No. 846,221. PATENTED MAR. 5, 1907.

W. H. LUDEWIG.

FLUSHING TANK VALVE.

APPLICATION FILED MAY 31, 1906.

3 SHEETS—SHEET 1.

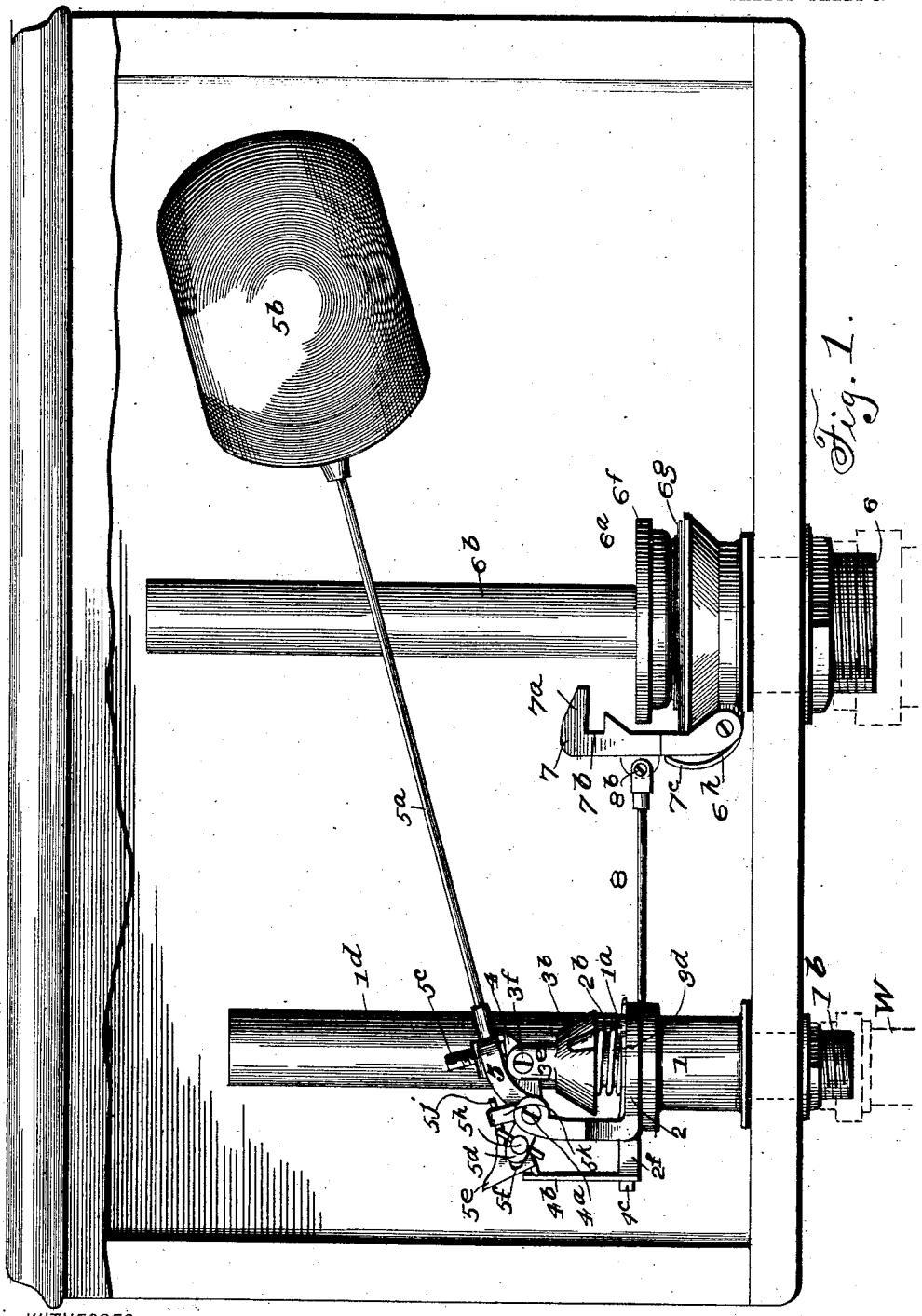

Fig. 1.

