M. B. STAFFORD.

Automatic Air-Tight Reservoir.

No. 223,075. Patented Dec. 30, 1879.

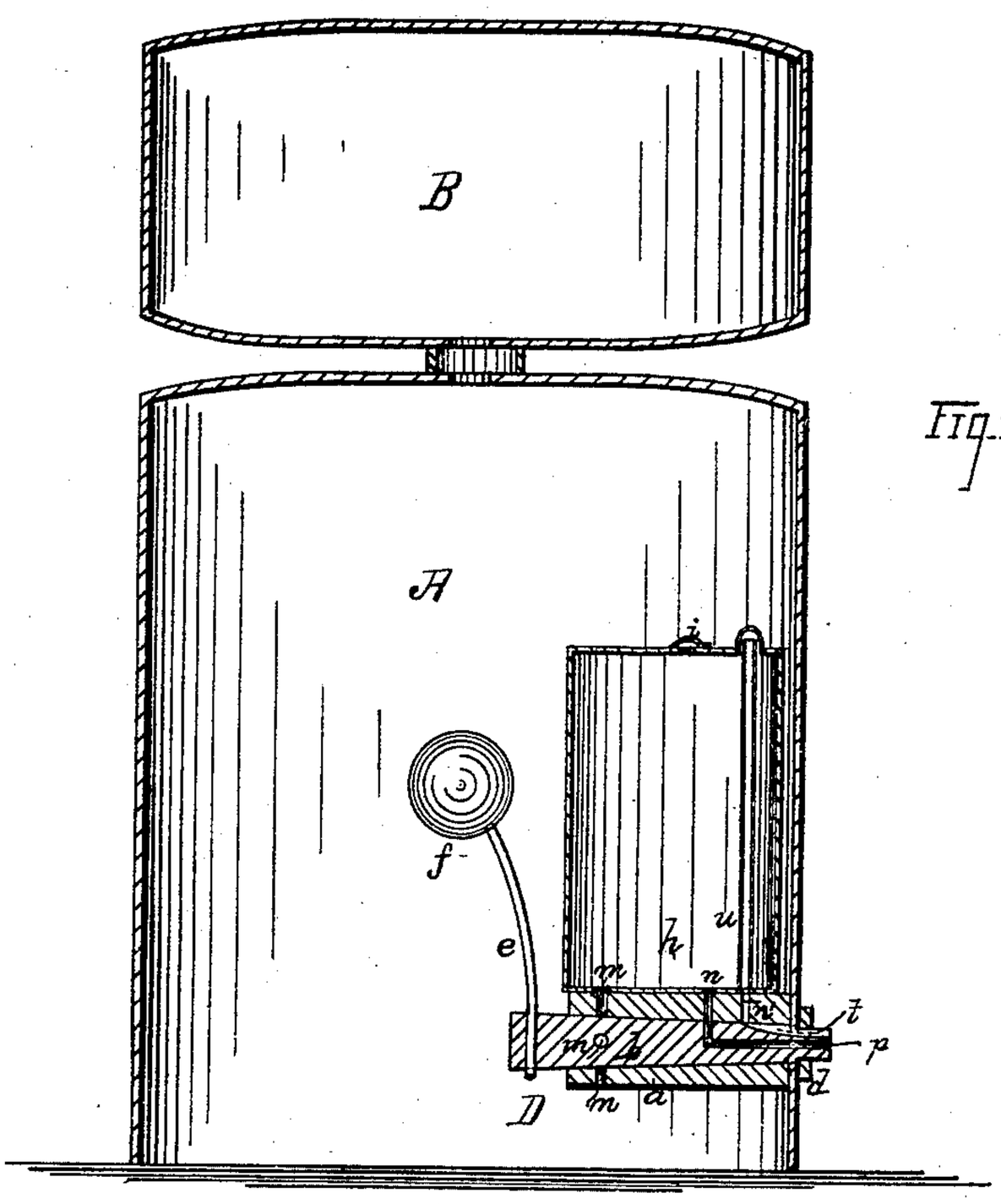

Fig. 1.

