C. F. JOHNSON.

FLUSHING DEVICE.

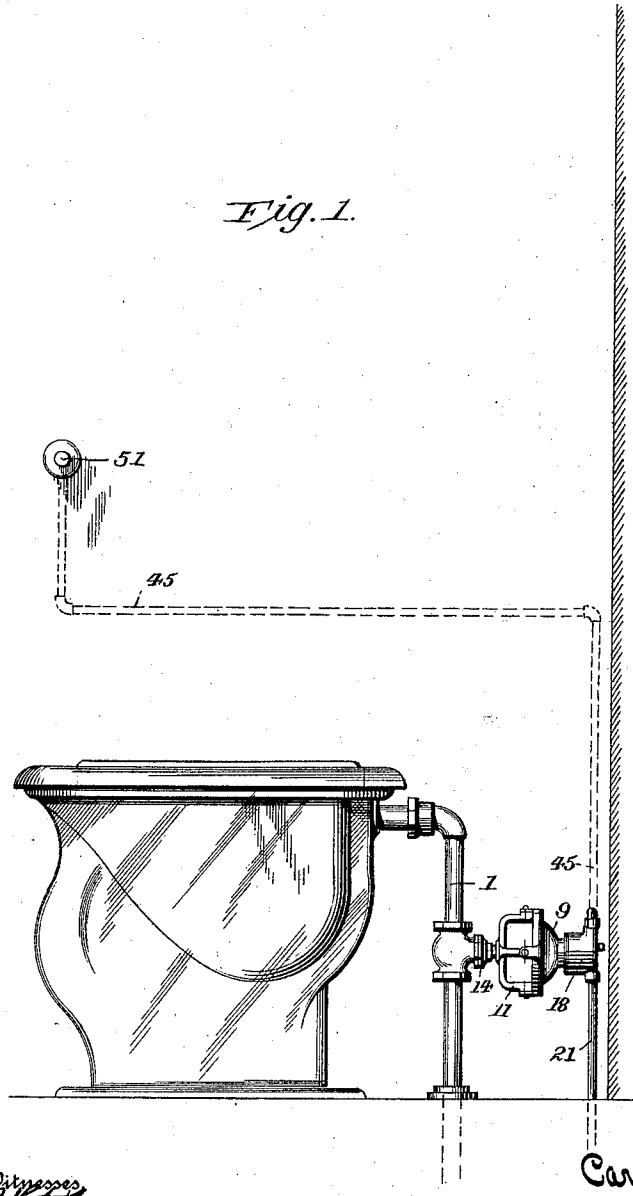
APPLICATION FILED NOV. 13, 1908.

1,029,687.