WITNESSES

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3 SHEETS—SHEET 2.

Fig. 2.

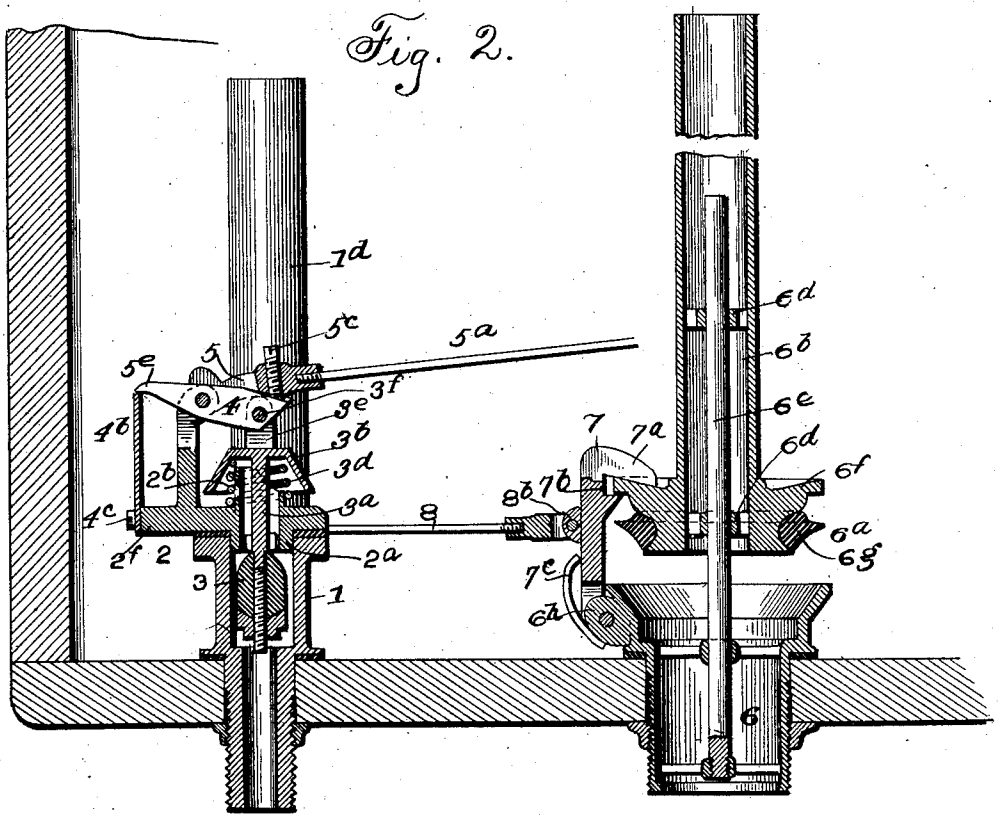
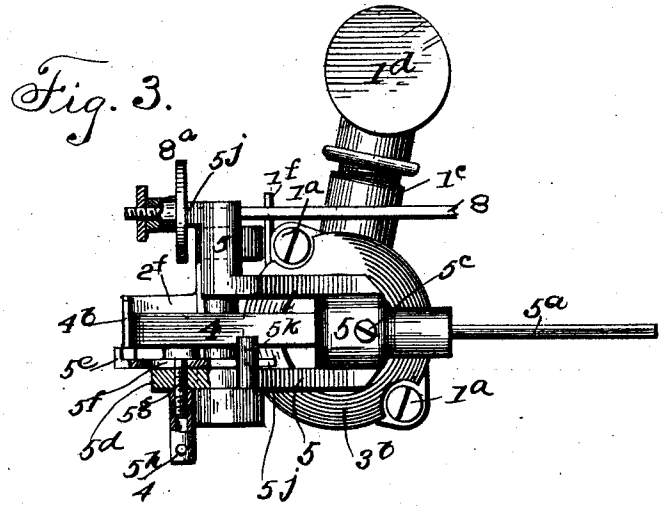


