(No Model.)

E. RUUD & A. G. HOLMES.

DISK METER.

No. 568,924. Patented Oct. 6, 1896.

FIG. 1.

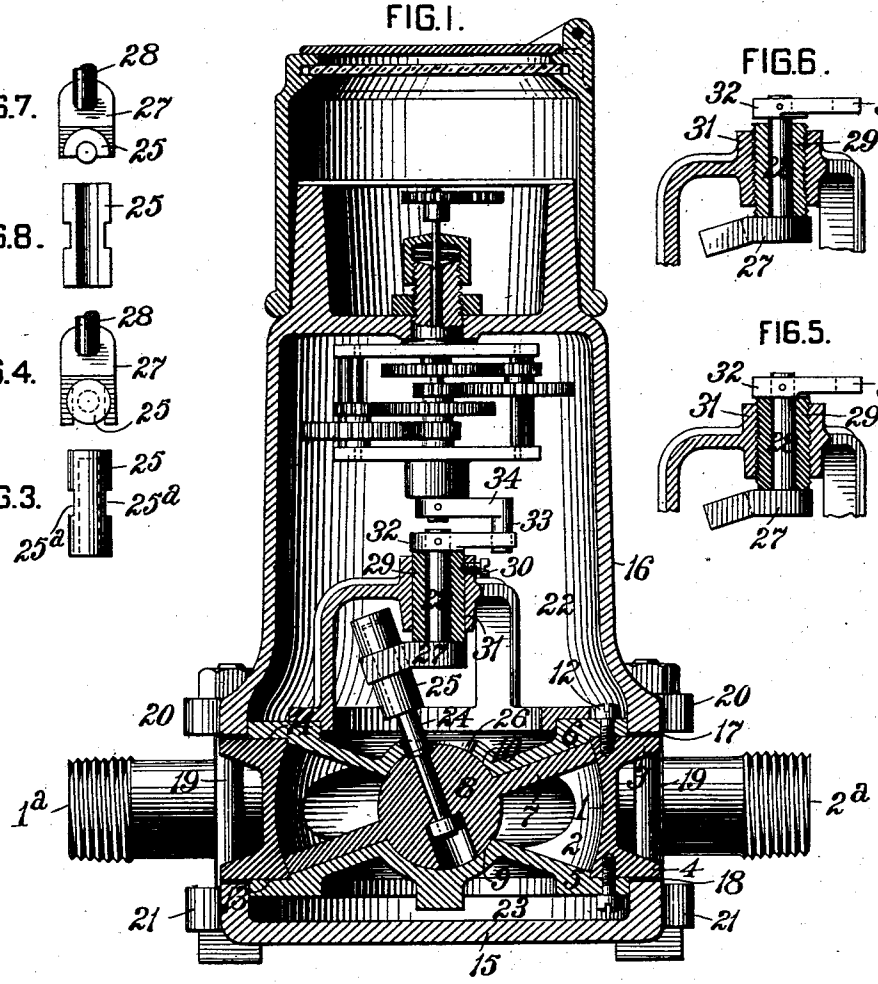


FIG. 7.

FIG. 8.

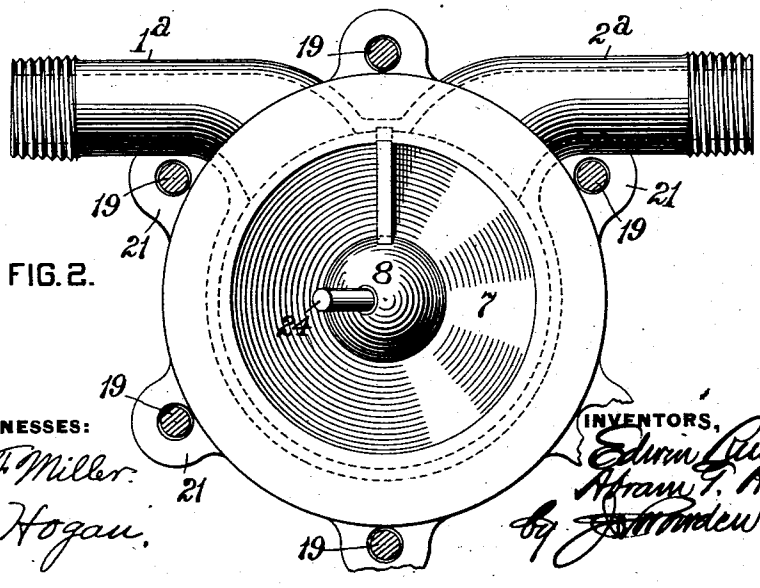
FIG. 4.

