No. 618,193. Patented Jan. 24, 1899.

J. THOMSON.

DISK WATER METER.

(Application filed Nov. 2, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

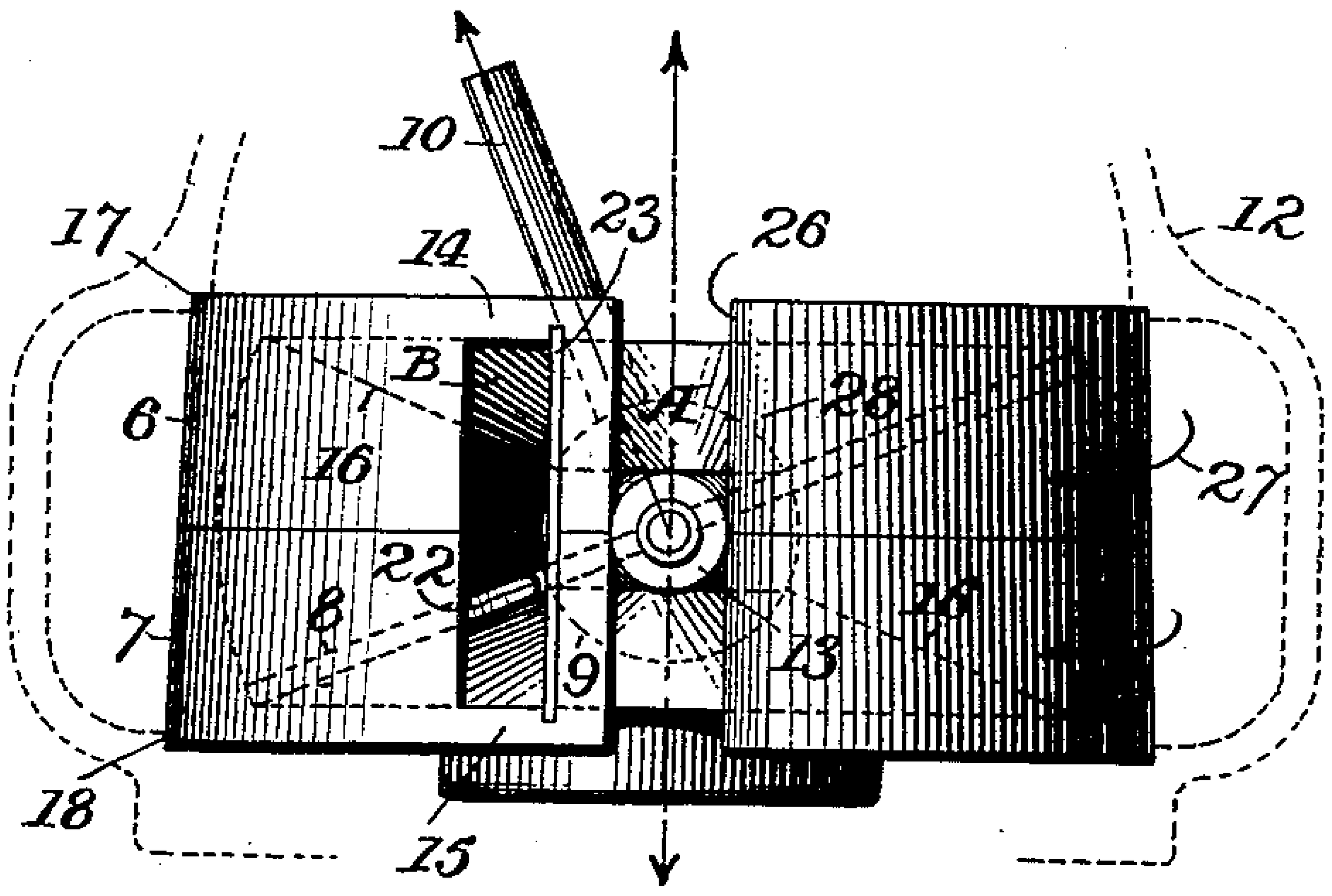

Fig. 2.

