

2 Sheets—Sheet 1.

No. 520,195.

Patented May 22, 1894.



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(No Model.)

2 Sheets—Sheet 2.

J. THOMSON.
DISK WATER METER.

No. 520,195.

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Fig. 3.

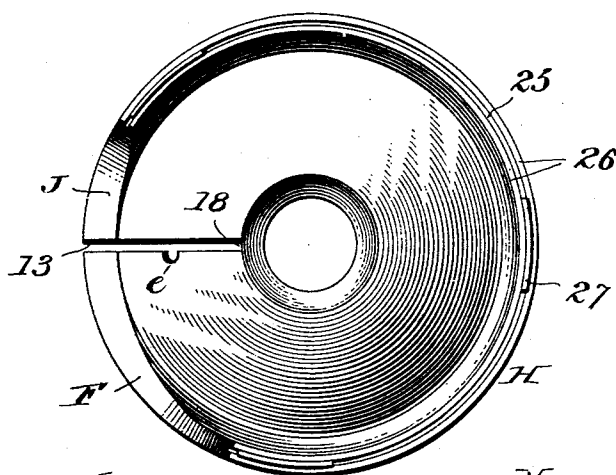


Fig. 4.

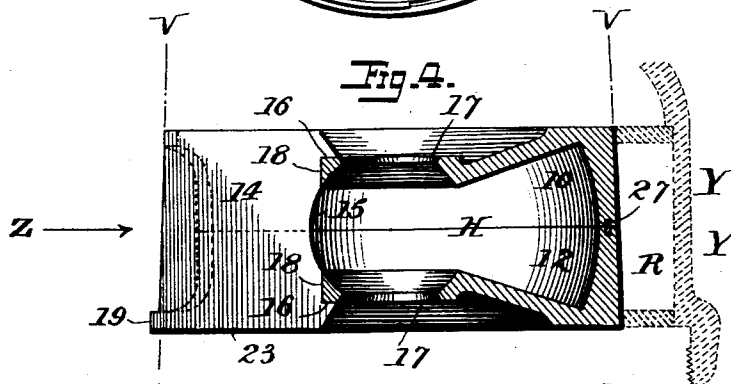


Fig. 5.

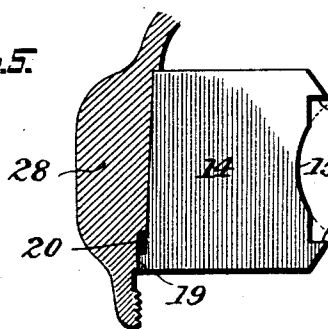


Fig. 6.

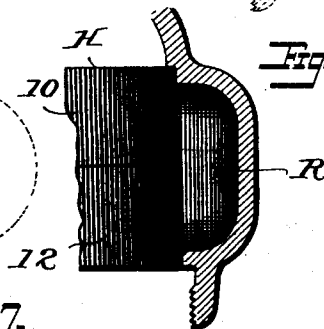
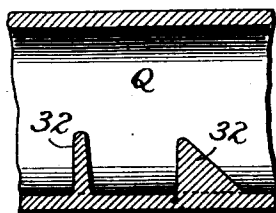


Fig. 7.



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UNITED STATES PATENT OFFICE.

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DISK WATER-METER.

SPECIFICATION forming part of Letters Patent No. 520,195, dated May 22, 1894.

Application filed August 9, 1893. Serial No. 482,769. (No model.)

To all whom it may concern:

Be it known that I, JOHN THOMSON, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Disk Water-Meters, of which the following is a specification.

My invention relates to disk water meters, and it has for its object to improve and simplify the construction and operation of such meters, and to these ends my invention consists in the various features of construction and arrangement of parts, producing the mode of operation substantially such as hereinafter more particularly set forth.