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

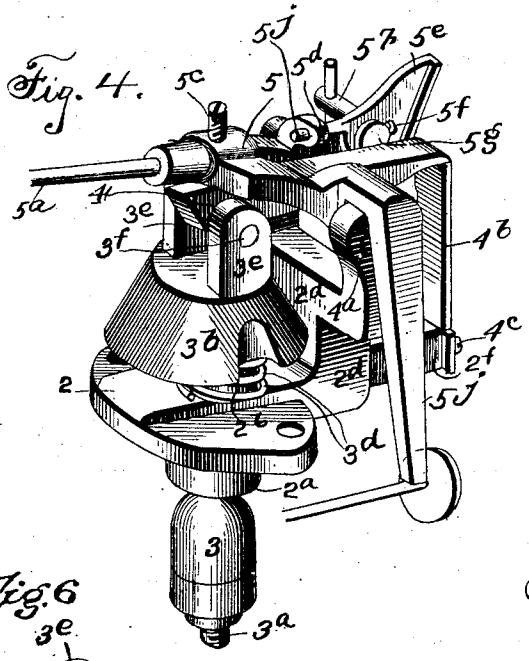


Fig. 5

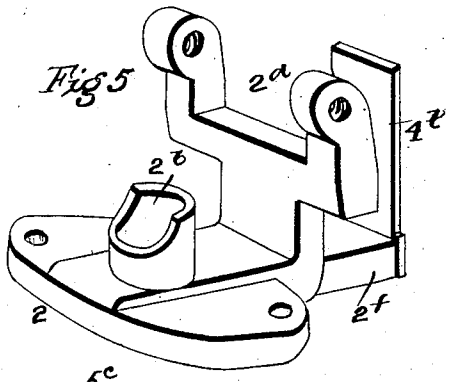


Fig. 6

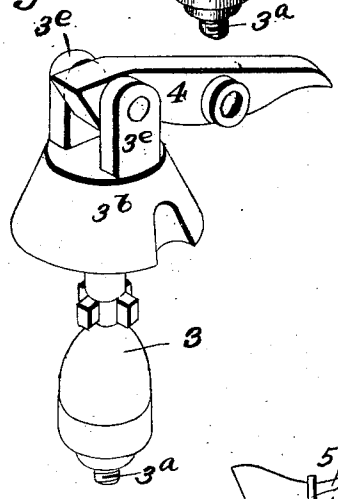


Fig. 7

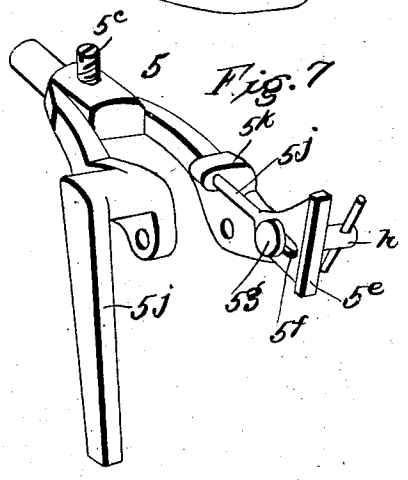
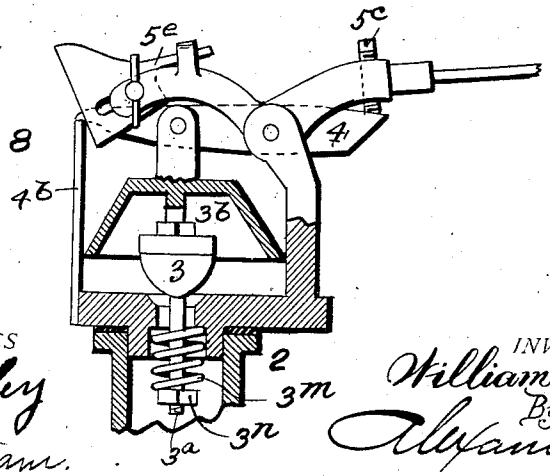


Fig. 8



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FLUSHING-TANK VALVE.

No. 846,221. Specification of Letters Patent. Patented March 5, 1907.

Application filed May 31, 1906. Serial No. 319,534.

