

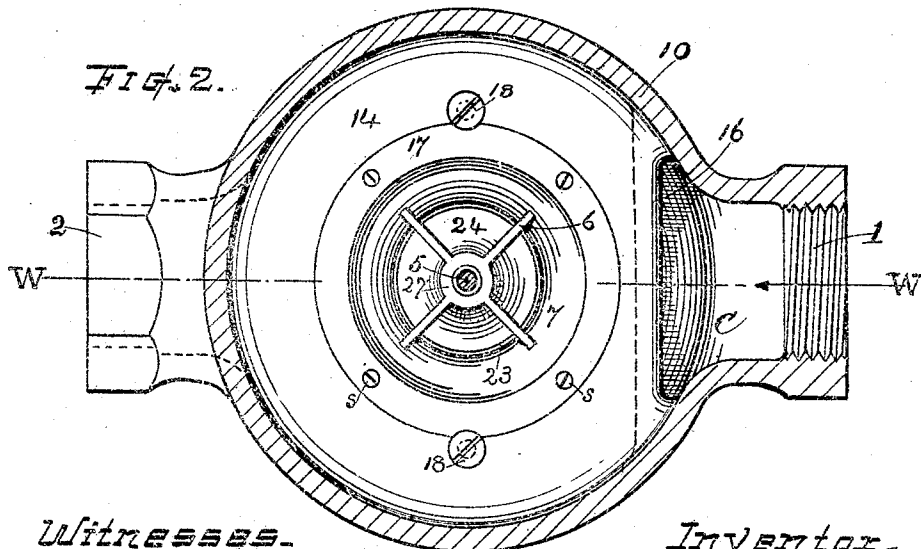
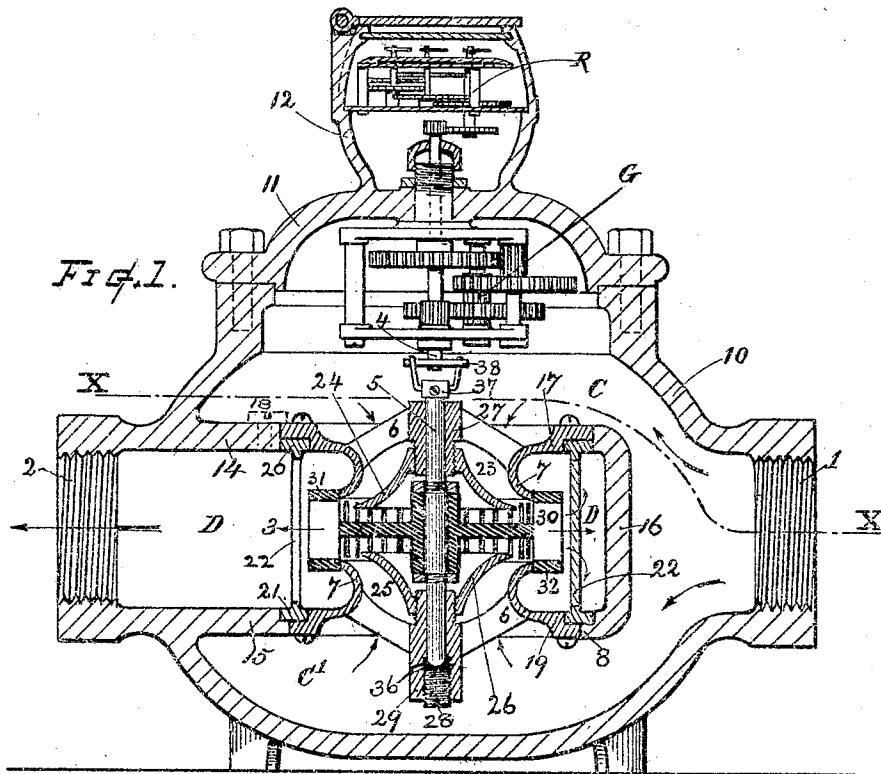
No. 884,491.

PATENTED APR. 14, 1908.

O. HIERSING.
WATER METER.

APPLICATION FILED OCT. 2, 1907.

2 SHEETS—SHEET 1.



Witnesses.

Edla P. Blenue.
Z. R. Burling

Inventor.

