(No Model.)

J. A. TILDEN.

ROTARY WATER METER.

No. 488,587. Patented Dec. 27, 1892.

Fig. 1.

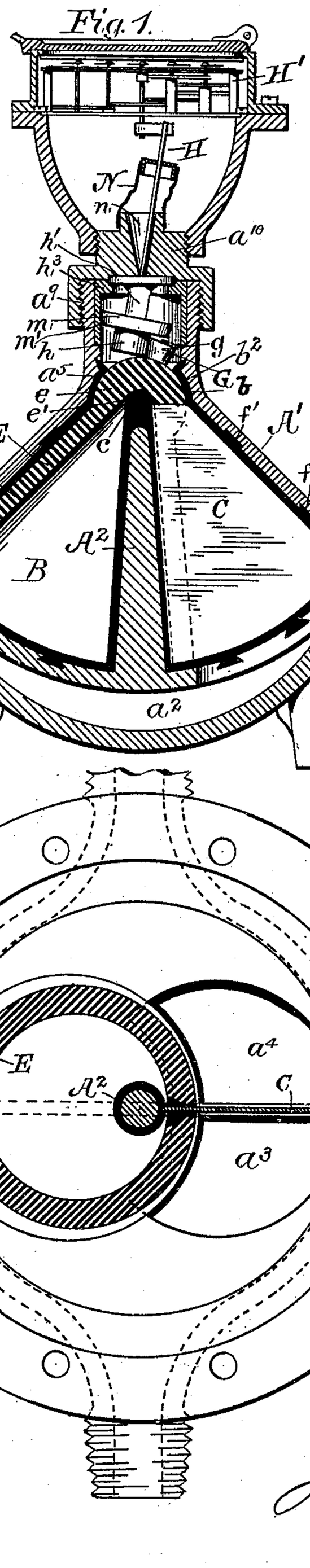

Fig. 3.

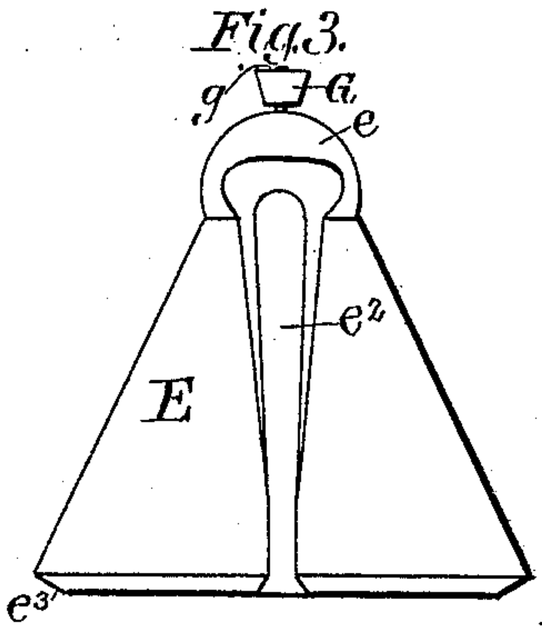

Fig. 4.

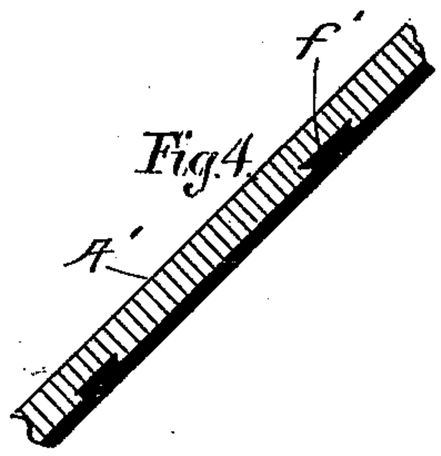

Fig. 5.

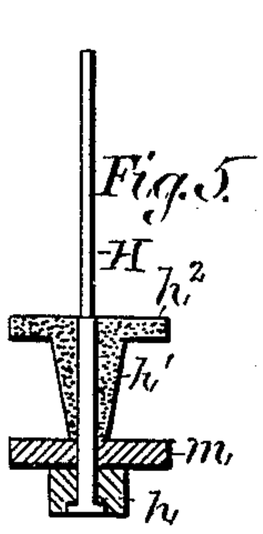

Fig. 6.

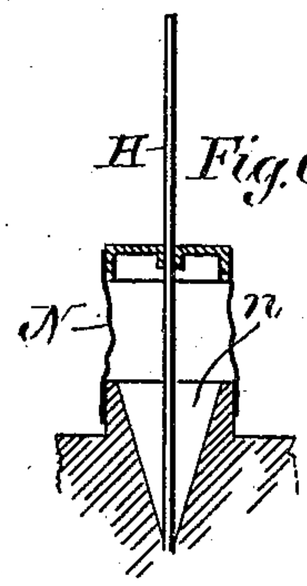

Fig. 2.

