C. F. JOHNSON.

FLUSHING DEVICE.

APPLICATION FILED NOV. 19, 1908.

1,029,688.

Patented June 18, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

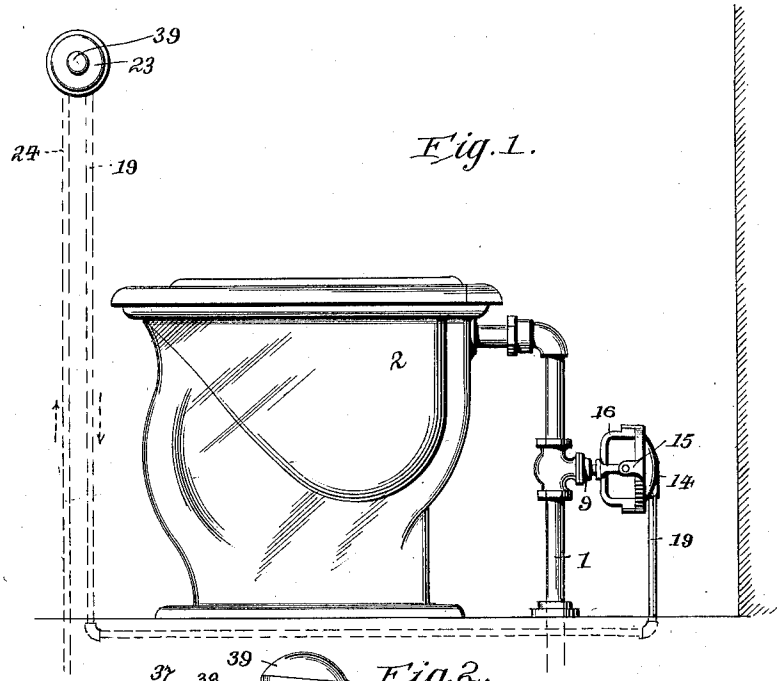


Fig. 2.

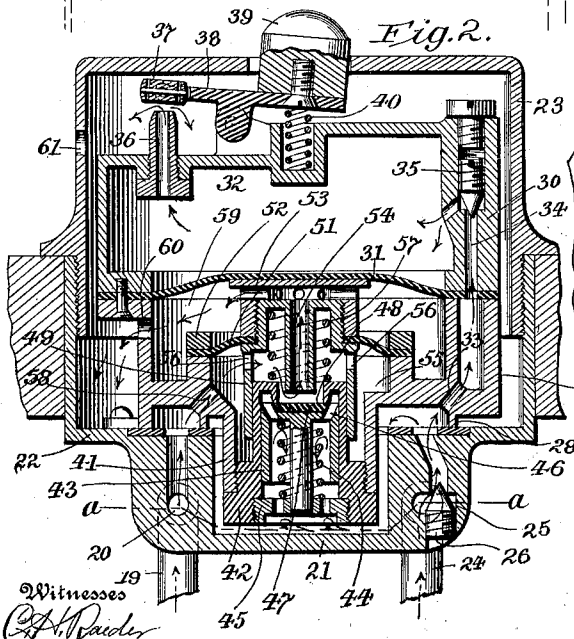
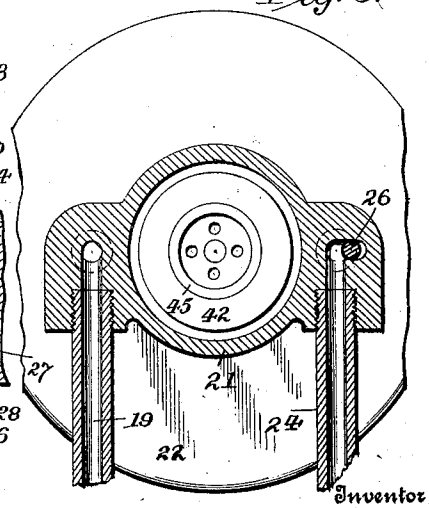


Fig. 3.



Witnesses

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2 SHEETS—SHEET 2.