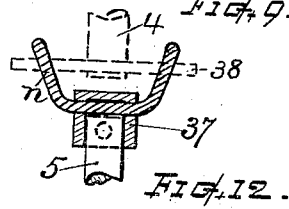
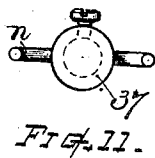
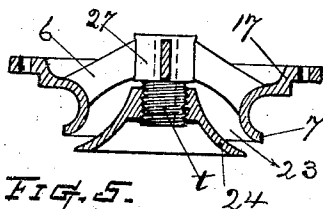
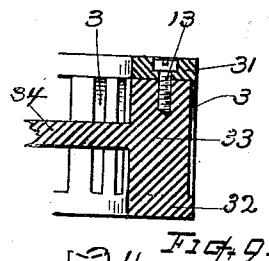
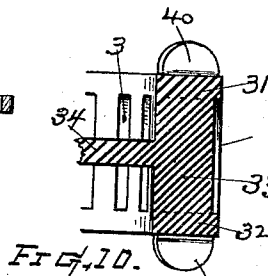
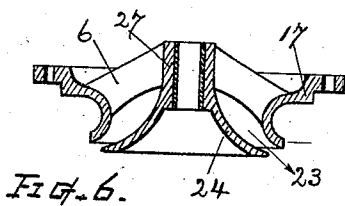
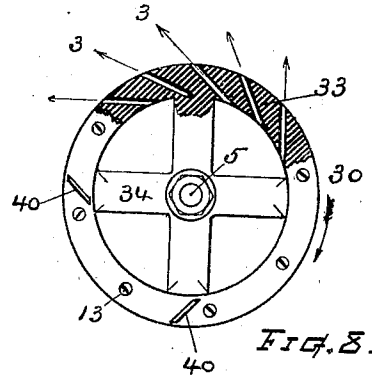
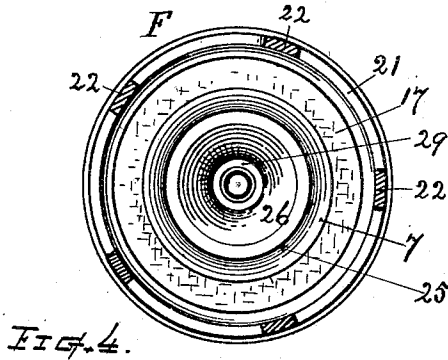
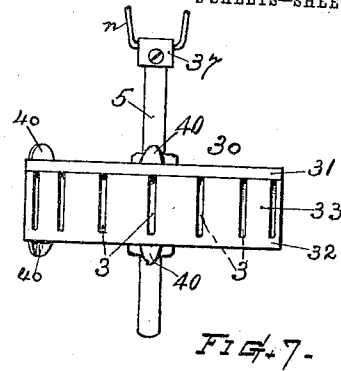
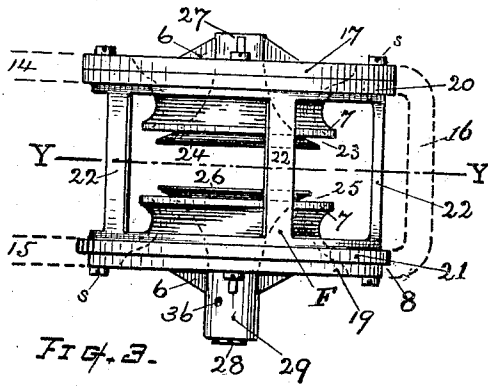
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No. 884,491.

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O. HIRSING.
WATER METER.
APPLICATION FILED OCT. 2, 1907.

2 SHEETS—SHEET 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

OTTO HIERSING, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO UNION WATER METER COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

WATER-METER.

No. 884,491.

Specification of Letters Patent.

Patented April 14, 1908.

Application filed October 2, 1907. Serial No. 395,557.

To all whom it may concern:

Be it known that I, OTTO HIERSING, a subject of the King of Norway, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Water-Meters, of which the following is a specification, reference being made therein to the accompanying drawings.

