

No. 620,791.

Patented Mar. 7, 1899.

H. & P. MEINECKE.
DISK METER.

(Application filed Apr. 24, 1897.)

(No Model.)

3 Sheets—Sheet 1.

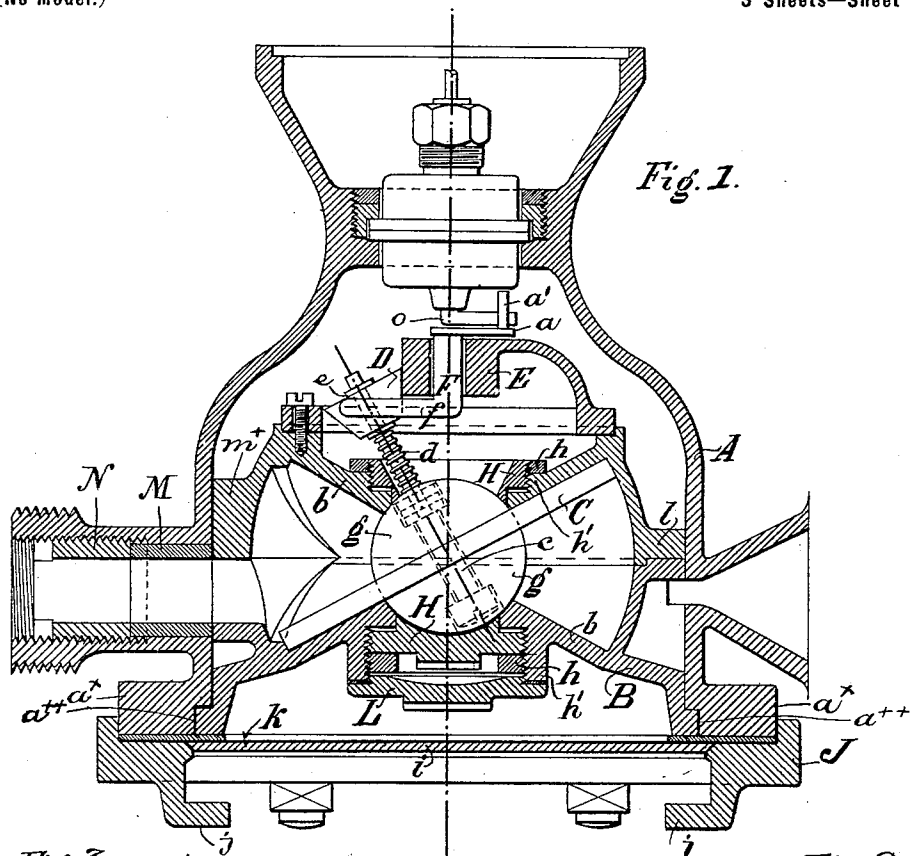


Fig. 1.

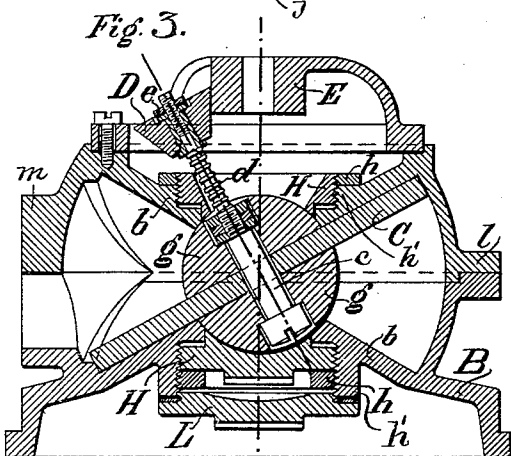


Fig. 3.

