A. GUTHRIE.

Water-Meter.

No. 160,767. Patented March 16, 1875.

FIG. 1.

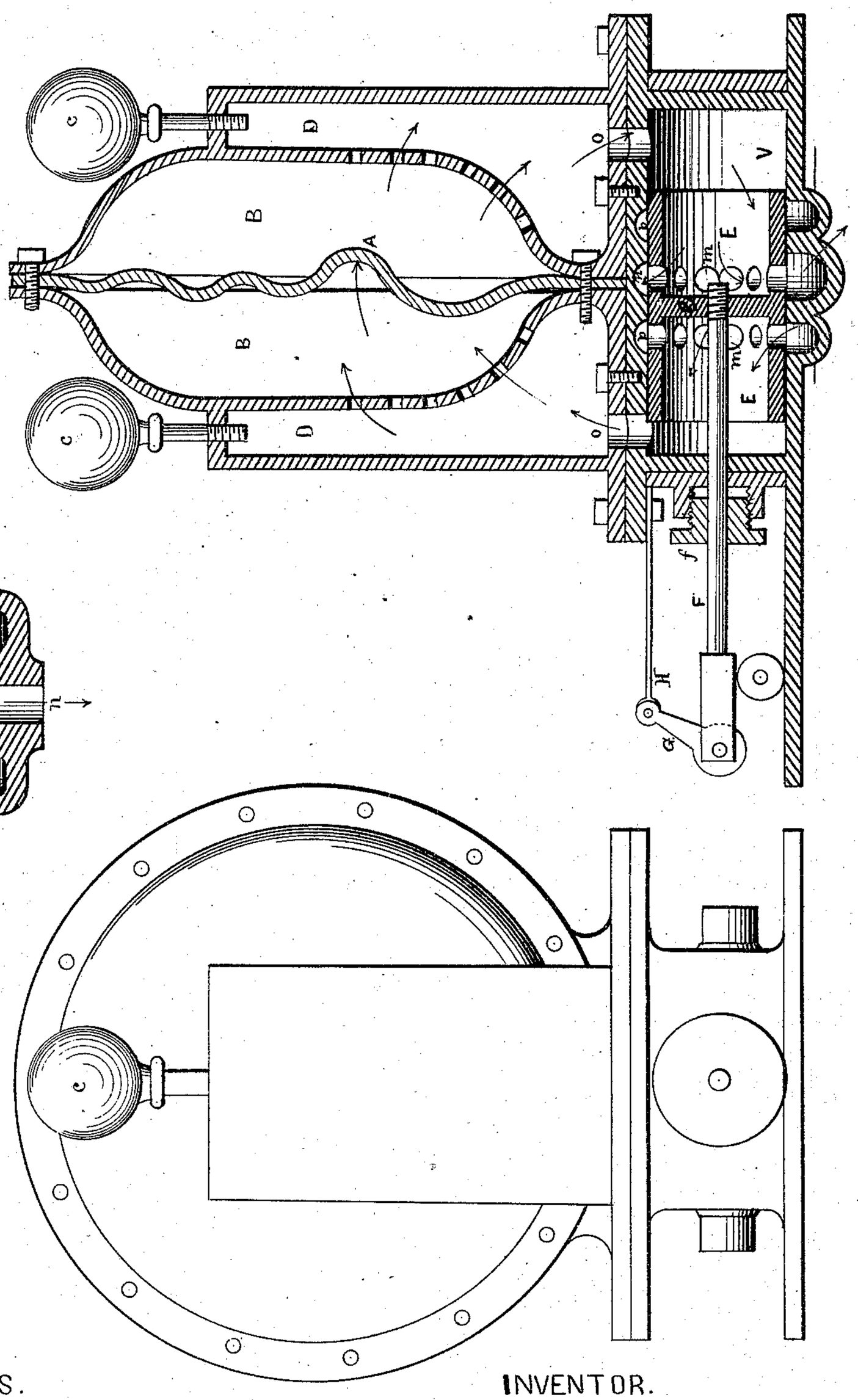
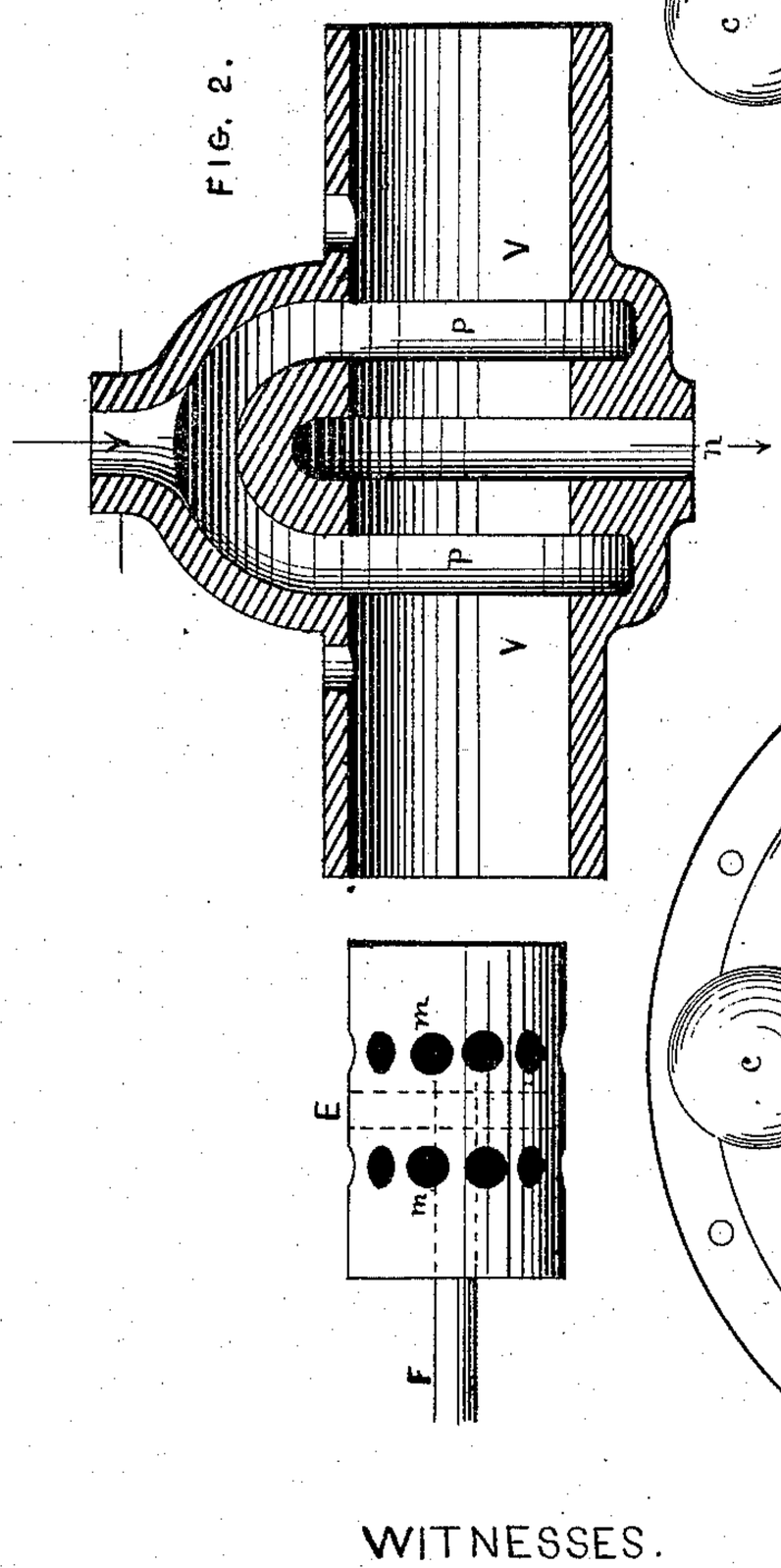