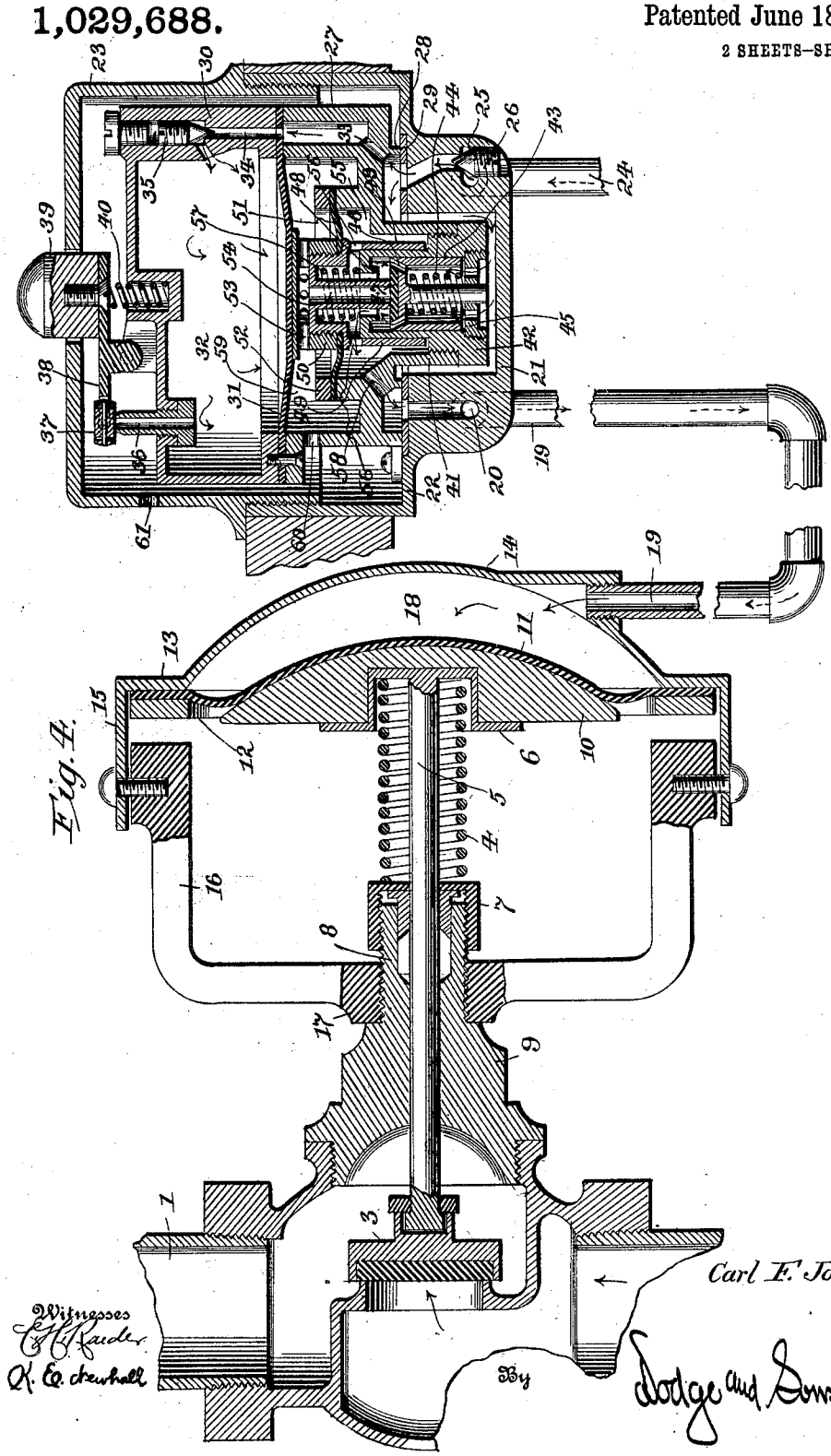

Fig. 4.

Witnesses

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FLUSHING DEVICE.

1,029,688. Specification of Letters Patent. Patented June 18, 1912.

