H. I. DILTS.

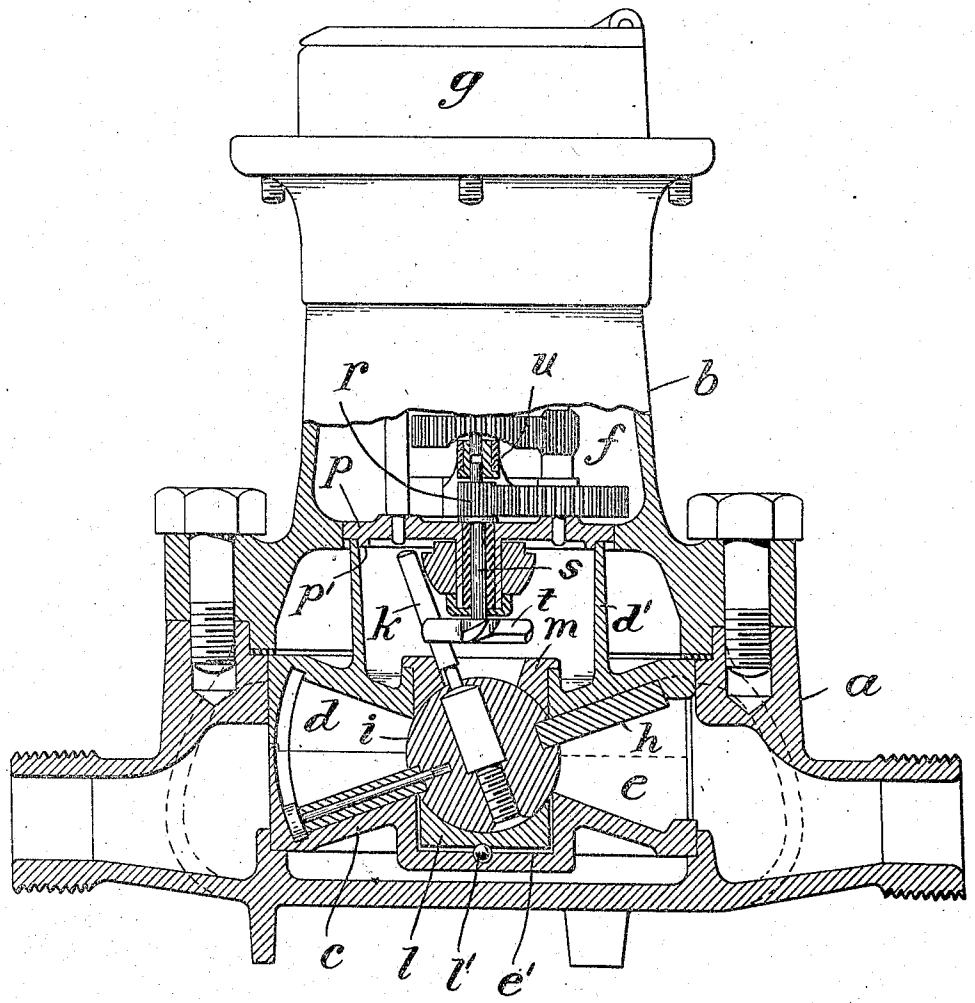
WATER METER.

APPLICATION FILED MAR. 13, 1909.

941,563. Patented Nov. 30, 1909

2 SHEETS—SHEET 1

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

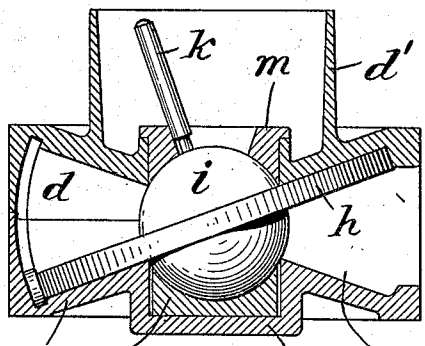


Fig. 3

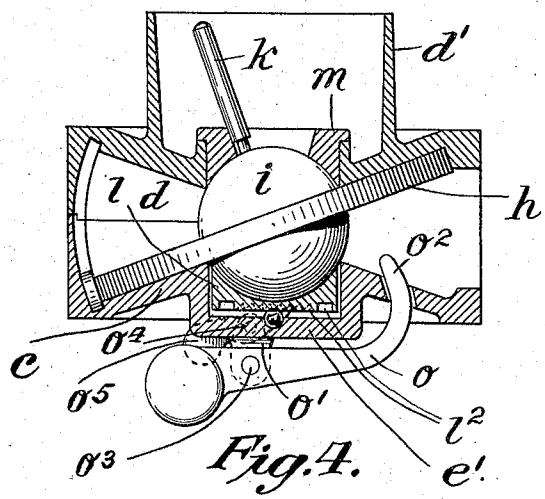
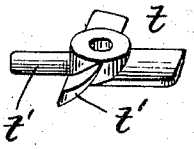


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY I. DILTS, OF NEW YORK, N. Y., ASSIGNOR TO NEPTUNE METER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

WATER-METER.