FIG. 2.



WITNESSES.

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UNITED STATES PATENT OFFICE.

ALFRED GUTHRIE, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. **160,767**, dated March 16, 1875; application filed July 20, 1874.

To all whom it may concern:

Be it known that I, ALFRED GUTHRIE, of the city of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Machine for the Measurement of Liquids, properly termed a "Water-Meter," which I verily believe has not been known or used prior to my invention; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in the manner or mode of actuating the valves for stopping and changing the currents of the liquid entering and discharging from the meter. This is accomplished by means of compressed air, acting through the medium of the fluid, entering and discharging from the meter directly upon a properly-adjusted face or surface of the valve, which, in turn, is restrained from premature movement by means of a spring or other mechanical device, until the force of the compressed air is sufficient to make the required movement of the valve positive and certain.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

I provide a measuring-vessel containing any given quantity, say one or more gallons, which is constructed of two half-spheres bolted together by a center rim, having between them a flexible diaphragm of india-rubber, or other suitable material, made or shaped so as to conform to the interior surfaces of the spheres, forming thereby two distinct measuring-chambers, the diaphragm being made so full as not to offer any resistance of consequence when moved from side to side of the meter. I next provide the operating-valve, to which is securely bolted the united spheres. (Seen in Fig. 1, but laid open to show the internal arrangement.)

The diaphragm A is shown by the dotted lines dividing the meter into the two chambers B B, each chamber communicating with its proper air-chamber C. D D show passages from the air-vessels to the ends of the valve E, and by openings in the walls a free passage for the liquid to and from the chambers B B is provided. E shows an equilibrium-valve, having a center division, *e*, and appropriate ports *m m* for their respective measuring-chambers, making essentially two valves, though in one. F shows the piston or valve rod passing out through the stuffing-box *f*, on the end of which is attached the small pitman G, and connected with the spring H, forming a knuckle-joint.

The valve E is properly a hollow cylinder, working in its chamber V as near water-tight as may be, avoiding friction; but to relieve it from unequal friction or pressure I have provided in the chamber V the passages *n* and *p p* in Fig. 2, surrounding the whole piston, so that the entering liquid, and the discharge also, may press equally upon all sides. *p p* show the inlet, and *n* the discharge.

The operation may be understood by following the direction of the arrows, beginning at the induction-pipe *p*, the liquid passing in at the port *m* through to the hollow center of the valve or piston E, and up through the port *o* into the passage and into the chamber B, driving the diaphragm A across to the opposite wall, forcing the liquid forward of it in the direction of the arrows out to the discharge. As the diaphragm can go no farther after it reaches the wall, its pressure upon the discharging liquid ceases. On the other side the pressure is increasing, due to its head and setting back into the air-vessel, and back down upon the exposed area of the valve E, until sufficient power has accumulated to knuckle the joint, and the valve moves to its proper change, and the inlet and discharge is reversed.

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

1. The combination and arrangement of the measuring-chambers B B, the diaphragm A, and the air-chambers C, operating essentially as and for the purposes herein set forth and described.

2. The combination and arrangement of the

valve E with the pitman G and spring H, for the purposes substantially as herein set forth and described.

3. The combination and arrangement of the hollow valve E, with its ports *m m*, and wall *e*, with its surrounding inlet-channels *p p*, and discharging-channel *n*, as and for the purposes herein set forth and described.

4. In a fluid-meter, the valve E, arranged to be operated by the direct force of the fluid upon its face, substantially as herein set forth and described.

ALFRED GUTHRIE.

Witnesses:
C. J. QUEEN,
G. N. FOOTE.