This invention relates to a novel construction for that class of water-meters commonly known as "current meters" or "velocity meters", wherein a single revolving meter-wheel is employed for imparting movement to a registering mechanism; the objects of my present invention being to provide a meter mechanism that is simple and convenient for manufacture; efficient and durable for practical use; and having peculiar features of construction and combinations such as more fully hereinafter explained, and particularly set forth in the subjoined claims.

To this end my invention consists in a meter mechanism, the parts of which are constructed, combined and organized for operation substantially as illustrated in the accompanying drawings, wherein

Figure 1 represents a longitudinal central vertical section (at line W W on Fig. 2) of a water-meter embodying my invention. Fig. 2 represents a horizontal section of the same at line X X on Fig. 1. Fig. 3 is a side view of the inner casing or wheel-race, with the meter-wheel removed therefrom. Fig. 4 is a horizontal section of the same at line Y Y on Fig. 3. Fig. 5 is a transverse vertical section of one of the bearing-heads, showing the deflector bell as made adjustable on the bearing. Fig. 6 is a central vertical section of the bearing-head, showing the deflector bell as made integral with the bearings. Fig. 7 represents a side view of the meter-wheel. Fig. 8 is a plan view of the meter-wheel, a portion thereof being shown in section. Fig. 9 represents a fragmentary section of the rim of the meter-wheel made with a removable ring member. Fig. 10 is a similar section showing the rim as made integral, and also as provided with retarding fins. Fig. 11 is a top view and Fig. 12 a section of the coupling head for the meter axle.

In the embodiment of my invention as shown in the drawings, the shell or main

casing 10 is made of suitable size and form for containing the operating parts, and is provided, as usual, with inlet and outlet spuds 1 and 2 for connection with the service-pipes; a removable cover 11 is provided, carrying an upper casing 12 within which the registering mechanism R, of any approved kind, is arranged and suitably connected with the usual train of driving and speed-reducing gearing G. The prime axle 4 in said gear train receives its motion from the meter-wheel axle 5. The main casing is internally formed with two horizontal partitions 14 and 15 connected by an upright barrier partition 16, disposed as shown, and integral with the globular shell, thereby separating the interior into two inlet-chamber spaces C and C', and an exit chamber D, the former communicating with the inlet-spud 1 and the latter with the outlet-spud 2. The horizontal partitions are each provided with a central circular seat or opening within which the inner casing or wheel-race frame F is fitted and supported by suitable annular flanges, as at 8.

The inner casing F is composed of two oppositely disposed annular bearing-heads 17 and 19, of similar form, and an intermediate frame or member consisting of two rings, 20 and 21, united by a series of upright posts, standards or bars 22, with open space between said posts. The heads are respectively secured to the rings by screws s or other suitable fastenings. The inner casing is detachably secured in position within the main casing by button screws 18, as shown in Fig. 2. The bearing-heads 17 and 19 are each provided with an annular inwardly turned or retro-curved flange 7, approximately semicircular in cross section, so that their edges are directed outward; also with concentrically arranged bearings 27 and 29, integrally connected therewith by bracing arms 6 of thin flat proportions, and standing edgewise in relation to the direction of the flowage. Upon each of the bearings I provide a flaring cone or deflector bell (24 and 26) the larger ends of which are towards each other, while their flared rims, which are preferably of concavo-conoidal form, approach the reverse outward curvature of the bearing-head flanges 7, and in combination therewith form downward and upward vortex passages through the heads with out-

wardly curved water-ways, 23 and 25, having annular peripheral-discharge spaces, as best shown in Figs. 1, 3, 5 and 6. The deflectors may, in some instances, be made integral with the bearing-hubs, as shown in Fig. 6; but I prefer to construct the deflector as a separate member internally threaded and screwed upon the inner threaded end *t* of the bearing, as shown in Figs. 1 and 5; so that the deflector can be adjusted up or down thereon to bring its flaring rim nearer to or farther from the outwardly turned part of the flange 7, and thus vary the area or size of the annular discharge space, as desired.

The meter-wheel 30 is arranged for centrifugal action, and comprises a hub fixed on the axis shaft 5, and a cylindrical rim consisting of upper and lower ring portions, and an intermediate portion having passages or slots 3 formed therethrough at suitable intervals, with solid material 33 between the slots. The slots are disposed at an angle to the radial of their position of about forty five degrees, more or less, in their horizontal plane; and approximately parallel with the wheel axis in their vertical planes. The slots are preferably of uniform width at both the inner and outer faces of the wheel rim, (see Fig. 8.)