FIG. 3.

FIG. 6.

FIG. 5.

FIG. 2.



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UNITED STATES PATENT OFFICE.

EDWIN RUUD AND ABRAM G. HOLMES, OF PITTSBURG, PENNSYLVANIA, ASSIGNORS TO THE PITTSBURG METER COMPANY, OF SAME PLACE.

DISK METER.

SPECIFICATION forming part of Letters Patent No. 568,924, dated October 6, 1896.

Application filed February 26, 1896. Serial No. 580,851. (No model.)

To all whom it may concern:

Be it known that we, EDWIN RUUD and ABRAM G. HOLMES, citizens of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Disk Meters, of which improvement the following is a specification.

The object of our invention is to provide an improvement in fluid-meters of the class in which an oscillating disk supported in a central bearing imparts movement to a stem or shaft; and to this end our invention consists in means for controlling the movement of the disk and transmitting motion from the disk to a rotary shaft from which a reducing or registering mechanism is driven, in means for effecting the adjustment of the controlling and transmitting mechanism, in an improved construction of the parts inclosing the disk-chamber, and in certain combinations and features of construction, all as hereinafter fully set forth.

In the accompanying drawings, which illustrate our invention, Figure 1 is a central vertical section through a disk meter constructed in accordance with our invention; Fig. 2, a plan view of the disk-chamber and disk, the upper cap or head of the disk-chamber and the casing containing the registering mechanism being removed; Fig. 3, a side elevation of the bearing on the stem of the disk; Fig. 4, an end view of the same bearing, showing its connection with the driving-arm of the shaft; Fig. 5, a sectional view of the bearing of the driving-shaft, showing a modification of the means for adjusting; Fig. 6, a similar view showing means whereby automatic adjustment of the driving-shaft and arm may be effected; Fig. 7, an end view of a modification of the bearing for the stem, and Fig. 8 an elevation of the same bearing.

In the embodiment of our invention shown in Fig. 1 of the drawings the main casing 1, within which the disk-chamber 2 is formed, consists of a single integral casting on which the inlet and outlet nozzles 1^a and 2^a are formed. The inside of the main casing 1 is turned out in the form of a zone of a sphere to permit the desired movement of the disk 7, which is fitted therein. By the employment of a single integral structure to form this portion of the body of the meter a continuous smooth surface may be obtained without joints or irregularities and without any possibility of variation by different adjustments of bolts in putting together, by changes or wear in packing, or by accidental variations in the thickness of packing between joints.

The casing 1 is provided with flanges 3 and 4 and closed at its ends by the separately-removable caps 5 and 6.

The disk 7, which is fitted to oscillate in the chamber 2, is secured to or formed integral with a ball 8, fitted in bearings 9 and 10 in the caps 5 and 6, and the inner surfaces of the caps 5 and 6, between the bearings 9 and 10 and the inner surface of the casing 1, have the form of conical frustums, against which opposite radial elements of the disk are adapted to bear as the disk oscillates.

The caps or heads 5 and 6 near their outer edges are provided with surfaces 13 and 14, which are adapted to fit against the surfaces formed on the ends of the casing 1, so as to form a tight joint without the employment of packing, and the caps are secured to the casing of the disk-chamber by means of bolts 11 and 12.

The flanges 3 and 4 on the main casing 1 extend beyond the edges of the caps 5 and 6 sufficiently far to form bearings for the edges of the lower casing 15 and the upper casing 16, which contains the registering mechanism. The joints between the main casing 1 and the edges of the casings 15 and 16 are made tight by means of the gaskets 17 and 18, and the casings 1, 15, and 16 are secured together by means of bolts 19, passing through the lugs 20 and 21 on the casings 15 and 16, respectively. By means of this construction the caps or heads 5 and 6 have a rigid invariable bearing directly on the metal of the main casing 1, and the tight joints formed by the packing between the casings 15 and 16 and the main casing 1 renders the employment of packing between the main casing and the caps unnecessary. The inner conical surfaces of the caps are maintained in invariable

relation to one another, since there is no packing to be compressed or varied in thickness, and when the caps are once adjusted to permit the proper contact of the opposite sides of the disk the caps may be removed and replaced without danger of affecting this adjustment, as it might be affected by the employment of packing between the caps and the ends of the main casing 1 or between two parts of the main casing 1.

