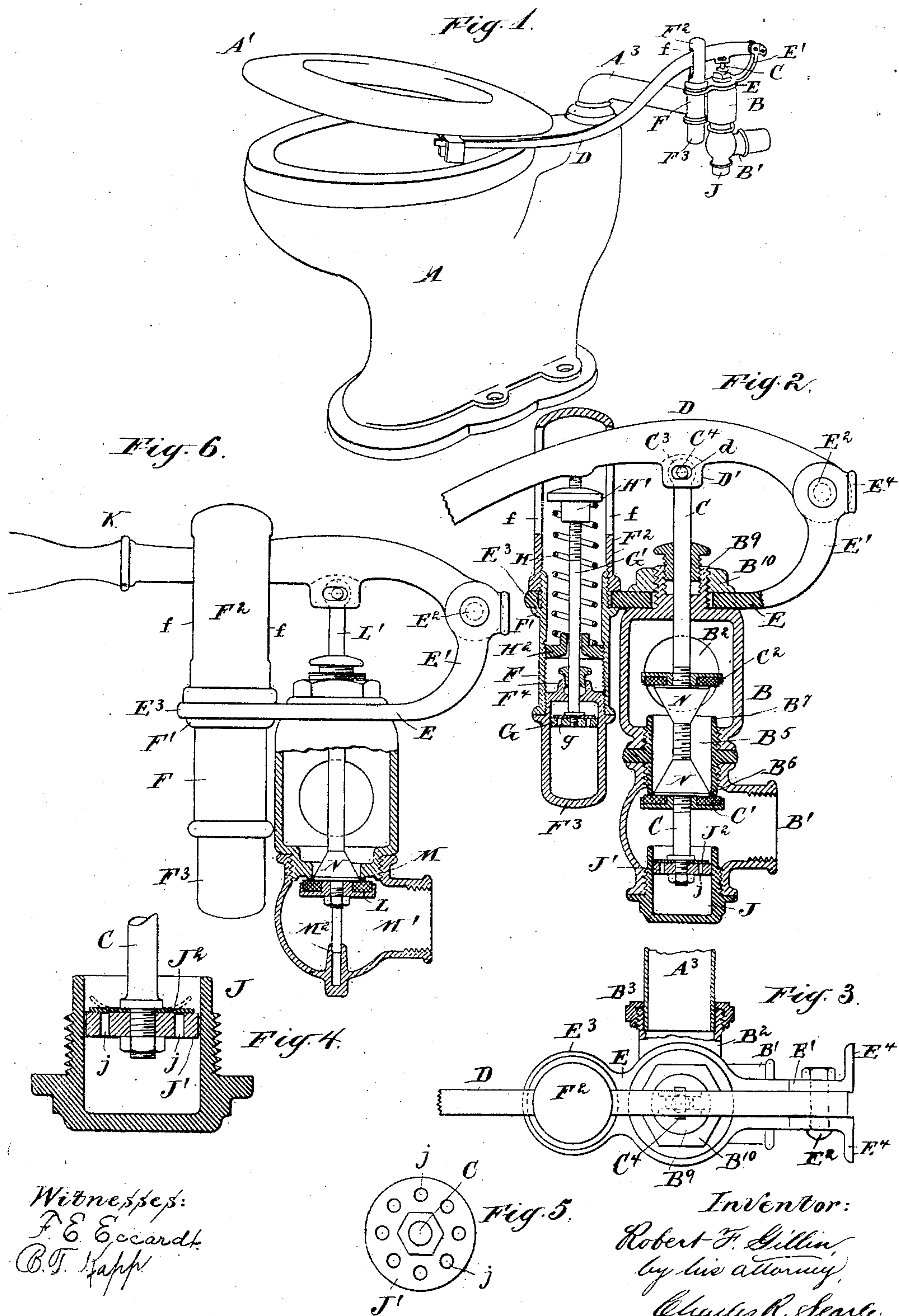


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R. F. GILLIN.  
SELF CLOSING VALVE.  
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# UNITED STATES PATENT OFFICE.