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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, laterines, 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 a longitudinal sectional view of the valve mechanism, the supporting case or housing, and the push-button which controls the exhaust or relief valve; Fig. 3 a transverse sectional view, taken on the line *a*—*a* of Fig. 2; and Fig. 4 a longitudinal sectional view of the mechanism shown in Fig. 2, the parts being differently positioned, the water controlling valve and its fluid-pressure motor, which latter is controlled in its operation by the valve mechanism just mentioned.

The main object of the present invention is to provide a simple and efficient device whereby water may be caused to flow for a fixed period of time to a closet or the like, and then automatically shut off.

A further object of the invention is to provide a fluid-pressure motor for closing a valve controlling the flow of water or the like, which motor will be caused to alternately open and close the valve through the operation of a suitable valve mechanism, which mechanism controls the flow of fluid to and from the motor, the valve mechanism in turn being caused to assume one or another position by the manual venting of said mechanism.

In the drawings, 1 denotes the water-supply pipe, through which the water passes in the direction indicated by the arrows in Fig. 4, said pipe in the construction shown in Fig. 1 communicating with the closet-bowl, 2. A valve 3 controls the flow of the water through said pipe, the valve seating against the pressure of the water and being normally withdrawn from its seat by a spring 4, which surrounds the valve-stem 5, bearing at its upper end against a cap 6 carried at the outer end of the stem and at the opposite end against a cap 7 which is screwed upon an externally-threaded tubular projection 8 formed upon the valve bonnet 9.

A plate 10 is mounted upon the cap 6, the outer face of the plate being convex and bearing against a flexible diaphragm 11, the edge of which is secured between a ring 12 and the flat portion 13 of a dome-shaped member 14. Said member is provided with a series of ears 15 which are secured to the arms 16 of a spider frame 17 which in the form illustrated is secured upon the threaded projection 8.

The fluid-pressure chamber 18, formed between the diaphragm 11 and the dome-shaped member 14, is in communication with a pipe 19, the opposite end of which terminates in a port or passage 20 formed in the pipe-head 21. Said head, as will be noted upon reference to Figs. 2 and 4, is provided with an outwardly-extending shell 22 which has secured to it a cover or casing 23, the shell and cover inclosing the working parts of the valve mechanism.

A pipe 24 is connected to the pipe-head and communicates with a port 25 in which is located a regulating valve 26. Mounted within the shell 22 of the pipe-head is a frame or casting 27, provided with a downwardly-projecting flange 28, which flange makes a tight joint with a gasket 29 interposed between said flange and the adjacent face of the pipe-head. A shell 30 surmounts the casting 27 and a flexible diaphragm 31 is secured at its edge between the adjacent faces of the casting 27 and the shell 30, forming a fluid-pressure chamber 32 in said shell or casing, as clearly seen upon reference to Figs. 2 and 4. Fluid under pressure may pass into said chamber through ports or passages 33 and 34, a regulating valve 35 being interposed in the passage 34 so that the quantity of air which may pass into the fluid-pressure chamber 32 in a given time may be regulated. A vent passage 36 is provided for the chamber 32, said passage being normally closed by a valve 37 carried at the outer end of an arm or lever 38, the opposite end of said lever being provided with a push-button 39 which

extends through an opening formed in the cover or casing 23. A spring 40 serves to protrude the push-button through said opening and to force the valve 37 to its seat, thereby sealing the chamber 32. Casting 27 is provided with a downwardly-projecting collar 41, extending into an opening or recess formed in the pipe-head. Said collar is interiorly threaded at its lower end, and a sleeve 42 is mounted therein, the upper end of the sleeve being somewhat reduced in diameter. A cylindrical valve 43 is mounted within the lower end of the sleeve and is urged upwardly by a spring 44 which at its upper end bears against the under face of the valve and at its lower end against a perforate nut 45 which is screwed into the lower end of the sleeve 42. The upper end of the valve is provided with a series of perforations 46 and a disk 47 of patent leather or like material is mounted in the upper face of the valve, and when said valve is raised, as in Fig. 2, the disk comes against the valve-seat 48, which has the shape of a downwardly-projecting rib preferably formed as an integral portion of the sleeve 42.

