J. FARRELL.

Water-Closet Valve.

No. 160,313

Patented March 2, 1875.

FIG. 1

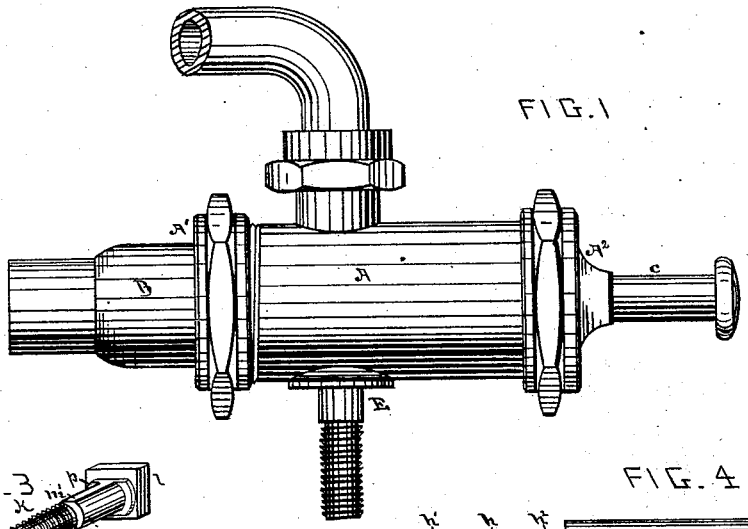


FIG. 3

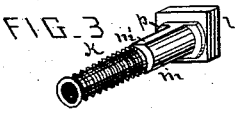


FIG. 4

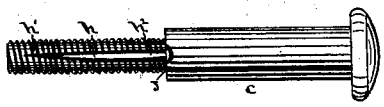
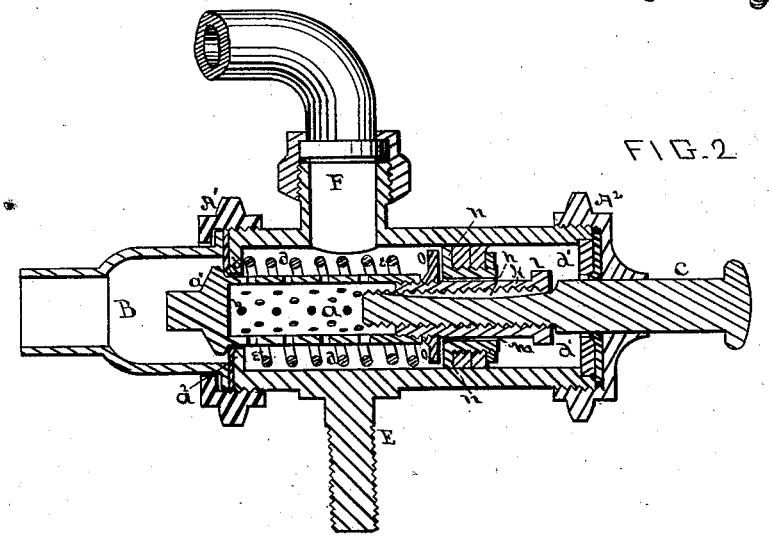


FIG. 2



WITNESSES: Chas. G. Page
H. L. Parker

INVENTOR: John Farrell,
by George A. Christy
his atty.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

JOHN FARRELL, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN WATER-CLOSET VALVES.

Specification forming part of Letters Patent No. **160,313**, dated March 2, 1875; application filed December 24, 1874.

To all whom it may concern:

Be it known that I, JOHN FARRELL, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Valves for Water-Closets and Hoppers; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is an outside view of a cylindrical valve-casing, with its several requisite adjuncts arranged for use. Fig. 2 is a sectional view thereof; and Figs. 3 and 4 are detached perspective views of certain parts, hereinafter more especially referred to.

My invention relates to the construction of a valve for water-closets and hoppers; and consists, principally, in the construction and combination of the water-ways therein, in connection with a hollow perforated valve-stem and an operating-stem, whereby, after the valve has been opened, the inflow of water from the water-main shall be gradually cut off as the valve-stem is slowly retracted within the valve-casing, the devices with reference to securing this result being made adjustable, as hereinafter set forth.