Patented June 18, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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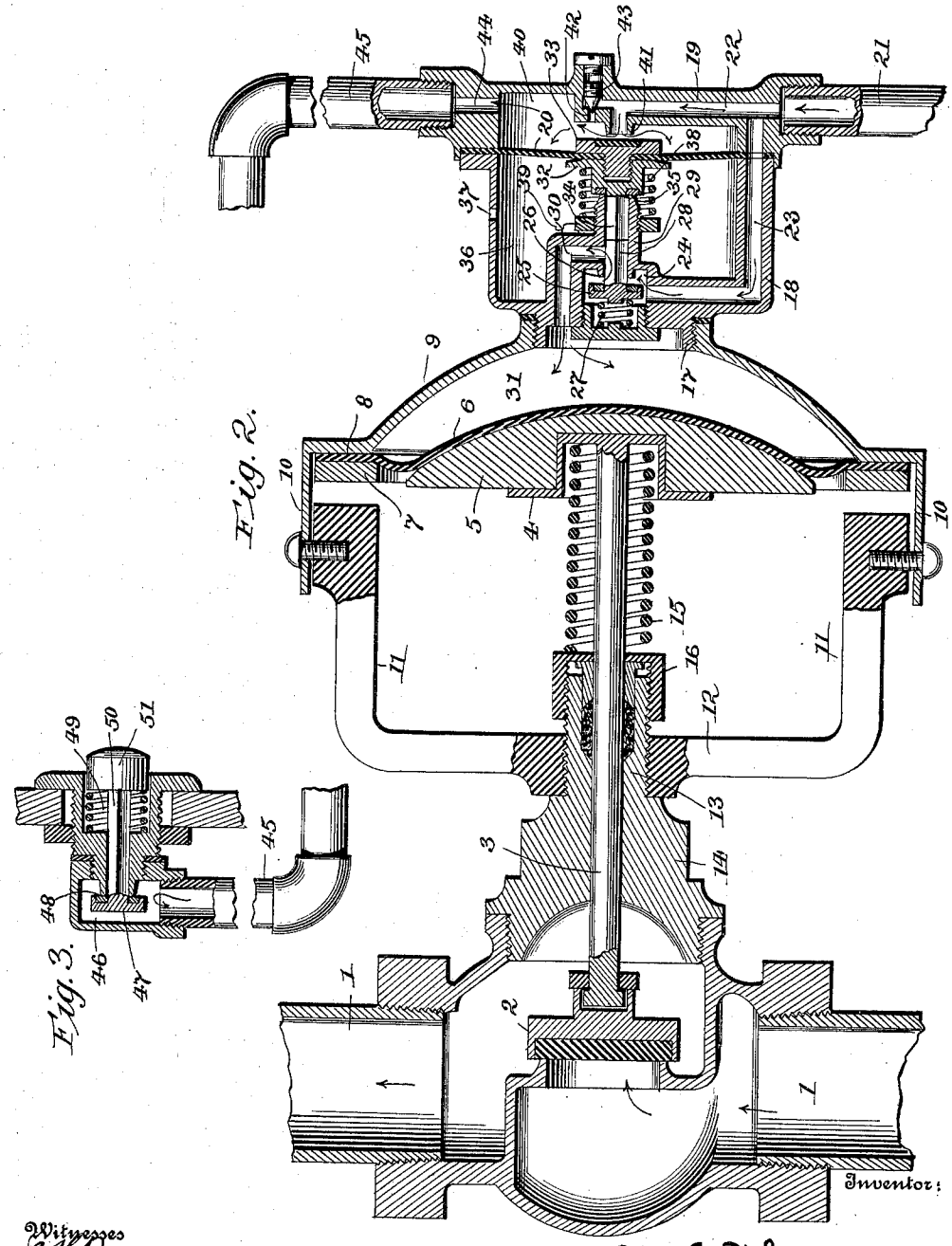

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

CARL F. JOHNSON, OF MILWAUKEE, WISCONSIN.

FLUSHING DEVICE.

1,029,687. Specification of Letters Patent. Patented June 18, 1912.

Application filed November 13, 1908. Serial No. 462,511.

To all whom it may concern:

Be it known that I, CARL F. JOHNSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Flushing Devices, of which the following is a specification.

My present invention pertains to an improved flushing apparatus, adapted more especially for use in connection with water-closets, latrines, and the like.

The invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevation of the apparatus shown as applied to a closet; Fig. 2 an enlarged longitudinal sectional view of the valve and the fluid-pressure mechanism employed to operate the same; and Fig. 3 a detail sectional view of the relief valve, which is actuated to vent the apparatus and to thereby start the fluid-pressure mechanism into operation.

The main object of the invention is to provide an apparatus whereby a flow of water may be maintained for a definite period and thereafter automatically shut off through the agency of fluid-pressure mechanism, the flow of water being started by the manipulation of a push-button or like device, which vents the valve-actuating motor.

A further object of the invention is to so construct the apparatus as to produce a relatively quick seating of the water valve after the requisite quantity of water has passed therethrough, so as to prevent wire-drawing thereof. The action is not, however, so quick as to produce a water hammer.

In the drawings, 1 denotes a pipe, through which water or other liquid is forced under pressure, and 2 a valve located in said pipe and serving to control the flow of the liquid therethrough. The valve 2, as will be seen upon reference to Fig. 2, seats against the pressure of the liquid. The stem 3 of said valve carries at its outer end a cap 4, the outer portion of which passes into a recess formed in the adjacent face of a plate 5, the opposite face of the plate being rounded or convex and bearing against a flexible diaphragm 6. The edge of said diaphragm is held between a ring 7 and the flat portion 8 of a dome-shaped member 9. Said member is provided with ears 10 which are secured to the arms 11 of a spider frame 12 which, in the form shown, is secured upon an externally-threaded tubular projection 13 formed as an extension of the bonnet 14 of the valve.

A spring 15 encircles the stem 3 and bears at its outer end against the cap 4 and at its opposite end against a cap 16, which is screwed upon the outer end of the tubular projection 13.

The outer end of the dome-shaped member 9 is provided with an internally-threaded opening into which is screwed a nipple 17 formed upon a shell or casing 18.

