

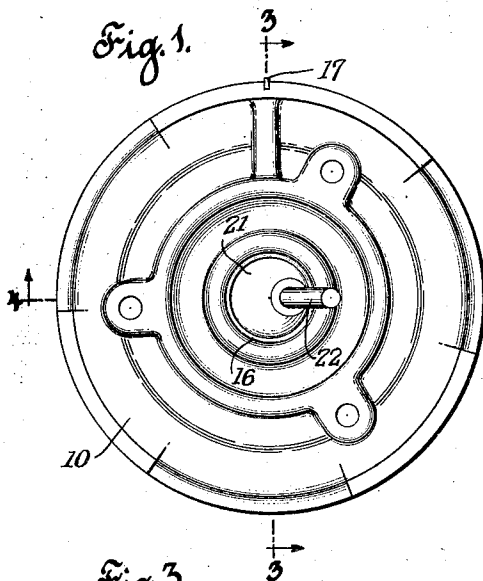
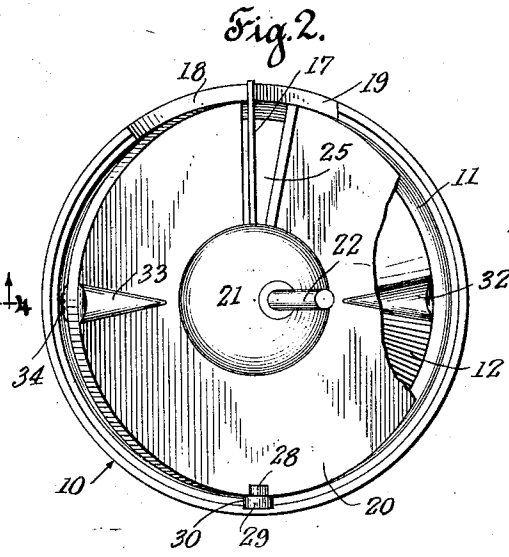
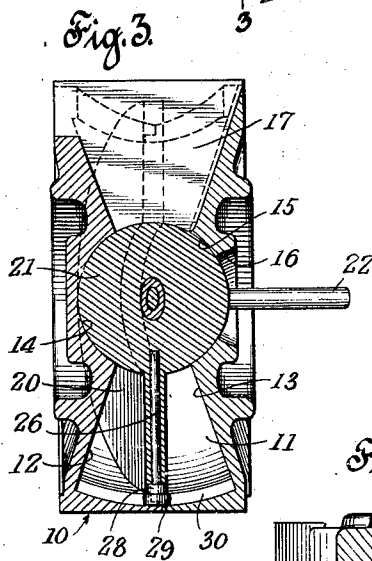
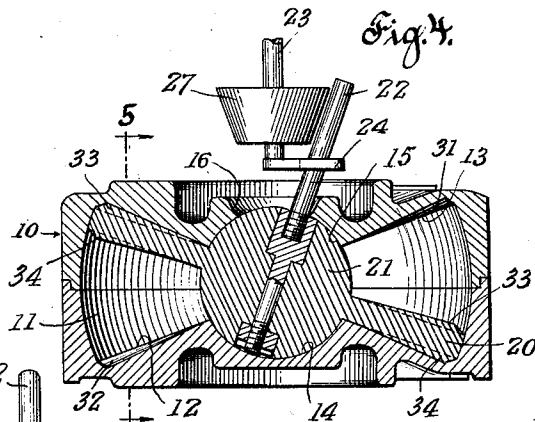
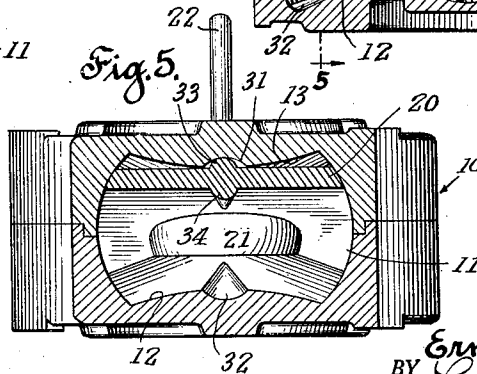
Dec. 2, 1930.

