(No Model.)

2 Sheets—Sheet 1.

J. A. TILDEN.

DISK WATER METER.

No. 489,208. Patented Jan. 3, 1893.

Fig. 1.

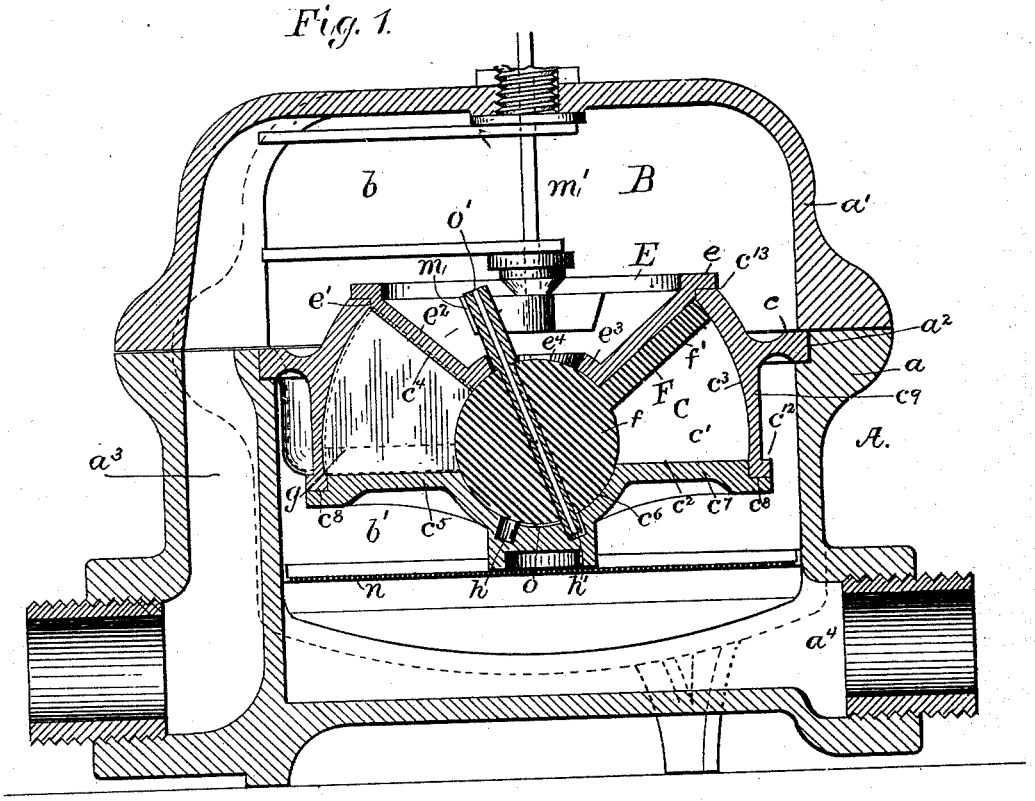
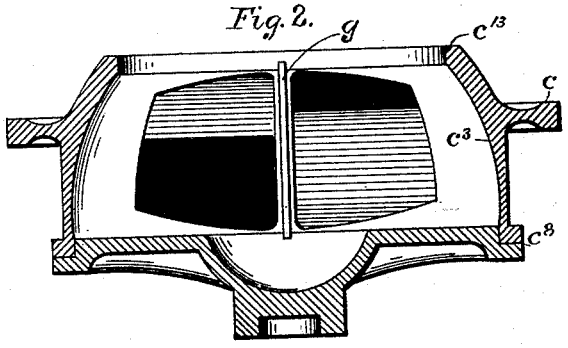


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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No. 489,208. Patented Jan. 3, 1893.

Fig. 3.

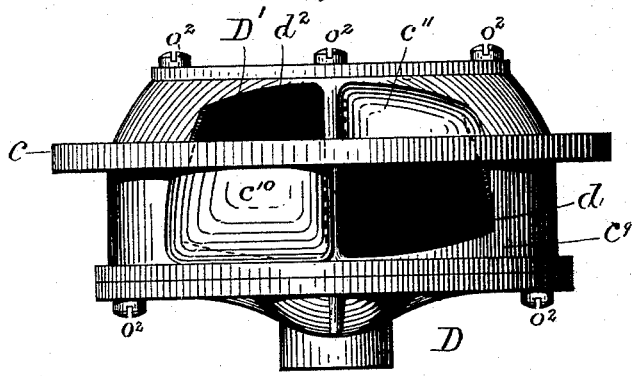
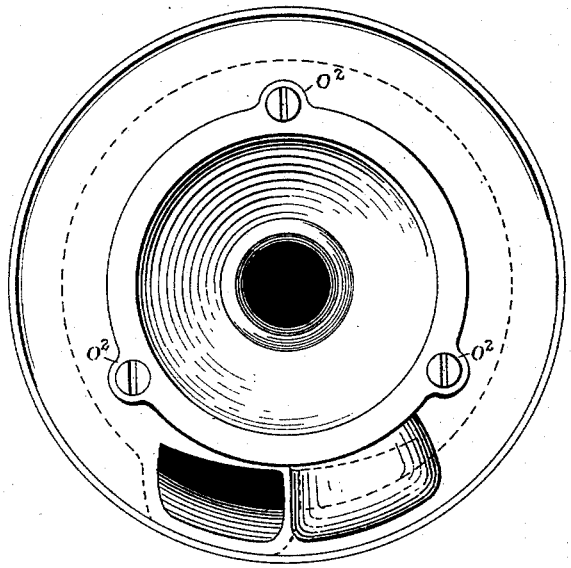


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES A. TILDEN, OF HYDE PARK, MASSACHUSETTS, ASSIGNOR TO THE HERSEY MANUFACTURING COMPANY, OF PORTLAND, MAINE.