A second shell 19 is secured upon the outer end of the shell 18, a diaphragm 20 being clamped between the adjacent faces of said shells. A pipe 21 serves to conduct fluid under pressure into an opening or channel 22 formed in the shell 19, and likewise into a channel 23 formed in the shell or casing 18. Said channel 23 opens into a valve-chamber 24, in which is mounted a valve 25, normally urged to its seat 26 by a spring 27. The stem 28 of the valve 25 is polygonal in cross-section and works in a circular opening formed in an inwardly-projecting member 29 of the shell or casing 18. A duct or channel 30 provides communication between the opening in the member 29 and a chamber 31 formed between the diaphragm 6 and the wall of the dome-shaped member 9.

The diaphragm 20 carries two valves 32 and 33. Valve 32 is provided with a polygonal stem 34, which works in the rounded opening formed in the member 29. Said valve 32 works in conjunction with a valve-seat 35 and serves to vent the chamber 31 into a chamber 36 formed in the shell or casing 18 through channel 30 and the passage formed in the member 29 when the valve 32 is withdrawn from its seat. A vent 37 is formed in the wall of the chamber 36, so that the air passing from the chamber 31 into the chamber 36 may escape to the atmosphere.

A spring 38, bearing at one end upon an adjustable nut 39 and at its opposite end upon the body of the valve 32, serves to withdraw said valve from its seat; or in other words, works in opposition to the diaphragm 20, which is normally pressed inwardly by the air or other fluid under pressure which passes into a chamber 40 formed between the diaphragm 20 and the outer

wall of the shell 19 through the channel 22, past the valve 33 when said valve is removed from its seat 41 by the pressure of the air in said chamber 40. A by-pass 42, provided with an adjustable pin-valve 43, is also in communication with the port or channel 22 and the chamber 40.

A port or passage 44 is connected with a pipe 45, which pipe leads and is connected to a valve chamber 46 in which a valve 47 is mounted and normally held to its seat 48 by a spring 49. The valve-stem 50 is polygonal in cross-section and working through an opening which is circular in cross-section affords a vent for the pipe 45 and consequently for the chamber 40, when the valve 47 is moved away from its seat by the inward movement of a push-button 51.

The diaphragm 6 and its allied parts may be termed a "primary fluid-pressure motor," which controls the closing movement of the valve 2. Valve 25 may be termed an "induction valve" and valve 32 an "eduction valve" for the primary fluid-pressure motor. The diaphragm 20 and its allied parts may be termed a "secondary motor" or motor for controlling the valves of the primary motor. The valve 33 may be termed the "primary feed valve" for the secondary motor, and the valve 47 the "exhaust valve" for said secondary motor.

The operation of the apparatus is as follows: Assuming, of course, that water under pressure is being supplied to the pipe 1 and passes through the valve in the direction of the arrow in Fig. 2, and further assuming that a constant supply of air or other fluid under pressure is maintained in the pipe 21, so long as the secondary motor is not vented, or in other words, so long as the valve 47 remains closed the air-pressure in the secondary motor will hold the parts in the positions shown in Fig. 2, in which it will be noted that the eduction valve 32 is closed and the induction valve 25 is open, so that air under pressure may pass directly through the pipe 21, port or channel 23, around the stem 28, through channel 30 and into the chamber 31, thereby forcing the diaphragm inwardly and closing the valve 2. When, however, it is desired to open the valve 2 and to permit water to pass therethrough, an inward movement of the push-button 51 will open the valve 47 and consequently vent the chamber 40 of the secondary fluid-pressure motor. The escape of the air from chamber 40 will permit the spring 38 to immediately close the valve 33 upon its seat and prevent further ingress of air into the chamber 40, at the same time opening the eduction valve 32. The valve 25 will then immediately be forced to its seat by the action of the spring 27, so that ingress of air to the chamber 31 of the primary motor will be prevented and said chamber will be vented through the channel or passage 30, the passage formed in the member 29, into the chamber 36, and through the opening 37. The water or other liquid under pressure will then force valve 2 from its seat, which action is assisted in a measure by the spring 15. The parts will remain in these positions and the water continue to flow through the pipe 1 until the pressure is restored in the secondary motor. This is accomplished slowly and the time necessary may be determined by the regulation of the pin-valve 43, which, as before noted, controls the by-pass or feed port 42. The air at first passes slowly through this port and eventually refills the chamber 40 of the secondary motor to such an extent as to unseat valve 33, when the inrush of air will quickly fill chamber 40 and, overcoming the tension of the spring 38, force the valve 32 to its seat. The stem 34 of valve 32 abutting against the stem 28 of valve 25 moves said valve 25 off of its seat and thereby reestablishes communication between the supply pipe 21 and the chamber 31 of the primary fluid-pressure motor. The accumulation of air in the chamber 31, which takes place rather rapidly, will close the valve 2 and consequently shut off the flow of liquid therethrough. The relation between the valves 33 and 25 is such that the valve 25 will not start to open until the valve 33 has opened sufficiently to cause the quick action of the diaphragm 20 just noted. As a consequence, the valve 32 is closed just after or approximately with the opening of the valve 25, and by reason of this no air from the channel or port 23 can escape to the atmosphere through the chamber 36 and vent 37.