Any leakage of fluid from the disk-chamber 2 into the spaces 22 and 23 in the casings 16 and 15, respectively, will not interfere with the operation or materially affect the measurement of the fluid, and after these spaces are once filled there will be no further leakage into them because there is no means of escape for the fluid which has already entered, the escape of fluid from the chambers 22 and 23 being prevented by the packing 17 and 18.

Our improved construction obviates the necessity for a large outer casing inclosing the casing of the disk-chamber, such as is employed with constructions in which the casing of the disk-chamber is made in two parts which are secured together so as to form a joint between the two ends, and which is liable to leak or to have the joint frozen if exposed.

The upper casing 16 is separate from the upper cap 6 and detachable from the main casing 1 without disturbing the upper cap, and the casing 16 and the registering or reducing mechanism may be removed together, leaving the cap 6 secured in place and the stem 24 exposed, so as to be conveniently handled for moving the disk.

It is important that the main casing 1 and the caps 5 and 6 may be quickly and easily put together, always in the same exact relation to one another, and that when those parts are so put together the stem 24 of the disk 7 should be conveniently accessible for the purpose of moving the disk.

When the upper and lower casings 16 and 15 are removed, either of the caps 5 or 6 may be removed without disturbing the other, and in replacing them no readjustment or renewal of packing is necessary, which by a slight variation in the thickness of the packing might affect the relation of the parts.

In case of any small amount of wear of the ball 8 or its bearings 9 or 10 either or both of the surfaces 13 14 on the caps or heads 5 and 6 may be turned down to permit the caps to be brought closer together, so as to bear on the ball; but it will be obvious that in a disk meter of the kind herein described when the conical ends or caps 5 and 6 are once properly fitted and adjusted to receive the ball 8 and the disk 7 any considerable wear of the ball 8 or its bearing or of the disk 7 or the conical surfaces of the caps cannot be properly compensated for by merely resurfacing any of the parts and bringing them closer together. Wear on the ball or its bearing or on the disk or cones, if sufficient to affect the operation of the device, practically requires that one of the caps at least should be renewed. With our improvement this is a comparatively simple matter, since the caps are separate from every other part of the device, are easily detachable, and are of such small value that their renewal involves but a very slight expense. It will be seen that with our improved construction the renewal of either of the caps 5 or 6 does not necessarily involve the renewal of any other part, such as the casing 16 or the main casing of the disk-chamber, as in some constructions.

Another advantage of our construction is that each of the caps is provided with but a single bearing and that the thickness of the cap is immaterial. On this account it is only necessary that the single measurement between the end surfaces of the main casing 1 should be correct and that the corresponding surface on the caps should be fitted thereto, instead of being fitted between two other parts or against a fixed bearing and between the disk and the bearing. In such constructions the fixed bearing is not only inaccessible or difficult to get at, but is usually hidden from view unless the conical cap is totally removed, and dirt or some other substance is liable to come between the cap and the bearing and keep it from its seat. Such constructions require that the conical caps should be of a certain exact thickness which cannot be reduced for purposes of adjustment, and also require that every part of the device should be removed in order to get at the bearing or cap. With our improvement either cap may be separately detached or replaced without disturbing the other, and when the cap is being put in position the bearing-surface is fully exposed to view.

On the upper portion of the stem 24, which projects from the ball 8 through the opening 26 in the upper cap 6, we provide an adjustable sleeve 25, which in the drawings is shown closed at one end, but which, if preferred, may be open at both ends. The stem 24 does not extend far enough into the sleeve to come into contact with the closed end of the sleeve, but sufficient space is left to permit any desirable adjustment of the sleeve on the stem. The sleeve 25 is movable on the stem 24 and is provided with grooves 25^a on the sides to receive the forked end of the driving-arm 27, which is secured to the driving-shaft 28. As the disk 7 oscillates the upper end of the stem 24 moves in a circle and drives the sleeve 25 and arm 27, and through them the shaft 28, and the sleeve 25 turns once on the stem 24 while the shaft 28 is making one rotation on its axis.

