above the piston 14, may escape through the passages 28 to the interior of the water chamber 2. The escape thus provided from the upper end of the valve casing, upon unseating the valve 23 by depressing the push button at the upper end of the valve stem, is sufficiently larger than the restricted passage 19<sup>a</sup> through the piston to at once relieve the pressure above the piston, whereupon the pressure against its under side will promptly lift the piston and open the main valve 16 to admit the full water supply to the interior of the water chamber 2, and thence through its discharge openings 31 and 32 to the rim and jet of the closet bowl. So long as the relief valve 23 is held open, by pressure upon the push button 26, no pressure can accumulate above the piston, and the pressure below the latter will therefore maintain the piston and main valve in upper position. When pressure upon the push button 26 is released, however, the spring 29 will instantly lift the valve stem 22 and seat the valve 23, thereby cutting off any further escape of water from the chamber above the piston, whereupon the continued admission of water to the chamber above the piston through the restricted passage 19<sup>a</sup> in the latter will gradually restore the pressure at the upper side of the piston and counterbalance the upward pressure upon its under side, and permit the downward pressure upon the top of the valve 16 to restore the parts to normal position and close said valve.

When the piston 14 and the valve 16 are in their uppermost position the valve seat is closed by the enlarged cylindrical portion or flange 18<sup>b</sup> upon the lower end of the nut 18 carried by the valve stem, so that while the piston and valve remain in such uppermost position the water supply is cut off from the interior of the chamber 2 and the closet bowl. Even though the relief valve 23 be held open, therefore, by continued pressure upon the push button 26, the main

valve will remain closed (by the flange 18<sup>b</sup>) until the push button is released and the relief valve permitted to seat itself, whereupon the piston and main valve will begin to descend and the main valve be again opened. As the main valve approaches its seat, the cylindrical portion of the flange 18<sup>a</sup> at the upper end of the nut 18 will enter the valve seat and gradually cut off the flow of water through it prior to the final seating of the main valve.

During the time the main valve is open the water will enter the interior of the water chamber 2 more rapidly than it will escape to the closet bowl through the outlet passages 31 and 32 from said chamber, with the result that the chamber will become filled with water. When the main valve is then closed and the water supply cut off from the water chamber, the water remaining in the latter will escape through the passage 32 at its lower end to the closet bowl and serve to "re-fill" the latter.

In order to prevent water hammer, which is liable to occur at the moment that the supplemental valve 18<sup>b</sup> closes the passage or communication through the slow closing valve mechanism, I provide suitable means for trapping water in the space or chamber 13 above the piston. In the present instance such means comprise a tubular extension 14<sup>a</sup>, which coöperates with a circular recess or socket 12<sup>a</sup> formed in the casing cap 12 adjacent the outlet or relief opening which is governed by the manually operated valve 22. The construction and arrangement are such that immediately prior to the closing of the supplemental valve 18<sup>b</sup> after a partial movement or traverse of the piston 14 the tubular extension 14<sup>a</sup> thereof will enter the socket 12<sup>a</sup>, with the result that although the valve 22 may be open the relief or exhaust from the chamber 13 is closed by the tubular extension and independently of such relief valve. In this manner some of the water is trapped or confined in the space 13 above the piston and such water is utilized as a cushion to prevent water hammer due to any sudden closing of the passage through the casing of the valve mechanism.

I claim:

1. In a water closet, the combination of a bowl, a water chamber arranged at one side of the bowl and communicating therewith through separate passages, and slow closing valve mechanism arranged within said chamber for controlling the supply of water thereto, said chamber being of a capacity to supply the "refill" substantially as described.
2. In a water closet, the combination of a bowl with a jet and a rim flush, a water chamber arranged at one side of the bowl and having outlets near its upper and lower ends to communicate with the bowl, and slow closing valve mechanism arranged within said chamber for controlling the supply of water thereto, the lower outlet of said chamber being in communication with the jet of the bowl, whereby the contents of the chamber will provide the refill for the bowl after the valve mechanism has been closed; substantially as described.
3. In a water closet, the combination of a bowl, a water chamber arranged at one side of said bowl and in open communication therewith, and a slow-closing valve located within said water chamber and operating, when closed, to cut off the water supply from the interior of the chamber in which the valve is located, and when opened to admit water supply thereto and thence to the water closet bowl; substantially as described.
4. In a water closet the combination of a bowl having a jet and rim flush, a water chamber arranged at one side

of the bowl and provided at its lower and upper ends with outlets to the jet and rim flush, respectively, and a slow-closing valve located within said chamber and operating when closed to cut off the water supply from the interior of the chamber in which the valve is located, and when opened to admit the water supply thereto and thence to the jet and rim flush of the closet bowl; substantially as described.

5. In a water closet, the combination of a bowl having a water supply chamber in communication therewith, and slow closing valve mechanism for controlling the supply of water to such chamber comprising a valve casing communicating respectively with a source of water under pressure and with said water supply chamber, a piston actuated valve movable within said casing, said piston and valve being exposed to the water under pressure and the former having the greater pressure area, means for equalizing the pressure on opposite sides of the piston, and means for trapping the water in said casing above the piston after a partial traverse of the latter to prevent water hammer.