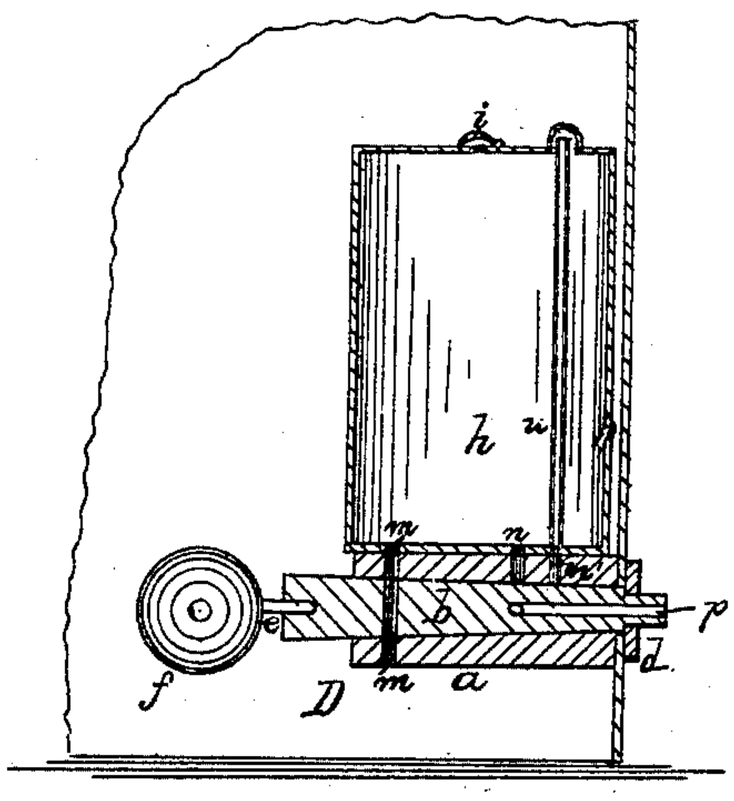

Fig. 2.

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MARSHALL B. STAFFORD, OF NEW YORK, N. Y.

IMPROVEMENT IN AUTOMATIC AIR-TIGHT RESERVOIRS.

Specification forming part of Letters Patent No. **223,075**, dated December 30, 1879; application filed April 26, 1879.

To all whom it may concern:

Be it known that I, MARSHALL B. STAFFORD, of New York, in the county of New York and State of New York, have invented a new and useful Improvement in Automatic Air-Tight Reservoirs, of which the following is a specification, reference being had to the accompanying drawings.

The object of the invention is to produce a purely automatic means of supplying houses with water in sections of cities where the pressure in the street-main during the day-time is not great enough to meet the demand. This is consummated by constructing the head of the reservoir of a size adapted to the maximum pressure of the water in the street-main, and of supplying a means of automatically charging the reservoir with air, whereby sufficient pressure is brought to bear upon the surface of the water to force the required amount up into the house through the supply-pipes.

In the accompanying drawings, A represents the reservoir, having an inlet and outlet (not shown) at any desired point near its lower edge. B represents the head, which is preferably of a diameter equal to that of the reservoir, and is directly above and connected with it by a neck, its capacity being regulated by varying its depth according to the pressure of the water in the street-main. Thus, when the pressure of the water, which is usually greatest during the night, is forty pounds to the square inch, the head should be one-third the size of the reservoir. The size of the reservoir will vary according to the supply of water required.

At a suitable point within the reservoir, preferably near its lower edge, is secured a rotary valve, D, consisting of the horizontal cylinder *a* and valve-stem *b*, which extends longitudinally through the cylinder, and has upon its outer end, which passes through the side of the reservoir, a nut, *d*, to retain it in place, while its inner end is provided with an arm, *e*, extending at right angles to the valve-stem, and having upon its end a globe, *f*, or analogous device of less specific gravity than water, so that as the water in the reservoir either rises or falls the globe and arm will be actuated, and thereby operate the valve, as hereinafter more fully described.

Upon the cylinder *a*, and connected with it by suitable ports or apertures, is rigidly affixed an auxiliary reservoir or tank, *h*, of dimensions varying according to the size of the reservoir A, and having upon its upper surface a flap-valve, *i*, to permit the escape of air into the reservoir A at the proper time.