The hub, arms and rim of the wheel are preferably formed of hard vulcanized rubber, or other suitable light material. In the construction of the wheel the upper ring 31 may be attached to the body-portion 33 of the rim by screws 13, or other suitable means, (see Fig. 9) but the lower ring portion 32 is best made integral with the slotted portion of the rim. In some instances, however, the rim can be made with both ring portions 31 and 32 integral with the intermediate portion 33, as indicated in Fig. 10. The wheel rim is mounted and connected by suitable arms 34 with the hub fixed upon the central shaft or axle 5 which is provided with upward and downward projecting journals that are supported to turn in bearings 27 and 29. The lower bearing 29 is provided with a step-bearing stud 28 of hard rubber or similar material screwed therein, and upon which the rounded lower end of the wheel journal is supported. The bearing is best provided with an opening 36 from the exterior to the interior thereof. The web or arms of the wheel are arranged at mid height of the body of the rim; and are preferably made thin and disposed horizontally flatwise. Their edges may be beveled or rounded to readily pass through the water.

The curved flanges 7 of the bearing-heads terminate adjacent to and in line with the respective ring portions 31 and 32 of the wheel rim, and the enlarged or flaring ends of the deflector members 24 and 26 are disposed between said head flanges and the arms of the wheel, so that the current of water is

directed outward against the inner face of the wheel-rim; a portion of the flow passing downward through the upper bearing-head and a portion upward through the lower bearing-head as the liquid flows from the inlet chambers C and C', thence centrifugally outward through the wheel into the exit chamber, causing revolution of the wheel by reason of the inclination of the slots.

The top end of the axis-shaft 5 is provided with a cap member having a wire *n* inserted transversely therethrough and its ends bent upward, as in Figs. 11 and 12, thereby forming a pronged and forked coupling head 37 that detachably engages a cross-bar 38 fixed on the lower end of the primary spindle 4 of the reducing-gear train; power and motion being thus transmitted from the meter-wheel to said gear train and thereby to the registering mechanism. The gear train and register mechanism being of well known construction need not be herein more fully described.

The bell of the lower deflector 26 is preferably made of somewhat less diameter than that of the upper deflector 24, for the purpose of affording a greater volume of current at the under side of the wheel. This excess of current tends to buoy up and overcome the gravity of the wheel, thereby practically eliminating the friction of the bearing parts. By the adjustment of the deflectors or cones the differential of current can be regulated to any degree required.

In some instances I provide upwardly or downwardly projecting fins or wing-flanges 40 upon the upper or lower annular faces of the wheel rim; (see Figs. 7, 8 and 10) said fins being best disposed upon the rim with an oblique trend in opposite direction to the inclination of the water-way slots 3, and with greater or less degree of inclination; the purpose thereof being to effect resistance when running under a high velocity of current or great volume of flowage, and to prevent over registering by the wheel. Such fins or projections may not in all instances be employed.

I claim—

1. In a water-meter of the character described, the inner or wheel casing, consisting of two oppositely disposed bearing-heads each having an inwardly curved semicircular flange, a central bearing-boss and brace arms supporting said bearing boss; in combination with an intermediate frame consisting of upper and lower ring-members that afford annular seats for said bearing-heads, and a series of upright posts uniting said ring members, and having openings between said posts.

2. In a water-meter of the class described, a meter-wheel having a cylindrical rim comprising upper and lower ring members and an intervening body portion with a series of narrow inclined slots therethrough, said slots being of approximately uniform width at the

inner and outer circles of the rim, an axis-shaft and hub within said wheel, and centrally disposed arms or web members connecting said rim concentrically with the hub and axis-shaft; in combination with oppositely arranged wheel-bearing-heads having means for supporting the wheel axis-shaft, and means for delivering water currents from above and below the wheel, outward through said slotted rim.