To all whom it may concern:

Be it known that I, WILLIAM H. LUDEWIG, of Rock Island, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Flushing-Tank Valves; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improved ball-valve for flush-tanks of closets; and its object is to obtain a sudden closing of the supply-valve, also a quick opening thereof, also an automatic quick closing of the flush-valve simultaneously with the opening of the supply-valve, and to control all these operations by one float; also, to provide means for regulating the closing of the valve quickly at any desired water-level, to prevent hammering in the water-pipes when the valve is closed, and to utilize the flushing-valve stem as an overflow.

My novel valve construction is equally well adapted for use in broad shallow tanks located overhead or in deep narrow tanks located just above the bowl, as I dispense with the necessity for a siphon connection in the flushing-tank.

Subordinate features of the invention are the accessibility of parts, the easy adjustment thereof, and the capability of removal of the parts from the tank without taking it down.

A practical form of the invention is illustrated in the accompanying drawings, which I will describe in detail and refer to the claims appended to the specification for summaries of the features and combinations of parts for which protection is desired.

In said drawings, Figure 1 is a side elevation of the complete apparatus within a tank, the side of the tank being broken away to show the construction and the parts being shown in position with float raised and the water-inlet valve and the flushing-valve closed. Fig. 2 is a sectional view showing the inlet-valve in open position. Fig. 3 is a full-size plan view of the inlet-valve mechanism. Fig. 4 is a perspective view of the part shown in Fig. 2, showing the valve in open position. Fig. 5 is a perspective view of the upper part of the inlet-valve casing. Fig. 6 is a perspective view of the valve and valve-lever detached. Fig. 7 is a perspective view of the float-lever casting detached with the adjustable tripping device. Fig. 8 is a detail view of a slight modification.

The tank is of any preferred form and construction. To the bottom thereof is attached the inlet-valve casing comprising a lower portion 1 and an upper part 2, which are separable horizontally and united by screws 1^a. The lower part 1 is provided with a nipple 1^b, to which the water-supply pipe W is attached. It is also provided with a lateral branch 1^c, to which is connected an air-chamber 1^d, which may be formed by a closed cylinder or piece of piping, as shown. The object of this chamber is to prevent pounding in the pipes when the water is suddenly stopped by the closing of the valve. The upper part 2 of the valve-casing is provded with a depending annular flange 2^a, entering part 1 and forming the valve-seat. It also has an upstanding cylindric flange 2^b, which is preferably cut away on one side to admit more ready escape of water toward the center of the tank.

The inlet-valve 3 is preferably a ball or bullet valve adapted to seat against flange 2^a and secured on a stem 3^a, which extends upward through the opening in part 2 and has a depending flared skirt-flange 3^b on it, above and overreaching the flange 2^a, and adapted to check the upward flow of water through the valve and direct it downwardly and outwardly around the valve-casing into the tank. A coiled expansion-spring 3^d is preferably interposed between the skirt-flange and part 2 of the casing for the purpose of both preventing rattling of the valve-stem when the valve is open and also to assist in quickly closing the valve when the latter is permitted to close. As shown in Figs. 1 and 2, the valve closes with the current, and consequently the spring does not have to be very strong, and, in fact, does not necessarily have to be used; but it gives a quicker closing action to the valve and renders it more quiet when open.

The valve-stem is provided at top with ears 3^e, by which it is pivotally connected by a pin 3^f to one end of a rocking lever 4, which is pivoted on a pin 4^a, transfixing arms 2^d, rising from a lateral extension of part 2 of the casing adjacent the valve-stem. The rear end of lever 4 is adapted to be engaged by a flat spring-catch 4^b, fastened at its lower end by screws 4^c to an extension 2^f of part 2, and when the valve is fully open the upper end of spring 4^b engages under the outer end

of lever 4 and holds the valve positively opened until the spring-catch is disengaged, as hereinafter described.

Pivoted on pin 4^a beside and embracing locking-lever 4, but not interfering therewith, is a lever-casting 5, to the forward end of which is attached the stem 5^a, to which the float 5^b is fastened, so that lever 5 will be oscillated by the rise and fall of the float. Through the lever 5 above the valve-stem is tapped an adjustable bolt 5^c, whose lower end is adapted to contact with the forward end of lever 4 when the float drops and force the valve-stem downwardly, thereby opening the valve. To a rearwardly-projecting lug 5^d on lever 5 is attached an adjustable trip-plate 5^e, which has a slot 5^f transfixed by a bolt 5^g, secured by a hand-nut 5^h, and said tripping-plate has a finger 5^j slidably engaged with an ear 5^k on lug 5, so that said trip-plate can be adjusted toward or from the pivot of the lever. The rear edge 5^i of said trip-plate is adapted when the plate is properly adjusted to engage catch 4^b as the float rises to the proper level and will cause said catch to release lever 4, thereby permitting the inlet-valve to close suddenly under the pressure of the water and action of spring 2.