Near the inner end of the cylinder *a* a port or aperture, *m*, passes vertically through the cylinder and valve-stem and into the reservoir *h*.

Adjacent to the outer end of the valve D are two apertures or ports, *n* and *n'*, the port *n* passing through the bottom of the reservoir *h* and the upper portion of the cylinder *a* and into the valve-stem *b*, where it meets the gate *p*, which is at the horizontal center of the stem, and has an outlet on the outside of the reservoir A. Thus water in the auxiliary reservoir *h* may pass off through the aperture *n* when the valve-stem is in such position that the said aperture and gate *p* connect.

The aperture *n'* also extends through the bottom of the tank or reservoir *h* and upper part of the cylinder *a*, and connects, when the valve-stem is in proper position for that purpose, with the gate *t*, which is simply a groove upon the surface of the valve-stem near its outer end. The purpose of the aperture *n'* and gate *t* is to admit air to the auxiliary reservoir *h* at the proper time.

Immediately above the aperture *n'* is arranged a pipe or tube, *u*, which passes upward and enters a cap on the reservoir *h*. The object of this construction is to secure the admission of air into the upper part of the auxiliary reservoir when it contains water, the air passing through the gate *t*, aperture *n'*, and upward through the tube *u*.

The operation of the device is as follows: The reservoir is placed, preferably, in the cellar of the house, and connected with the street water-main by a pipe having an automatically-operating check-valve. In the night-time, when there is but little demand for water, the pressure in the street-main will be at its maximum, and the water will open the valve in the supply-pipe and gradually fill the reser-

voir A. The globe *f*, floating upon the surface of the water, rises and falls with it. As the water rises in the main reservoir A, it passes through the aperture *m*, gradually filling the auxiliary reservoir *h* and driving the air contained in it out through the flap-valve *i* into the reservoir A, the water as it enters the reservoir A forcing the air into the head B, thus causing it to be compressed. After enough water has entered the reservoir A to bring the arm *e* to a perpendicular position, by elevating the globe *f* the valve-stem *b* will have rotated so far that it will close the aperture *m* and open the apertures or ports *n n'*. Through the aperture *n* then escapes the water that entered the auxiliary reservoir *h*, the aperture *n'* with the tube *u* serving as a vent whereby the air can reach the upper surface of the water and permit it to run out. Of course, as the water leaves the auxiliary reservoir the air instantly fills it. The succeeding day, as the water is drawn from the reservoir A, the globe *f* gradually falls and rotates the valve-stem, closing the apertures *n n'* and opening the aperture *m*. The pressure of the compressed air upon the surface of the water in the reservoir A forces it through the outlet into the pipes, thus supplying the house for the following day. The water now again flows into the reservoir A, as above described, and the same operation is repeated each succeeding night.

The purpose of catching the auxiliary reservoir *h* full of air to discharge into the reservoir A is to compensate for the amount of air usually absorbed by the water, and thereby to insure the requisite pressure upon the surface of the water within the tank.

It is obvious that in extreme cases, if required, a pump may be applied to the gate *p* after the water has left the auxiliary tank *h*, and air forced into the reservoir in any quantities demanded.

It is also obvious that many forms of valves or other contrivances may be employed to effect the object above described without altering the result or departing from the invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An air-tight reservoir having a head divided from the body of the reservoir by a neck, for storing compressed air, of dimensions adapted to the maximum pressure of the water in the street-main, substantially as set forth.

2. An automatic air-tight reservoir provided with an air-cock operated by the rise and fall of the water in the reservoir, substantially as set forth.

3. An air-cock arranged to automatically receive and discharge a specific quantity of air by the action of the rise and fall of the water within the reservoir, substantially as set forth.

4. An air-tight liquid-reservoir provided with a means for automatically discharging a specific quantity of air into the water-reservoir, in order to compensate for the air usually absorbed by the water, substantially as set forth.

In testimony that I claim the foregoing improvement in automatic air-tight reservoirs, as above described, I have hereunto set my hand this 21st day of April, 1879.

MARSHALL B. STAFFORD.

Witnesses:

CHARLES C. GILL,

WM. BRO. SMITH.