Referring to the accompanying drawings, in which I have shown an embodiment of my invention in one completed apparatus, although it will be understood that the features of invention may be used separately or together, or in connection with other features, Figure 1, is a vertical, central section through the inlet and outlet spuds and the main casing, the disk and internal gear train being shown in side elevation. Fig. 2, is a horizontal, center section of the main casing on the line A, Fig. 1, the top of the disk casing being shown in plan. Fig. 3, is a plan view of the inside of one of the sections of the disk casing. Fig. 4, is a transverse section through the disk casing showing the diaphragm in side elevation, and noting a modification in dotted outline. Fig. 5, is a detail view of the diaphragm. Fig. 6, is a detached cross-sectional view of the annular receiving channel of the main casing on the line B, Fig. 2; and Fig. 7, is a detached section and elevation of the channel on the circular line C, Fig. 2.

One of the features of my invention relates more particularly to the construction of the disk casing and the parts connected therewith, and particularly to the construction and arrangement of the diaphragm in connection with the disk casing, and in carrying out this part of my invention I make the disk casing of two separate sections 10 and 12, without any partition or wall between the ports, as heretofore constructed in this class of meters, for the purpose of attaching the diaphragm; but in place of that, the sections of the casing are cut or otherwise formed, as by saw-

ing or milling radially or cross-wise, as shown at 13, Fig. 3, forming open slots suitably located circumferentially with relation to the inlet and outlet ports, and within the slots so formed the diaphragm 14 is inserted.

The diaphragm 14, is preferably constructed from a piece of sheet metal, and is of a width equal to the combined width of the two sections of the disk casing at its outer diameter. The inner edge of the diaphragm is formed in the arc of a circle, as 15, to receive the ball 9 of the disk, and it is further provided with two lips 16, which are adapted to engage the flat bearing surfaces 17 of the outer sides of the disk casing, the central portion of the disk casing being of less thickness than at the edges, the parts being practically cone frusta, as is well understood in this class of devices. Thus, the diaphragm can be inserted into the slots of the disk casing by forcing it inwardly toward the socket, as indicated by the arrow Z, Fig. 4, and the faces 18, act as stops to fix the horizontal position of the diaphragm, while the bearings 17, in connection with the lips 16, define its vertical position, and thus it will be seen that the diaphragm can be accurately seated by simply slipping it in place, and when once in place, it will be securely held without danger of displacement, and without the necessity of providing ribs or projections in the disk chamber. Furthermore, not only is the diaphragm held in position, but it serves in addition to act as a key to clamp the sections 10 and 12, of the disk casing together, the lips 16, bearing on the surfaces 17 for this purpose, and this is a great convenience in assembling the parts and testing the same, without the necessity of permanently securing the parts together. The diaphragm is further provided with a lip 19, extended outwardly beyond the perimeter of the disk casing, and this is adapted to engage the slot 20 in the main casing (see Fig. 5), thus acting to properly locate both of the casings with relation to each other circumferentially.

When the disk casing is placed within its bearings in the main casing, and an inclosing cap, as 21, is closed to impinge upon its outer face 22, and also upon the outer face 23 of the diaphragm, forcing the disk casing

and diaphragm to a stop shoulder, as 24, in the casing, the entire structure is firmly locked and secured in position, and the necessary perfection of joint closure between the disk casing and the main casing is readily obtained. This may be done by the use of truly cylindrical bearings, but I prefer to employ a tapering bearing in the main casing, the outer peripheral surface of the disk casing being formed to a corresponding angle, as indicated by the lines V, Fig. 4. The mechanical construction of such a bearing is somewhat more troublesome to maintain than a true cylindrical bearing, but the practical advantage is that the disk casing may be more readily loosened and removed after the joints may have been corroded. Therefore, in a device of this character, the aforesaid detail of construction is regarded as of considerable importance, in that it provides adequate means for the subsequent ready examination and repair of the meter, it being observed that it is only necessary to remove the cap 21, when the disk chamber and connections may be removed from the main casing and adjusted or inspected, as required. One of the particular advantages of this arrangement of the diaphragm is that there is the utmost freedom of delivery of fluid to and from the disk chamber H, as no sharp corners or pockets are formed by the intersection of the diaphragm with the casing, and hence the displacement of the disk is not throttled, and the strain upon the device is uniform throughout the complete nutation of the disk.