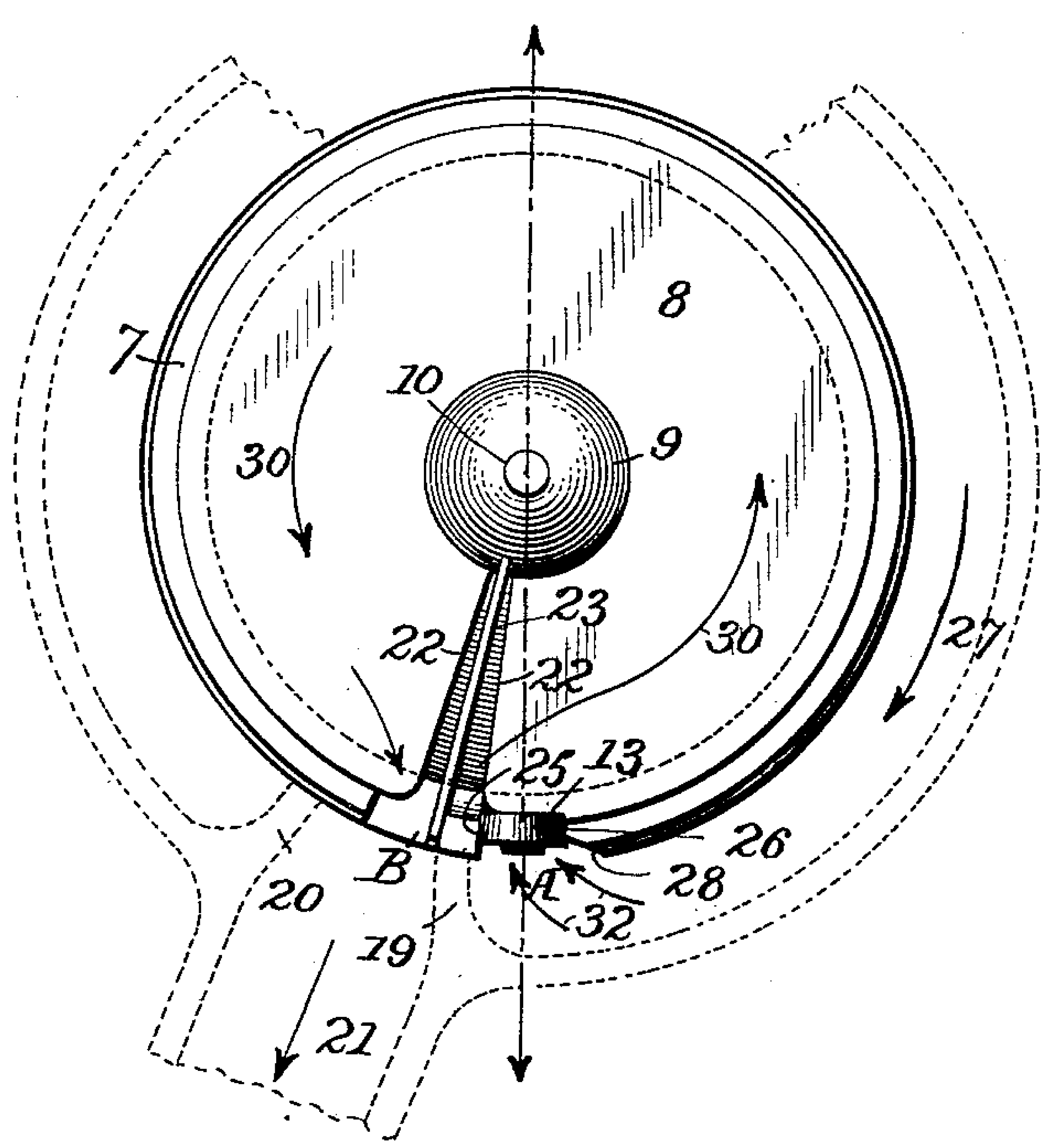

Fig. 3.