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## SELF-CLOSING VALVE.

SPECIFICATION forming part of Letters Patent No. 785,729, dated March 28, 1905.

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*To all whom it may concern:*

Be it known that I, ROBERT F. GILLIN, a citizen of the United States, residing in the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Self-Closing Valves, of which the following is a specification.

The invention relates more particularly to flushing-valves for plumbing systems by which water is admitted freely when the valve is opened and is then slowly checked in its flow as the valve, urged by the force of a spring, gradually approaches its seat, the slow closing movement being controlled by the action of a plunger or piston in a closed cup or cylinder analogous to a "dash-pot."

The object of the invention is to provide a construction in which the spring and controlling-piston and cylinder forming the dash-pot are independent of the valve-casing and not exposed to the action of the water therein and are readily accessible for adjustment or repairs without interfering with the valve or disturbing its arrangement.

A further object is to so dispose the dash-pot relatively to the valve-operating means that the valve-casing may be positioned as found necessary or desirable without changing such relation.

The invention consists in certain novel features and arrangements of parts by which the above objects are attained and in certain details of construction to be hereinafter described.

The accompanying drawings form a part of this specification and show preferred applications of the invention.

Figure 1 is a perspective view of an automatic water-closet equipped with the improved valve and connections. The remaining figures are on a larger scale and show details of the valve and controlling means. Fig. 2 is a vertical section, partly in elevation, showing the valve illustrated in Fig. 1 with its immediately-connected parts. Fig. 3 is a corresponding plan view. Fig. 4 is a vertical section showing the dash-pot construction on a larger scale, and Fig. 5 is a corresponding view of the under face of the dash-pot

plunger. Fig. 6 is a side elevation, partly in vertical section, showing the invention applied to a hand-operated water-closet valve.

Similar letters of reference indicate like parts in all the figures.

A is the bowl of an automatic closet, in which the flushing-water is controlled by the elevation and depression of the closet-seat A', through a lever D actuating the valve-stem C in the valve-casing B, receiving its water through an inlet B' and delivering it through the outlet B<sup>2</sup> and pipe A<sup>3</sup>, connected at one end to the outlet by a slip-joint at B<sup>3</sup> and at the other to the closet-bowl.

The casing B comprises two main portions, the inlet-chamber and an outlet-chamber, separated by a passage B<sup>5</sup>, having a valve-seat in each chamber. The valve C' in the inlet-chamber is arranged to serve in closing the valve-seat B<sup>6</sup>, and the valve C<sup>2</sup> in the outlet-chamber serves to close the upper valve-seat B<sup>7</sup>. Both valves are mounted on the valve-stem C, which extends axially of the casing and is guided at the lower end, and the valves are sufficiently separated to permit the required movement of the stem in alternately opening and closing the valve-seats. The upper end of the stem has a head C<sup>3</sup>, in which is a transverse pin C<sup>4</sup>, received on each side of the head in a slot d in a depending lug D' on the lever D. Thus connected the valve-stem C and its valves C' C<sup>2</sup> and the lever D rise and sink together.

E is a yoke encircling the stuffing-box B<sup>9</sup> on the casing B and held in place by a nut B<sup>10</sup> on the threaded exterior thereof. A bifurcated arm E' curves upward from one side of the yoke, and with the pin E<sup>2</sup> extending through the lugs of the arm and end of the lever D serves as a fulcrum for the latter.

