J. V. REDFIELD & J. T. BORDLEY.

LIQUID METER.

APPLICATION FILED DEC. 31, 1910.

1,016,361.

Patented Feb. 6, 1912.

2 SHEETS—SHEET 1.

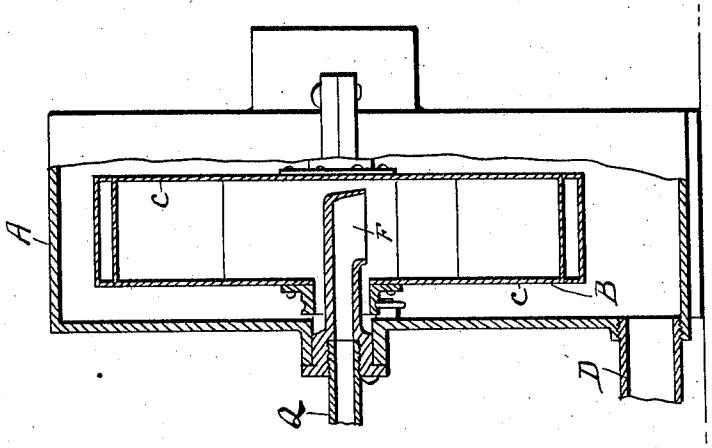

Fig. 5.

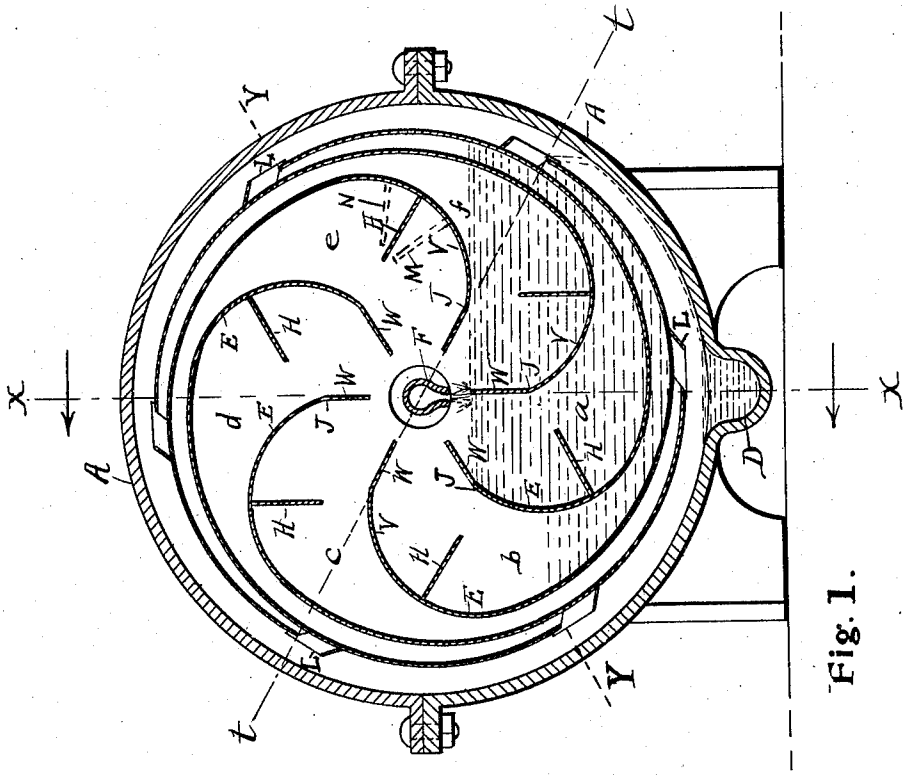

Fig. 1.

Witnesses

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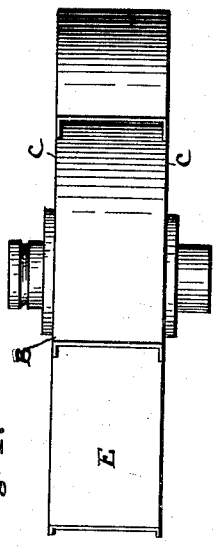

Fig. 4.

