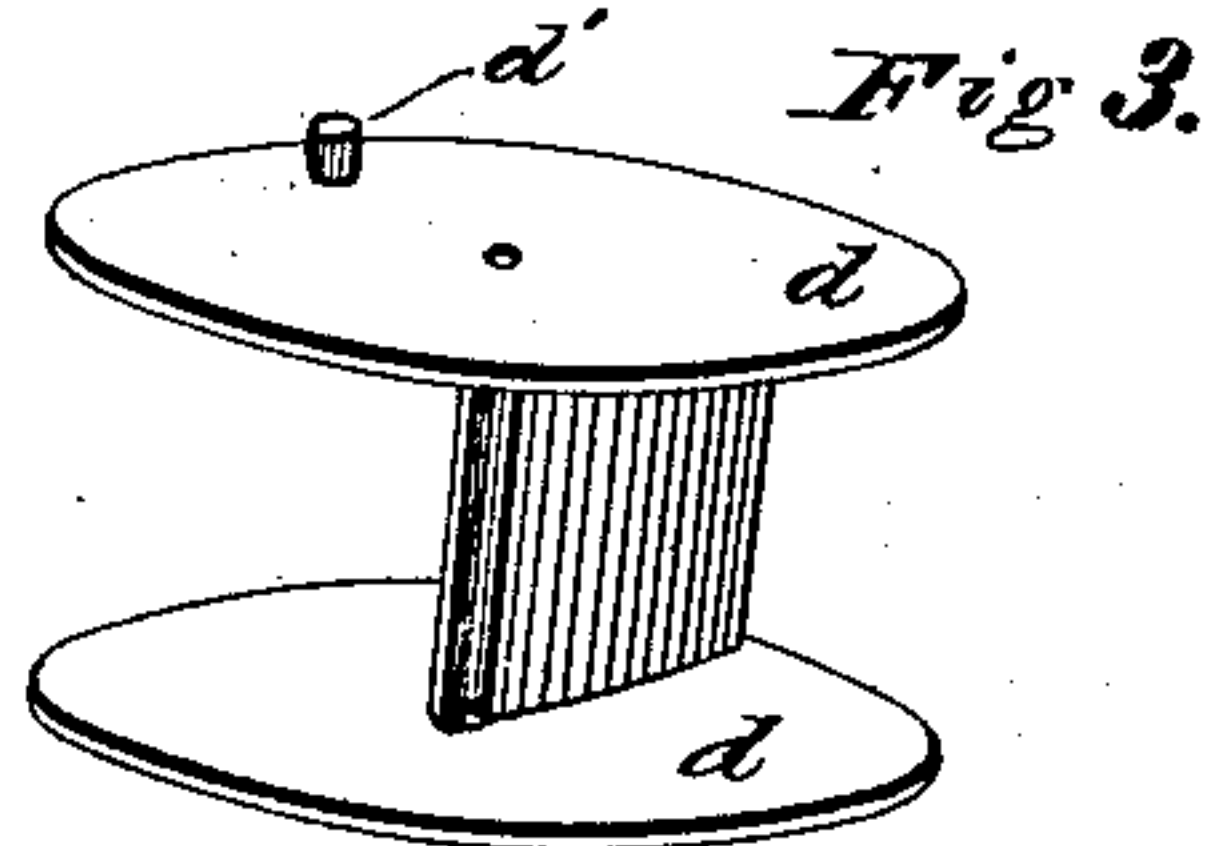
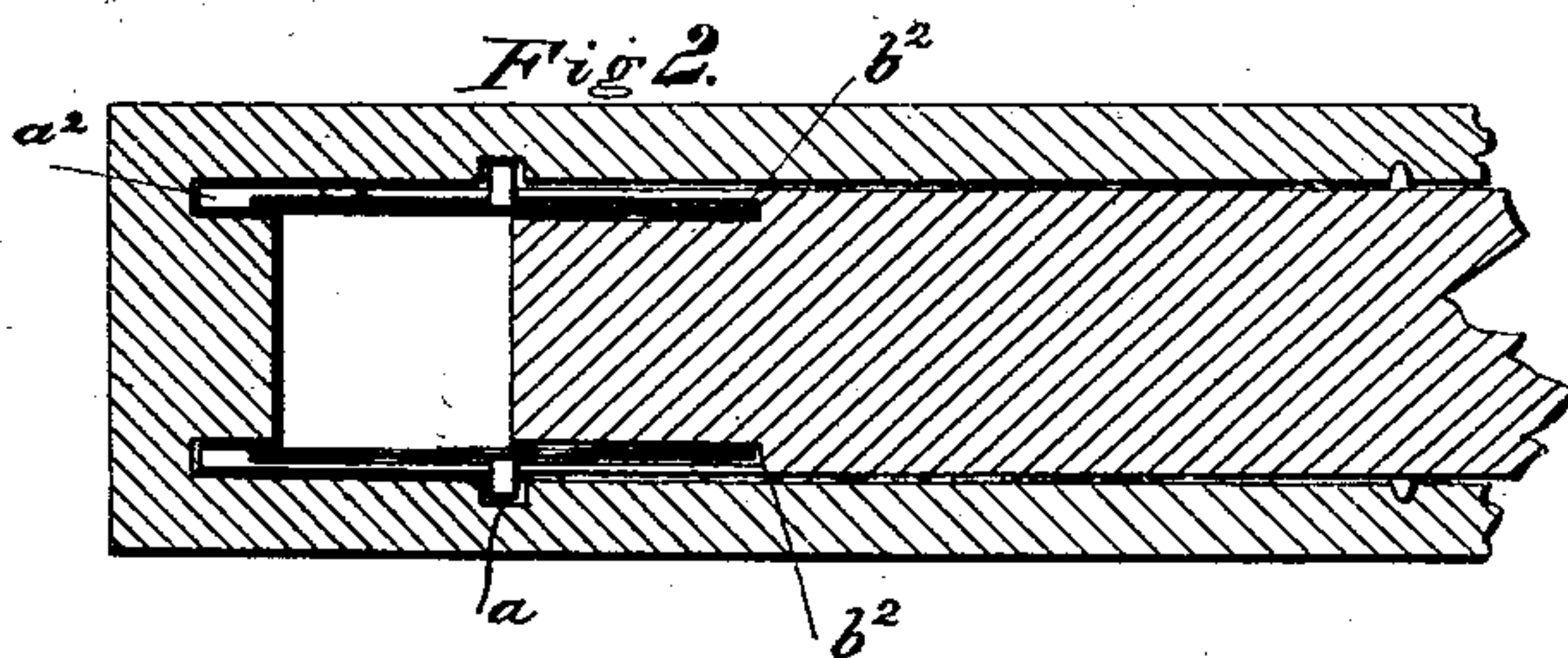