In practice the valve mechanism is found to operate with sufficient celerity or rapidity to prevent wire-drawing of the same, while the operation is not sufficiently quick to cause a water-hammer.

It is conceivable that instead of connecting the shell or casing 18 directly to the member 9, the parts may be located at a distance from each other and connected by a pipe or suitable conduit.

The push-button or vent valve may be located at any convenient point.

Having thus described my invention, what I claim is:

1. In combination with a valve controlling the flow of liquid under pressure; a fluid-pressure motor acting to close the same; a source of fluid pressure leading to said motor; a second motor likewise in communication with said source of pressure; a valve mechanism controlled by said second motor to alternately vent and to place the first motor in communication with the source of fluid pressure; means for quickly venting said second motor; means for gradually restoring the pressure in said second motor;

and means for establishing full pressure within said motor after it has been partially restored.

2. In combination with a valve controlling the flow of liquid under pressure; a fluid-pressure motor acting to close the same; a source of fluid pressure leading to said motor; a second motor likewise in communication with said source of pressure; a valve mechanism controlled by said second motor to alternately vent and to place the first motor in communication with the source of fluid pressure; means for venting the second motor; a valve acting to cut off the supply of fluid from said second motor when the motor is vented and to restore the full pressure within the motor after the pressure has been partially reëstablished; and means for gradually reëstablishing the pressure within said second motor.

3. In combination with a valve controlling the flow of liquid under pressure; a fluid-pressure motor acting to close the same; a source of fluid-pressure leading to said motor; a valve controlling the inlet of fluid under pressure to said motor; means for normally holding or urging said inlet valve to its seat; a second fluid-pressure motor having a diaphragm; an exhaust valve for the main motor mounted upon one side of said diaphragm; means interposed between said exhaust valve and the inlet valve for moving the latter from its seat as the former is closed; a valve mounted upon the opposite side of the diaphragm and serving when the second motor is exhausted to close the main supply port leading to said motor; means for gradually recharging the second motor; and means for venting said second motor.

4. In combination with a valve controlling the flow of liquid under pressure; a fluid-pressure motor acting to close the same; a source of fluid pressure leading to said motor; an inlet valve controlling the flow of fluid to said motor; a spring acting to seat said inlet valve; a stem extending outwardly from said inlet valve; a second motor having a movable diaphragm; an exhaust valve mounted upon one face thereof; a stem extending outwardly from said exhaust valve toward the stem upon the inlet valve; a spring acting to unseat said exhaust valve; a valve mounted upon the opposite side of the diaphragm and serving, when said second motor is exhausted, to close the main supply port thereof; an adjustable feed port for said second motor; and a manually-actuated vent for said second motor.

5. In combination with a valve controlling the flow of liquid under pressure; a fluid-pressure motor for closing the same; an inlet valve leading to the motor; an exhaust valve therefor; a second fluid-pressure motor acting to close the exhaust valve and to open the inlet valve; and means for causing said second motor to operate quickly during the latter part of its valve-actuating movement.

6. In combination with a valve controlling the flow of liquid under pressure; a fluid-pressure motor for closing the same; an inlet valve leading to the motor; an exhaust valve therefor; a second fluid-pressure motor acting to close the exhaust valve and to open the inlet valve; and means for slowly recharging the second motor at first and then quickly filling the same, whereby a quick closing of the main valve is insured.

7. In combination with a valve controlling the flow of liquid under pressure; a fluid-pressure motor for actuating the same; an exhaust valve for said motor; a second fluid-pressure motor serving normally to close said exhaust valve; means for venting said second motor; and means for slowly recharging the second motor at first and then quickly filling the same, whereby a quick closing of the exhaust valve is produced and a relatively quick recharging of the main motor is obtained.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL F. JOHNSON.

Witnesses:
W. F. TESCHAU,
WM. C. BRUST.