Aug. 16, 1938. W. A. WHITE 2,127,195

WATER METER

Filed May 3, 1935

Fig. 1.

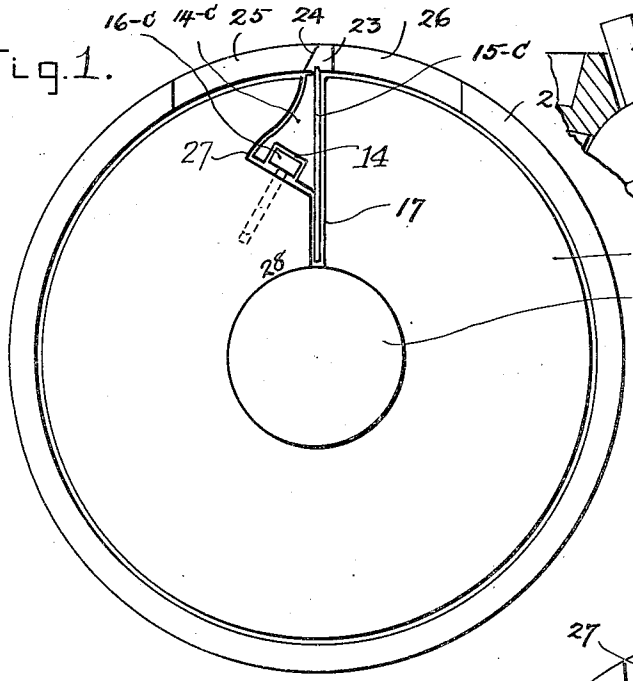


Fig. 4.

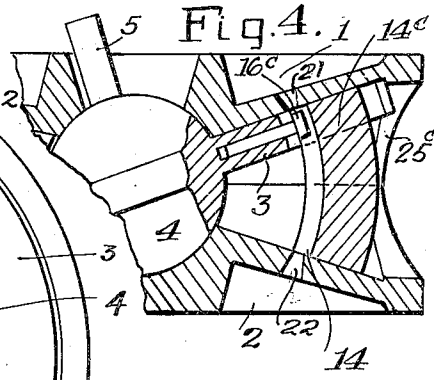


Fig. 3.

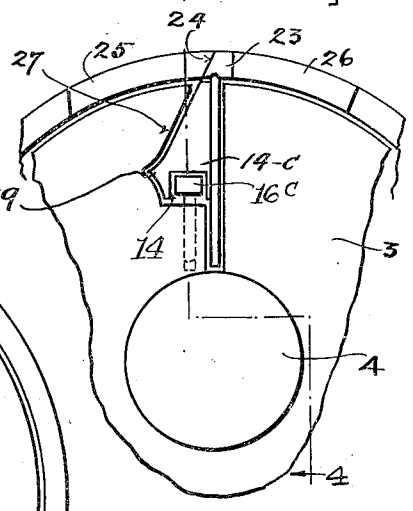
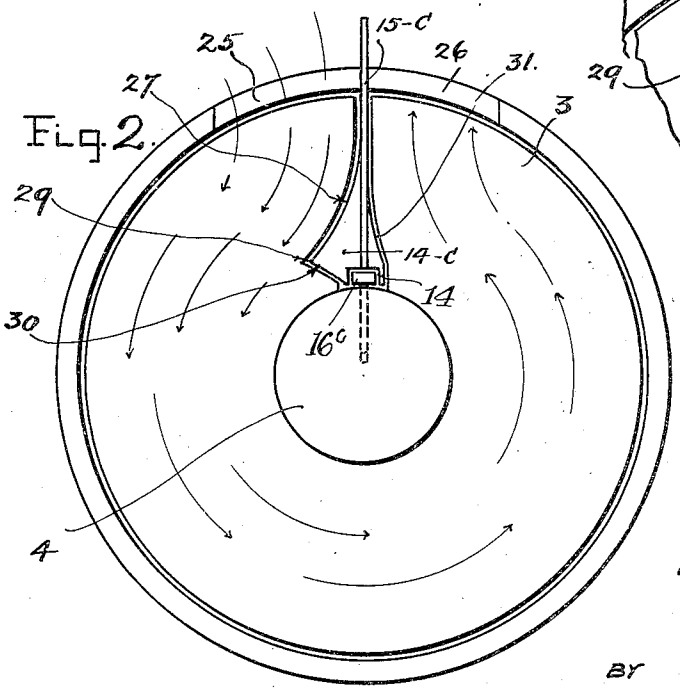


Fig. 2.



