No. 844,180. PATENTED FEB. 12, 1907.

N. NILSON.

SELF CLOSING VALVE.

APPLICATION FILED AUG. 16, 1906.

Fig. 1.

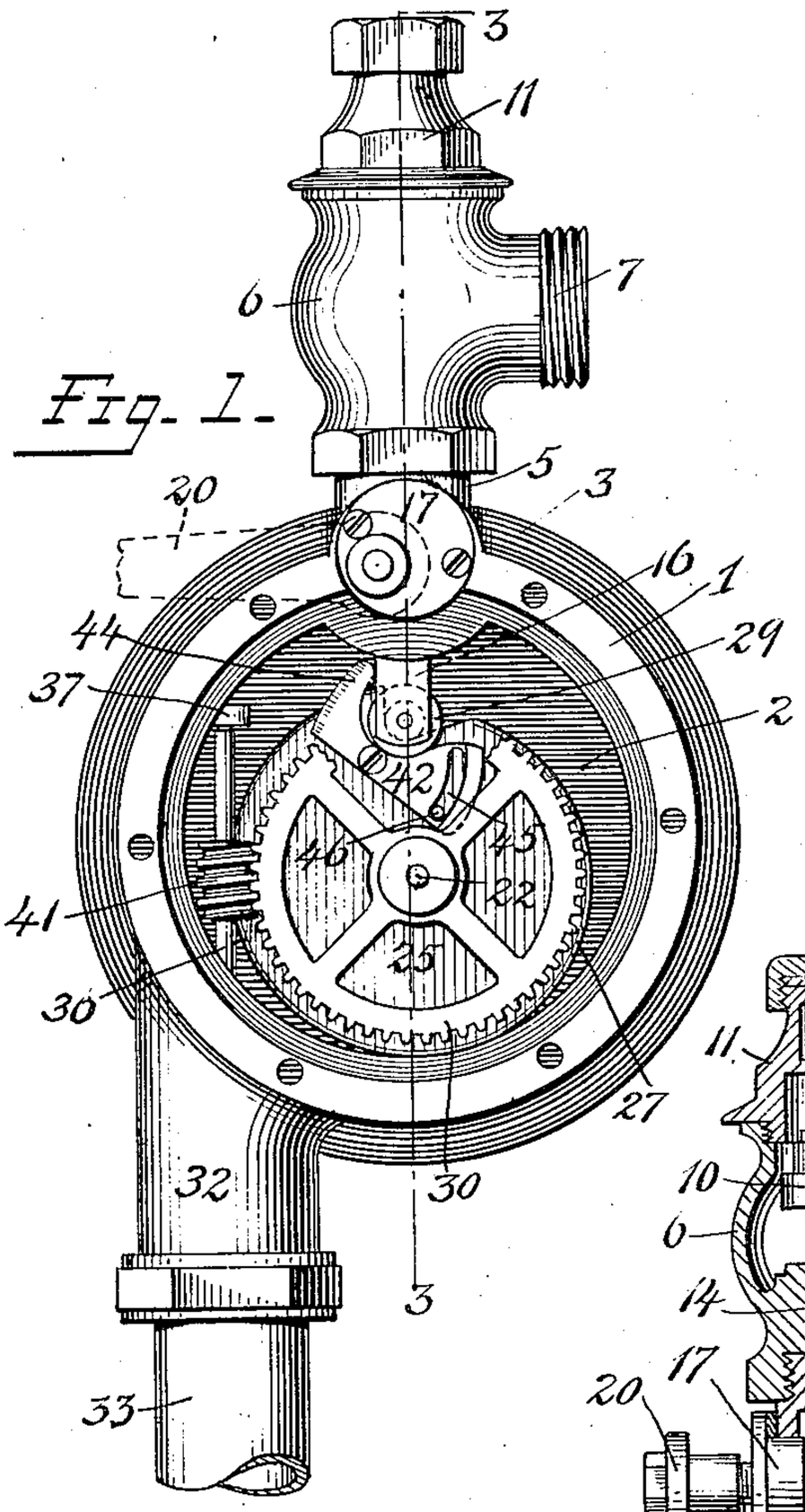


Fig. 2.