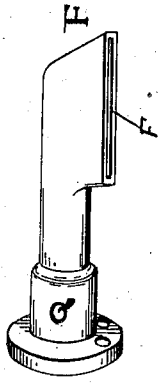

Fig. 3.

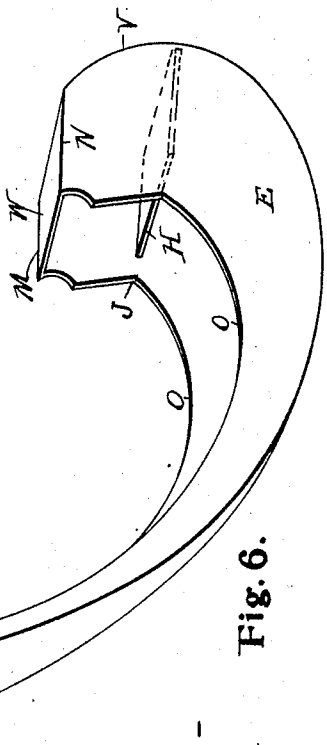

Fig. 6.

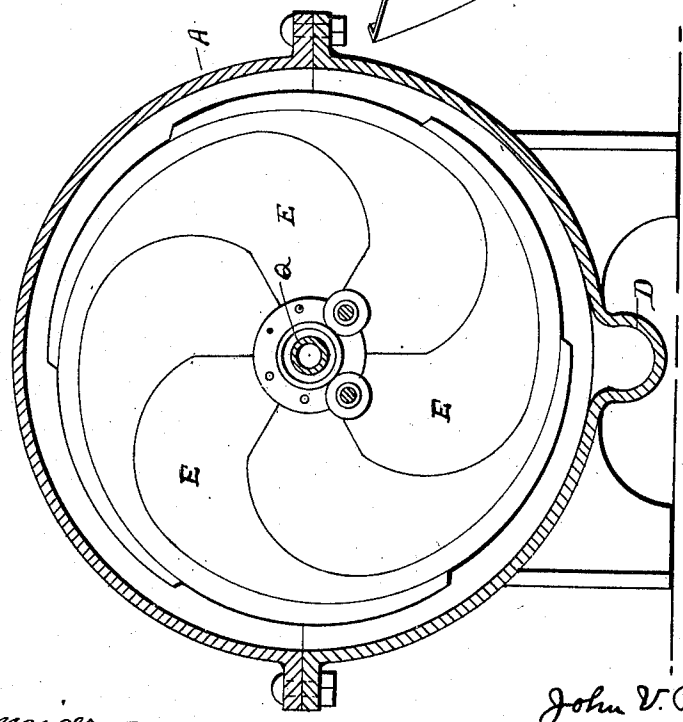

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

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LIQUID-METER.

1,016,361. Specification of Letters Patent. Patented Feb. 6, 1912.

Application filed December 31, 1910. Serial No. 600,298.

To all whom it may concern:

Be it known that we, JOHN V. REDFIELD, a citizen of the United States, residing at the village of Grosse Pointe Farms, Wayne county, Michigan, and JOHN T. BORDLEY, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Liquid-Meters, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to liquid meters, and has for its object an improved device of the rotatable or drum type in which the liquid is measured as to quantity by the successive filling and subsequent discharge of the several compartments into which the interior of the drum is divided.

In the drawings:—Figure 1 is a sectional elevation of the tank and meter drum, showing the various compartment walls of the drum, and the inclosing tank or casing, the side walls of each partition member being removed to show the interior construction. Fig. 2 is an end elevation of the tank and drum, the tank being shown in section, showing one method of building up and assembling the drum. Fig. 3 is a perspective of the pipe or nozzle through which the water is introduced into the measuring drum and into the several compartments thereof. Fig. 4 is a side view of the drum, showing the discharge orifices for the various interior compartments. Fig. 5 is a sectional elevation, at right angles to that of Fig. 1, along the line X—X thereof. Fig. 6 is a perspective of an individual partition piece removed from the drum.