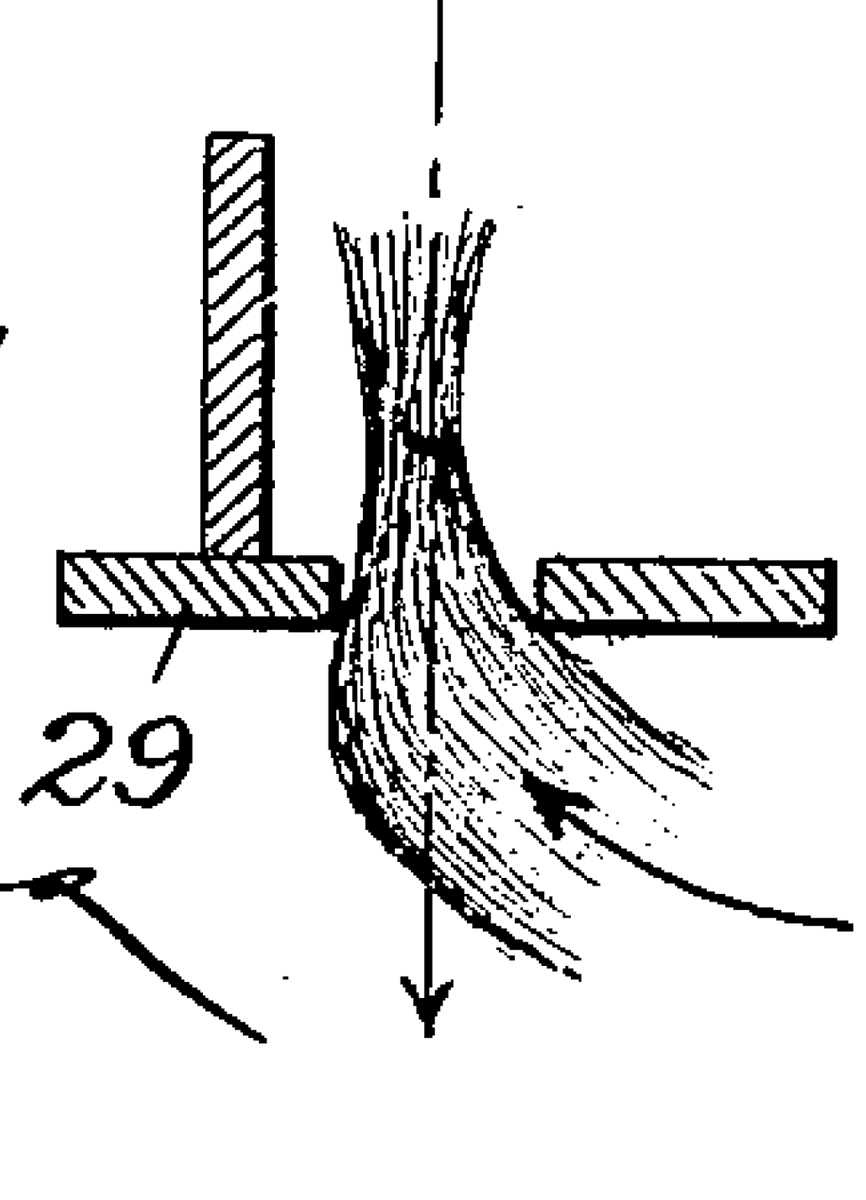

Fig. 4.