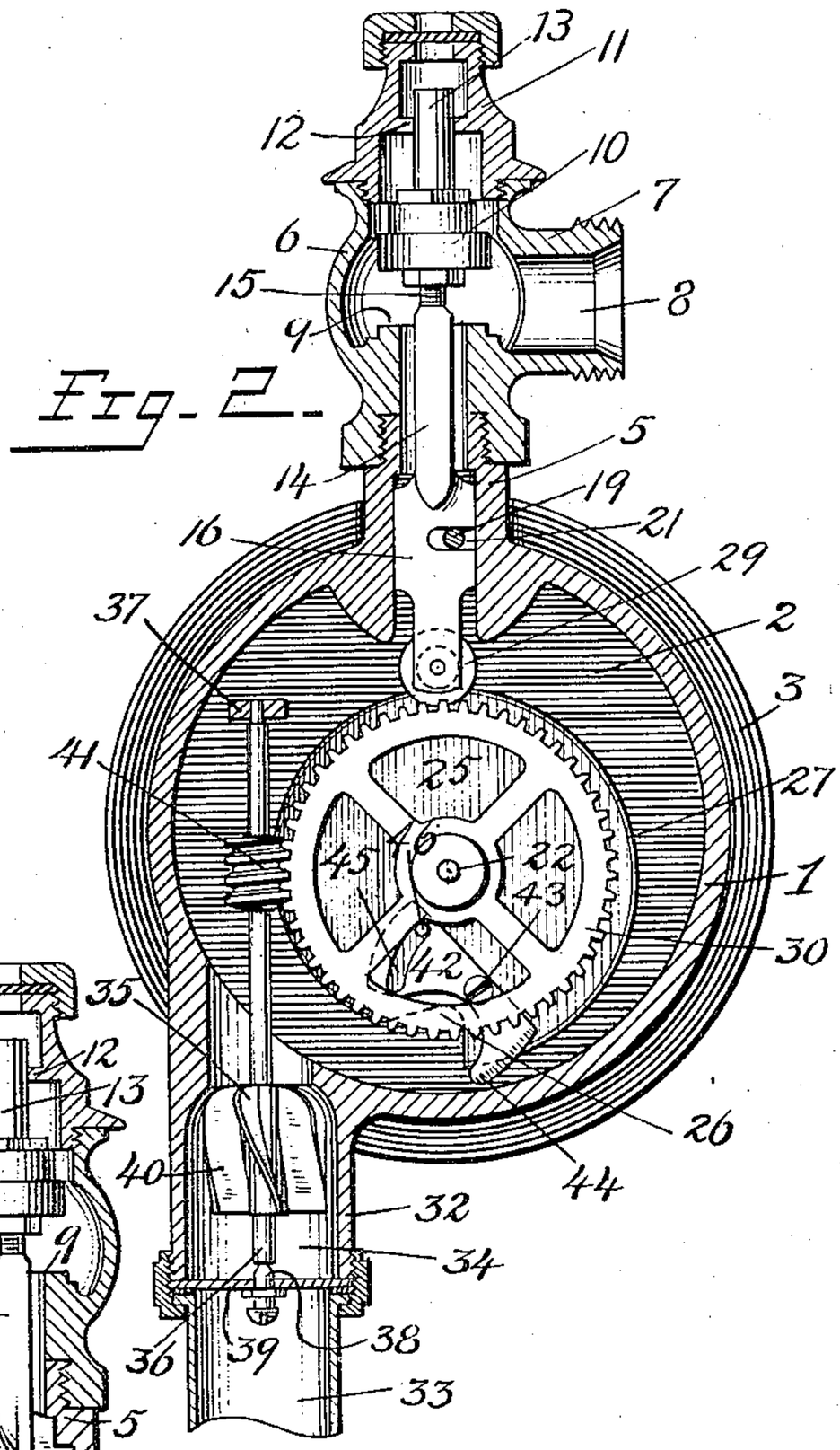


Fig. 3.

