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R. S. WATSON.  
VALVE FOR WATER CLOSETS.

(Application filed Feb. 5, 1898.)

(No Model.)

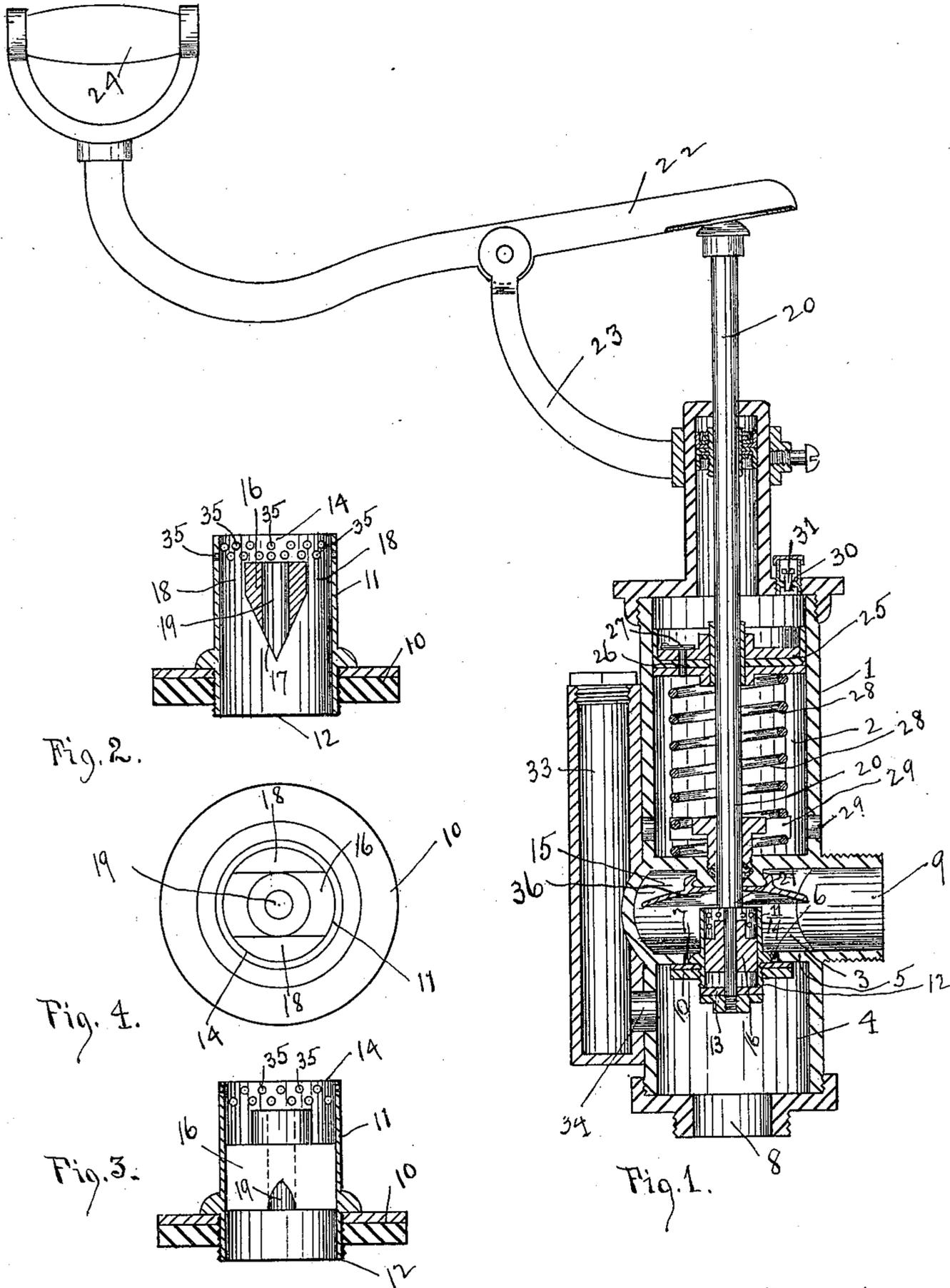


Fig. 2.

Fig. 4.

Fig. 3.

Fig. 1.

Attest:  
J. H. Durell,  
W. E. Sartand.

Inventor:  
Robert S. Watson  
By Geo. P. Thomas  
His Atty.

# UNITED STATES PATENT OFFICE.

ROBERT S. WATSON, OF BAY CITY, MICHIGAN.

## VALVE FOR WATER-CLOSETS.

SPECIFICATION forming part of Letters Patent No. 621,549, dated March 21, 1899.

Application filed February 5, 1898. Serial No. 669,187. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT S. WATSON, a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Valves for Water-Closets, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in valves for water-closets; and the object of the invention is to provide a valve for a water-closet which can be easily operated and which will be cheap and effective in its operation.

Another object of the invention is to provide a water-closet valve which will operate without noise or gurgling under a high pressure of water.

The invention consists in the combination and arrangement of the parts and also in the construction and operation of the same, as will be hereinafter fully set forth and which will also be specifically set forth in the claims.