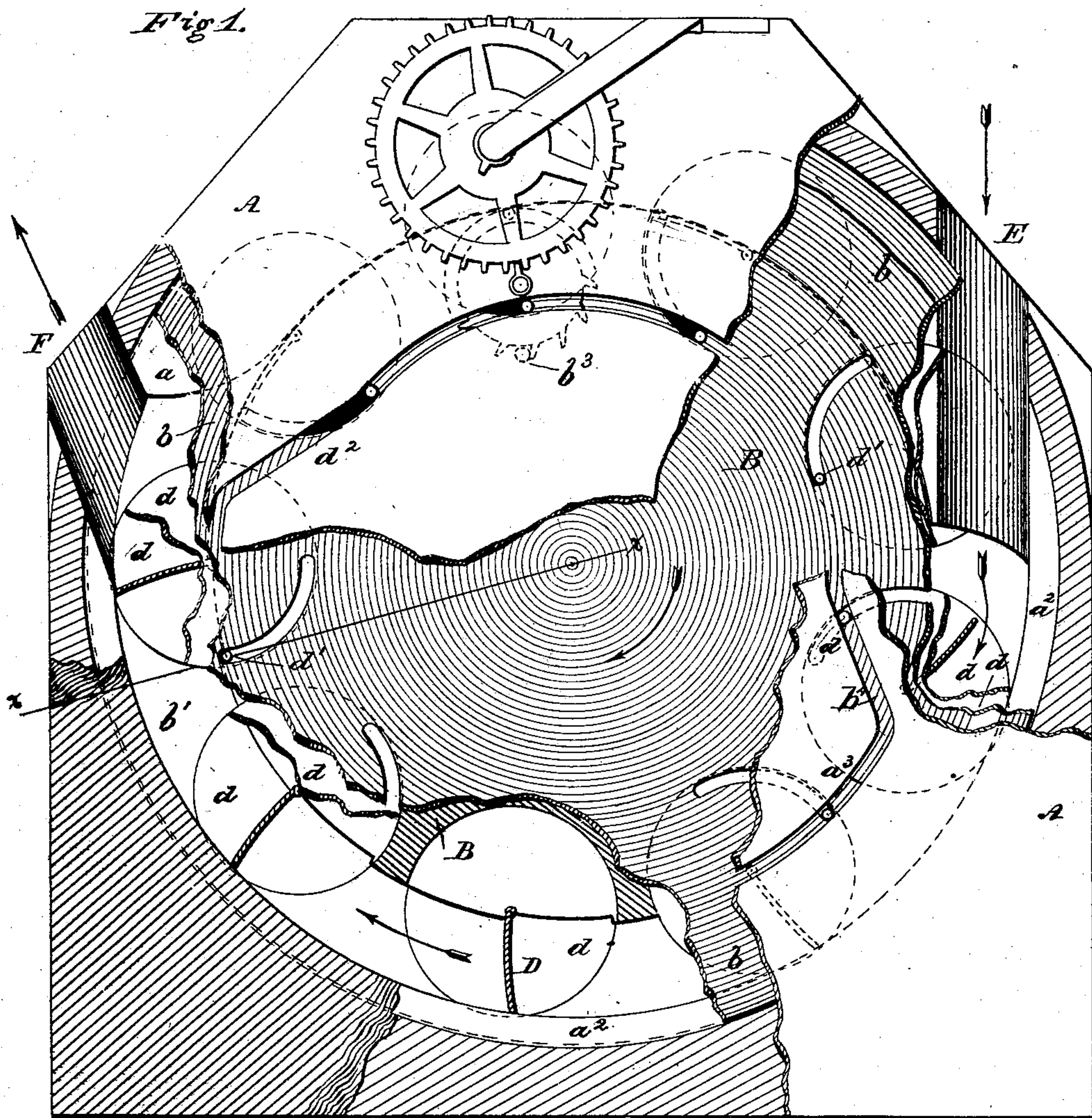