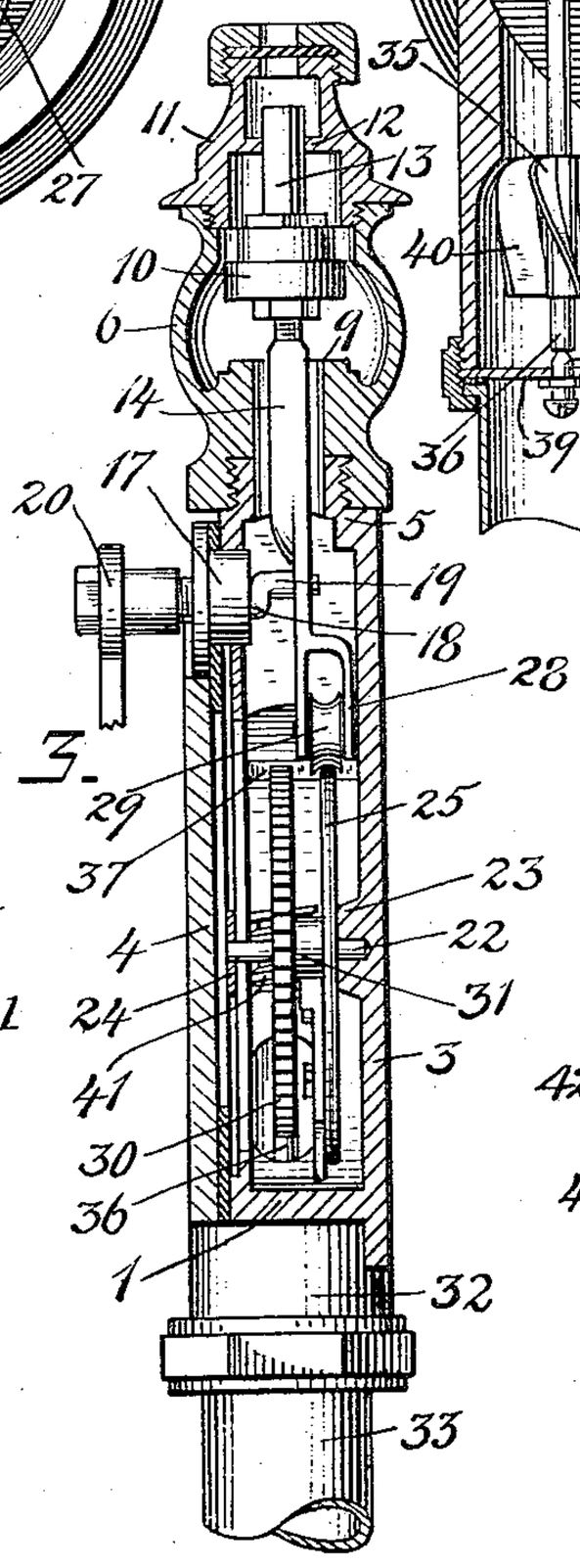


Fig. 4.