Mounted upon the upper reduced end of the sleeve 42 is a cylindrical member 49, the upper end of which is reduced and exteriorly threaded to receive a nut 50, between which and a shoulder formed upon the cylindrical member 49 is clamped the inner edge of a diaphragm or ring 51, the outer edge of said diaphragm being secured in place between the upper edge of the casting 27 and a ring 52. This diaphragm may be said to form a flexible packing for the valve, and prevents any air from passing upwardly between the valve and the wall of the member 27. The upper end of the nut is provided with a series of perforations 53, which communicate with an opening formed in a downwardly-projecting tubular member 54 formed as an integral portion of the cylindrical member 49. Said tubular member projects downwardly through an opening formed in the upper portion of the sleeve 42, the opening being somewhat larger than the outer diameter of the tubular member, so as to leave a space between the two, which space is at all times in communication with a chamber 55 formed below the diaphragm 51, through openings or ports 56 formed in the side walls of the cylindrical member 49. A spring 57 surrounds the tubular member 54 and serves to move the cylindrical member 49 and its allied parts upwardly when the chamber 32 is vented and the diaphragm 31 is relieved of pressure upon its upper face. A port or passage 58 is formed in the casting 27 and serves to place the chamber 55 in communication with the port 20 and consequently with the fluid-pressure chamber 18.

For the sake of clearness, the chamber 18 and its allied parts may be designated as a "fluid-pressure motor" and the chamber 32 and its allied parts as a "second fluid-pressure motor". The tubular member 54 may be termed the "exhaust valve" and the member 43 the "inlet valve".

The operation of the apparatus is as follows, reference being had to Fig. 4: Fluid under pressure passing from the pipe 24 into the port or passage 25 will enter the space in the pipe-head formed between the inner walls thereof and the downwardly-inclined collar 41. Thence it passes through the perforations in the nut 45, through the hollow cylindrical valve 43, through the perforations 46 formed therein, around the tubular member 54, which at such time is seated upon the disk 47 so that no air or other fluid can pass therethrough, through the ports or openings 56, port or passage 58, port 20, pipe-head 19 and into the fluid-pressure chamber 18, where it will exert its force and close the valve 3 against the pressure of the liquid passing through the pipe 1. Simultaneously with the passage of air in the manner just indicated, the air will likewise pass through the ports 33, 34 and into the fluid-pressure chamber 32. In fact, the valves will not come to the position shown in Fig. 4 until the pressure in chamber 32 is sufficient to seat the exhaust valve 54 and to thereby move the inlet valve away from its seat and permit the air to pass in the direction just noted. When the vent valve 37 is moved from its seat by an inward movement of the push-button, the air will be exhausted from the chamber 32 and the parts will assume the positions shown in Fig. 2. Chamber 32 being exhausted, the spring 57 will raise the valve 54 and the diaphragm 31, thereby permitting the air to be exhausted from the fluid-pressure chamber 18, through pipe 19, port or passage 58, ports 56 leading from the chamber 55, upwardly through the tubular member 54, through ports 53 and into the exhaust chamber 59 located below the diaphragm 31, which chamber vents through a passage 60 into the shell 22, from which point it may be discharged through a suitable opening formed in the shell or in the cover 23, such vent being shown at 61 in the latter. This last vent, however, is not essential if it be desired that the air shall exhaust from the casing through the opening in which the push-button works. The parts will maintain the positions shown in Fig. 2 so long as the exhaust valve 37 is held off of its seat, or after it is seated until the chamber 32 contains sufficient fluid to overcome the force of the springs 57 and 44. The time which is required to fill the chamber 32 depends upon the adjustment of the valve 35. If the valve is set closely then a longer

period will obtain than would be the case if the air had a relatively free inlet into said chamber. The relation of the inlet and exhaust valves is such that one valve must close before the other can open. Thus, when moving from the position shown in Fig. 2 to that shown in Fig. 4 the exhaust valve 54 will be seated against the disk 47 before it will move the valve 43 from its seat, so that no air can pass from the source of fluid pressure to the atmosphere without having first done its work in the fluid-pressure chamber 18.