W. PEMBERTON & H. B. PIPER.

Liquid-Meters.

No. 157,346.

Patented Dec. 1, 1874.



WITNESSES

*Harry King*  
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By *His Attorney*  
*Wm. D. Baldwin*



# UNITED STATES PATENT OFFICE

WILLIAM PEMBERTON AND HENRY B. PIPER, OF CLEVELAND, OHIO,  
ASSIGNORS TO THEMSELVES AND LOUISA LAURA PIPER, OF SAME  
PLACE.

## IMPROVEMENT IN LIQUID-METERS.

Specification forming part of Letters Patent No. **157,346**, dated December 1, 1874; application filed  
October 7, 1874.

### CASE B.

*To all whom it may concern:*

Be it known that we, WILLIAM PEMBERTON and HENRY B. PIPER, both of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Liquid-Meters, of which the following is a specification:

The object of our invention is to measure liquids under pressure by passing the liquid through a conduit divided into a series of movable compartments of given area traveling with the current, said compartments being opened and closed automatically by positive action of a fixed stop or guide acting upon movable diaphragms. The subject-matter claimed is hereinafter specified.

In the accompanying drawings, Figure 1 represents a view in elevation of one side of our improved mechanism, with a portion broken away and in section, for the better illustration of our invention. Fig. 2 represents a transverse sectional view of a portion of our invention cut through line *xx* of Fig. 1; Fig. 3, a view in perspective of one of the diaphragms used in our meter.