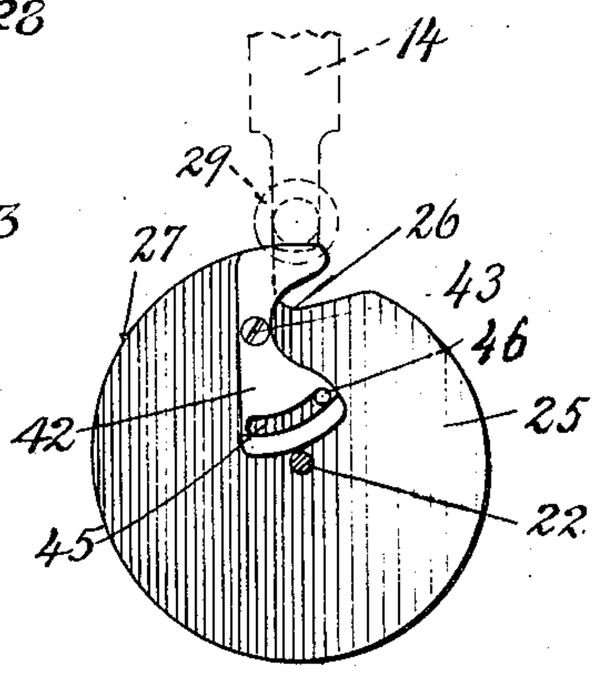
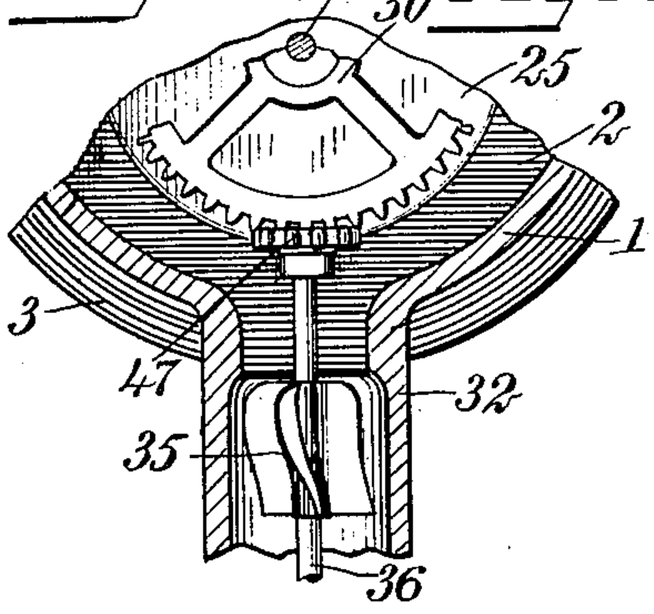


Fig. 5.



WITNESSES

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NILS NILSON, OF NEW YORK, N. Y., ASSIGNOR OF FIFTY ONE-HUNDREDTHS TO CHARLES B. GRIMSHAW, OF NEW YORK, N. Y.

SELF-CLOSING VALVE.

No. 844,180. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed August 16, 1906. Serial No. 330,832.

To all whom it may concern:

Be it known that I, NILS NILSON, a citizen of the United States, and a resident of the city of New York, (City Island, borough of the Bronx,) in the county and State of New York, have invented a new and Improved Self-Closing Valve, of which the following is a full, clear, and exact description.

This invention relates to self-closing valves, and is particularly useful in connection with devices of this character adapted for flushing closets, urinal-bowls, and the like.

The object of the invention is to provide a self-closing valve, simple, strong, and durable in construction, which may be operated manually to permit the flow of water through the same, and which automatically closes the inlet to the valve in a gradual manner, thereby permitting a slow afterflow.

A further object of the invention is to provide a device of this character in which the inlet is closed through the rotation of a motor which is actuated by the flow of the water and which rotates a cam-wheel adapted to close the inlet-valve.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, in which—

Figure 1 is a front elevation of the valve, showing a part removed. Fig. 2 is a vertical cross-section. Fig. 3 is a vertical cross-section on the line 3 3 of Fig. 1. Fig. 4 is a plan view of a detail, and Fig. 5 is a vertical cross-section of a part of a modified form of the device.

Referring more particularly to the drawings, I provide a casing 1, preferably cylindrical in form, having a chamber 2 therewithin. The open ends of the cylindrical casing are closed by a back plate 3 and a front plate 4, secured to the casing in the usual manner with screws or bolts. At the upper side of the casing is an inlet-pipe 5, having a threaded end upon which is mounted an inlet-valve casing 6, which has a lateral extension 7, provided with an opening 8, through which water may enter from the supply-pipe.