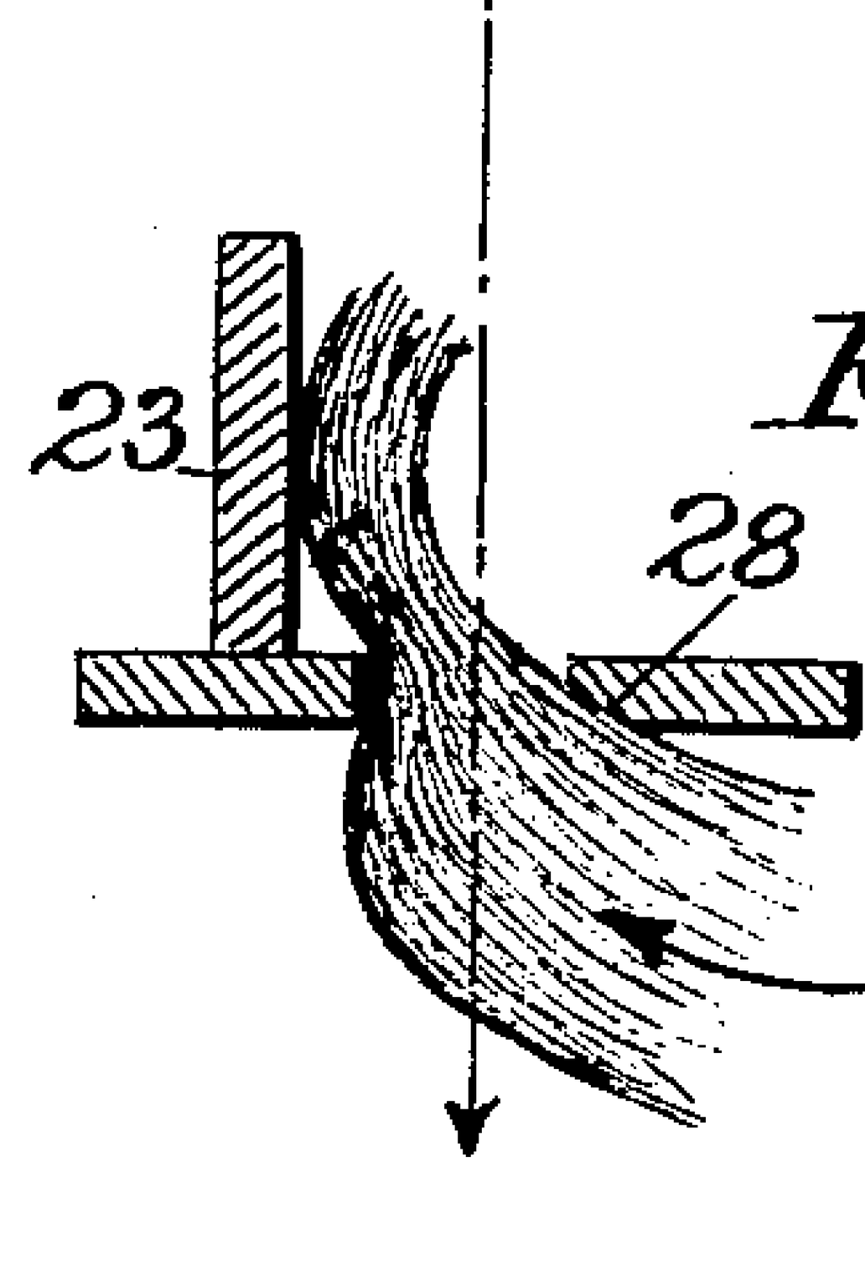

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Fig. 5.

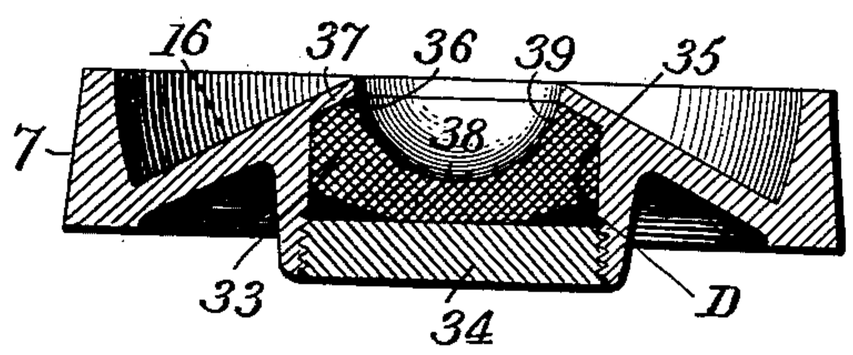


Fig. 6.