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ROTARY WATER-METER.

SPECIFICATION forming part of Letters Patent No. 488,587, dated December 27, 1892.

Application filed July 20, 1891. Serial No. 400,190. (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 and 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 the specification, in explaining its nature.

The object of this invention is to provide a meter which shall have few parts, be inexpensive to build, and one which shall have for its size, great capacity, and a required degree of accuracy.

The essential elements of the invention are found in the peculiar shape of the piston chamber and of the piston, in the novel method of sustaining the piston in the piston chamber, and of controlling its action therein. Also in the special manner of connecting the piston with the registering mechanism. Also in the case, forming the piston chamber, permanently lined with an anti-corrosive substance in a peculiar way by a process of molding.

In the drawings, Figure 1 is a vertical section of the meter and registering mechanism on the line $x\ x$ of Fig. 2. Fig. 2 is a horizontal section on the line $y\ y$ of Fig. 1. Fig. 3 is an elevation of the piston. Fig. 4 is a detail view representing a section of the casing. Figs. 5 and 6 are detail views showing portions of the mechanism connecting the piston with the registering devices.

The meter case preferably is formed in two parts, viz., the base or lower section A and the upper section A′. The base has a flange a' which surrounds the cavity or bottom a^2 of the piston chamber and which is a true section of a sphere and the inlet port a^3 and the outlet port a^4. The base also supports a tapering post A^2 which preferably is cast integral with it and rises from the center of the spherical cavity. The upper section A′ is conical in shape from its apex or upper end a^5 to the flange a^6, and the flange a^6 rests in the recess a^7 in the base A. The binding or clamping ring a^8 rests upon the flange a^6 and by means of bolts and nuts clamps it to the flange a' of the lower section. The upper end or part a^5 of the upper section of the meter case is cylindrical, is open at its top and has the screw thread a^9 upon which screws a stud cap a^{10} (see Fig. 1). The inner surface or wall of the upper section A′ forms a true conical chamber and with the spherical bottom a^2 forms the piston chamber B. The post A^2 terminates preferably in a rounded end which is so located that its center is also the center of the hemispherical termination b of the conical chamber B. There is also in the piston or measuring chamber B, a radial partition or abutment C, which extends from the wall or surface of the section A′ between the ports a^3 a^4 in the base to the conical post A^2.

The piston E consists of a hollow cone which terminates at its top in a ball e of a size to fit the hemispherical cavity b^2 of the case. The apex of the interior of the cone terminates in a rounded surface e' which fits the rounded termination c of the post A^2. The piston is also provided with a radial slot e^2 which extends from the ball or apex e to its base and which is of a shape to allow the piston, when in position in the chamber B to slide or swing on the abutment or partition C during its gyration in the chamber. The circular lower edge e^3 of the piston is of a curve and shape to rest or very nearly rest upon the curved bottom of the chamber in all positions which the piston may take.

The piston E in operative position in the measuring chamber B rests upon the apex of the post A^2 with its rounded cavity e' and with the abutment or partition C in the slot e^2.

The construction of the parts is such that the conical piston serves with the abutment C to divide the measuring chamber into measuring spaces, namely, where the piston joins or is in contact with the partition C, where its exterior comes in contact with the wall b' or its interior in contact with the conical projection A^2 and where its lower edge e^3 comes in contact or very nearly in contact with the chamber bottom.

While the construction, shape and proportion of the parts are such that the conical piston, acting in conjunction with the abutment, serves to divide the piston chamber

into parts, the lines of division are constantly changing as the piston is constantly moving or gyrating about the chamber and maintaining a continually changing contact with the side wall from its apex to its base, while at the same time it is moving forward and back on the partition plate C.

The inner surface of the section A′ and the upper surface of the base I prefer to finish by a lining of thin hard rubber permanently fixed or secured to the case and forming a part thereof. This I accomplish by providing the casing with numerous dovetail or other recesses or holes f' and molding the rubber to the shell and in said recesses or holes under heat and pressure or by vulcanization, and when so applied to the case the rubber fills the holes or recesses and serves to knit or bind the lining permanently and securely to the shell. Of course, I may use in lieu of the dovetail recesses or holes any other suitable method of attaching hard rubber to the case. By so attaching the hard rubber lining to the meter case, a very much smaller amount of hard rubber is necessary for providing a lining than when the ordinary method of employing removable linings of hard rubber is used, and the meter case can be made smaller and more compact. Consequently, a more economical meter can be made. While I have represented the fixed lining as applicable to the case of the meter herein specified, I would not limit myself to its use in this particular class of meters.