It is well known that one of the objects of this class of meters is to avoid friction in the operation of the disk 8 and ball 9, so that the meter will operate with uniformity under all flows, and not be liable to wear. The construction and arrangement of the diaphragm and casing above described tend to this result, but in order to further carry out this idea, I nickel-plate the inner portion, at least, of the disk casing of the meter, thereby providing a perfectly smooth and uniform surface for the disk, and as the disk is usually made of rubber, I find that the friction between the nickel-plated surfaces and the rubber is exceedingly small and much less than when the ordinary materials, like brass, or similar compositions, are used, and not only are the friction and wear less, but the parts are less liable to corrosion by the fluids passing through, and it will thus be seen that the operative parts of the meter will be more uniform and accurate in their operations, and be subject to less wear, and hence of longer life. The diaphragm too, is preferably nickel-plated for the same reasons, and I find that the rubber disk arranged in connection with the nickel-plated disk chamber and diaphragm produces highly practical results.

While the sections of the disk casing are held together with greater or less security by the diaphragm as above constructed, it is de-

sirable to provide other means for holding the parts together, whether a diaphragm of such a construction is used or not, and this I accomplish by providing narrow grooves 25, in the inner contact faces 26 of the disk casing sections, and then providing narrow strips 27, of spring-metal and springing three or more of them into the grooves, as best shown in Figs. 3 and 4, when the spring tension of the narrow strips will hold the sections securely in position. The metal strips are thus bent to form circular bearing ribs adapted to be received by the corresponding groove in the opposite section. Instead of a series of strips, it is obvious that a single strip might be employed, producing a continuous rib. The advantages of this construction are that the bearing faces 26 do not require to be so broad as would be necessary for the insertion of steady-pins; that each section of the casing is a duplicate of the other, and as the operations in forming the sections are identical, the chances of error in machining or molding are materially reduced, and the details of manufacture simplified, while the result is an exceedingly simple and effective construction.

Another feature of my invention relates to the arrangement of the ports and water-ways, and in carrying out this feature, the disk casing is entirely surrounded at its periphery by a circumferential channel R, between it and the inner wall of the outer or main casing. A rib 28, meeting the outer edge of the diaphragm, and a rib 29, making contact crosswise with the cylindrical exterior of the disk casing divides the annular channel circumferentially into two portions, while the contact of the disk casing with the cylindrical bearings 24 and 30 of the main casing I, completes the closure of the channel R. The inlet stream is caused to first enter the space Q, farthest from the inlet port F of the disk casing, and this is accomplished in the present instance, by curving one of the inner walls of the inlet spud, as at 31, to act as a deflector. In the bottom of this portion Q, of the receiving channel, are arranged a number of ribs 32, disposed transversely therein, and of less height than the channel, as best seen in Fig. 7, thereby forming a series of open pockets. The object of thus first deflecting the swift entering stream away from the inlet port of the disk casing, is to deposit in these pockets any obstructions likely to damage the disk, particularly as in the instance of lead and paste used in making the thread and wiped joints of the water pipe. Then too, this forces a complete reversal of the current within the channel, so that the flow through that portion of the channel opposite to the inlet port is at a ratio equal to the cross-sectional area of that space, and the delivery into the inner port of the disk chamber is at the lowest possible velocity. The delivery from the outlet port J, of the disk chamber into the annular space at T, is also entirely

unimpeded. This arrangement, likewise, obtains a condition of pressure in the chambers N and M above and below the disk casing, which is absolutely similar whether the condition of operation be dynamic or static, as the water which reaches and fills this chamber must either pass the joints of the ball and the diaphragm, or through special perforations in the disk casings, as indicated at e, Fig. 2. The described construction and arrangement also afford convenient means for the application of a screen or strainer, as by simply taking a strip of perforated metal 33, and inserting it in the annular channel opposite the inlet port. It is thus upon the insertion of the disk casing, securely confined in position and effectually protects the disk against such material as may not have lodged in the aforesaid receiving pockets. Moreover, the strainer may be readily removed for cleaning, and a new screen or strainer may be substituted by simply withdrawing the disk casing. Another advantage of this construction is that the inlet spud 34, and the outlet spud 35, may lie in the vertical and horizontal centers of the main casing, instead of the more cumbersome and unsymmetrical arrangement heretofore suggested, in which the spuds lie tangentially to the casing.