The length of the bearing of the sleeve 25 on the stem 24 may be such that the wear between these parts will be slow, and the forked end of the arm 27 is protected from wear by the interposed sleeve 25. The sleeve may be removed and replaced in reverse posi-

tion in the forked end of the arm 27, and when it is worn to such an extent as to require renewal the sleeve may be removed and another substituted for it at very little expense.

The adjustment of the sleeve 25 on the stem 24 is effected by lowering the shaft 28 and arm 27. In order to permit of this adjustment, we have shown in Fig. 1 a rubber bushing 29, surrounding the shaft 28 and forming a bearing therefor, which is held in a fixed bearing 31 and secured therein by means of a set-screw 30. When it is desired to raise or lower the sleeve 24 and arm 27, the set-screw is removed and the bushing 29 is moved endwise, and with it the shaft 28, arm 27, and sleeve 25. In the construction shown in Fig. 1 the bushing 29 is fitted closely between the driving-arm 27 and the arm 32, which engages a pin 33 on an arm connected with the reducing or registering mechanism, so that when the bushing 29 is moved in either direction the shaft 28 and the arms 27 and 32 move with it.

In Fig. 5 of the drawings we have shown the bushing 29 similarly fitted between the arms 27 and 32 and provided with a screw-thread on its outer surface whereby it is screwed into the bearing 31, and may be adjusted by being turned in the bearing.

In the construction shown in Fig. 6 of the drawings we have shown the shaft 28 between the arms 27 and 32 of greater length than the bushing 29, so that the shaft may be moved longitudinally in the bushing and the adjustment may be effected without moving the bushing. With this construction the shaft 28, the arm 27, and the sleeve 25 may move down automatically and permit adjustment of the sleeve to the stem 24 as the parts become worn.

The detachable sleeve or bearing 25, instead of completely surrounding the stem 24, may be constructed, as shown in Figs. 7 and 8, or so as to embrace only that portion of the stem which exerts a pressure against the bearing, and instead of making the bearing cylindrical on its outer surface it may be rectangular or any other preferred form on the outside.

We claim as our invention and desire to secure by Letters Patent—

1. In a disk meter, the combination, with an oscillating disk fitted in a disk-chamber, of a stem secured to the disk, a longitudinally-adjustable shaft which is actuated by the disk, a driving-arm on the shaft, a sleeve carried by the driving-arm which forms a bearing for the stem of the disk and which is adjustable thereon by longitudinal movement of the shaft, substantially as set forth.

2. In a disk meter, the combination, with an oscillating disk, of a stem secured to the disk, a driving-shaft, an arm secured to the shaft and actuated by the stem, a detachable bearing interposed between the arm and stem, and means for simultaneously adjusting the shaft and the bearing on the stem, substantially as set forth.

3. In a disk meter, the combination, with an oscillating disk fitted in a disk-chamber, of a stem secured to the disk, a forked driving-arm on a shaft which is actuated by the disk, and a tubular bearing fitted in the forked driving-arm and forming an elongated bearing for the stem, substantially as set forth.

4. In a disk meter, the combination, with an oscillating disk fitted in a disk-chamber, of a stem secured to the disk, a driving-arm rigidly connected to a longitudinally-movable shaft which is actuated by the disk, and a sleeve on the stem which is fitted in a slot formed in the driving-arm and is movable longitudinally therewith, substantially as set forth.

5. In a disk meter, the combination, with an oscillating disk, of a stem secured to the disk, a driving-shaft, an arm secured to the driving-shaft and actuated by the stem, a fixed support or frame, an adjustable bushing in the support or frame forming a bearing for the driving-shaft, and means whereby the bushing may be adjusted and fixed in adjusted position, substantially as set forth.

6. In a disk meter, the combination, with an oscillating disk, of a stem secured to the disk, a driving-shaft, an arm secured to the shaft and actuated by the stem, a loosely-fitted detachable bearing interposed between the arm and stem, and means for simultaneously adjusting the shaft and the bearing on the stem, substantially as set forth.

7. In a disk meter, the combination, with an oscillating disk, of a stem secured to the disk, a driving-shaft, an arm secured to the driving-shaft and actuated by the stem, a fixed support or frame, an adjustable bushing in the support or frame forming a bearing for the driving-shaft, and means for fixing said bushing in adjusted position substantially as set forth.

In testimony whereof we have hereunto set our hands.

EDWIN RUUD.
ABRAM G. HOLMES.

Witnesses:
F. E. GAITHER,
T. J. HOGAN.