W. PEMBERTON & H. B. PIPER.

Liquid-Meters.

No. 157,347. Patented Dec. 1, 1874.

Fig: 1.

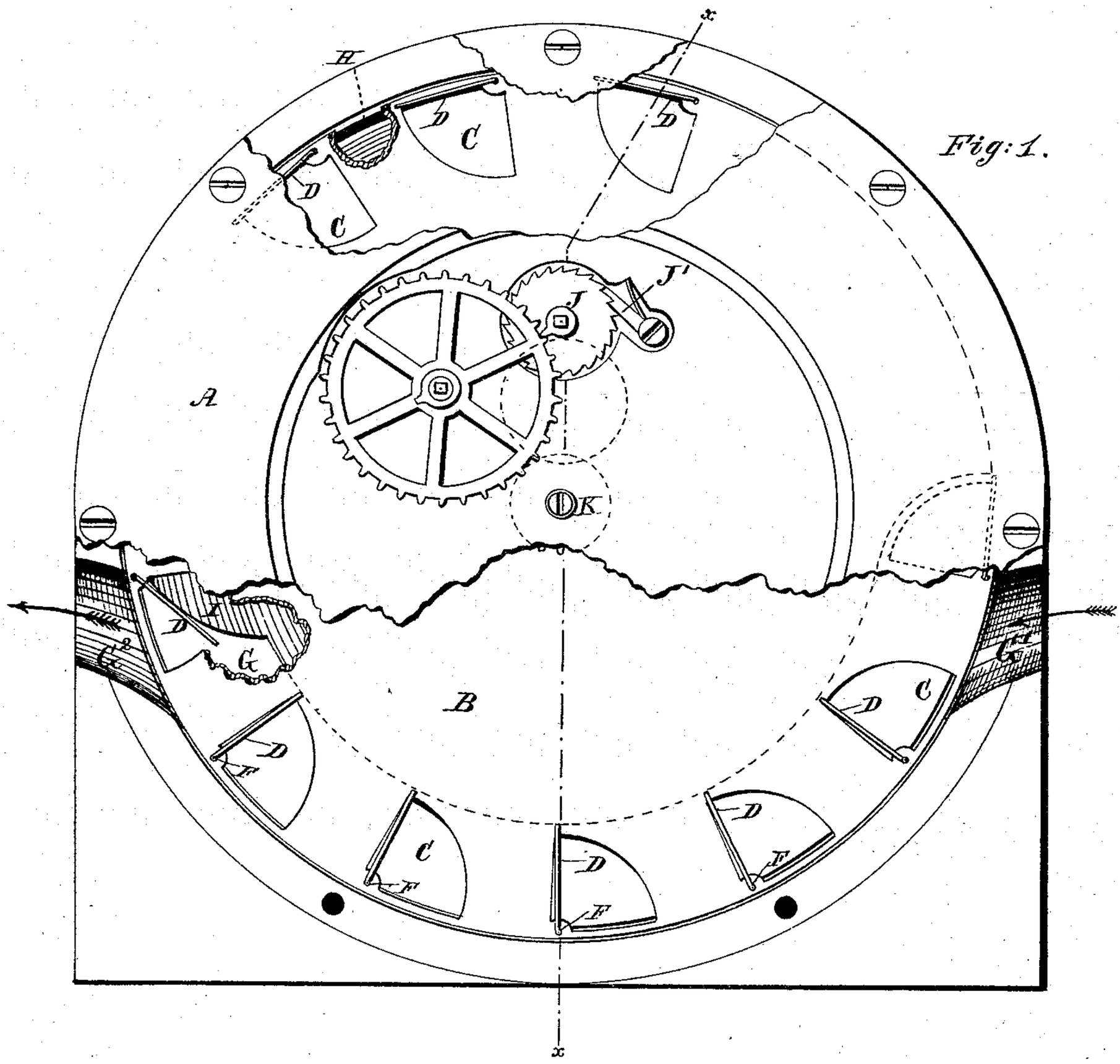


Fig: 2.