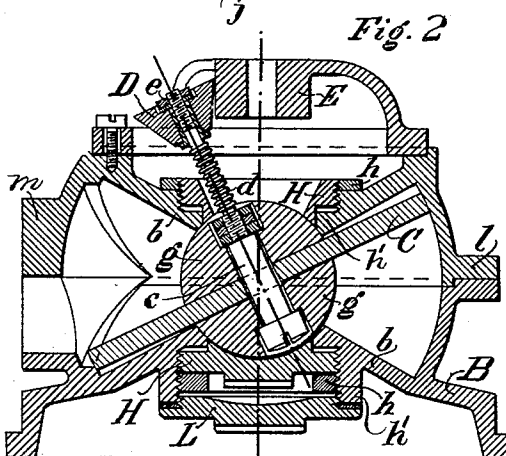


Fig. 2.

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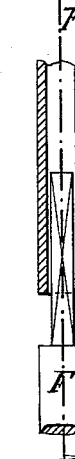
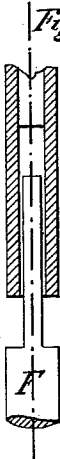
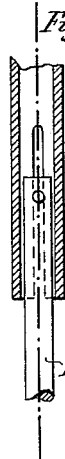
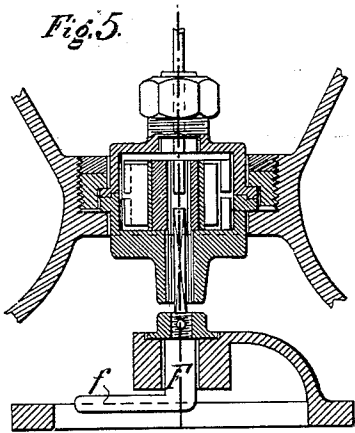
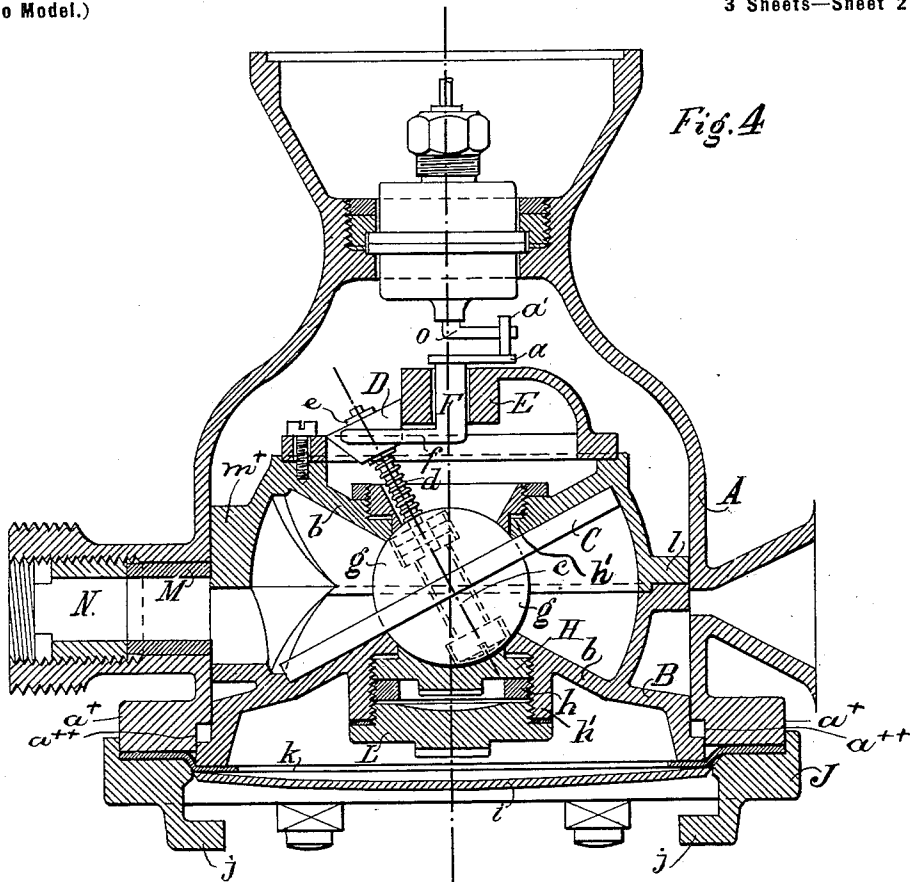
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3 Sheets—Sheet 2.