A represents the tank, within which is journaled the rotatable drum B, whose ends C may be plane, whose sides, cross sectionally, are substantially circular, and consist of the exposed outer ends of the several partition members E, which are of the same width, from edge to edge, as the length of the cylinder, and each of which is preferably provided with side pieces O, which, when the several members E are assembled, constitute the plane ends of the cylinder; or each partition member E may be made without these side pieces and attached to the one-piece ends of the cylinder, which they touch, firmly enough to be water tight. The interior of the drum as thus assembled is thereby divided into the several compartments *a*, *b*, *c*, *d*, *e* and *f*, as shown in Fig. 1, although the number can, of course, be varied as desired. None of these partition members reach to the center of the drum; part of the space thus left is occupied by the nozzle F of the inlet pipe Q, which is coaxial with the drum, and about which, as a center, though not necessarily on it as a bearing, the drum rotates.

As the water flows through the nozzle F, it first flows down the straight portion W of the partition E, and thence onto the first curved portion V of the partition E or else, depending on the degree to which the individual chamber is tilted, strikes directly on the curved surface V, and is thereby deflected against the vane or baffle plate H, which is almost parallel with the adjacent truly radial portion W of the partition wall, from whose concave face V it rises, and by which it is preferably supported. As the principal office of this plate is the reception of the impact of the falling drops of the water of condensation, its fit with respect to the bottom and sides of the chamber across which it lies need not be watertight so long as it is sufficiently strongly supported in position. The receiving of the impact of the falling water by this vane or baffle plate thus counteracts the tendency of the drum as a whole to tilt or rotate about its axis, due to the impinging of the water on the vane H, which only takes place when the meter is not primed, or when it is operating under an excessive head of water. When so much water has accumulated in a compartment as to extend comparatively far to one side of the vertical line X—X of the drum's axis in proportion to its increase in depth, the drum slowly rotates about its axis to adjust itself to this disproportion as to weight, so that part of the inflow from the nozzle F is now directed into the next compartment *f*; a part of the contained water in compartment *a* is spilled over the top of the wall into the compartment *f*, but that part of the contained mass of water in the outer, nar-

rowing tip of compartment *a* is not emptied into the tank A, because of the alterations in the position of the drum, or rather of the compartment *a* thereof, until the drum has turned so far about its axis that the at first oblique line Y—Y has attained and passed a horizontal position. By the time the drum has rotated to such an extent that the chamber *a* has reached the position occupied by chamber *b* in Fig. 1, it will be seen from an examination of the dotted line *t*—*t* running from the discharge outlet of that chamber to the top of its partition wall, that a large part of the water must have been emptied. As the exact capacity or volume of each chamber or compartment is known, the amount of water can easily be ascertained from the indication (by the use of any type of automatic numberer or register) of the number of revolutions accomplished by the drum in a given time. The tank empties through the discharge outlet D.

The baffle plate H is preferably so located with respect to the curvature of the supporting partition member E that, if extended until it reached the next adjacent partition member, it would strike it at the "elbow" or angle J, where the true radial extent of the wall E ceases, and where the curved portion which gradually approaches in its extent the peripheral line of the drum begins. It may, however, without departure from the scope of our invention be located in either of the dotted-in positions indicated in Fig. 1 on each side of the full line position, or in an intermediate position.

Of course variations in the distance between the axial center of the drum and the ends of the several partition walls W it may be made as desired, and as determined by the quantity of water that it is designed that each compartment shall hold without spilling. We have also found it advisable, under some circumstances, to incline the inner end of these walls somewhat from their otherwise approximately radial position, in order to deflect a part of the flow of water accordingly, thereby advancing or retarding the filling of the individual compartments, and thus changing the volume of water measured by each compartment for purposes of calibration. In such case the bending of each wall W occurs about its junction with the elbow J as a center, and the free or inner end of the wall W is the end that moves. On the outer face of the drum adjacent to, though somewhat spaced from, the small discharge ends of the several scroll chambers, there may be located a series of baffling vanes L (see Fig. 1,) which, in case live steam finds its way into the drum, counteract the tendency, which it would otherwise manifest, to rotate under the influence of the blow-off of the steam into the outer air. The interior vanes or baffle plates H not only serve the function first described, but they also combat the rotative influence on the drum as a whole due to the impingement of live steam against the curved partition walls E.