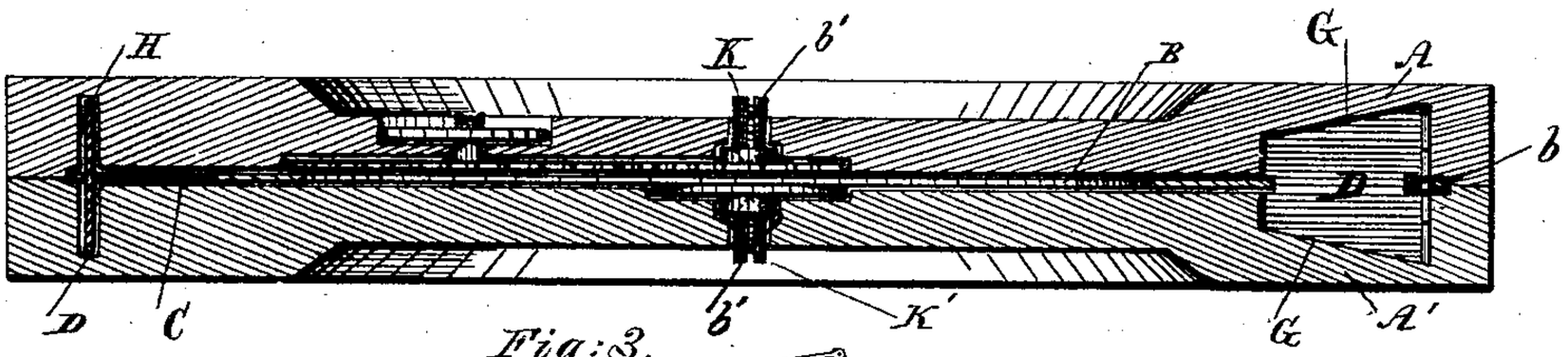
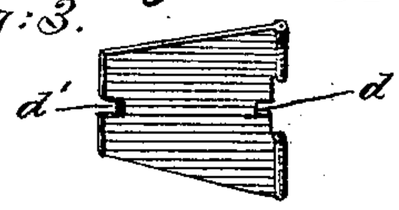


Fig: 3.



WITNESSES

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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. **157,347**, dated December 1, 1874; application filed October 7, 1874.

CASE A.

To all whom it may concern:

Be it known that we, WILLIAM PEMBERTON and HENRY BRUCE 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:

Our invention relates to liquid-meters of that class in which the liquid is measured as it flows under pressure through a conduit divided into movable compartments by hinged diaphragms automatically swung across the conduit by the pressure of the liquid, and folded out of operation by a stop or shoulder as the liquid leaves the conduit. The object of our invention is to secure a simple and efficient apparatus which will accurately register the escaping liquid. The subject-matter claimed will hereinafter be designated.

In the accompanying drawings, which show so much of our improved apparatus as is necessary to illustrate our invention, Figure 1 represents a view in elevation, with portions of the casing broken away to show the interior; Fig. 2, a section therethrough, on the line *x x* of Fig. 1; and Fig. 3, a view in perspective of one of the hinged diaphragms or trip-flanges detached.

A metallic frame or case for inclosing and supporting the operative parts of the mechanism is shown as composed of two parts, A A′, in this instance of similar construction and corresponding outline, which are united by bolts or screws, so that they may readily be separated. An annular frame or disk, B, is inclosed between the two parts of the supporting and inclosing frame or casing, (which parts are recessed or cut away to receive the disk,) and is caused to revolve, as will hereinafter be explained, with its edge or periphery moving in a groove-seat, *b*, formed by corresponding shoulders on the inner sides of the sections A A′ of the supporting-casing. The disk is supported at its center in the supporting-casing by a hub, *b′*, with which it revolves. Within and near the periphery of the revolving frame or disk are formed a series of sector-openings, C. Metal plates D, constituting trip-flanges or movable diaphragms, are hinged or pivoted at their backs or outer side at equal distances apart to the outer side of this revolving frame, so as to swing or open and close within these openings C. To keep the plates in proper position and prevent wabbling on their pivots, guide notches or recesses *d d′* are formed at their outer or free ends, and at their backs, so that the plates embrace the revolving frame, and are kept in position at right angles thereto. The back notches *d* embrace the lugs F, to which the plates are hinged. A water-way or conduit, G, is formed by recessing or cutting away the sections A A′ of the frame from the inlet G^1 to the outlet G^2. This conduit is preferably so made as to represent in form, in cross-section, the outline of a truncated cone, with its base outward. A groove or guideway, H, for the movable diaphragms D, leads from the eduction G^2 at the termination of the conduit to the induction G^1 at or near the beginning of the conduit. This groove is formed in the two parts of the frame or case A A′, and terminates at its opposite edges or sides, in both parts, flush with the wall of the outer or largest portion of the conduit, and flush with the inner edge of the groove-seat or rest *b*, respectively.