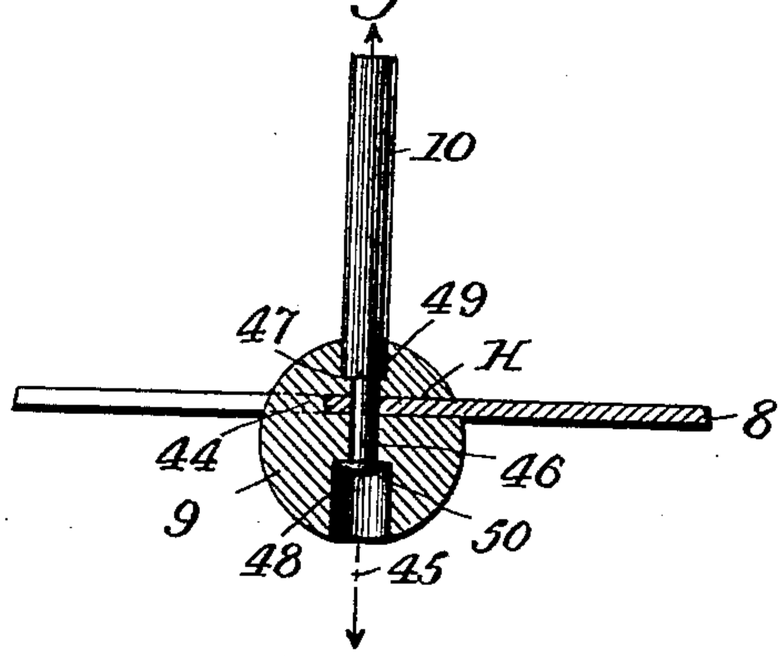
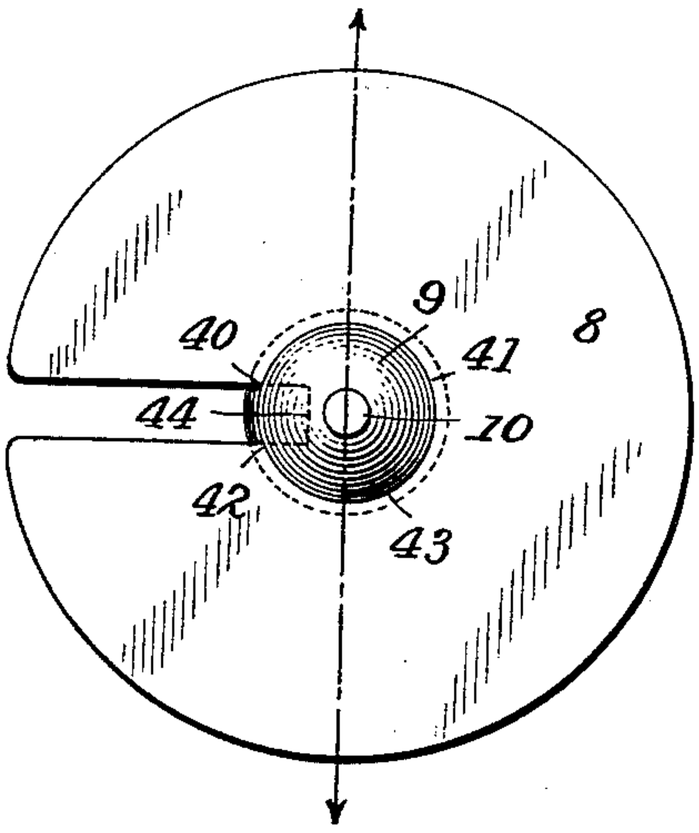


Fig. 7.