E. E. GAMON

1,783,707

WATER METER

Filed Nov. 17, 1927



INVENTOR.

BY *Ernest E. Gamon*  
*Frank Fischer*  
ATTORNEY

## UNITED STATES PATENT OFFICE

ERNEST E. GAMON, OF PRINCE BAY, NEW YORK

## WATER METER

Application filed November 17, 1927. Serial No. 233,858.

This invention relates to water meters and particularly to meters of the type in which a wobble disc is caused to gyrate by the flow of liquid passing through the meter.

5 In a water meter of the common disk type, having a measuring chamber fitted with a nutating disk piston, a ball socket and a disk spindle rotating around a conical control block, it is known, to those versed in the art, 10 that owing to fixed inlet and outlet ports, together with the inherent peculiarities of the design, the power applied to the disk piston is of varying intensity at practically every instant of the revolution of nutation; 15 also, the disk piston, at its periphery, having a circumference always greater than the greatest circumference of the cone around which it travels, there of necessity takes place a justifying or slippage, to enable the piston 20 to start the next nutation from the same point as the previous one; furthermore, due to the reasons stated above, unbalanced strains and thrusts are caused in the measuring chamber, that have a tendency at certain 25 positions of the disk to cause it to lift from joint forming contact on the cone faces, bringing the disk spindle with more or less shock against the control block, causing retardation of the disk movement and consequently loss of registration. 30

Another effect of unbalanced forces in the measuring chamber is to wear the ball seats or bearings in the direction of the last quarter of the chamber toward the outlet port, allowing 35 the disk eventually to rub against the walls of the chamber, with further loss of registration, and at certain rates of speed to break the disk.

I have found by experiment and study, 40 that these harmful phenomena can be greatly modified and controlled by projections or elevations upon the surface of the disk, properly designed to fit into depressions formed in the surface of the cone; by placing these pro- 45 jections or elevations at favorable positions

on the disk, it is possible to cause the disk spindle to fall away from the control block for a varying time and distance, directly proportionate to the distance the axial contact line of the disk is allowed to fall below the 50 crown line of the cones.

If elevations and depressions are formed at the two positions where the maximum slippage or rubbing of the disk takes place upon the cone, the disk is greatly strengthened 55 at these places, and the slippage or rubbing effect greatly decreased, as it is not necessary that the projections actually touch the walls of the depressions. Slippage then takes place at the edges of depressions, the 60 wider the depressions, the less slip, as the maximum slip is on the centre line of the said depressions. These depressions will act as a water cushion and therefore greatly modify or reduce the slipping action when 65 the disk comes into contact with the cones at certain points in the nutation.

Further, it is possible to so form and place the elevation and depression, as to use some of the energy of the stream in the measuring 70 chamber, to press the disk with greater force upon the cones at one point than another; also by presenting a favorable, or unfavorable, face to the path of the stream, it is possible to retard or accelerate the stream at 75 preferred points and to increase or decrease the energy applied to the disk piston at varying points. By these controlling or modifying means, it is possible to greatly flatten out the peak of the shock and build up the energy 80 at the weakest points.

Again, it is possible by the use of vanes or projections properly placed upon the disk piston, with depressions in the surface of the cones, to exert a force always tending to keep 85 the disk from rubbing against the wall in any one position, or to counteract a force tending to drive it against said wall in given position.

Heretofore, the method employed has always resulted in choking or retarding the flow 90

of water at the ports, the consequent loss of energy taking place at some non-moving point. The herein described method increases the opposition to the flow in the measuring chamber itself, by means of the moving member, and converts the energy extracted into useful work.

The principal object of this invention is to overcome the foregoing difficulties by providing the nutating or oscillating disc with means engageable with correlated means in the upper and lower coned ends of the disc or measuring chamber whereby the disc is given a balanced thrust in the chamber.

A further feature is in the provision of cushioning means at the points of contact at the instant of the greatest drag or impedance of the disc, the means employed also presenting a favorable surface to the thrust of the liquid at predetermined points.