3. In a water-meter of the class described, a meter-wheel comprising a central hub, an axle-shaft, and a concentric cylindrical rim with arms or web members connecting said hub and rim at mid-height thereof, said rim consisting of upper and lower annular face-portions with an intervening body-portion having a series of water-way slots disposed therethrough oblique to the radial planes at their positions; in combination with a wheel casing provided with means for directing an upward and a downward current to the interior of the wheel, and means for deflecting the respective currents outward to impinge on said slotted rim between the upper and lower annular face-portions, for centrifugal passage through the water-way slots.

4. In a water-meter of the class described, the combination, of a meter-wheel comprising a central hub with axle journals, and a concentric circular rim having obliquely disposed water-ways therethrough; an annular funnel-shaped bearing-supporting head having an inner-end flange that terminates within the interior of the wheel rim, an axial bearing-boss supported in said head, and a flaring deflector on the inner end of said bearing-boss, the adjacent faces of said flange and deflector embracing an annular outwardly delivering water-way discharging against the inner circular face of the wheel-rim.

5. In a water-meter, the combination, of a suitable casing, a centrifugally discharging meter-wheel, comprising an annular rim having a series of obliquely disposed passages therethrough, means for conducting the water to said wheel from above and below, and having current-directing surfaces that form annular peripherally discharging water-ways that deliver the currents in outwardly directed jets against the interior of the wheel rim.

6. In a water-meter the combination with a suitable casing, and meter registering mechanism; of a centrifugally discharging meter-wheel suitably connected for operating said registering mechanism, oppositely directing water-ways for conducting currents thereto from above and below the wheel, and for delivering said currents about the inner circle of the wheel rim in upper and lower outwardly directed jets, and means for regulating the proportional volume of the respective jets or delivery passages.

7. In a water-meter of the character described, the combination of a centrifugally discharging meter-wheel, a meter-wheel-casing comprising bearing-heads each provided with an inward under-curved flange, a central bearing-boss, and bracing arms that support the bearing-boss therein, the meter-wheel axle mounted in said bearings, a flaring or bell-shaped deflector coacting with the flange of each bearing-head to form an annular outwardly directed peripherally discharging water-way within the circle of the wheel-rim.

8. In a water-meter, the combination with a meter-wheel having a cylindrical rim with a series of radially inclined slots or passages therethrough, a wheel-casing comprising two annular bearing-heads, each provided with an inward flange of approximately semicircular cross section, its edge terminating adjacent to the inner face of the wheel-rim, journal bearings supported within said bearing-heads, and a flaring or bell-shaped deflector adjustably supported on each of said journal bearings, its larger end standing within the inner circle of the wheel, said deflector being adjustable towards or from the curved flange of the bearing-head.

9. The combination, with the main casing having inlet and outlet spuds, and provided with two horizontal partitions with central openings therein, and an upright barrier connecting said partitions; of an inner casing comprising two circular seat portions, intervening post members uniting said seat portions, and two oppositely disposed annular bearing-heads fitting the openings in said partitions, and having bearing-hubs supported concentrically within said heads, a centrifugally discharging meter-wheel provided with annular face members, said wheel axially mounted in said bearings, and retro-curved flanges on said bearing-heads that extend into the respective ends of the wheel and terminate adjacent to and in approximate alignment with its annular face members, and means for retaining said inner casing within the main casing.

10. In a water-meter of the character described, the combination of a meter-wheel comprising a cylindrical rim having a series of obliquely disposed slots or passages for outward discharge of the liquid therethrough, a central hub, an axis-shaft, and intermedially disposed web members uniting said rim and hub, an upper and lower bearing-head carrying the bearings for the axis-shaft above and below the wheel, said bearing-heads provided with passages for conducting a downward and an upward current to the interior of said wheel-rim, and a concavo-conoidal deflector upon the inner end of each bearing, the flared terminal end of the lower deflector being of less diameter than that of the upper deflector, for the purpose set forth.

11. In a water-meter of the character described, the combination with the meter-wheel having a diagonally-slotted rim with upper and lower annular rim faces, and the
5 bearing-heads having inward retro-curved flanges, the edges thereof approximately matching the inner edges of the rim-faces; of the projecting resistance fins arranged upon

the annular rim-face, or faces, substantially as described. 10

Witness my hand this 26th day of September, 1907.

OTTO HIRSING.

Witnesses:

ERNEST R. LADUKE,
MERRILL L. WELCKER.