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UNITED STATES PATENT OFFICE.

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DISK WATER-METER.

SPECIFICATION forming part of Letters Patent No. 618,193, dated January 24, 1899.

Application filed November 2, 1897. Serial No. 657,214. (No model.)

To all whom it may concern:

Be it known that I, JOHN THOMSON, a citizen of the United States, residing at New York, (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.

This invention relates to improvements in disk water-meters, the several features and objects of which will be pointed out in the following description.

In the drawings, Figure 1 is an elevation of a disk-chamber casing as viewed from the inlet-port. Fig. 2 is a top plan view of the disk and its lower casing. Figs. 3 and 4 are diagrams to illustrate the principle involved leading to a peculiar construction of the inlet-port. Fig. 5 is a transverse sectional detail of the lower section of the disk-casing. Fig. 6 is a sectional detail, and Fig. 7 a part top plan view, of the disk and ball.

In the figures of the drawings, 6 7 are the upper and lower sections, respectively, which together form the disk-casing. 8 is the disk; 9, the ball; 10, the ball-spindle, and 12 denotes in dotted outline an external main casing.

The inlet-port A is preferably milled across the periphery of the disk-casing, forming a slot, open top and bottom. The thrust-roller of the disk or other suitable projection thereon is adapted to reciprocate in the port. The outlet-port B, which may be of a width and area equal to or even greater than that of the inlet-port, is also milled in the face of the disk-casing, but preferably does not pass entirely across the periphery of the casing, the upper and lower ends 14 15 terminating at the frustums 16. In this wise the outlet-port may be sealed by the bearings 17 18 and ribs 19 20 to discharge into an outlet-chamber, as 21, of the main casing.

In an earlier patent I have shown, described, and claimed a novel system for circumferentially guiding and controlling the disk in a disk water-meter to prevent the edges of the slot of the disk from making contact with the diaphragm, and the construction here shown and now to be described is a modification of the constructions already shown and described, operating upon and embodying the same principles and having the same general objects in view.

It is not new to prevent the edges of the slot of the disk, as 22, from bearing upon the diaphragm, as 23, by causing a projection on the disk to operate in a slot or against a "wall-piece" in the disk-casing or a slot in the disk to operate against a "controlling-abutment" in the disk-casing, whether the slot or the wall-piece or the abutment be disposed remote from or contiguous to the ports, as see my patent already referred to—namely, No. 476,102, dated May 31, 1892—and also my patents No. 485,437, dated November 1, 1892; No. 535,641, dated March 12, 1895, and No. 568,641, dated September 29, 1896; but what the present improvement in the art consists of is this—namely, in providing a narrow vertical port the side walls 25 26 of which shall be approximately parallel and be adapted to act as a bearing for the thrust-roller or pin or projection or other device on the disk for guiding or controlling its circumferential movement. In other words, the diameter or breadth of the projecting device shall be approximately equal to the width of the port, but free to reciprocate vertically. In this wise the two edges 22 of the slot in the disk are prevented from coming in contact with the sides of the diaphragm, the principle and advantages of which, novel with me, have already been shown and described and broadly claimed in my former patents referred to.

When the port and thrust-bearing are constructed and arranged as just described, it has been found to be advantageous, if not essential, to cause the water to flow around the periphery of the disk-casing toward the port in a circular channel, as 27, (see also Fig. 2 of my Patent No. 520,197 of May 22, 1894, and Fig. 2 of No. 568,641 of September 29, 1896,) and to bevel that edge of the port 28 which is contiguous to the inflowing stream. If the port were left square on both edges, it would act like a sharp-edged perforation 29, Fig. 3, causing the inflowing water to directly impinge upon the thrust-roller, the disk, and the ball, thus producing extra pressure and friction upon the ball and socket; but by beveling or rounding the nigh side of the port 28 the jet is deflected to strike obliquely