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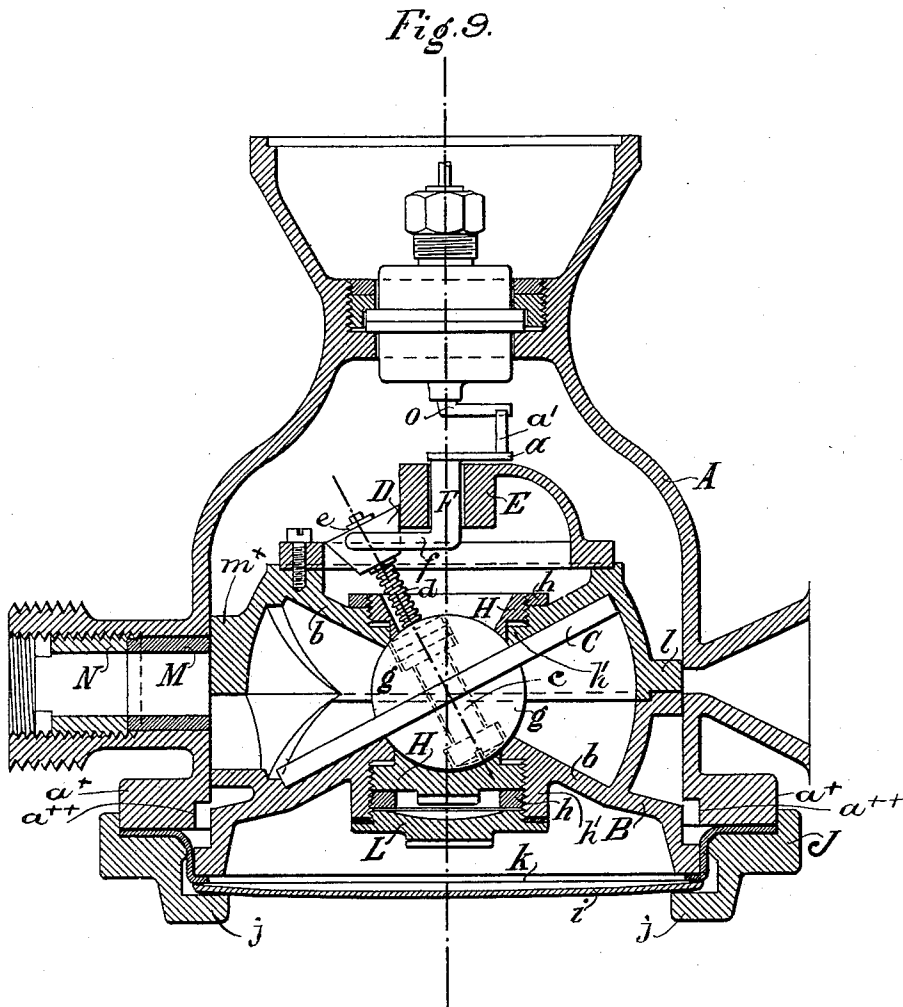
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

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DISK METER.

SPECIFICATION forming part of Letters Patent No. 620,791, dated March 7, 1899.

Application filed April 24, 1897. Serial No. 633,772. (No model.)

To all whom it may concern:

Be it known that we, HEINRICH MEINECKE and PAUL MEINECKE, subjects of the Emperor of Germany, and residents of Breslau, in the Empire of Germany, have invented certain new and useful Improvements in Disk Meters, of which the following is a full, clear, and exact description.

This invention relates to disk meters for water and other liquids. The disk meter is, as usual, provided with a disk working between two conical surfaces in an inner casing and has its shaft working at an angle to the vertical axis of said casing. The liquid in the outer or main casing has to circulate around the inner casing before it can enter the latter to act on the disk, and finally leaves through the outlet-opening leading into the service-pipe. So far this arrangement is of ordinary construction and therefore forms no part of our invention, which we will proceed to describe. We provide on the periphery of the inner casing an annular flange, well fitting the cylindrical part of the outer casing, and form a liquid-tight compartment at the lower part between the inner casing and the bottom plate of the outer casing for the purpose hereinafter stated.