Wallace A. White

INVENTOR

BY Arthur Serivener

ATTORNEY.

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WATER METER

Wallace A. White, Richmond, Va.

Application May 3, 1935, Serial No. 19,559

10 Claims. (Cl. 73—258)

My invention relates to water meters of the type known as disc meters; having nutating pistons for measuring the water as it passes through the meter; and registering mechanism operated by the piston for measuring the amount of water. It has for its object the control of the vertical component of the movement of nutation of the piston; the reduction of wear upon the piston; the reduction of eddies and counterstreams in the flow of the water through the measuring chamber; and hence the longer life of the meter and its greater accuracy over a long period.

In meters of this class the measuring chamber consists of a circular box having a water inlet port and a water outlet port; the ports being separated from one another by a division plate. In this box, which is made in two, and sometimes in three parts, a disc shaped piston is so arranged that water flowing through the chamber will cause it to nutate. Projecting from the vertical axis of the piston is a pin or stem which is given, by the nutating of the disc, a circular motion; and by which motion the piston imparts motion to a train of gears, which in turn actuate the hands of the registering dials.

The durability of the parts moved by the flowing water, and the accuracy of the measurement of the water over a long period, depends upon the running fit of the parts, and upon the proper nutation of the piston, and the preservation of the piston against wear.

In the accompanying drawing,

Fig. 1 is a plan view with the top removed of one form of my invention;

Fig. 2 is a similar view of a slightly modified form;

Fig. 3 is a fragmentary view of another slightly modified form; and

Fig. 4 is a transverse sectional view on the line 4—4 of Fig. 3, looking in the direction of the arrow.

In all four figures, the numerals 1 and 2 represent the upper and lower halves of the measuring chamber. The numeral 3 is a disk of the piston, and 4, a central ball from which the disk radiates, and the numeral 5 is a pin extending from the vertical axis of the disk which actuates the train of registering gears (not shown) when the piston is nutated by the flow of liquid through the measuring chamber.

The inlet and outlet ports 25 and 26, respectively, in the measuring chamber are separated by the division plate 15c. One edge of the division plate is held in a groove in the column 23, as shown in Figs. 1 and 3, and one edge of this column is inclined as shown at 24 in continuation of the sloping surface of the block 14c. In the construction shown in Fig. 1, this division plate is held in a groove 17, which extends from the ball to the outer periphery. The disk has a clearance opening to receive this division plate, and an anti-friction guide roller 16c is carried by the disk, and this moves up and down in a vertical groove or channel 14, formed in block 14c on the side of the division plate. This groove or channel 14 is curved in a vertical plane on a radius struck from the center of the ball as shown in Fig. 4. The block 14c slopes on its outer surface in order to deflect the water entering through inlet 25.

In the form shown in Fig. 2, the guide roller 16c is at the inner end of the division plate 15c and adjacent to the ball 4, and is guided in a vertically disposed groove similar to the groove 14 shown in Fig. 4, and formed in the inner edge of the block 14c on the side of the division plate 15c.

In this form the channel block 14c is provided with an acute edge 29, the purpose of which is to direct the water into the stream flow, as indicated by the arrows, and to reduce the tendency of the water to flow back along the inner surface 30 of the channel block. This action of an acute edge on a stream flow is known in hydraulics. On the outflow side of the division plate 15c the latter is built out to form a streamline surface 31 to reduce eddies and countercurrents in the outflowing water.

In the form illustrated in Fig. 3, the groove 14 is located about midway from the ball to the outer periphery, and the anti-friction guide roller 16c is located alongside the division plate on an axis substantially parallel with said division plate, and moves up and down in a curved channel or groove 14, such as that previously described in connection with the other forms.

As shown in Fig. 4, the upper and lower halves of the measuring chamber are provided with holes 21 and 22 which provide for the passage of a jet of water through groove 14 to keep it free of foreign material.

I have now described my improvement wherein I form a guide-roller channel or groove on the division plate, and provide for the passing of a jet of water down the groove to keep it free from foreign material; and the further improvement wherein I form upon the division plate a watered surface 27 designed to direct the inflowing water into the desired stream flow around the measuring chamber, and to create a condi-

tion approaching equilibrium around the surface of the ball 4 of the meter piston.