What we claim is:—

1. In a liquid meter, in combination with a tubular axle having a radially arranged discharge terminal, a revoluble drum having a plane end portion and interior partition members having concaved faces spaced at their inner ends from said discharge terminal portion, and constituting with their outer ends a substantially circular periphery for the drum, the chambers thus constituted being of tapering contour with their smaller discharge ends at the periphery of the drum, baffle plates projecting into the several chambers from the concave faces of the partition walls, whereby the water normally falling into each chamber from said discharge terminal may be temporarily deflected, and baffle plates arranged about the periphery of the drum, adjacent the discharge ends of the several chambers, whereby the rotative effect on the drum as a whole due to the unintended escape of steam through said terminal and the several chambers is counteracted, substantially as described.

2. A liquid meter, comprising a revoluble drum having plane end portions, a plurality of partly radially extending and partly curved interior walls, the outer curved portion of each of which form a part of the periphery of the drum, the interiorly located part of each chamber being larger than its outer end portion, a baffle plate rising from the concave face of each chamber wall adjacent its broadest portion and extending a portion of the distance spacing its supporting wall from the convex face of the adjacent wall, in the direction of that point therein where the curved portion joins the truly radial portion, and an inlet terminal member arranged axially with respect to the drum, whereby water is conducted to the interior thereof and is intercepted and somewhat deflected in its fall into one of the chambers of the drum by the baffle plate therein, substantially as described.

3. A liquid meter, comprising a drum, having plane end portions, partition members partly radial and partly curved in their extent therewithin dividing the interior of the drum into a plurality of tapering compartments, the outer end of each partition wall constituting a part of the curved outer face of the drum, each partition wall being spaced from those adjacent on either side to form an outlet aperture for one of the chambers, and baffle plates projecting into the wide portion of each chamber from the concave face of its wall toward the outer end of the radial portion of the next parti-

tion wall in position to receive the impact of some of the water entering the chamber, and an axially arranged inlet pipe whereby water may be successively introduced into the several chambers as the drum rotates, substantially as described.

4. In a liquid meter, in combination with a plurality of compartments arranged about a common center, and with the outer portions of the partition walls thereof constituting a substantially circular periphery therefor, the inner portion of each compartment having substantially radially arranged walls and the space included between the outer portions of said walls gradually narrowing as the periphery of the compartment is approached, a baffle plate projecting into each compartment from the concaved partition wall thereof in a direction perpendicular to a line tangent to a curved portion of the partition wall thereof adjacent the outer end of the radially arranged portion, and means for introducing a supply of water along the common axis of rotation of said compartments and for filling the same successively as the structure of the assembled compartments revolves, each baffle plate receiving the impact of the water first entering its compartment and deflecting the same in its fall, substantially as described.

5. In a liquid meter, in combination with a tubular central member provided with a discharge aperture, a drum member rotatable thereabout, said drum having a plurality of interior partitions whereby a corresponding number of scroll-shaped chambers are formed, each of said partitions being spaced from the axial center of the drum with its portion next adjacent thereto normally radially arranged though inclinable from its normally true radial position, and a baffle plate projecting from the concave face of each partition wall toward the outer end of the radial portion of the next adjacent partition wall, adapted to receive and partially counteract the impact of water falling into its chamber from the discharge aperture of said central member, substantially as described.

In testimony whereof, we sign this specification in the presence of two witnesses.

JOHN V. REDFIELD.
JOHN T. BORDLEY.

Witnesses:
VIRGINIA C. SPRATT,
WILLIAM M. SWAN.