The proper working of the disk meter depends on the following conditions, viz: First, the disk in rolling over the two opposite conical surfaces in the interior of the inner casing must always be in contact with the working surfaces, so as to divide said inner casing into two liquid-tight compartments separating the inlet from the outlet; second, the disk working between the two opposite conical surfaces in the inner casing must be capable of adjustment relatively to the conical surfaces; third, the moving parts and the counter of the meter must be protected against injury caused through freezing; fourth, the disk meter must not be entirely prevented from working when freezing sets in; fifth, the tight joint between the outlet-opening of the inner casing and the outlet-port in the outer casing must be maintained regardless of the relative positions of the two casings.

The disk meter constructed according to the present invention fulfils these conditions, and in describing the same we will refer to the accompanying drawings, in which—

Figure 1 shows a vertical section through

the inlet and outlet of our improved disk meter. Figs. 2 and 3 are sectional views of the inner casing, showing the disk provided with means for adjustment. Fig. 4 is a similar view to Fig. 1, showing the parts in a position they would assume through a slight freezing, the meter being still in working condition. Figs. 5 to 8, both inclusive, show in detail various forms of couplings for maintaining the connection between the working parts of the meter and the counter. Fig. 9 is a similar view to Fig. 4, showing the parts in their lowermost position as moved by a very strong freezing.

The lower flange a^x of the outer or main casing A of our improved disk meter is of cylindrical form and has an annular recess a^{xx} . Mounted therein with a good fit is the inner or disk casing B. The latter is held in its upper or normal position by a yielding bottom plate i of the outer casing A. Both the casings are provided with a liquid inlet and outlet, the latter being of circular section. The inlet in the outer casing is of elliptical form and the liquid entering into it has to circulate around the outside of the inner casing B before gaining access to the interior thereof.

The spherical body of the disk C is supported in cup-bearings in the inner casing and is provided with a shaft c , carrying at its outer extremity a guide or antifricition roller D, adapted to run on a track around a central guide-block E, in which is mounted a crank-shaft F. The disk-shaft thus set at an angle with the vertical axis of the inner casing B causes the disk C to remain in contact with the conical surfaces b of said inner casing. The pressure of the liquid on the disk C keeps the roller D in contact with the block E and imparts to the shaft of the disk a tumbling motion, thereby causing it to act on the crank-arm f of the shaft F, which transmits the motion to the counter for the purpose of registering the quantity of liquid passed through the meter.

In order to carry out the first of the conditions laid down, we provide improved means for adjusting the roller D on the shaft of the disk. If the said roller is too far out, it will prevent the disk C from being in contact with the conical surfaces b , as shown in Fig. 2. The roller D is adjusted against the pres-

sure of a helical spring *d* by means of the screw and locking-nuts *e*, so as to approach it nearer the disk, the angle of the disk-shaft with the vertical becomes reduced, and the disk is brought into contact with the cones *b*. Not only is it required to insure a true contact between the disk *C* and the surfaces *b*, but the water must also be prevented from percolating between the central spherical body *g* of the disk and the bearing *H* by making the latter adjustable to take up wear. Said bearings *H* are arranged so as to enable them to be adjusted by securing them into their sockets *h'*, as shown, and then securing them by locking-nuts *h*.

L is a screw-cover for the lower socket *h'*.

