

HENRY F. WHEELER.

Water Meter.

No. 123,530.

Patented Feb. 6, 1872.

Fig. 1.

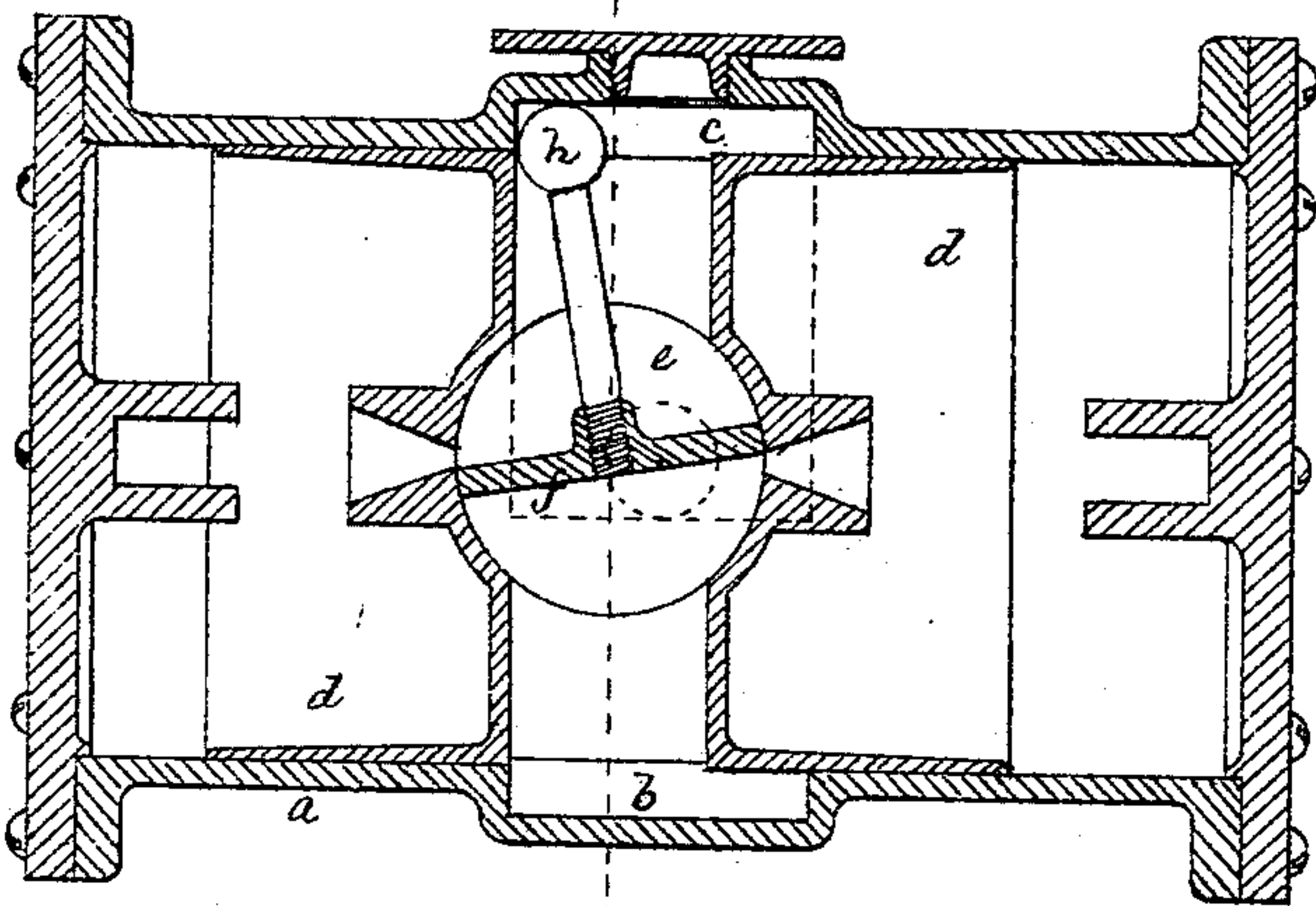


Fig. 2.