It is designed in practice to provide the inlet valve with a relatively large opening so that a slight movement will let sufficient air through to cause the fluid-pressure motor to operate the water valve quickly. In practice it is found that the arrangement is such that the water valve acts quickly enough to prevent wire-drawing, while on the other hand it does not close so quickly as to cause a water-hammer.

By adjustment of the valve 26 a quick opening of the primary motor may be produced, which adjustment, however, will not interfere with a slow closing of the same. This is, in some instances, important, for in certain forms of closet bowls it is desirable that the water should be delivered thereto quickly in flushing, while on the other hand, the water should be delivered slowly in filling.

It will be readily appreciated that the housing for the valve mechanism may be located at any desired point, so long as the push-button is within easy reach.

Having thus described my invention, what I claim is:

1. In combination with a valve controlling the passage of fluid through a pipe; a fluid-pressure motor acting to close the valve; a source of fluid pressure in communication with the motor; an inlet valve controlling the supply of fluid pressure to said motor; a spring urging said inlet valve toward its seat; an exhaust valve, said valve being provided with a hollow stem, the lower end of which, when closed, is seated upon the inlet valve and serves to move said latter valve from its seat; a second fluid-pressure motor for operating said exhaust valve; means for venting said second fluid-pressure motor; and means for feeding air gradually into said motor.

2. In combination with a valve controlling the passage of fluid through a pipe; a fluid-pressure motor acting to close the valve; a source of fluid pressure; an inlet valve controlling the passage of fluid under pressure to the motor; a spring urging said inlet valve toward its seat; an exhaust valve provided with a hollow stem, the lower end of which seats itself upon the inlet valve and serves, when closed, to unseat said inlet valve; a diaphragm located above said exhaust valve; a chamber formed above the diaphragm; a valve for venting said chamber; and a valve for controlling the flow of fluid under pressure through an opening into said chamber.

3. In combination with a valve controlling the passage of fluid through a pipe; a fluid-pressure motor acting to close the valve; a source of fluid pressure in communication with the motor; an inlet valve serving to control the passage of fluid to the motor; a spring acting to force said inlet valve to its seat; an exhaust valve comprising a cylindrical member mounted and movable upon the outer face of the housing for the inlet valve and likewise provided with a tubular extension the lower end of which seats itself when said valve is closed upon the head of the inlet valve, said exhaust valve being provided with a series of combined feed and exhaust ports in the lower portion thereof and with exhaust ports in the upper portion thereof which are in communication with the tubular member; a spring serving to elevate said exhaust valve; a diaphragm located above the exhaust valve and forming the lower wall of a chamber; an exhaust valve controlling the exhaust port for said chamber; and a valve for controlling the passage of fluid under pressure into said chamber.

4. In combination with a valve controlling the passage of fluid through a pipe; a fluid-pressure motor for operating the same and serving to close the valve; a source of fluid pressure connected to said motor; a reciprocating inlet valve controlling the passage of fluid into the motor; a spring serving to move the inlet valve to its seat; a reciprocating exhaust valve, said valve having a series of ports arranged adjacent to its lower end for the inlet and outlet of air therethrough and likewise provided with a series of ports in its upper end communicating with the interior of the valve for permitting exhaust air to pass therethrough; a diaphragm secured at its inner edge to said exhaust valve and at its outer edge to a fixed portion of the apparatus; a spring serving to elevate the exhaust valve; a second fluid-pressure motor located above the exhaust valve; means for venting said second motor; and means for admitting fluid under pressure to said motor.

5. In combination with a valve adapted to control the passage of fluid through a pipe; a fluid-pressure motor for closing the valve; a source of fluid pressure in communication with said motor; an inlet valve serving to cut off the passage of fluid to the motor; an exit valve supported by a flexible diaphragm which permits the valve to move endwise; a second fluid-pressure motor having a flexible diaphragm which serves to

move the exit valve so as to close the same and at the same time cause said exit valve to open the inlet valve; means for venting said second fluid-pressure motor; and means for permitting the said second fluid pressure motor to be gradually recharged when the exit is closed.

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

CARL F. JOHNSON.

Witnesses:
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W. F. TESCHAU.