Cast in one with the yoke and opposite to the arm E' is a ring E<sup>3</sup>, receiving the upper end of a tube F, arranged with its axis parallel with the valve-stem C. The tube may be secured to the yoke by various means or may be cast therewith. I have shown it as projecting through the ring E<sup>3</sup> and provided with a fixed collar F', abutting against the under face of the ring and held firmly by a screw-cap or guide F<sup>2</sup> on the exteriorly-



threaded upper end of the tube. The cap or guide forms an upward extension of the tube and is closed at the top and slotted, as indicated at *f, f*, on opposite sides to receive the lever *D*, extending through it, and hold the latter against lateral strains, while permitting the required up-and-down movement. The lower end of the tube is threaded interiorly and receives a cylinder *F*<sup>3</sup>, forming a downward extension of the tube, closed at the bottom and having a stuffing-box *F*<sup>4</sup> on its upper end within the tube, through which passes the rod *G*' of a plunger or piston *G*, loosely fitted to the interior of the cylinder and provided with a series of openings *g* from one face of the plunger to the other, controlled by any preferred form of valve. I have shown the valve as formed of a washer of leather or like flexible material held to the upper face of the plunger and adapted to lift and allow the oil or other liquid with which the cylinder is filled to pass freely through the series of openings *g* during the downstroke of the plunger and to close the openings on the upstroke. The piston-rod *g*' extends axially of the tube and impinges against the under face of the lever *D* and is urged upward by the force of a helical spring *H*, encircling the piston-rod, abutting at the upper end against a nut *H*<sup>1</sup> on the threaded upper end of the rod and at the lower end against an adjustable collar *H*<sup>2</sup>, mounted in the screw-threaded interior of the tube *F* above the stuffing-box *F*<sup>4</sup>, permitting the expansive force of the spring to be adjusted to the resistance offered by the valves, lever, and weight of the closet-seat. Thus arranged the depression of the closet-seat *A*' forces down the valve-stem *C*, and the valve *C*<sup>2</sup> seats itself upon the upper valve-seat *B*<sup>7</sup> and prevents the flow of water to the bowl, the plunger *G* being similarly depressed and sinking readily by reason of the free passage of oil in the cylinder *F*<sup>3</sup> from below the plunger to the upper face thereof through the openings *g*.

When the closet-seat is released, the action of the spring *H* through the rod *G*' tends to raise the lever *D* and closet-seat *A*' and also through the connections *C*<sup>3</sup> and *D*' between the lever and valve-stem raises the valves *C*' *C*<sup>2</sup>, the upward movement being retarded by the oil above the plunger and the speed determined by the force of the spring and the rate at which the oil may pass. During this lifting movement water flows from the inlet *B*', through the passage *B*<sup>5</sup> and outlet *B*<sup>2</sup>, to the pipe *A*<sup>3</sup> and thence to the bowl to perform the flushing operation, the flow being free in the early portion of the movement and diminishing as the valve *C*' approaches its seat *B*<sup>6</sup> until it ceases with the seating of the valve and the parts conditioned for a succeeding flushing operation.

Under ordinary conditions of pressure and leverage it is sufficient merely to guide the

lower end of the valve-stem, as in the construction shown in Fig. 6, to be presently described; but when the water-pressure is excessive there is a tendency of the valve *C*' to seat itself too quickly. To aid the cylinder *F*<sup>3</sup> in retarding the movement, I employ an auxiliary dash-pot *J*, screwed into the lower end of the inlet-chamber and containing a plunger *J*', secured to the lower end of the valve-stem *C* and having a series of openings *j* and valve *J*<sup>2</sup> in all respects similar to the dash-pot *F*<sup>3</sup>, but working with the water received in the valve-casing instead of with oil. In the cylinder *F*<sup>3</sup> the plunger works in a confined volume of liquid in moving in either direction. In the auxiliary dash-pot the plunger *J*' sinks readily in the cup *J* and is held by atmospheric pressure against rising at a rate faster than is allowed by the passage of water around it or leaking past the disk or valve *J*<sup>2</sup>.

By locating the cup *J* at a low point in the casing its supply of water is assured under all conditions, and by the construction shown the necessity for a stuffing-box is avoided, and it also serves as a guide for the extremity of the valve-stem.