On the inner side of the casing 6, at the lower portion of the same, is a valve-seat 9, upon which a valve 10 normally rests, shutting off communication between the supply and the chamber 2. A head 11 is mounted upon the upper part of the inlet-valve casing 6 and provides a guide 12 for a rod 13, extending upwardly from the valve, which is of conventional form. A rod 14 has a threaded end 15 screwed into a suitable opening in the under side of the valve and extends through the inlet-pipe into the chamber 2, having a flattened section 16, adapted to act as a guide within the inlet-pipe, while permitting the flow of water therethrough. A plug 17 is located in an opening in the front plate 4, adjacent to the rod-section 16. A pin 18, having a lateral offset end 19, passes through the plug 17 and is adapted to be rotated by means of a lever 20, rigidly mounted on the end of the pin outside of the plug 17. The offset end 19 of the pin 18 is located in a transverse slot 21 of the rod-section 16. The pin 18 passes through the plug 17 to one side of the center line of the inlet-pipe 5. If the pin is rotated, the offset end raises or lowers the rod in the inlet-pipe, the end 19 moving transversely within the slot 21 to provide for its lateral movement. By this means the valve may be opened manually by directly turning the rod 20 or by a chain attached to the same in the usual manner for use in connection with closets or the like.

Within the chamber 2 is a shaft 22, having one end seated in a bearing 23, formed integral with the back plate 3, while the other end is pivotally mounted in a bearing-plate 24, located adjacent to the front plate 4. A cam-wheel 25, having a recess 26 and a spiral periphery 27, is mounted rigidly upon the shaft 22. The spiral constituting the rim of the cam-wheel is at its greatest radial distance from the center of the same at one edge of the recess 26, while it is at the least radial distance from the center at the other edge of the recess. The end of the rod 14 has an offset member 28, forming with the body of the rod a fork, within which is pivotally mounted a grooved roller 29, adapted to engage with the rim of the cam-wheel, as shown most clearly in Fig. 3, and to be received by the recess 26 and normally to rest within said recess when the valve is closed, as shown in Fig. 1.

A gear-wheel 30 is rigidly mounted upon

the shaft 12 in front of the cam-wheel 25 and is separated from the same by a washer 31.

The lower side of the casing 1 has an outlet-pipe 32, communicating in the usual manner with the pipe 33, leading to the closet-bowl. Within the outlet-pipe 32 is a chamber 34, within which is located a small water-turbine having a shaft 36, located centrally with respect to the outlet-pipe. The upper end of the shaft 36 is provided with a bearing 37 in an integral lug projecting inwardly from the back plate 3. The opposite end of the shaft 36 is rotatably mounted on a pointed pin 38, secured in a transverse member 39, mounted at the end of the outlet-pipe 32. The turbine is of conventional form and comprises a plurality of blades 40, by which it is rotated when the water flows through the outlet-pipe. A worm 41 is rigidly mounted upon the shaft 36 and engages with the teeth of the gear-wheel 30.

When it is desired to use the device, the inlet-valve 10 is raised from the valve-seat 9 by means of the lever 20. This permits the supply-water to flow through the inlet-pipe into the chamber 2 and out of the same through the outlet-pipe 32. When the valve 10 is opened, the rod 14 is correspondingly raised, thus bringing the roller 29 out of the recess 26. As soon as the water flows through the outlet-pipe the motor therewithin is rotated, and this rotation is communicated to the cam-wheel 25 by means of the worm and wheel 41 and 30. Thus, as soon as the water begins to flow the cam-wheel begins to rotate and the roller 29 comes into engagement with the spiral periphery, engaging first at that portion of the spiral at the greatest radial distance from the center of the wheel, whereby at first the valve is kept open a maximum distance. As the cam-wheel revolves the radius of the spiral decreases, and thus the inlet-valve 10 is gradually returned to its seat until the cam-wheel completes its revolution, when the roller again slips into the recess 26, thereby completely closing the valve 10. It will be understood that by this gradual closing is effected the slow after flow necessary for the successful operation of devices of this character in order to provide the water seal of the closet or other bowl with the necessary quantity of water, for if the water is allowed to rush through the seal without the afterflow the seal does not obtain the requisite water to make it operative.