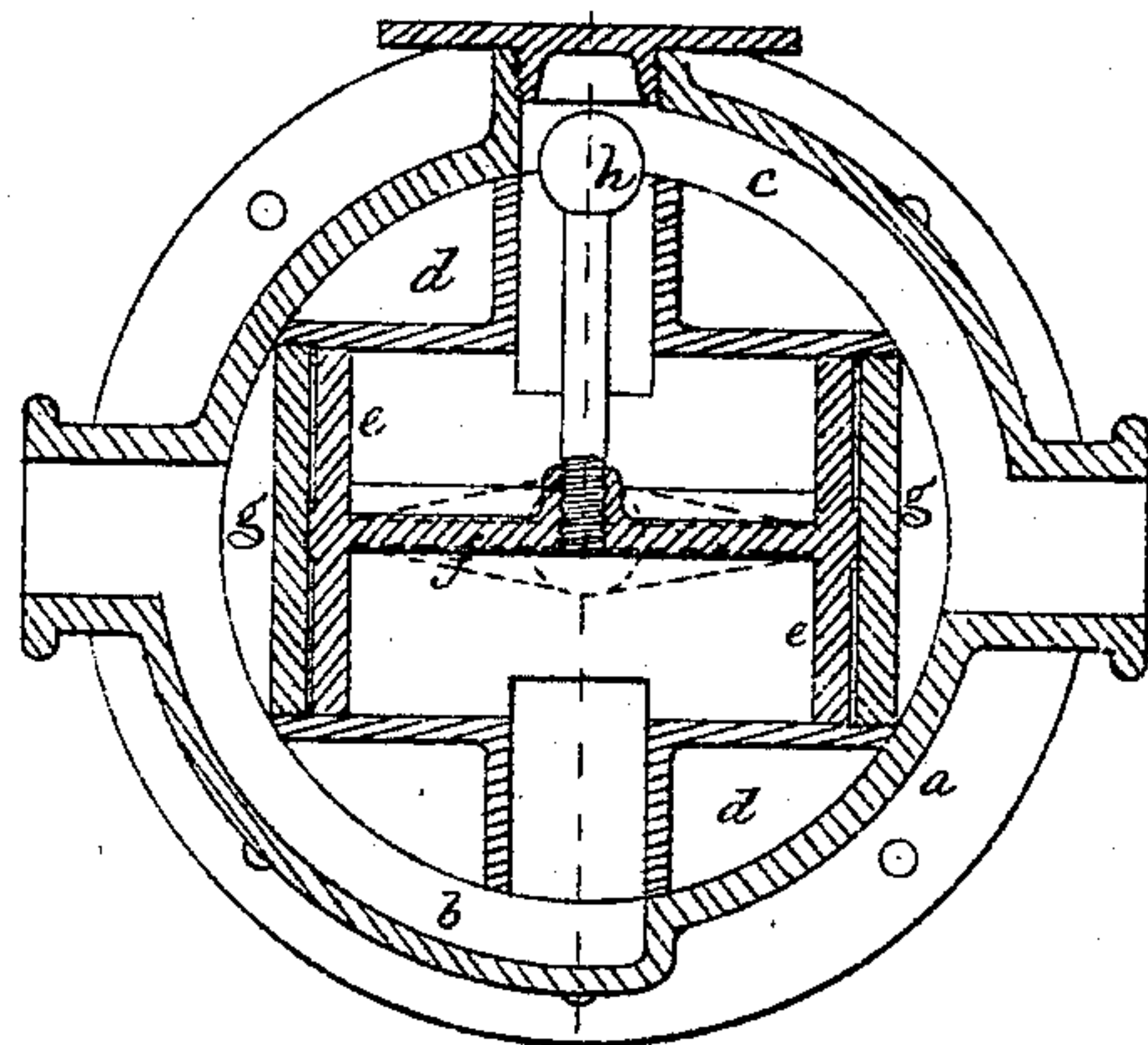


Fig. 3.