The operation is as follows: The liquid enters the induction-pipe G^1, impinges against the hinged diaphragms or trip-flanges, closing or swinging them out across the conduit, forming movable compartments therein. When the diaphragms reach the terminus of the conduit (where they are carried by the current) they abut against a stop, I, formed by a shoulder crossing the conduit from the guideway or groove H to its opposite side, and forming an abutment terminating the conduit. This folds the diaphragm back against the outer wall of the guide-groove, into which they pass, and in which they fit snugly, to prevent leakage from the conduit, the liquid passing out at G^2, and the diaphragms, as their disk revolves, being carried around in the groove, (the fluid in the meantime acting on the succeeding diaphragms,) and again, in succession, being presented to the current of liquid, and

automatically closed and opened, as before. As the area in cross-section of the inlet and of the outlet are each the same as that of the conduit, there is no dead liquid accumulated during the operation. As the disk or frame B revolves a suitable indicator or registering device is caused to indicate the flow of the liquid, by means of any well-known arrangement of gearing connected with the hub *b'*. A ratchet-wheel, J, and pawl J', forming part of this gearing, prevent the backward movement of the revolving disk.

Set-screws K K', passing through the frame A A', support the hub of the disk, and thus any wear may be compensated. As the disk fits snugly between the sides of the frame, leakage is prevented.

The peculiar form of the conduit is advantageous, as the largest portion of the body of the liquid, and consequently the greatest pressure, is exerted against the backs of the diaphragms, thus acting on the disk with greater leverage than could be brought to bear were the diaphragms of uniform sectional area throughout their entire length. The liquid as it enters the conduit is deflected from its narrow to its wider side.

The area of the diaphragms being slightly larger than that of the conduit, the pressure always causes them to fit snugly, notwithstanding the wearing away of the diaphragms.

Another advantage due to our method of hinging the diaphragms at their outer ends instead of their inner ends, as heretofore practiced, is that the diaphragm is drawn across the face of the induction-pipe some distance before opening, so as to allow the compartment in advance of it to be completely filled, and then opens quickly but steadily when released from its guiding-groove, owing to the pressure of the liquid behind, and thus avoids the slamming of the diaphragms. The stop at the eduction end of the conduit gradually swings out the diaphragm in the direction of the outflowing current, thus pressing out the liquid, and the diaphragms fit so snugly in the groove H that flooding is effectually prevented—that is to say, there can be no dead space in this meter, and consequently it must always register uniformly and accurately.

We do not, broadly, claim actuating hinged diaphragms by the pressure of a column of liquid flowing through a conduit, as we find that this is old; but

What we do claim as our invention, and desire to secure by Letters Patent, is—

1. The liquid-meter hereinbefore described, consisting of the combination of the casing or frame, the conduit through which the liquid flows, the revolving disk or frame, the diaphragms hinged to the outer edge of said disk, and projecting inwardly across the conduit, the stop at the eduction end of the conduit, and a return-groove connecting the induction and eduction ends of the conduit, these members being constructed and operating in combination substantially as hereinbefore set forth.

2. The combination of the conduit, the revolving disk, and the diaphragms hinged at their outer ends to said disk, these members being constructed and operating in combination substantially as hereinbefore set forth.

In testimony whereof we have hereunto subscribed our names.

WILLIAM PEMBERTON.
HENRY BRUCE PIPER.

Witnesses as to signature of HENRY BRUCE PIPER:

L. A. RUSSELL,
BELLE PIPER.

Witnesses as to the signature of WILLIAM PEMBERTON:

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