I will now proceed to describe my method of controlling the piston and obtaining registration therefrom. The piston is provided at the extremity of the ball e' with a pin g, upon which is a small roll G. This roll, either directly or indirectly, bears against the lower end of a gyrating pin H, which is used for the double purpose of controlling the piston, that is, keeping the piston in contact with the wall of the piston chamber, and imparting motion to the registering train H′ in a manner described in previous patents. This gyrating pin H preferably is provided with a small roll h, against which the roll carried by the piston bears. The pin H passes through and is held by a flexible packing h' which is in the form of a disk h^2 held between the cap stud a^{10} and a flanged sleeve h^3, (see Fig. 1,) and which has a downward extension through which the pin H runs. The resistance of this flexible packing, which preferably is made of rubber and the spring thereof are sufficient to cause the piston to assume the position shown in Fig. 1. Now, as the piston gyrates about the chamber, the position shown in Fig. 1 is one of any number of positions which the piston will take, and as the motion of the piston is constant, a revolving movement will be imparted to the lower end of the gyrating pin and a similar revolving motion to the upper end which engages with the registering train. While the spring of the flexible packing is sufficient to maintain the piston in position for all ordinary purposes, I prefer to use in addition an independent roll m mounted upon the pin H and arranged to bear or roll against the interior of the wall of the chamber m'. Without this roll the piston is controlled in a flexible relation to the chamber, but with the roll the relation is more positive. I prefer to use a roll somewhat smaller than would be required for a positive connection. The construction as a whole affords a very desirable and practicable method of controlling the piston, and at the same time obtaining registration therefrom. There may be attached to the gyrating pin a flexible cap N to prevent particles of grit and hard matter from entering the conical cavity n below it and wedging the gyrating pin. And the inclosed space may, if desired, be filled with a liquid.

It will be observed that the piston is supported by the conical projection A^2 and that the conical projection not only acts to support the piston, but that it also acts to make a joint over its entire length with the piston. It is not essential that this support should be tapering, neither is it essential that the piston be carried on the end of the support in the manner shown. The ball on the end of the piston, for instance, may have the same spherical contour on the under side that it has on the upper, and the upper end of the support would then be made concave to receive it, rather than rounded.

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

1. In a water meter the combination of a piston chamber having a side wall to form a hollow cone provided with a spherical upper end and a bottom forming a true section of a spherical cavity, and having a chamber underneath the main spherical wall divided to form distributing chambers for the inlet and outlet passages, with a gyrating hollow cone-shaped piston of an angle smaller than that of the conical wall of the piston chamber and mounted in said chamber, as and for the purposes described.

2. In a water meter a piston chamber formed or shaped upon one end or base to a true section of a spherical cavity, and a conical wall extending or rising from the edge of said end or base, a post in said chamber, connected upon one side with the wall by a partition, a port upon each side of said partition, and a gyrating hollow cone-shaped piston mounted upon said support and of a less angle than the angle of the conical wall of the piston chamber, and having a slot in one side to receive the partition, as and for the purposes described.

3. The piston chamber having the regularly curved base, conical wall and regularly curved upper end, the projection or post A^2, the partition C between the post and the wall, the hollow piston E, having the curved or ball apex e to fit the curved upper end of the pis-

ton chamber, and the slot e^2, and mounted upon said projection and partition, and provided with a gyrating movement in said chamber by the water pressure, substantially as described.

4. The combination of the base A, having a water inlet and a water outlet, ports connecting them with the piston chamber, the piston chamber shaped as specified, the post A^2, partition C, and slotted hollow conical piston E, mounted and operated in the chamber as specified, as and for the purposes described.

5. The combination in a water meter of the base section A, having a water inlet and water outlet, the ports, the post A^2, the flange a' and circular recess a^7, with the clamping ring a^8 to clamp the flange a^6 to the base flange a', the partition C between the post A^2 and the wall of the piston chamber, the slotted hollow piston E, mounted in the piston chamber as specified, as and for the purposes described.

6. The combination of the piston chamber, shaped as specified, the projection A^3 and partition C, the inlet and outlet ports, the piston E, shaped as specified, and mounted in the piston chamber, as described, whereby under water pressure it is provided with a gyrating movement, and an auxiliary device bearing upon the piston to assist the water pressure to maintain the piston in proper contact with the wall of the piston chamber during its gyrating movement, as and for the purposes specified.

7. The combination of the gyrating rod H, provided with a flexible packing h' formed thereon, a hole in the stud cap a^{10}, through which it passes, and a flexible hole cover attached to the rod to move with it, as and for the purposes described.

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