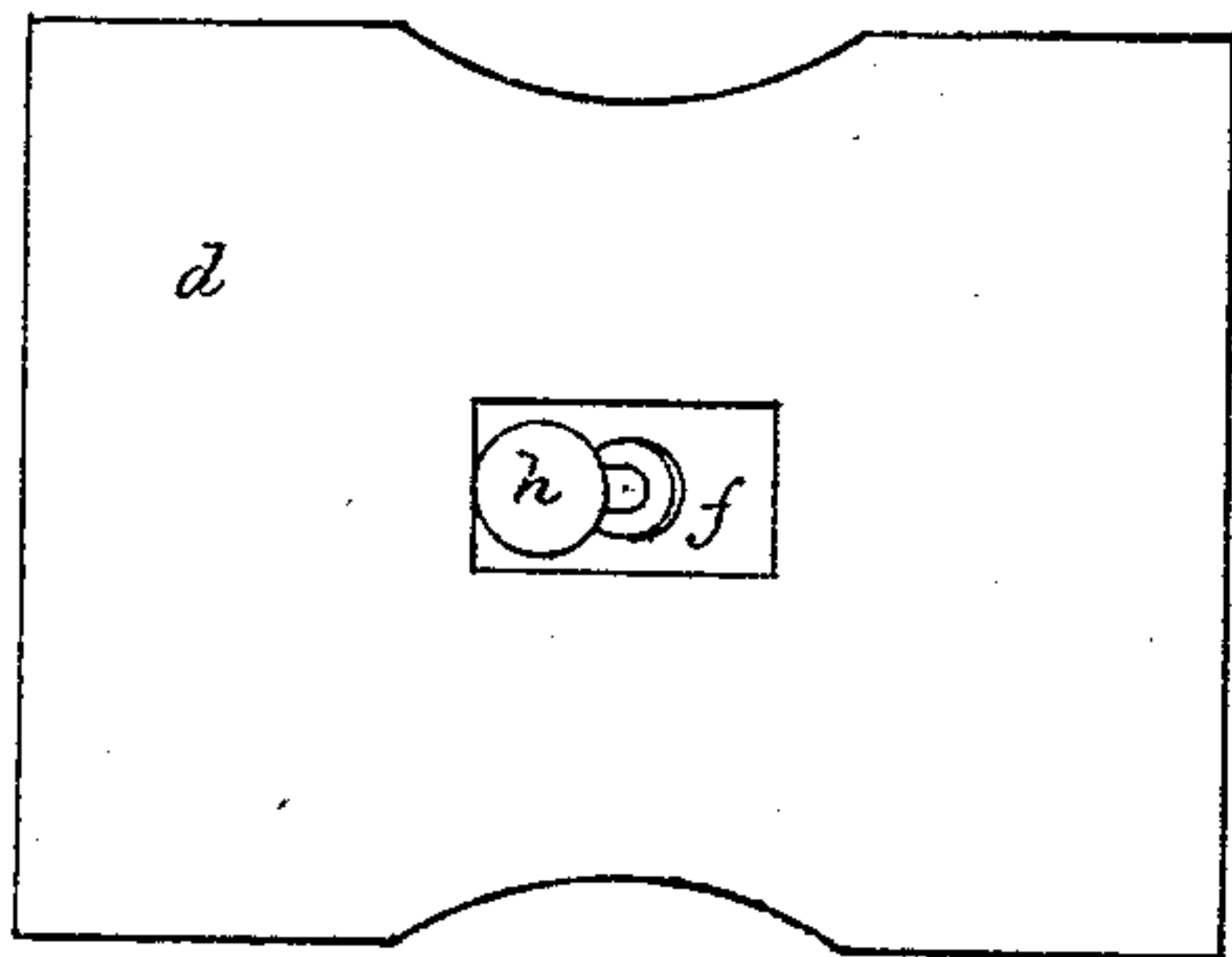
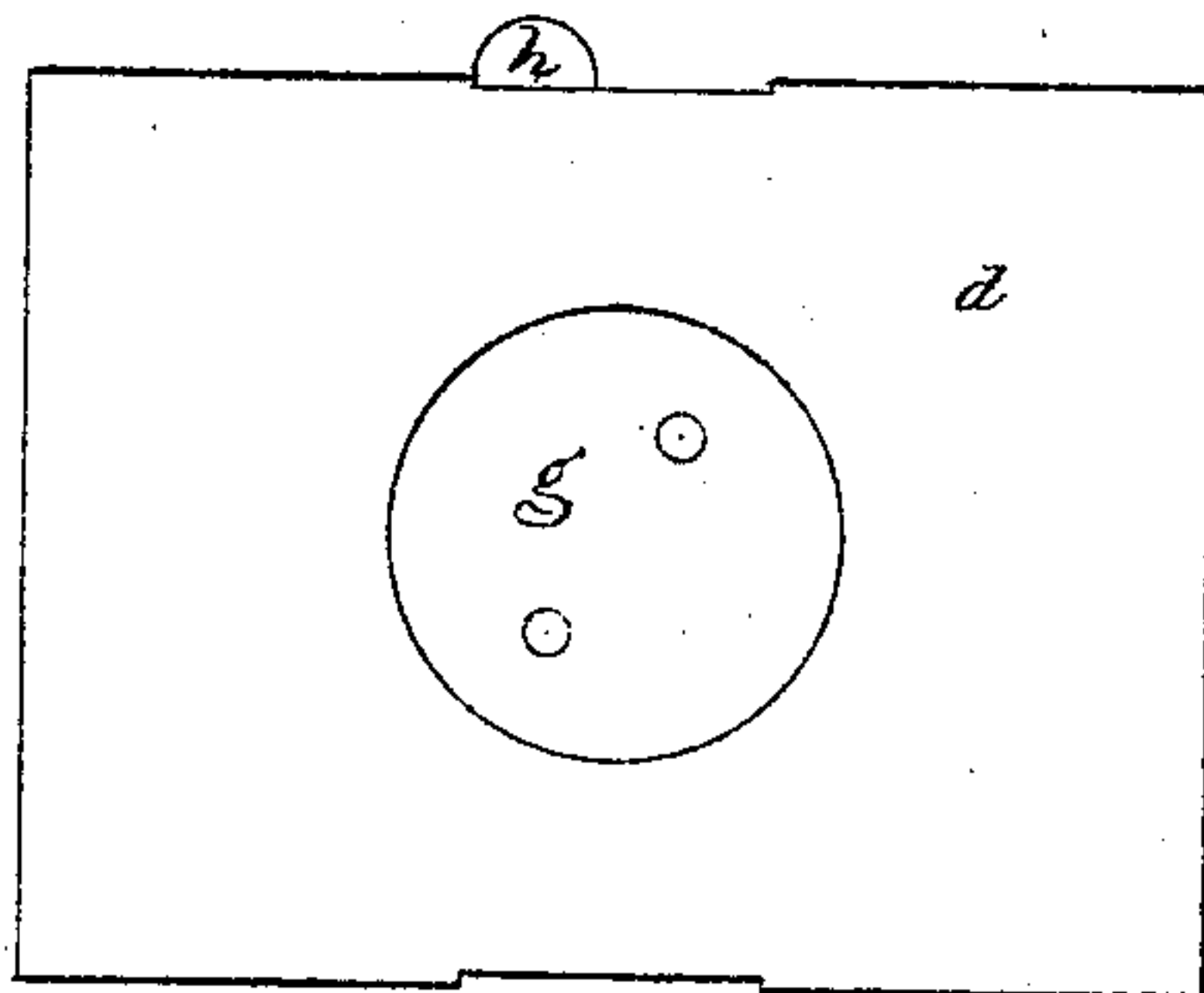