A frame, A, is provided with a circular recess struck from a common center, the upper portion of the recess being formed with a shorter radius than the lower portion, as shown by the dotted lines, Fig. 1. By means of this peculiar construction of the recess a shoulder, *a*, is formed, which acts as an abutment against which the diaphragms strike, and which folds them in by positive motion onto the drum, as and for the purposes hereinafter more fully set forth. In this recess revolves a drum, B, provided with guide-flanges *b b*<sup>1</sup>, one on each side, which work in guide-grooves *a*<sup>2</sup> on the frame. These flanges and grooves form a water-tight joint. Closely fitting in recesses *b*<sup>2</sup> in the drum, and between the flanges, are disks *d*, formed on diaphragms D. These diaphragms are pivoted at equal distances around the periphery of the drum, and are free to oscillate in not quite quarter circles. Upon each of disks *d* a lug, *d'*, is provided, which rides in a cam-groove, *a*<sup>1</sup>, on each side of

the case. On one side of the meter is the induction-pipe E; on the other is the eduction-pipe F. A conduit or passage is provided between the two pipes, running around the lower portion of the drum. This conduit is of equal size in its transverse section to the eduction and induction pipes, thus admitting of no extra space for the collection of dead liquid. A cam, *b*<sup>4</sup>, is provided in the cam-groove opposite and adjacent to the inner end of the induction-pipe, so that, as each diaphragm which has been folded in onto the drum passes around to a point opposite the induction-pipe, the lug strikes and rides upon said cam, thus opening the diaphragm and closing the conduit.

It is the diaphragm closing the conduit and offering an impediment to the free run of the liquid, which imparts a revolution to the drum. As the diaphragms are opened, being equidistant from each other, they form compartments of equal area traveling with the current. As each diaphragm passes the eduction-pipe it abuts against the shoulder *a*, which folds them in onto the periphery of the drum, the liquid in the compartment having passed out of the eduction-pipe. The cam in the groove opposite the eduction-pipe aids, with a positive action on the lug *d'*, in folding in or closing the diaphragms. The length of the diaphragm is greater than the width of the conduit, whereby the end of the diaphragm abuts against the periphery of the conduit, forming an eccentric lock, and thus preventing the backward movement of the drum.

The grooves in the casing are so constructed in relation to the diaphragms that, when the outer edge of the diaphragms have been ground down they are held in position by said grooves, and are prevented from swinging around too far. After the diaphragms have passed the eduction-pipe and have been closed, they pass through a groove sufficiently small to admit of their free passage around to the induction-pipe, and at the same time prevent any water following, thus forming a water-tight passage or joint for the folded diaphragms to

pass through. This water-tight joint extends from the eduction to the induction pipe.

Upon one of the sides of the drum is formed a lug,  $b^3$ , which, in its revolution, strikes a tooth upon one of a series of indicator-wheels, thus recording on a dial-plate of any well-known form its revolution or amount of liquid passing through the recess.

We do not broadly claim a revolving disk carrying hinged diaphragms, as this is old; but

Having thus described our invention, we claim—

1. The combination, in a liquid-meter, of a casing or frame, a drum revolving therein, guide-flanges working in guide-grooves on the frame, disks turning in closely-fitting sockets in the drum and flanges, diaphragms connecting the disks, and cam-guides to open and close the diaphragms positively, these members being constructed and operating in combination, substantially as hereinbefore set forth.

2. The combination of the recessed frame, the revolving drum, the oscillating disks pivoted on the drum and provided with flanges working in the recesses, and the diaphragms interposed between the disks, these members being constructed and operating substantially as hereinbefore set forth, to form an easy-working but tight joint.

In testimony whereof we have hereunto subscribed our names.

WILLIAM PEMBERTON.  
HENRY BRUCE PIPER.

Witnesses as to the signature of HENRY BRUCE PIPER:

L. A. RUSSELL,  
BELLE PIPER.

Witnesses as to the signature of WILLIAM PEMBERTON:

WM. J. PEYTON,  
B. H. MORSE.