DISK WATER-METER.

SPECIFICATION forming part of Letters Patent No. 489,208, dated January 3, 1893.

Application filed July 5, 1892. Serial No. 438,892. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. TILDEN, a citizen of the United States, residing at Hyde Park, in the county of Norfolk, State of Massachusetts, have invented a new and useful Improvement in Water-Meters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to the class of meters known as disk meters, and comprises various details of construction and organization, whereby a meter of great efficiency, accuracy and durability is obtained, while at the same time the mechanical parts are simplified in arrangement and reduced in cost.

In the drawings: Figure 1 is a view in vertical central section of the meter: Fig. 2 is a view in vertical section and elevation of a portion of the inner case, illustrating in part the construction of the case and the arrangement of the ports: Fig. 3 is a view in elevation of the complete inner case removed from the outer case: Fig. 4 is a view in plan thereof.

The outer case A, is made in two parts a a', the part a forming the base, and the part a' the cap which is secured to the base by bolts. The two parts together form without the inner case a large chamber B (see Fig. 1) which is divided into two parts by the inner case C, and its laterally extending flange c. This flange furnishes the means by which the inner case is held in the chamber B, being made sufficiently large to drop into the recess a^2 on the inner side of the top of the base a, the flange resting upon the shoulder formed by the recess and the cap a' lapping upon the upper surface of the flange. This construction provides for the easy removal of the inner case from the outer case, as it is simply necessary to unbolt and lift the cap a' from the base a to expose the inner case and permit it to be taken out. The outer case A, has the water passage a^3 in the one side connecting with the upper part b of the chamber B, and on the opposite side the passage a^4 connecting with the lower part b' of the chamber B. Either of these passages may be used for the inlet or outlet respectively. In Fig. 1 I have represented the passage a^4 as the inlet and the passage a^3 as the outlet. The cap a' is made of sufficient height to provide space for a section of the reducing train of the registering mechanism.

The inner case C contains the disk chamber c', which preferably has the flat lower surface or bottom c^2, the spherically curved side wall c^3, and the downwardly extending conical top c^4. The spherically curved side wall is a true section of about two thirds of a hemisphere, the greater diameter being at the base and the smaller at the top. The case is constructed of three parts, namely, first, the base plate c^5 which has a central downwardly rounded depression c^6, forming a disk bearing, and the horizontal extension c^7 on each side ending in a depressed flange c^8; second, the side wall c^9, which has the flange c, the enlargement c^{10} upon the lower side of the flange, and the enlargement c^{11} upon the upper side of the flange, see Fig. 3, providing respectively a portion of the inlet port D, and of the outlet port D', the inlet port including the large opening d in the wall c^9 below the flange c, as well as the portion of the opening afforded by the enlargement c^{11}, the entrance to which extends through the flange, and is at a right angle to the entrance d; the outlet port including the large opening d^2 through the wall c^9, and the increased opening through the flange c, provided by the enlargement c^{10}, see Figs. 3 and 4, and the outer wall c^3 which has an outwardly extending foot or flange c^{12} about its lower edge to fit into the depression in the lower plate formed by the depressed flange c^8. The upper edge c^{13} is squared. It will be understood of course that this wall is hollow and has a cylindrical opening below and above the lower opening having the largest diameter. It will be also understood that the lower opening is closed by the bottom plate c^5. The upper opening is closed by the top plate E. This upper plate forms the third part of the case and has the cylindrical flange e, which rests upon the upper surface of the wall c^9, the short cylindrical section e', which fits into the cavity immediately below upper cylindrical opening, and forms a joint with the squared upper edge of the wall c^9 and the downwardly-extending conical sec-

tion e^2, the inner surface of which forms the top of the disk chamber, and which ends about the upwardly curved central section e^3, the center of which is removed to form an opening e^4. The section e^3 of the upper plate and the depression c^6 of the lower plate form spherical bearings for the ball f of the disk F. The disk comprises the ball f and the thin conical plate or section f', extending conically from the ball. The disk chamber c' upon the port side is divided by the partition or abutment g, which extends from the wall c^9 between the ports to the ball of the disk: and the disk plate f' is provided with a radial recess through which the partition extends. At the lower end of the lower bearing c^6 there is formed in the bottom plate the inclined circular track h (see Fig. 1) into which extends the axis h' of the disk ball, the opposite end of the axis extending through the hole e^4 in the upper plate E, and bearing against a short lever m on the lower end of the spindle m', connected with the reducing mechanism of the registering train. Preferably the diameter of that part of the axis h' in the track h is somewhat less than the width of the track, so that the axis may not cramp as it traverses the grooves. The object of this axis and track is to maintain the disk in mechanically controlled relation to the case and to the ports and wall of the case, so that it is compelled to travel or move in a given track, which is the track in which it should move to properly and accurately co-act with the ports and wall in its measuring function. The disk thus mechanically held, guided and controlled in the disk chamber cannot be dislodged by a shock, and reduces friction and wear to a minimum.