Fig. 6 shows a flushing-valve arranged to be operated by a hand-lever *K*. In this form of the invention the yoke *E* and tube *F* and its connections are in all respects similar to those above described. The valve-stem *L*' carries a single valve *L*, matching to the valve-seat *M* and contained in an inlet-chamber *M*', provided with a guide *M*<sup>2</sup>, receiving the lower end of the valve-stem and serving instead of the cup *J*. The depression of the hand-lever *K* forces the valve from its seat and permits the flow of water during the gradual rise of the lever until the valve is again seated.

*N N* are conical nuts serving to hold the valves in position on the stem and also by gradually filling the openings in the valve-seats to prevent hammering due to the sudden stopping of the flow of water therethrough.

*E*<sup>4</sup> *E*<sup>4</sup> are lugs formed on the curved arm *E*' of the yoke and serving to secure the fulcrum of the lever firmly to the wall of the apartment or other convenient support.

The lower end of the valve-stem is of such length relatively to the depth of the guide or cup as to serve as a stop for limiting the downward movement.

It will be noted that the valve-casing may be set in any desired position to present the inlet and outlet nozzles favorably to the water-supply pipe and to the bowl, and the yoke may be turned on the casing to present the lever in any desired position relatively thereto. The tube *F* and its connections being attached to the yoke are always in position to act through the rod *G*' upon the lever, thus permitting the valve to be easily installed under all conditions, the slip-joint connection between the casing and bowl permitting con-



nection to the latter to be easily made without danger of fracture from excessive strains.

I attach importance to the fact that the cylinder  $F^3$  and piston  $G$ , forming a dash-pot, are independent of the casing. Thus constructed the cylinder may be supplied with oil, and the corrosion of the spring and other parts, due to the action of water, may be avoided, and by eliminating the spring from the valve-casing the latter affords an unobstructed passageway for the flushing-water.

The cap  $F^2$ , besides serving as a guide for the lever, conceals the spring and piston-rod, and thus adds to the neat appearance of the apparatus.

Modifications may be made in the forms and proportions of the parts and in various details of construction.

The cylinder  $F^3$  and its parts may be formed and attached differently than here shown and may be differently located in respect to the lever and valve. The plunger may be provided with other means than the series of openings and flexible disk or washer to permit the easy flow of oil in one direction, and the force of the spring may be differently applied.

Other liquids may be substituted for oil in the cylinder  $F^3$  or air may serve.

Parts of the invention may be used without the whole. The cylinder  $F^3$  may be omitted and the cup  $J$  depended upon alone to induce the desired slow movement of the valve in closing in response to the action of the spring, or the cup  $J$  may be dispensed with and the dash-pot  $F^3$  alone used. The spring may be used without either of the dash-pots shown, or other means for retarding the motion may be used with the spring.

Although I have described the invention as applied to water-closet valves, it will be understood that it may be applied to valves serving in other situations and in general to valves in which a quick opening and slow closing movement is desirable.

I claim—

1. A valve-casing containing a valve, a lever for operating the latter, and means for inducing a return movement of the lever and valve, in combination with a closed cylinder independent of said casing, a plunger disposed parallel with the valve-stem and arranged to move quickly in one direction in said cylinder and slowly in the opposite direction, and loose connections in said cylinder from said plunger to said lever.

2. A valve-casing, a valve therein, a valve-stem for said valve, a yoke on the casing having a bifurcated arm, a lever fulcrumed on said arm and having loose connection intermediate its ends with said stem, a cylinder parallel with and by the side of said casing, and supported by said yoke and slotted for the passage of the lever, a spring in said cylinder beneath the lever, a cup detachably depending from the cylinder, and a plug in said cup having a stem under the lever and surrounded by said spring, all as and for the purpose specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

ROBERT F. GILLIN.

Witnesses:

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CHARLES R. SEARLE.