The greatest impediment to the proper formation of water-meters is due not so much to the wear and tear of the parts as to the influence of freezing. It is well known that water when freezing expands by one-tenth its volume and as the water entirely fills the meter this expansion must necessarily lead to the destruction of one or other part of the meter unless the contingency is provided for. Naturally, therefore, means had to be devised to protect those parts of the meter which are the most costly to produce and difficult to replace and to permit the pressure of the ice to act on some parts which can be easily repaired. This is one of the leading features embodied in the construction of our improved water-meter. We cause the pressure of the ice to be exerted on the bottom plate *i* of the outer casing, which for that purpose is made, comparatively speaking, the weakest part of the meter. To this end we provide the outer casing *A* with a yielding loose bottom plate *i*, having a chamfered edge and resting on an inclined or beveled seat on the supporting-ring *J*, between which and the lower flanged ends of both the casings *A* and *B* a ring *k*, of leather or analogous material, forms a tight packing. The loose plate *i* is made of metal and yields under the pressure of the ice formed in the interior of the meter. The ice forces the inner casing *B* downward and the latter presses up on the bottom plate *i* and causes the same to bulge out and leave its seat on the supporting-ring *J*. Thus the ice will have room for expansion without causing the destruction of any other part of the meter.

It happens sometimes that consumers forget or neglect to report on the damage to the meter and that they thaw the meter in order to obtain a supply of water. The water so drawn off is not registered, owing to the connection between the meter and the counter being severed through the action of the freezing. Consequently we have found it necessary to provide means for automatically closing the water-inlet to the meter by the displacement of the inner casing. This we have accomplished by making the inlet elliptical, as before stated, with its major axis horizontal and adapted to be closed by a block or

extension *l* on the casing *B* at the downward motion of the latter, as shown at Fig. 9, where the yielding bottom plate is shown supported on the inwardly-extending projections *j* of the bottom ring *J*. When the freezing is not very sharp, the bottom plate *i* may only be forced downward just off its seat and become jammed, thereby preventing the casing *B* from moving down sufficiently to close the inlet-orifice of the meter, as shown at Fig. 4, when small quantities of water are enabled to pass through, which can only be registered when the connection between counter and meter remains uninterrupted.

We provide a movable connection between the counter and meter by any of the devices shown in Figs. 4 to 8, both inclusive.

The crank-shaft *F* is mounted in the bearing *E*, rigidly connected to the casing *B*, and converts the tumbling motion of the disk-shaft into a rotary motion for the counter. The connection between the disk-shaft of the arm *f* of the crank-shaft *F* is constant, while the connection between the latter and the counter is obtained through the medium of a coupling device by which such parts are enabled to move endwise without becoming disengaged even at the lowest position of the casing *B*. (See Fig. 9). The coupling shown at Fig. 4 comprises a crank-arm *a* at the upper end of shaft *F*, whose crank-pin *a'* is of such length as to enable it to remain in contact with the crank-arm *o* of the main shaft of the counter, notwithstanding the changed position of the casing *B*. The coupling shown at Figs. 5 to 8, both inclusive, comprises a crank-shaft *F*, having a square-shaped straight end adapted to fit into the square hole in the main shaft of the counter. Fig. 6 shows a coupling on the pin-and-slot principle, the shaft *F* being provided with a cross-pin *m*, adapted to work in slots in the hollow end of the shaft of the counter, or, as shown in Fig. 7, the flattened end of the shaft *F* may be arranged to engage in the forked end of the main shaft of the counter. The principal points to be observed in the choice of these coupling devices are that they be movably arranged and that the connection between the parts must never become interrupted whatever may be the position of the inner casing *B*.

The inner casing *B*, as previously mentioned, fits the outer casing *A*, so that no water can pass out of the meter without its having first passed through the inner casing *B*. For this purpose we arrange a sleeve *M* in the inner end of the outlet-port of the outer casing *A*, which sleeve is pressed tightly against the outlet-orifice in the block *m'* of the casing *B* by means of a screw-threaded sleeve *N* in the screw-threaded front end of the said outlet-port of the outer casing *A*.

The flooding of the premises on thaw setting in is prevented by the insertion of the rubber ring *k* between the casing *B* and the bottom plate *i*, forming a tight joint at the lower end

of the meter, which will last or seal the joint even after the bottom plate *i* has been forced off its seat through the influence of freezing.