When the valve is opened by means of the lever 20, the rush of water through the chamber 2, while often of considerable strength, does not operate the motor instantaneously, so that a short interval elapses before the cam-wheel begins to rotate. Thus if the lever is at once released after the valve is opened there is the danger of the roller slipping back into the recess again, and thereby instantaneously reclosing the valve. To obviate this, I provide a member 42, pivoted, by means of a screw-pin 43, to the cam-wheel 25 and between the latter and the gear-wheel. The member 42 has a laterally-projecting toe 44 at one end and a slot 45 at the opposite end, which is weighted and is heavier than the end having the toe. A pin 46, projecting laterally from the cam-wheel, is located in the slot 45. The toe 44 is adapted to lie adjacent to the recess 26, when not displaced, as shown in Fig. 4. When the roller rests within the recess, the member 42 is in the position shown in Fig. 1 with the toe displaced from the recess 26. Then the valve is closed and the rod 16 is in its normal position. When the inlet-valve 10 is opened and the roller is withdrawn from the recess 26, the weighted end of the member 42 instantly swings the same about the pivot 43 into position with the toe adjacent to the recess. Thus if the lever 20 is released the roller cannot return into the recess, but falls upon the toe, the outer edge of which coincides with the spiral at the edge of the recess. Thus when the cam-wheel begins to turn the periphery passes along under the roller until the recess again reaches the same after one complete revolution, when the roller pushes aside the member 42 into the position shown in Fig. 1 and enters the recess completely to close the valve.

While my invention is particularly applicable for use as a flush-valve, it may also be used as a liquid-measuring device, for it will be understood that the quantity of water or other liquid which flows through the same depends upon the rapidity with which the cam revolves to return the roller to the recess and the pitch of the spiral constituting the periphery of the cam-wheel, as the pitch of the spiral governs the rapidity with which the valve 10 is returned to the seat 9. If necessary, I can provide the valve with an air-chamber located near the inlet-seal to avoid a water-hammer within the valve and to regulate the pressure of the flow therethrough. It will be understood that any other gearing intermediate of the motor and the cam-wheel may be employed to effect the purpose. The quantity of liquid which flows through the valve is also dependent upon this gearing, for if the rotation of the motor is transmitted to the cam-wheel at a reduced rate a greater quantity of liquid will flow through the valve.

Fig. 5 illustrates a modified form of the device in which the outlet-pipe 32 is located centrally with respect to the chamber and in which the shaft 36, which substantially coincides with the vertical center line of the chamber, has at its upper extremity a pinion 47, the teeth of which mesh with the teeth of

the gear-wheel 30 and through which the gear-wheel is turned when the rush of water through the outlet actuates the motor.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A device of the class described, comprising a chamber having an inlet and an outlet, a valve adapted to close said inlet and having a rod extending into said chamber, a cam-wheel within said chamber engaging with said rod and adapted to move the same by its rotation, and a motor operated by the flow of water through the device and adapted to rotate said cam-wheel.

2. A device of the class described, comprising a chamber having an inlet and an outlet, a valve adapted to close said inlet, and having a rod extending into said chamber, a cam-wheel within said chamber engaging with said rod and adapted to move the same by its rotation, a motor operated by the flow of water through the device, and means for transmitting the rotation of said motor to said cam-wheel.