I do not limit myself to the methods of forming my division plate shown in the drawing, wherein the division plate and the channel-block are integral, or cast or brazed together. For the division plate can be made as one flat piece, and the channel-block can be made as a separate piece, either a casting or of pressed sheet metal; and whether a casting or pressed sheet metal, it can be attached to the division plate, or it can be assembled alongside the division plate in the measuring chamber. I show the integral form in the drawing as it is the neatest, and the best from the point of view of both user and manufacturer.

I claim:

1. In a disc meter, a measuring chamber having an inlet port and an outlet port, and having a bearing; a disc-piston mounted in the bearing and arranged to nutate in the measuring chamber; the said piston having a radial slot; a division-plate set in the chamber and in the said radial slot to separate the inlet from the outlet port, the said plate having on its inlet side a block shaped to deflect the inflowing water into the annular channel of the measuring chamber, the said block being slotted in a vertical plane; and a pin mounted on the piston to co-act with the slot in the block to guide the piston.

2. In a disc meter, a measuring chamber having an inlet port and an outlet port, and having a bearing; a disc piston mounted in the bearing and arranged to nutate in the chamber and slotted radially; a division plate set in the chamber and received within said radial slot; the said division-plate separating the inlet and outlet ports and having on its inlet side a block shaped to turn the inflowing water into the annular channel of the measuring chamber so as to relieve the piston bearing of the impact of the inflowing water.

3. In the measuring chamber of a disc meter; a division plate having on its inlet side a block shaped to gradually turn the inflowing water into the annular channel of the measuring chamber, and a disk piston mounted within the chamber and arranged to nutate therein and provided with a radial slot which receives and straddles the division plate.

4. In the measuring chamber of a disc meter; a bearing; a disc-piston mounted in the bearing and arranged to nutate in the chamber; a division-plate to separate the inlet from the outlet port of the chamber, the said plate having on its inlet side a block shaped to gradually turn the inflowing water into the annular channel of the meter, the said block having a slot arranged in a vertical plane; and a pin mounted on the piston and co-acting with the said slot to guide the piston.

5. In a measuring chamber of a disc meter; a division plate having approximately midway of its length on its inlet side a block shaped to gradually turn the inflowing water into the annular channel of the chamber, and a disk piston mounted within the chamber and arranged to nutate therein and provided with a radial slot which receives and straddles the division plate.

6. In the measuring chamber of a disc meter; a bearing; a disc-piston mounted in the bearing and arranged to nutate in the chamber; a division-plate arranged to separate an inlet and outlet port and having a block shaped to turn the inflowing water into the annular channel of the chamber, the said block being located on the inlet side of the division plate as far as practicable from the center of the measuring chamber without obstructing the free inflow of water to the chamber; and the said block having in it a vertical slot; and means mounted on the piston and co-acting with the slot to guide the piston.

7. In the measuring chamber of a disc-meter; a bearing; a disc-piston mounted in the bearing and arranged to nutate in the chamber; a division-plate arranged to separate an inlet and outlet port and having a block shaped to turn the inflowing water into the annular channel of the chamber, said block disposed on the inlet side of the division plate about midway of its length, the said block having a slot on its side away from the water inlet port and as far as practicable from the center of the chamber and means mounted on the piston and co-acting with the slot in the block to guide the piston.

8. In the measuring chamber of a disc-meter; a bearing; a disc-piston mounted in the bearing and arranged to nutate in the chamber; a division plate arranged to separate the inlet port from the outlet port of the chamber, a slotted block on the inlet side of the plate and midway approximately of its length, and shaped to turn inflowing water away from the center of the chamber and into the annular channel of the chamber; the said chamber being pierced above and below the slot; and a pin mounted on the piston and coacting with the slot against the horizontal thrust of the water on the piston.

9. A water meter including an annular chamber, a disk piston having a bearing in the center of the chamber, the chamber having an opening in the wall, a division-plate extending inwardly therefrom and dividing the opening into an inlet and outlet port, a block at one side of the division plate, said block forming a water directing surface and having a housed groove therein, the disk piston carrying an anti-friction roller adapted to be received in the housed groove, whereby the nutations of the disk piston are controlled by the up and down movement of the roller within the housed groove.

10. A water meter including an annular chamber, a disk piston having a bearing in the center of the chamber, the chamber having an opening in the wall, a division-plate extending inwardly therefrom and dividing the opening into an inlet and outlet port, a block at one side of the division plate, said block forming a water directing surface and having a housed groove therein, the disk piston carrying an anti-friction roller adapted to be received in the housed groove, whereby the nutations of the disk piston are controlled by the up and down movement of the roller within the housed groove formed in the division-plate.

WALLACE A. WHITE.