Having thus described our invention, the following is what we claim as new therein and desire to secure by Letters Patent:

1. A disk meter comprising a screw-threaded disk-shaft provided with a roller, and means for adjusting the roller consisting of screw and locking nuts adapted to be secured upon the screw-threaded end of the disk-shaft against the outer end of the roller, and a helical spring pressing against the inner end of the roller, whereby the roller is kept close against the nuts; substantially as described.

2. A disk meter comprising a disk-shaft having a screw-threaded end and provided with a roller, and means for adjusting the roller consisting of screw and locking nuts adapted to be turned on the screw-threaded end of the disk-shaft against the outer end of the roller, and a helical spring pressing against the inner end of the said roller; substantially as described.

3. A disk meter comprising an inner casing having conical surfaces and cup-bearings, the disk having a spherical body, the disk-shaft secured within the spherical body and projecting from one side thereof, the roller loosely mounted on the shaft so as to slide thereon, the helical spring mounted on the disk-shaft between the spherical body and the roller, and the nuts for adjusting the roller against the pressure of the spring; substantially as described.

4. A disk meter comprising an outer casing having a supporting-ring formed with a downwardly and inwardly inclined or beveled seat, a yielding bottom plate resting loosely upon the inclined or beveled seat, and a vertically-movable inner casing supported upon the yielding bottom plate; substantially as described.

5. A disk meter comprising an outer casing having a supporting-ring, a yielding bottom plate resting loosely upon the supporting-ring, a yielding packing-ring seated upon the supporting-ring and extending over the yielding bottom plate, and a vertically-movable inner casing supported upon the yielding packing-ring over the yielding bottom plate when the latter is jammed into its seat by the inner casing being forced downward; substantially as described.

6. A disk meter comprising an outer casing having a supporting-ring formed with inwardly-extending projections, a yielding bottom plate resting loosely upon the supporting-ring, a yielding packing-ring seated upon the supporting-ring and extending over the yielding bottom plate, and a vertically-movable inner casing adapted to be supported upon the ring, bottom plate and projections when it is forced downward; substantially as described.

7. A disk meter comprising an outer casing,

a vertically-movable inner casing provided with a peripheral flange at its lower end to fit the main casing, a supporting-ring, a yielding loose bottom plate resting upon the supporting-ring, and a packing-ring forming a tight joint between the supporting-ring and bottom plate, and the inner casing in the different positions of the latter; substantially as described.

8. A disk meter comprising an outer casing having a lower flange provided with an annular recess, an inner casing provided with a flange at its lower end fitting the annular recess, a supporting-ring having a beveled seat and located beneath the lower flange of the main casing, and a loose bottom plate beveled at its circumferential edge so as to fit the beveled seat of the supporting-ring and to rest normally thereon but adapted to be forced off said seat under the pressure of the downwardly-moved inner casing; substantially as described.

9. A disk meter comprising a main casing having inlet and outlet ports and a lower flange provided with an internal annular recess, a supporting-ring having an inner beveled seat, a bottom plate having a beveled circumference seating loosely upon the beveled seat of the supporting-ring a packing-ring, and an inner casing provided with a lower flange adapted to fit the annular recess and supported upon the bottom plate; substantially as described.

10. A disk meter comprising an outer casing provided with liquid inlet and outlet ports, an inner casing having a peripheral extension or block adapted to fit against and close the inlet-opening of the water-supply; substantially as described.

11. A disk meter comprising an outer casing provided with an outlet-port, a loose sleeve at the inner end of the outlet-port and a screw-threaded sleeve at the outer end of the outlet-port, and an inner casing provided with an outlet-opening; substantially as described.

12. A disk meter comprising an outer casing having inlet and outlet ports, a loose sleeve and a screw-threaded sleeve located in the outlet-port, and an inner casing provided with a block adapted to close the inlet-port, and a block in connection with the outlet-port; substantially as described.

13. A disk meter comprising a main casing, a vertically-movable inner casing, a counter, a disk, a disk-shaft, a yielding loose bottom plate upon which the inner casing is supported, a supporting-ring limiting the downward movement of the bottom plate and a crank-shaft whereby the disk-shaft is permanently connected with counter; substantially as described.

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