941,563. Specification of Letters Patent. Patented Nov. 30, 1909.

Application filed March 13, 1909. Serial No. 483,217.

To all whom it may concern:

Be it known that I, HENRY I. DILTS, a citizen of the United States, residing in Elmhurst, in the borough of Queens of the city of New York, in the State of New York, have invented certain new and useful Improvements in Water-Meters, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

The reliability and durability of water meters, as well as minimum reduction of head in operation, are largely dependent upon reduction of friction and prevention of wear of moving parts. This becomes very apparent when it is considered that an ordinary water meter is in almost ceaseless operation and that such operation is usually at a very high rate of speed, the rotation of the prime moving parts of a disk meter being often at the rate of four or five hundred revolutions per minute. It becomes, therefore, of great importance in striving for perfection in the construction of water meters to reduce to a minimum the friction of moving parts and liability to wear.

It is therefore the object of this invention, which is mainly concerned with disk meters, to improve the construction of such meters with this general purpose in view. In accordance therewith provision is made whereby the wear between the ball which carries the disk and its socket, which has heretofore been confined mainly to one point, shall be distributed; and provision whereby the weight of the driving spindle of the reduction train and its pinion is balanced during operation so that the pinion shall not rest heavily upon the plate which otherwise supports it.

The invention will be more fully explained hereinafter with reference to the accompanying drawings in which—

Figure 1 is a view partly in elevation and partly in vertical section of a disk meter which embodies the invention. Fig. 2 is a detail view illustrating a modification in the support of the disk. Fig. 3 is a view similar to Fig. 2 but illustrating still another modification. Fig. 4 is a detail view of the driving head of the reduction gearing.

The main lower casing *a* and the main upper casing *b* are or may be constructed in any usual or suitable manner. The main lower casing *a* supports in the usual manner the disk chamber, comprising the lower part *c* and the upper part *d*, this chamber being provided with the diaphragm *e*, on opposite sides of which are the inlet and outlet of the disk chamber. The upper main casing *b* likewise supports in usual manner the reduction gearing *f* and the register *g* which may be of any suitable or preferred construction. The measuring disk *h* is carried as usual by the disk ball *i*, which also carries the disk spindle *k*.

The disk ball *i*, in the construction heretofore in use, is seated directly in the upper and lower parts *c* and *d* of the disk casing. The resultant of the forces which act upon the disk tends to create excessive wear between the ball and the lower seat at a point in the quadrant nearest the outlet, and between the ball and the upper seat at a corresponding point, the wear being mainly, however, between the ball and the lower seat. Such wear eventually permits the ball to move out of center, thereby affecting the accuracy of the meter and finally causing friction between the disk and the walls of the casing and perhaps breakage. To prevent such wear upon one side of the seat, in the improved construction, the lower seat *l* and, preferably also, the upper seat *m*, through which the spindle *k* protrudes, are made independent of the respective parts of the disk casing, and the lower seat *l*, at least, is made rotatable, having a free fit or floating in the step *e'* formed therefor in the lower disk casing *c*, that it may be slowly but continuously rotated during the operation of the meter and the wear between the ball and the seat be thereby distributed.

As shown in Fig. 1, a single ball bearing *l'* is interposed between the seat *l* and the bottom of the lower casing *c*, in the axis of rotation, while in Fig. 2 the seat *l* is shown as having a free fit or floating in the step *e'* of the lower casing without the interposition of a ball, the presence of liquid between the seat and the step being relied upon as a lubricant sufficient to insure the free rotary movement of the seat. In both of the constructions shown in Figs. 1 and 2 the friction between the ball and the seat is relied upon to effect the slow rotary movement of

the seat, while in the construction shown in Fig. 3 other means for effecting such rotary movement are shown, such means comprising a weighted lever o, pivotally supported in a bracket o' on the bottom of the lower casing c and having a finger o^2 which projects upwardly through the bottom of the lower casing in position to be struck by the disk h at every oscillation thereof. The shaft o^3 on which the arm or lever o is mounted has at one end an arm o^4 which carries a weighted pawl o^5 which projects upwardly through the bottom of the seat e' and engages ratchet teeth l^2 formed on the bottom of the seat l, so that at each oscillation of the disk h the seat l receives a positive forward impulse.