In some instances it is desirable to arrange the ports and diaphragm in the position indicated by dotted lines in Fig. 2, as this gives more inlet space and allows a different arrangement of the strainer as clearly shown by the dotted lines.

As shown in dotted lines Y, of Fig. 4, the conditions for obtaining the annular channel may readily be reversed, the space being formed in the disk casing and the closure effected by the main casing, but the result will be identical, differing only in details of construction.

It will thus be seen that by the arrangements and constructions above indicated, not only am I enabled to cheapen the cost of such meters, but I provide a meter which is easily assembled or taken apart for adjustment or inspection, the parts are symmetrically arranged to produce the best results, and there is the least wear and tear in its operation resulting in an efficient and accurate meter, and while I have described the details of construction in the embodiment of my invention shown, it will be readily understood that these details may be varied without departing from the spirit of my invention, and I do not, therefore, limit myself to the specific arrangements set forth.

What I claim is—

1. In a water meter, a disk chamber having an open, radial or transverse slot so formed as to permit of a diaphragm being inserted therein from the outside, substantially as described.
2. The combination with a disk casing having an open transverse slot extending from the periphery of the disk casing inwardly to

its socket, of a diaphragm inserted therein thereby forming the inlet and outlet ports of the disk chamber, substantially as described.

3. The combination with a disk casing composed of two sections and having an open transverse slot formed therein, of a diaphragm inserted in the slot and adapted to clamp the sections of the casing together, substantially as described.

4. The combination with a disk casing composed of two sections and provided with an open transverse slot, of a diaphragm inserted in said slot the diaphragm being provided with lips adapted to engage the outer surfaces of the disk casing, substantially as described.

5. The combination with the main casing having a slot, of the disk casing, and the diaphragm the diaphragm having a projection extending outwardly from the disk casing and adapted to engage said slot in the main casing, substantially as described.

6. The combination with the disk casing made in sections and having circular grooves in their inner contact faces, of a strip or strips of metal inserted in said grooves substantially as described.

7. The combination with the main casing, of the disk casing centrally mounted therein, the annular channel surrounding the disk casing, a diaphragm in said disk casing, ribs separating the channel into receiving and discharging spaces, one of the ribs being opposite the diaphragm, and the diaphragm engaging the said rib substantially as described.

8. The combination with the main casing, of the disk casing, and the annular receiving channel provided with open pockets, substantially as described.

9. The combination with the main casing having an inlet and a receiving channel extending at each side of said inlet, of a disk casing having an inlet port arranged at or near the end of one side of the receiving channel, and the other side of the receiving channel being provided with open pockets, substantially as described.

10. The combination with the main casing, of the disk casing having the inlet port, the annular receiving channel, the inlet, and a deflector the deflector being arranged so that the inlet current is deflected into that portion of the receiving space farthest from the inlet port of the disk casing, substantially as described.

11. The combination with the main casing having an inlet and outlet and an annular channel between the inlet and outlet, and transverse ribs separating said channel into inlet and outlet channels, of a disk casing inserted in the main casing, and having an inlet and outlet port adjacent to one of the ribs, open pockets in one portion of the inlet channel, and a deflector arranged to deflect the inlet current toward the open pockets, and away from the inlet port of the disk casing, substantially as described.

12. The combination with the main casing,

of the disk casing, the annular receiving
channel, and inlets centrally arranged with
regard to said channel, a deflector, one por-
tion of the channel being provided with open
5 pockets and the other with a screen, substan-
tially as described.

In testimony whereof I have signed my

name to this specification in the presence of
two subscribing witnesses.

JOHN THOMSON.

Witnesses:

ROBERT S. CHAPPELL,
J. MCKINNON.