3. A device of the class described, comprising a chamber having an inlet and an outlet, a valve adapted to close said inlet and having a rod extending into said chamber, a cam-wheel within said chamber having a recess adapted to receive said rod when the valve is closed and being adapted to return said rod to said recess by its rotation, when the valve is open, and means actuated by the flow of water through the device, for rotating said wheel.

4. A device of the class described, comprising a chamber having an inlet and an outlet, a valve adapted to close said inlet and having a rod extending into said chamber, and provided at its end with a roller, a cam-wheel within said chamber, having a spiral periphery and a recess adapted to receive said roller when the valve is closed, and being adapted to return said roller to said recess by its rotation, when the valve is open, and means actuated by the flow of water through said device, to rotate said wheel.

5. A device of the class described, comprising a chamber having an inlet and an outlet, a valve adapted to close said inlet and having a rod extending into said chamber provided at its end with a roller, a cam-wheel within said chamber having a spiral periphery and a recess adapted to receive said roller when the valve is closed, and being adapted to return said roller to said recess by its rotation when the valve is open, means on said wheel to prevent the return of said roller to said recess before the wheel has completed one revolution, a motor actuated by the flow of water through the device, and means for transmitting the rotation of said motor to said wheel.

6. A device of the class described, having an inlet and an outlet, a valve adapted to close said inlet and having a rod projecting into said chamber, a cam-wheel having a recess and a spiral periphery, said rod resting in said recess when said valve is closed, a member pivoted to said wheel and having a toe and a weighted end adapted to swing said toe adjacent to said recess to ride said rod onto said periphery, and means actuated by the flow of water through the device for rotating said wheel.

7. A device of the class described, comprising a chamber having an inlet and an outlet, a valve adapted to close said inlet and having a rod projecting into said chamber provided at its end with a roller, a cam-wheel having a recess and a spiral periphery, said roller being adapted to rest in said recess when said valve is closed, means for raising said rod to open said valve, a member pivoted to said wheel, having a toe and a weighted end adapted to swing said toe adjacent to said recess to ride said roller onto said periphery, and means actuated by the flow of water through the device for rotating the said wheel, said roller displacing said toe and entering said recess when said wheel completes a rotation.

8. In a device of the class described, comprising a chamber having an inlet and an outlet, a valve adapted to close said inlet and having a rod extending into said chamber, a cam-wheel within said chamber having a recess adapted to receive said rod when the valve is closed and being adapted to return said rod to said recess by its rotation, a motor adapted to be actuated by the flow of water through the device and having a shaft ex tending into said chamber provided with a worm, and a gear-wheel rigid with said cam-wheel and engaging with said worm.

9. A device of the class described, comprising a chamber having an inlet and an outlet, a valve adapted to close said inlet and having a rod extending into said chamber provided with a roller, a cam-wheel within said chamber having a recess and a spiral pe riphery, said roller being adapted to ride upon said periphery and to rest within said recess when said inlet-valve is closed, a gear-wheel rigid with said cam-wheel, a motor adapted to be actuated by the flow of water through the device and having a shaft extending into said chamber, and a worm on said shaft engaging with said gear-wheel.

10. A device of the class described, comprising a chamber having an inlet and an outlet, a valve-seat within said inlet, a valve normally resting upon said valve-seat and having a rod projecting into said chamber provided with a roller, a cam-wheel within said chamber having a recess, and a spiral periphery, said roller being adapted to rest in

said recess when said valve rests upon said valve-seat, and to ride upon said periphery when said valve is open, said cam-wheel having a member pivoted thereto provided with a toe and a weighted end, said toe being adapted to displace said roller onto said periphery when said valve is open, a gear-wheel rigid with said cam-wheel, a motor adapted to be actuated by the flow of water through the device and having a shaft projecting into said chamber, and a worm upon said shaft engaging with said gear-wheel.

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

NILS NILSON.

Witnesses:
BENJM. E. HAYDOCK,
HAROLD BJERCKE.