It will be noted that in the construction shown in Figs. 1 and 2 the inlet-valve will both open and close quickly. It is opened by the descent of the float, which drops quickly upon the opening of the flush-valve and snaps the inlet-valve open as soon as its weight overcomes the resistance of the water, and the valve is held open by the engagement of catch 4^b with lever 4 until the float has risen sufficiently to cause the tripping-plate 5^e to disengage catch 4^b from the valve-lever, whereupon the valve instantly closes, as is obvious. The shock or hammering which would ordinarily be caused by the sudden closing of the inlet-valve is cushioned by the air-chamber, and no injurious results follow from such sudden closing.

The flushing outlet-tube 6 is closable by a valve 6^a, which has a hollow stem 6^b provided with internal guides 6^d, by which it is guided in its vertical movements upon a rod 6^e, attached to and rising axially from the outlet-tube 6, as shown. The hollow stem 6^b forms an overflow-valve when the flush-valve is closed. The flush-valve may be unseated by any of the ordinary pull devices, (not shown in the drawings,) but normally closes by gravity in the direction of the flow of water. It is provided with a weighting-flange 6^f above the rubber packing-ring 6^g, and this flange is adapted to be engaged by a hook-catch 7, pivoted to a lug 6^h on the outlet-tube 6 and projecting above the flange 6^f and having a finger 7^a on its upper end adapted to arrest the upward opening movement of valve 6^a and a notch 7^b adapted to engage the flange 6^f and hold the flush-valve open when it is raised, the catch being pressed inward to engage the flange 6^f by a spring 7^c, as shown. The catch 7 is automatically disengaged from the flushing-valve upon the descent of the float by means of a finger 5^j on lever 5, which depends beside the casing and adjacent to an adjustable flanged nut 8^a on a rod 8, which is pivotally connected to the catch 7, as at 8^b, and its rear end is guided in a lug 1^f on part 1 of the valve-casing, and said nut can be adjusted on the rod to such position that when the float descends sufficiently finger 5^j contacts nut 8^a on rod 8 and forces the rod backward, disengaging catch 7 from flange 6^f and allowing the flushing-valve to close immediately before or as the inlet-valve is opened.

Operation: When the tank is full, the inlet-valve is closed, the float being at such a height that the tripping device 5^e holds the spring-catch 4^b out of engagement with lever 4, and consequently the valve 3 remains closed. Now if the flushing-valve be raised (by any ordinary means) it is caught and held open by catch 7 until the float drops to the point at which finger 5^j engages the stop-nut 8^a on rod 8 and causes the rod to pull catch 7 away from and release the flush-valve, which closes by gravity. Simultaneously therewith, or nearly so, the weight of the float is transmitted to the valve-stem through bolt 5^c, and the valve is suddenly opened, allowing water to enter the tank. The valve is held open by catch 4^b until the float again rises sufficiently to cause tripping device 5^e to disengage catch 4^b from lever 4, and the inlet-valve suddenly closes. Upon again raising the flushing-valve the cycle of operations is repeated. Of course the height of water maintained in the tank is regulable by adjusting the tripping-plate so as to engage catch 4^b earlier or later in the upward movement of the float. By removing the screws which fasten part 2 to part 1 of the casing the entire valve mechanism can be removed, and a closing-plate may be secured to part 1 in place of part 2, so that water can be turned on the pipes while the valve mechanism is removed, so that it will not prevent use of the rest of the system.