The cylindrical case A, which contains the principal parts of my improved valve apparatus, is connected at one end with the water-main B by a screw cap or coupling, A^1, in the usual way, and is provided at its other end with a cap, A^2, through which the operating-stem *c* passes out from said case, so as to be operated by a lever or any other device commonly employed in water-closets, and is so arranged as to be worked either by hand or by the down pressure of the seat thereon. It is secured in place by a screw-threaded bolt, E, or in other convenient manner. The discharge-pipe F is coupled with a discharge-nozzle in the usual way, such as a screw-coupling, so that the nozzle can be turned in proper position relatively to the water-closet basin, and then permanently secured in place by screwing up the coupling. The receiving end of chamber A is closed by a valve, a^1, seating on the valve-seat a^2 and suitably packed. The valve-stem *a* is made hollow, and with holes or slots therein, varying in size and number according to the quantity of water which it is desired shall flow into the water-chamber when the valve is open, and so that while the valve is closing the inflow of water will be gradually shut off—as, for instance, when the valve is at half-stroke only one-half the quantity of water will flow into the water-chamber as when fully depressed. This valve-stem works like a piston in the valve-opening, so that the water from the main B, when the valve is opened, will pass through the holes of and into the valve-stem below the seat, and thence through the holes above the valve-seat into the chamber *d*. The operating-stem *c* is screwed into a tubular connection, *k*, which tubular connection has a head, *l*, shoulder *p*, cylindrical body *m*, flattened along one or more of its sides, as at *m'*, and on the tubular body is arranged a piston, *n*, and below the piston is screwed a collar, *o*, and below the collar is screwed the open end of the hollow valve-stem *a*, around which a coiled spring is arranged to engage the said collar *o* at one end, and the bottom of the chamber *d* with the other. Along the screw-threaded portion of the operating-stem *c* is a grooved water-way, *h*, of varying area in cross-section, such area being least at its end h^1, and gradually increasing toward its end h^2, at which point it opens into the chamber *d'*. This groove constitutes a water-way from the hollow perforated valve-stem *a* in chamber *d* on one side of the piston *n* to the chamber *d'* on the other side, and its area at the point of receiving and discharging is increased or diminished as the operating-stem *c* is adjusted either backward or forward in the tubular connection *k*, which is somewhat less in length than such groove. This water-way is made with a minimum of discharge area at its end h^1, so that, as the piston *n* wears away and allows a portion of the water to leak around it, the area of water-escape port, by the groove *h*, may be correspondingly lessened. A small notch is made in the shoulder J of the operating-stem *c*, so that the water-way *h* shall at that end be always in communication with the chamber *d*. Instead, however, of forming the water-way *h* in the operating-stem, it may be made in the tubular connection *k* with like results, or through the body of the stem, the

relative lengths and the adjustments of the two being so varied as that by screwing the stem up and down the area of port opening from one chamber, d, to or from the other, d', may be varied at pleasure, so as to regulate the flow of the water either way. The piston n is made up of disks and packing-rings in any known suitable construction, and, to the extent of its motion, operates like any ordinary piston. The flattened parts m' on the tubular connection k constitute water-ways, which are auxiliary to the water-way h in supplying water to the chamber d', but are closed by the close contact of the collar o and piston n when said collar is raised by the action of the spring e in closing the valve a^1. As the operating-stem c is depressed the piston n will be brought into engagement with collar p of the tubular connection k, and the valve being opened, water from the water-main will flow into chamber d through the perforated valve-stem, pass therefrom out through the discharge-pipe, and also through the water-ways h and m', into the chamber d', and, on the pressure being removed from the operating-stem, the collar o will be brought against piston n by the action of the coiled spring, and the said water-ways m' will thereby be closed, so that, during the consequent short back stroke of the piston, the resistance of the water in the chamber d', which can only be slowly discharged therefrom through the small way h, will be such as to admit of only a slow retraction of the valve-stem a and closing of the valve a^1, and the smaller the escape-port in the water-way h the less rapid will be the motion of the valve a^1 in closing. By this means the inflow of water through perforated valve-stem will be very gradually cut off, and the length of time of such operation may be regulated by adjusting the stem c in the tubular connection, as hereinbefore set forth.

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

1. A water-way passage, h, having an adjustable area of water-escape opening, arranged in connection with the operating-stem c, whereby the area of water-escape port may be regulated by the adjustment of the operating-stem, substantially as set forth.

2. The adjustable operating-stem c, having a tapering groove, h, arranged therein, in combination with the piston n, whereby the area of water-escape port may be varied by the adjustment of the operating-stem c with reference to the leakage of the piston, substantially as set forth.

3. The hollow perforated valve-stem a, working by a longitudinal motion in the direction of its length through the valve-port a^2, substantially as set forth.

4. The tubular connection k, having one or more water-ways, m', in combination with an adjustable operating-stem screwed therein, a loose piston thereon, and a collar, o, arranged substantially as set forth.

5. The tubular connection k, with one or more water-ways, m', an adjustable operating-stem screwed therein, a piston thereon, and a collar, o, in combination with the hollow perforated valve-stem a, substantially as set forth.

6. The valve a^1, hollow stem a, collar o, and spring e, in combination with the loose piston n, substantially as shown and described.

In testimony whereof I have hereunto set my hand.

JOHN FARRELL.

Witnesses:

JAMES M. CHRISTY,

GEORGE H. CHRISTY.