Another purpose is to produce means providing a greater clearance from the conical central block, when the disc is travelling along its path on the coned ends of the chamber, than at other points, to control the slippage of the disc.

These important objects are accomplished by the novel construction and arrangement of parts, hereinafter described and shown in the accompanying drawing, forming a material part of this disclosure, and in which:—

Figure 1 is a top plan view of a meter made in accordance with the invention, the indexing device being omitted.

Figure 2 is a top plan view of the lower section of the chamber with the nutating disc in place, parts being broken away to show the lower end wall of the chamber.

Figure 3 is a sectional view on line 3—3 of Figure 1 taken in the direction of the arrow.

Figure 4 is a similar sectional view taken at a right angle to Figure 3 on line 4—4 of Figure 1.

Figure 5 is a partial sectional view of the meter, the section being taken on line 5—5 of Figure 4.

Referring in greater detail to the drawing, the numeral 10 designates in general a conventional meter body usually composed of two sections having between them a measuring chamber 11, its side walls being determined by a radius struck from the center of the chamber, its lower end 12 having a conically raised inner surface and its upper end 13 being similarly coned inwardly.

Centrally in the coned lower end wall 12 is a concave recess 14, a corresponding recess 15 being formed in the upper wall, these recesses constituting together a spherical seat, closed at the bottom, the top containing an opening 16, its edge being in the shape of a conic frustum with the larger diameter outward.

An opening through the side walls of the chamber has fixed centrally in it a vertical plate 17 dividing the opening to produce an

inlet and outlet port, respectively 18 and 19.

A nutating disc 20 is fitted to the chamber 11 to move therein and at the center of the disc is a sphere 21 close fitting the seat 14—15 and having a stem 22 extending at a right angle with the sides of the disc, outward through the opening 16 to adjacent a conical shaped block 27 on the driving spindle 23 of the index mechanism, to drive the same by engaging its fork 24, as seen in Figure 4, and it is to be noted that the inner end of the port partition plate 17 is concavely curved to fit against the sphere 21.

The disc 20 has a convergent angular opening 25 extending from its periphery to the sphere 21 to clear the partition plate 17 as the disc is gyrated within the chamber.

At a point in the disc directly opposite the opening 25 is a bored opening to receive the stem 26 having an outer enlarged portion 28 carrying a roll 29 operating in a slot 30 formed in the curved walls of the chamber, opposite the plate 17, this arrangement preventing rotation of the disc but permitting it to fluctuate freely as it wobbles or gyrates in its orbit, which obviously has a conical path.

The foregoing description is given in order that a clear understanding of the invention may be attained, which is important, in view of the peculiar motion of the disc, the motion being rectified by means now to be described.

Formed in one or both of the chamber end walls 12 and 13 are a plurality of depressions 31 and 32, respectively upper and lower, these depressions being made in any preferred shape or contour, disposed radially or otherwise and in any required number.

Corresponding lugs 33 and 34 on the sides of the disc 20 are shaped to engage in the depressions, these lugs producing a rolling motion, in a manner comparable to a gear tooth with its mate.

As changes of construction could be made within the scope of the invention, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a water meter having a chamber provided with oppositely disposed smooth conical surfaces having a pair of oppositely disposed radial recesses, a plane circular disc within the chamber, a stem extending at right angles from the disc, and oppositely disposed radial ribs on said disc, said ribs and recesses cooperating to affect the movements of the stem in predetermined positions.

2. In a water meter having a chamber provided with oppositely disposed smooth conical surfaces having a pair of oppositely disposed radial recesses, a plane circular disc

within the chamber, and oppositely disposed radial ribs on said disc, said ribs and recesses cooperating to affect the movements of the disc.

5 3. In a water meter having a chamber provided with a smooth conical surface, a plane circular disc having a cut-out portion and radial ribs on the disc positioned at right angles to the cut-out portion, said conical surface having recesses cooperating with the ribs  
10 to affect the movements of the disc.

This specification signed this ninth day of November, 1927.

ERNEST E. GAMON.

15

20

25

30

35

40

45

50

55

60

65