The invention is shown in the accompanying drawings, in which the same reference characters indicate the same parts throughout the several views, and in which—

Figure 1 represents a vertical transverse section of a water-closet valve containing my improvement. Figs. 2 and 3 are vertical transverse sections of the valve removed. Fig. 4 is a plan view of the same.

1 represents a cylindrical body of the valve device containing in its upper portion an air-chamber 2 and in its lower portion a water-chamber containing an upper section 3 and a lower section 4, divided from each other by a web 5, which contains a valve-opening 6, with a valve-seat 7 on its under side. The lower section 4 of the chamber is provided with an inlet-opening 8, and the upper section 3 is provided with a discharge-opening 9.

Upon the valve-seat 7 is placed a valve 10, provided with a central vertical tube 11, the ends of which project above and below the valve, and the lower end of this tube is provided with a valve-seat 12, upon which rests a relief-valve 13, the water-pressure from below the valves holding them firmly upon their seats. The upper end 14 of this tube reaches nearly to the upper end 15 of the

water-chamber, and within the tube is arranged a guide-piece 16, with its lower edge 17 of a wedge or V form, and the lateral sides of the V, which slant outwardly, are arranged so as to leave passages 18 on each side of the guide-piece, while the front and rear sides reach to the walls of the tube, to which they are secured for holding the guide-piece in position. Through the center of the guide-piece is a vertical opening 19, through which passes loosely a valve-rod 20, the lower end of which extends below the lower end of the tube and through the valve 13, to which it is solidly secured.

At a short distance above the guide-piece 16 the valve-rod is provided with a shoulder 21, and the rod extends upwardly through the air-chamber 2 and is provided on its upper end with an operating-lever 22, which is supported by a fulcrum-arm 23 and is provided with a handle 24 on its outer end, which is lifted to operate the valve-rod downwardly.

Within the chamber 2 is a piston 25, which is secured upon the valve-rod 20, and in the piston is an opening 26, upon the upper side of which is a valve 27, arranged so that as the valve is moved downwardly the valve lifts and allows air to pass into the chamber. Within the lower portion of the chamber 2 is placed a coiled spring 28, which lifts upwardly upon the piston for moving the valve-rod to seat the valves, and the side walls of the lower portion of the chamber 2 are provided with openings 29 for the free passage of air to and from the chamber below the piston, while in the upper portion of the air-chamber is provided a vent-opening 30, which is fitted with a screw-plug 31 for regulating the size of the vent as desired.

33 is a vertical air-chamber having its lower end provided with an opening 34 into the lower section 4 of the water-chamber, and the upper end of this chamber is closed, so as to allow the air confined within the chamber to form a cushion, which prevents any noise or pounding when the valves are closed by the pressure of water beneath the same.

The inlet-opening 8 is connected by suitable pipes to the usual water-supply from the mains in the waterworks system, and the discharge-opening 9 is connected with the bowl of any ordinary closet in the usual way, and

then the pressure from the water-mains is let into the lower section 4 of the water-chamber, and this pressure acting upon the under side of the valves retains the same firmly upon their seats.

In order to operate the device for flushing the closet, the handle 24 is drawn upwardly, and the opposite end of the lever acting on the end of the rod 20 operates the same downwardly and opens the relief-valve 13 and allows the water from below to flow into the upper section of the water-chamber and relieves the heavy pressure below the main valve, which when the shoulder 21 comes in contact with the upper end of the guide-piece 16 is moved easily downward, and the full flow of water passes through the main and the relief valve openings for flushing the closet, the quantity of water being regulated by the time the valves are held open by the air-cushion formed within the air-chamber above the piston 25, the air above the piston being allowed to pass out slowly through the vent 30, which is regulated to allow the desired amount of time to elapse before the valves are entirely closed, and while the spring 32 actuates the valve-rod and piston upwardly the water-pressure below the main valve holds the same against the shoulder 21 until the main valve closes, and the relief-valve then slowly closes as the valve-rod is lifted up by the spring, and the water coming in through the relief-valve serves to fill the bowl of the closet after being flushed by the water from the main valve.

In all valves heretofore devised for flushing the bowl of the closet directly from the main the pressure from the main has been so great that the action of the water through the valve has been accompanied by a great noise, and especially where a small relief-valve was used and the water passed through small and irregular ports or openings; but with my improved form of relief-valve the water has a free entrance to and passage through the tube 11, which is practically free and unobstructed by angles or turns, and the water passing in at the bottom of the tube is divided into two streams by the wedge or V edge 17 of the guide-piece, and these streams passing with great force through the passages 18 on each side of the V are forced through the upper end of the tube and against the upper wall of the chamber and the area of the space between the end of the tube and the upper wall of the chamber is contracted by the main valve, which carries the tube being lifted to its seat, which brings the end of the tube near the upper wall and thereby contracts the space between the wall and the end of the tube, so as to produce a slight back pressure upon the water in the tube, and in order to relieve this back pressure and to divide and change the current of the flow of water from the tube the upper end of the tube is provided with numerous side perforations 35, which allow a portion of the water to escape in all direc-

tions in small streams, which combine with the water which passes downward upon the outside of the tube after striking the upper wall of the chamber.