Fig. 4.



Witnesses.

W. B. Crosby  
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# UNITED STATES PATENT OFFICE.

HENRY F. WHEELER, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. 123,530, dated February 6, 1872.

*To all whom it may concern:*

Be it known that I, HENRY F. WHEELER, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Water-Meter; and I do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

Figure 1 of the drawing shows, in vertical longitudinal section, a meter embodying my invention. Fig. 2 shows the same in cross-vertical section, the sectional plane of each figure being denoted by a vertical dotted line on the other figure. In Fig. 3 the piston of my improved meter is shown in plan, and in Fig. 4 in side elevation.

*a* is the cylinder, which is cast with water-passages *b* and *c*, located at the middle of the length of the cylinder and extending each from a horizontal nozzle one-quarter around the cylinder, the inlet passage turning downward, and the outlet passage turning upward. The ends of the cylinder are closed by heads, and a long piston, *d*, is fitted carefully to the bore of the cylinder. This piston is peculiar in that it has a valve-case formed within it which communicates upward with the exhaust-passage *c*, and downward with the inlet passage *b*. Through said case are cut on either side elongated ports, each of which serves alternately to permit flow of fluid into and out of the space with which it communicates between the piston and the cylinder-head. Within said valve-case is placed a valve made up of two heads, *e e*, united by a connecting diaphragm, *f*, the heads and diaphragm being nicely turned to fit the smoothly-bored cylindrical valve-case in the piston, said diaphragm serving the purpose of a shifting-valve controlling the passage of the fluid through the ports with which it operates, and dividing the space in which it is located into inlet and outlet passages, the lower division being the inlet, and the upper division the outlet, and the heads serving as trunnions on which the valve is guided and kept in place. The open ends of the valve-case beyond the valve-heads are closed by removable heads *g g*. The inlet and outlet passages *b* and *c* are extended in the direction of the length of the cylinder, so that the inlet and outlet passages in the pis-