There may be extended across the lower section of the chamber B, the perforated diaphragm n, if desired, to intercept the passage of foreign matter.

In operation the water enters the section b' of the chamber, passes into the inlet D, traverses the disk chamber c', actuating the disk and leaving it through the outlet port D', entering section b of the chamber B, from which it flows through the passage a^3.

It will be seen that the disk case is contained or held in a large chamber, and that it and its laterally extending flange effect a division of the chamber into two parts, one of which receives water from the inlet and connects with the inlet port of the disk chamber, and the other of which connects with the escape passage and receives water from the disk chamber: It will also be observed that the construction of the two cases is such that the inner case is readily placed in the outer case, securely held and easily removed. It will further be seen that the construction of the disk chamber or case is such that each of the three parts can be accurately shaped, made and duplicated by ordinary machine tools and methods, and that they and the disk are so constructed and put together that the disk can be easily placed and removed from the case. It will also be observed that the bearings which wear, being in the upper and lower plates, can be easily renewed by simply substituting new upper and lower plates for the old ones, while the same side wall and disk can be used almost indefinitely.

I prefer to make the disk of hard rubber. The water pressure against the upper surface of the disk wall acting through the opening e^4 in the upper plate may be balanced by a water pressure in the space o below the lower bearing by means of water introduced to said space through a hole o' in the axis h', connecting the water chamber b with said space o.

It will be understood, of course, that the lower plate of the inner disk case and the upper plate of said case are secured to the intermediate flanged wall by screws o^2 which extend through holes in said plate into the wall and furnish means by which the two plates are made easily detachable from the wall c^3.

Having thus fully described my invention I claim and desire to secure by Letters Patent of the United States:

1. A disk meter having a case forming the measuring chamber and a measuring disk contained therein, the said case having the flange c, the enlargement c^{10} below the flange upon one side of the partition g, which opens through the flange and connects with and forms a part of the port opening d^2, and the enlargement c^{11} above the flange c, which opens downward through the flange and connects with and forms a part of the port d and is arranged upon the other side of the abutment or partition g as and for the purposes described.

2. The combination in a disk meter of the outer case A, comprising the base a and the cap a'; its passages a^3 a^4, and the inner disk case having a flange c which included with the case separates the cavity of the outer case into two distinct parts or sections, one of which parts or sections is an inlet chamber, and the other an outlet chamber; an inlet port in the inner case connecting the inlet chamber of the outer case with the measuring cavity of the inner or disk case, and the outlet port in said inner or disk case connecting its measuring cavity with the outlet chamber of said outer case, as and for the purposes described.

3. The combination in a disk meter of the outer case A, comprising the base a the cap a' forming a large open chamber B, and the passage a^3 a^4 and the removable inner disk case having the flange c, the edge of which is confined between the cap a' and the base a, and which, with the inner case, divides said chamber B into two sections, whereby the inner case is made easily removable from the outer case, as and for the purposes described.

4. The combination in a disk meter of the disk case formed of the detachable lower flat plate c^5 having the ball bearing c^6, the separate spherical curved wall c^9, having an opening at each end, the lower opening of which is closed by the plate c^5 and the detachable

upper plate c^4 closing the upper opening said plates being formed with a downward conically shaped section having a hole e^4 and the ball bearing e^3, as and for the purposes described.

5. The combination of the disk case made of three detachable plates or pieces c^4, c^5 and c^6 all shaped substantially as indicated and united together to form a disk chamber of the shape specified, and having ports of the character described with the conical disk contained in said chamber, having a ball f and the conical disk plate f' extending from the ball f slotted upon one side, and the abutment or partition g which extends through said slot, and divides one side of the disk chamber from the ball to the wall, substantially as described.

6. The combination of the disk chamber having the opening e^4 at its top and the space o at its bottom, the ball bearing, and the disk having a ball to fit the bearing, and a hole through the ball connecting the water chamber above it with the space o below it, as and for the purposes described.

7. In a disk meter the inner case, the lower plate c^5 of which has the depressed support c^8 for receiving the foot of the side wall, the said wall having a flange, inlet and outlet ports, and squared at the upper corner as specified, and the upper plate having an outwardly extending ledge to rest upon the squared upper surface of the side wall, and a downwardly extending conical section, which intersects at its upper outer edge the curved surface of the inner wall, the lower and upper plates being secured to the intermediate flanged wall by screws, as and for the purposes described.

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