6. In a water closet, the combination of a bowl having a water supply chamber in communication therewith, and slow closing valve mechanism for controlling the supply of water to such chamber comprising a valve casing communicating respectively with a source of water under pressure and with said water supply chamber, a piston-actuated valve movable within said casing, said piston and valve being exposed to the water under pressure and the former having the greater pressure area, means for equalizing the pressure on opposite sides of the piston, and means controlled by the movement of the piston for closing the outlet from the casing independently of said manually operated valve and thereby trapping water in said casing above the piston; substantially as described.

7. In a water closet, the combination of a bowl having a water supply chamber in communication therewith, and slow closing valve mechanism therein for controlling the supply of water to such chamber comprising a valve casing communicating respectively with a source of water under pressure and with said chamber, a piston-actuated main valve movable in said casing for governing the passage through the casing, means for equalizing the pressure on opposite sides of the piston, the upper end of the casing above the piston being provided with a recess or socket and a relief outlet into said chamber, a valve governing said outlet, and means controlled by said piston and arranged to cooperate with said socket to close said relief outlet and thereby trap water above the piston after partial movement of the latter.

8. In a water closet, the combination of a bowl having a water supply chamber in communication therewith, and slow closing valve mechanism therein for controlling the supply of water to such chamber comprising a valve casing communicating respectively with a source of water under pressure and with said chamber, a piston actuated main valve movable in said casing for governing the passage through the casing, means for equalizing the pressure on opposite sides of the piston, the upper end of the casing above the piston being provided with a circular recess or socket which is provided with a relief outlet, and a relief valve governing said outlet, said piston being provided with a tubular extension adapted to fit said socket after a partial movement and to thereby close said outlet independently of the relief valve to trap water in the space above the piston; substantially as described.

9. In a water closet, the combination of a bowl having a water supply chamber in communication therewith, and slow closing valve mechanism therein for controlling the supply of water to such chamber comprising a valve casing communicating respectively with a source of water under pressure and with said chamber, a piston-actuated main valve movable in said casing for governing the passage through the casing, means for equalizing the pressure on opposite sides of the piston, the upper end of the casing above the piston being provided with a recess or socket which is provided with a valve-governed relief opening or outlet, a supplemental valve movable with the main valve and adapted to close said passage in the cas-

ing when the latter valve is fully open, said piston being provided with an extension arranged to enter said socket to close the relief outlet independently of the relief valve substantially at the time of the closing of the supplemental valve and thereby trap water in the space above the piston to prevent water hammer; substantially as described.

10. In a water closet, the combination of a bowl, and slow closing valve mechanism cooperating therewith and comprising a casing, a valve device movable therein and means for trapping water in one end of the casing after a partial movement of the valve device to prevent water hammer; substantially as described.

11. In a water closet, the combination of a bowl, and slow closing valve mechanism cooperating therewith and comprising a casing, a piston actuated valve movable within the casing, means for releasing the pressure within the casing above the piston and means for trapping water above the piston after partial traverse of the latter to prevent water hammer; substantially as described.

12. In a water closet, the combination, with an earthenware bowl, of a water chamber formed integrally with said bowl and in open communication therewith, and a slow-closing valve located within said water chamber and operating when closed to cut off the water supply from the interior of said chamber within which the valve is located and when opened to admit the water supply thereto and thence to the closet bowl; substantially as described.

13. In a water closet, the combination, with an earthenware bowl having a rim flush and a jet, of a water chamber formed integrally with said bowl, and having a discharge passage at its upper end leading to the rim flush of said bowl and another discharge passage at its lower end leading to the jet thereof, and a slow-closing valve located within said water chamber and operating when closed to cut off the water supply from the interior of said chamber within which the valve is located and when opened to admit it thereto and thence to the rim and jet of the closet bowl; substantially as described.

14. In a water closet, the combination, with an earthenware bowl, of a water chamber formed integrally with said bowl and freely communicating therewith, a valve casing located within said chamber and having direct communication with the water supply independently of said chamber, and a slow-closing valve controlling the passage of water through said casing to the interior of said chamber; substantially as described.

15. In a water closet, the combination of the earthenware bowl 1, the water chamber 2 formed integrally with said bowl and communicating therewith, the valve casing 3 located therein and having the integrally formed depending water supply pipe 4 projecting at its lower end through the bottom of the chamber 2 and secured thereto, the piston and main valve operating within said casing, and the relief valve controlling the pressure above the piston and having a stem extending vertically through the top of the water chamber and provided with means for depressing it; substantially as described.

16. In a water closet, the combination of the earthenware bowl 1, the water chamber 2 formed integrally with said bowl and communicating therewith, the valve casing 3 located within said chamber and provided with the depending water supply pipe having its lower end projecting through and secured in the bottom of the chamber 2, the top plate or cap 21 for closing the upper end of the chamber 2, the piston and main valve operating within the main casing 3, the screw cap 12 for closing the upper end of the valve casing and provided with the tubular extension projecting upward through the top 21 of the chamber 2, the relief passage through the cap 12 from the interior of the valve casing to the interior of the water chamber, and the relief valve 23 having the stem 22 projecting upward through the tubular extension of the cap 12 and carrying a push button for operating the valve; substantially as described.

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