ton shall always be in communication with the passages *b* and *c* in any and all positions of the piston. To the valve-diaphragm *f* is connected a weight, *h*, in such a manner that when the weight is moved from a vertical position, it will tip or fall over one side or the other, so as to shift the position of the valve with reference to the ports it controls. For example, refer to Fig. 1, where the weight *h* is seen tipped to the left. It will be evident that, with the water flowing through inlet *b*, it must pass into the space between the right-hand end of the piston and the right-hand head of the cylinder, which will result in moving the piston to the left. Such movement of the piston brings weight *h* into contact with the metal of the cylinder, and then the valve partly shifts position by such movement of the piston, the weight gradually approaching the upright position and presently passing it to the right; when it gravitates and falls quickly to the right causing the valve to move suddenly, so as to open communication from the inlet with the space between the left-hand head of the cylinder and the left-hand end of the piston; and so also as to open communication with the outlet from the space between the right-hand cylinder-head and the right-hand end of the piston. It will be obvious, under such conditions, that the water passing into the left-hand space in the cylinder will force the piston to the right hand, causing displacement of water in the right-hand ends of the cylinder, which water will flow out of the apparatus through passage *c*.

The arrangement of the valve-ports in the valve-case in the piston, and the weight *h* should be such that when the weight is vertical the ports should be open enough to allow such further flow of water as will continue to advance the piston in the same direction which caused the weight to rise from its inclined to a vertical position, to the extent sufficient to cause the weight to pass its vertical position and to fall in the opposite inclined direction. It is this falling which first suddenly cuts off the inlet and outlet flow of the water as the valve passes the ports, and consequently brings the piston to a rest, and next and immediately opens the ports, reversing their communication with the inlet and outlet passages and reversing the movement of the piston.

In practice adjustable screws may be ar-



ranged in the weight-stem or in the outlet-passage to adjust and limit the amount of angular movement of the weight in falling. Also, in practice, to keep the piston from turning in the cylinder, which would cause the weight to bind in the passage *c*, I groove either the cylinder or the piston, a length slightly greater than the length of the piston-stroke, and fix a pin in the ungrooved part which fits easily in the groove. Projections from the cylinder-heads are made of such length that the piston abuts against them at the instant the falling weight causes the valve to close the ports, and thus the strokes of the piston are made constant in length. Directly over the tip-weight I make an opening through the cylinder, for convenience in securing the weight to the valve and to afford facility for any adjustment needed. Said opening is, of course, to be closed before putting the machine in operation. It is at said location that I propose to set the clock-work or indicator which registers the number of strokes of the piston or the quantity of fluid displaced by such strokes. Such mechanism may be operated by the movement of the piston in any of several ways now well known and practiced in water-meter constructions.

The apparatus may be converted into a motive-engine by attaching a piston-rod to the piston, carrying it through a stuffing-box in the cylinder-head and connecting said rod to other mechanism in any known way.

I have described the inlet and outlet passages as passing from horizontal nozzles, each one-quarter around the cylinder. This, however, is a mere convenience for attachment of pipes, it also leaving a clear space at the top for location of an indicator, and room for feet or

foundation on which the apparatus can stand conveniently. The inlet and outlet pipes might easily be directly connected with the cylinder casting, in a vertical direction, and the horizontal nozzles and the quadrant passages therefrom would then be dispensed with.

The tipping weight instead of being rigidly fixed to the valve, might be pivoted or hinged thereunto, and then the position of the valve would not be changed during the time while the piston in moving brought the inclined weight to a vertical position; but as soon as any further movement of the piston took place shifting the weight slightly beyond the vertical position; then the weight would at once fall, and would impart an impulse to the valve which would instantly shift it.

By reference to Fig. 1 it will be seen that the projections from the cylinder-heads which limit the stroke of the piston, are so made as not to check the flow of water into either space between the piston and the heads against which the piston strikes.

I do not claim the arrangement of the ports and valve-openings; nor a ported valve-case having endwise movements and carrying a cylinder placed transversely within or across it.

I claim—

A fluid-meter or engine, provided with a piston, constructed with a ported valve-case containing a rocking valve arranged to be operated by the movement of a tipping weight set in motion by the movements of the piston, substantially as described.

HENRY F. WHEELER.

Witnesses:

J. B. CROSBY,  
W. BRADFORD.