While the construction explained operates in a perfectly noiseless manner when the pressure from the water-main is not raised above forty or fifty pounds, a higher pressure however, by adding a greater force to the water passing through the tube of the valve, causes considerable noise and gurgling to occur as the water strikes the metallic wall of the chamber, and in order to cushion the force of the water and deaden or eliminate this noise I place directly beneath the upper wall of the chamber a disk 36, of rubber or other similar material of a pliable nature, so that the water after leaving the end of the tube strikes against the disk and is turned downwardly thereby without coming in violent contact with the metallic upper wall, so that a perfectly noiseless action is obtained under extremely high pressure.

It is understood, of course, that when the water passes through the relief-valve opening at a high pressure the area of the opening must be such as to cause the water to pass with great rapidity into the upper section of the water-chamber, where there is practically no pressure, and the area of the chamber being necessarily limited the construction of the apparatus in order to produce a noiseless action must be arranged so that the flow of water through the parts must be without obstructions and entirely free, and then in order to check the rapid flow and change the force of the current within the limited space allowed in the chamber a cushioning action on the stream and breaking into fine cross-streams an entire elimination of all sounds and gurgling is obtained and the apparatus has an entirely noiseless operation.

Of course it is understood that while I have shown and explained the upper end of the tube 11 as being provided with a series of perforations I do not limit my invention entirely to the precise construction shown, as it is well known that many forms of perforations or slits may be used for this purpose and a fairly good result will be obtained; and

What I claim as my invention is—

1. In a water-closet the combination of an upper and lower water-chamber divided by a web having a main-valve opening and a valve-seat on its under side, and having a water-inlet opening to the lower chamber, and an outlet-opening from the upper chamber, a main valve upon said seat and provided with a central opening and a seat on its under side for a relief-valve, and having on its upper side around said relief-valve opening a tube extending upwardly nearly to the top of the upper chamber, a guide-piece within said tube and with water-passages on each side of the guide-piece, a valve-rod passed through the upper chamber and extending loosely through the guide-piece and

5 tube and carrying on its lower end a relief-valve resting on said seat, and provided at a point above the guide-piece with a shoulder for actuating the main valve downwardly after the relief-valve is open, substantially as set forth.

10 2. In a valve for a water-closet, the combination of an upper and a lower water-chamber divided by a web having a main-valve opening and with a valve-seat on its under side, and provided with openings for the passage of water to the lower chamber and from the upper chamber, a main valve upon said seat and provided with an opening and seat 15 for a downwardly-operated relief-valve and an upwardly-projecting tube above the relief-valve opening, with a pliable soft disk secured to the upper portion of the upper chamber for cushioning the force of the water passing through said relief-valve opening 20 and tube, and a valve-rod for first opening the relief-valve and then the main valve, substantially as set forth.

25 3. In a water-closet valve the combination of the water-chamber having an upper and lower section divided by a web having a main-valve opening and valve-seat and provided with an inlet-opening to the lower section and an outlet-opening from the upper section, 30 with a main valve upon said seat and provided with an opening and seat for a relief-valve on its under side and provided on its upper side around said opening with an upwardly-extending tube, a guide-piece within 35 said tube and having a central opening for a valve-rod, and with its opposite sides reduced to form water-passages between the guide-piece and the inner wall of the tube, a valve-rod passed through the said upper section 40 and through said guide-piece and main valve, and having a relief-valve solidly secured to its lower end and resting upon said relief-valve seat, and provided with a shoulder

above said guide-piece for actuating the main valve downwardly after the relief-valve is 45 open, and a spring for actuating the valve-rod upwardly to close the valves, substantially as set forth.

4. In a water-closet valve, the combination of the air-chamber carrying a piston and a 50 valve for the rapid admission of air to the chamber and a vent for a slow exhaust of air from the chamber, a water-chamber below said air-chamber and provided with a web 55 for dividing the chamber into an upper and a lower section and having a main-valve opening with a valve-seat on its under side, a water-inlet opening into the lower section and an exhaust-opening from said upper section, a main valve upon said seat and provided 60 with a central opening having a seat for a relief-valve and provided on its upper side around said relief-valve opening with a tube extending toward the top of said upper section, and provided near its upper end with a 65 series of relief-openings, a downwardly-tapered wedge-shaped guide-piece within said tube and provided with a central opening for a valve-rod, and with passages on its opposite sides, a valve-operating rod passed through 70 said air-chamber and piston and extending through the upper section, guide-piece and tube and carrying on its lower end a relief-valve resting on said seat and provided above 75 said guide-piece with a shoulder for opening the main valve after the relief-valve is open, and a spring for operating said piston and valve-rod upwardly, substantially as set forth.

In testimony whereof I have hereunto af- 80 fixed my signature in the presence of two witnesses.

ROBERT S. WATSON.

Witnesses:

GEO. P. THOMAS,  
JAS. E. THOMAS.