It will be observed that the provision of an independent seat for the ball not only distributes the wear between the ball and the seat but also permits the seat to be formed independently of the lower casing and to be formed of a different and better wear-resistant material than that which can be employed to advantage in the lower casing. Furthermore, the seat may be removed and replaced by a new one if, for any reason, such substitution of a new seat becomes desirable. What has already been stated with respect to the lower seat l obviously is true with respect to the upper seat m, which may be rotatable to distribute wear and may also be machined independently of the upper casing and formed of a different material.

In the construction of nearly all meters there are provided, within the main casing, so called gravel chambers in which most of the heavy grit is collected so that it does not pass through the meter. Nevertheless, as the water soon fills the interior of the main casing, above the disk casing, and as the water which so enters the spaces above the disk casing sometimes carries with it more or less fine grit, it happens that sufficient fine grit settles upon the disk ball i, where it is exposed through the opening for the disk spindle, in the upper disk casing, to create considerable friction and wear between the disk ball and its seat.

As a means to prevent the settling of fine grit upon the disk ball, the upper disk casing d is provided on its upper side, around the upper ball seat, and completely inclosing the same, with an imperforate annular flange or wall d', integral with the upper disk casing, which extends to and fits closely against the under side of the lower plate p of the gear train, the underside of such plate being preferably formed with a low annular flange p' against which the annular flange or wall d' fits. The chamber within the flange or wall d' and between the upper disk casing and the lower plate of the gear train fills with water, but as it is a dead space which communicates with the annular and practically dead space outside of the flange or wall d', practically no water currents enter the space within the wall d' and there is practically no grit, even in a very finely divided condition, introduced into the chamber within the flange or wall d' and therefore practically no fine grit can settle upon the exposed surface of the disk ball i.

In the operation of meters as ordinarily constructed, it is found that the pinion r on the driving spindle s, resting against the upper surface of the plate p, under the weight of the pinion, the spindle and the driving head or arms t, sometimes wears into the plate p sufficiently to free the upper end of the spindle from the bridge u in which the upper end of the spindle has its bearing. The same is also sometimes true of other vertical members of the gear train. To overcome this effect of the weight of the spindle and its connected parts, or other member the driving or other arms t are formed with oblique or inclined surfaces, like propeller blades, as clearly shown in Fig. 4, such surfaces being inclined upward in the direction of movement of the arms, so that by the re-action of the water against such surfaces in the rapid rotation of the spindle, the spindle and its connected parts are lifted so that the weight thereof is practically counter-balanced and there is no wear between the underside of the pinion and the upper side of the plate. The internal resistance of the meter is thus further diminished and the life of the meter is prolonged.

I claim as my invention:

1. In an oscillating disk meter, the combination with the disk and the disk ball, of a disk casing formed with a step, a ball seat formed independently of the casing and freely rotatable in said step, and means to impart a slow rotary movement to said ball seat during the operation of the meter.

2. In an oscillating disk meter, the combination with the disk and the disk ball, of a disk casing formed with a step, a ball seat formed independently of the casing and freely rotatable in said step, an arm moved by the disk at each oscillation thereof and a pawl actuated by said arm and engaging the ball seat to impart a step by step movement thereto during the operation of the meter.

3. In an oscillating disk meter, the combination of a main casing, a disk casing, an oscillating disk having a disk spindle, a gear train, a plate supporting the gear train and a driving spindle having its driving arms formed with inclined surfaces like propeller blades to lift the spindle during the rotation thereof.

4. In a meter, the combination of a gear train including a driving spindle having its members mounted to rotate about vertical

axes, one of said members having arms formed with inclined surfaces to lift such member during the rotation thereof and prevent wear, a supporting plate for the gear train, and means actuated by the movement of the liquid through the meter to rotate such member.

This specification, signed and witnessed this 11th day of March, A. D., 1909.

HENRY I. DILTS.

Signed in the presence of—
A. B. RICKETTS,
J. SHIPMAN.