upon the diaphragm 23, as see diagram Fig. 4, instead of being directed toward and upon the ball. Moreover, this produces an oblique impact upon the thrust-roller which acts to partially or wholly counterbalance the circumferential thrust of the disk, due to the flow through the disk-chamber denoted by the arrows 30 on the disk and 32 at the port, Fig. 2, and it also acts to counteract the outward radial thrust upon the thrust-roller 13, due to centrifugal action (if a roller is used) when the disk is oscillated at high speed. The consequence of the arrangement and disposal just described is that a port of much smaller area can be employed than has heretofore been deemed essential to successful operation. In fact, instead of requiring the area of the inlet-port to be equal to or even greater than the cross-sectional area of the channel around the inside of the disk-casing, as heretofore practiced, its area when conforming to my system, heretofore and herein set forth, needs be no greater than that of the service-pipe. Then, too, in this wise the ports may be readily machined to precise dimensions instead of being roughly formed by casting, whence but little, if any, expense need be incurred in the calibration of different meters.

Another improvement consists in providing means for minute adjustment of the supporting—that is, the lower—socket-bearing 33, this being a separate piece of any desired composition of antifriction material or metal confined in the chamber D, as by the nut 34. The socket-piece is partially relieved of bearing at the outer portion of its base, as at 35, or the result to be described may be accomplished by relieving the upper face of the nut. Then the upper face of the .socket-piece is beveled, as 36, meeting a corresponding bevel 37 formed in the disk-casing, both of said bevels being alike and may preferably correspond with the angle of the frustum 16. Assume that the contour of the socket has been formed to approximate accuracy, but is slightly larger than the ball, or that, as the result of usage, it or the ball, or both, have become worn. In such case by forcibly turning in the nut the socket-piece will be sprung upwardly at the bottom 38 and deflected inwardly at 39 by the action of the bevels. By such compressive action a satisfactory adjustment of several thousandths of an inch may be obtained of the most rigid and lasting character.

The concluding improvement, Figs. 6 and 7, refers to the manner of securing the disk to the ball, this being related to an improvement shown, described, and broadly claimed in my Patent No. 568,640, dated September 29, 1896. When the ball 9 is solid, the groove H therein for receiving the disk 9 is formed by making two parallel side cuts, as from 40 to 41 and 42 to 43, as in the patent just cited. Then a cross-cut is made, as from 41 to 43, to such a depth, 44, that the disk will pass beyond the vertical center 45 of the ball. Now by drilling through both the ball and the disk 46, counterboring top and bottom 47 48, inserting the spindle with shoulder 49 and riveting it, as 50, the spindle, the ball, and the disk are as securely locked to each other as if they were formed as a single part.

While I have in general especially referred to the inlet-port as being preferable (which it, in fact, is) to that of the outlet-port as a guide for the thrust-bearing of the disk, I have not neglected to duly consider that the meter is operative if the inflowing stream should be directed to the outlet-port B. Neither have I neglected to take into account that the ports, either or both, may be formed at an angle to the vertical, or that the form might be a curve, the latter being so arranged as either to augment or to minimize the slip of the disk upon the frustums. Therefore without limiting myself to the precise illustrations, terms, and description herein employed to describe this embodiment of my invention,

What I claim is—

1. The combination with the disk-casing, disk and ball, of a socket-bearing confined within a chamber, and resting upon a nut so arranged and constructed that said socket-bearing may be compressed upwardly at its bottom and inwardly at its upper circumference.

2. The combination with the disk, ball, and disk-casing, of a socket-bearing confined in a chamber, its upper face and seat therefor being beveled, as 36, 37, and centrally supported by an adjusting-nut, as 34, substantially as and for the purpose described.

3. The combination of an integral ball having a groove, a disk, and a spindle, the spindle passing through both the ball and disk locking them together, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN THOMSON.

Witnesses:
W. G. ZICK,
MEYER KRASUEN.