In the modification shown in Fig. 8 the inlet-valve is closable against the flow of water, and in this case the valve is arranged above part 2 and may be closed by spring 3^m, arranged below the part 2 and the valve-seat and strung on the rod between the parts 2 and adjusting-nut 3^n. The valve-stem is pivoted to the rear end of the lever and is consequently opened when pin 5^c bears on the forward end of lever 4, when the float 5^d descends, and the spring 4^b serves to hold the valve in open position, as in the first instance, and is disengaged from lever 4 by the finger 5^e, when the float rises, as in the first instance, allowing the spring 3^m to close the valve

against the water. The other portions of the device remain practically the same in construction and effect, the spring 3^m performing the function of spring 3^d in closing the valve, but closing it downwardly instead of upwardly.

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

1. The combination of an inlet-valve, a lever to which the valve is pivotally connected. a catch for locking said valve open, a float, a float-lever adapted to open the valve when the float descends, and a trip operated by said float-lever for disengaging the catch when the float rises to the proper water-level.

2. The combination of a valve-casing, a valve therein, means for closing the valve, a rocking lever to which the valve-stem is pivotally connected, a catch for locking said lever to hold the valve open, a float, a float-lever adapted to open the valve when it descends, and means operated by said float-lever for disengaging the catch when the float rises to the proper water-level.

3. In combination, an inlet-valve, an oscillating lever pivotally connected to the valve-stem, a spring-catch engaging the lever to hold the valve in open position, a second lever, a float connected therewith, means whereby the float-lever causes the opening of the valve when the float descends, and a tripping-finger on said float-lever adapted to disengage the catch from the first lever and permit the valve to close when the float rises to the proper point.

4. The combination of a valve-casing, an oscillating lever pivoted on said casing, an inlet-valve having its stem pivotally connected to said lever, a catch adapted to lock the valve in open position, a second lever pivoted beside the first lever, a float connected with said second lever, the second lever being adapted to engage the first lever and open the valve when the float descends, and a tripping device on the second lever adapted to release the valve-catch when the float rises.

5. The combination of a valve-casing, an oscillating lever pivoted on said casing, an inlet-valve having its stem pivotally connected to said lever, a spring-catch adapted to lock the lever when the valve is open, a second lever pivoted beside the first lever, a float connected with said second lever, an adjusting device on the second lever adapted to engage the first lever, and open the valve when the float descends, and an adjustable tripping device on the second lever adapted to disengage the catch from the first lever when the float rises.

6. The combination of a valve-casing, a lever pivoted on the upper part of said casing, a valve-stem pivotally connected to one end of said lever, a valve on said stem, a spring for closing said valve, a float-lever pivoted beside the first lever, a float adapted to cause the float-lever to actuate the first lever when the float descends, a spring-catch for locking the valve-lever when the valve is opened, and means for disengaging the catch from the valve-lever when the float rises.

7. The combination of a two-part valve-casing, a lever pivoted on the upper part of said casing, a valve-stem pivotally connected to one end of said lever, a valve on said stem, a spring for closing said valve, a float-lever pivoted beside the first lever, a float adapted to cause the float-lever to actuate the first lever when the float descends, a spring-catch for locking the valve-lever in opened position, and a tripping device adjustably attached to said float-lever adapted to disengage the catch from the valve-lever when the float rises.

8. In a tank inlet-valve, the combination of a casing having a valve-seat, a valve-stem, a dispersing skirt-flange on said stem above the seat, and a valve on said stem; with an oscillating lever from which the valve-stem is suspended, a spring-catch for locking said lever when the valve is open, an oscillating float-lever pivoted beside the first lever adapted to engage the latter when the float descends and open the valve, and a tripping device adapted to disengage said catch from the lever when the float rises to the desired point.

9. In a tank inlet-valve, the combination of a valve-casing having a valve-seat, a valve-stem passing through said seat, a dispersing-flange on said stem above the seat, a valve on said stem below said flange, and a spring for closing the valve; with an oscillating lever from which the valve-stem is suspended, a spring-catch for locking said lever when the valve is open, an oscillating float-lever pivoted beside the first lever, a device on said lever adapted to engage the first lever when the float descends and open the valve, and an adjustable tripping device on the float-lever adapted to disengage said catch from the first lever when the float rises to the desired point.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM H. LUDEWIG.

In presence of—
ROBT. R. REYNOLDS,
LOUIS V. ECKHART.