(No Model.) 2 Sheets—Sheet 1.

L. H. NASH.

DISK WATER METER.

No. 527,535. Patented Oct. 16, 1894.

FIG. 1.

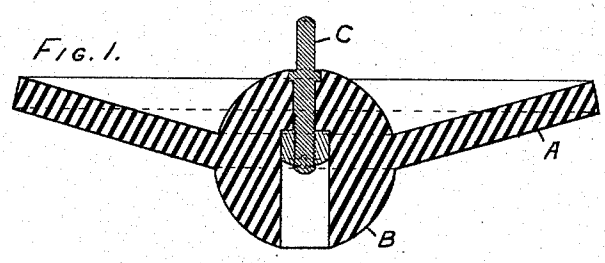


FIG. 2.

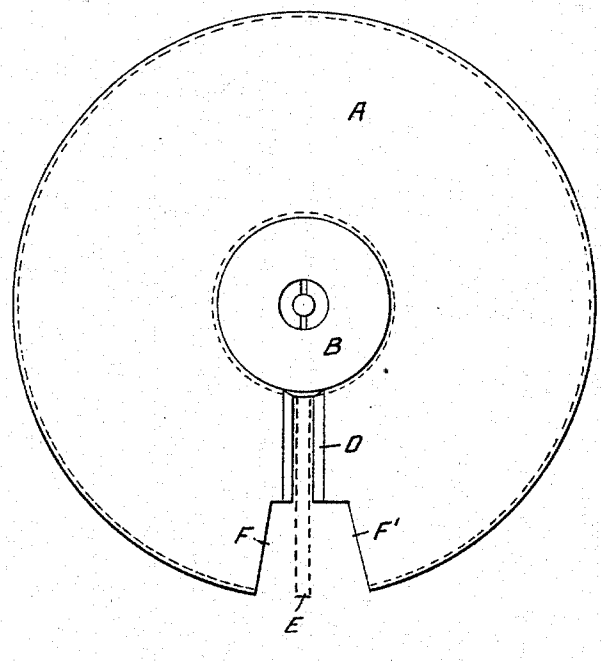
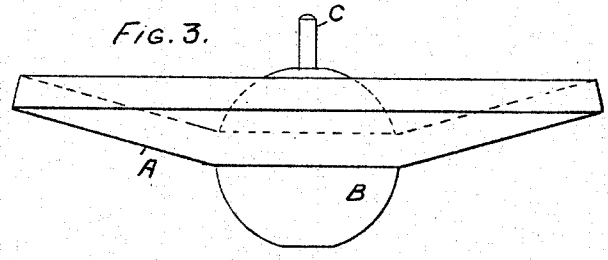


FIG. 3.



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(No Model.) 2 Sheets—Sheet 2.

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DISK WATER METER.

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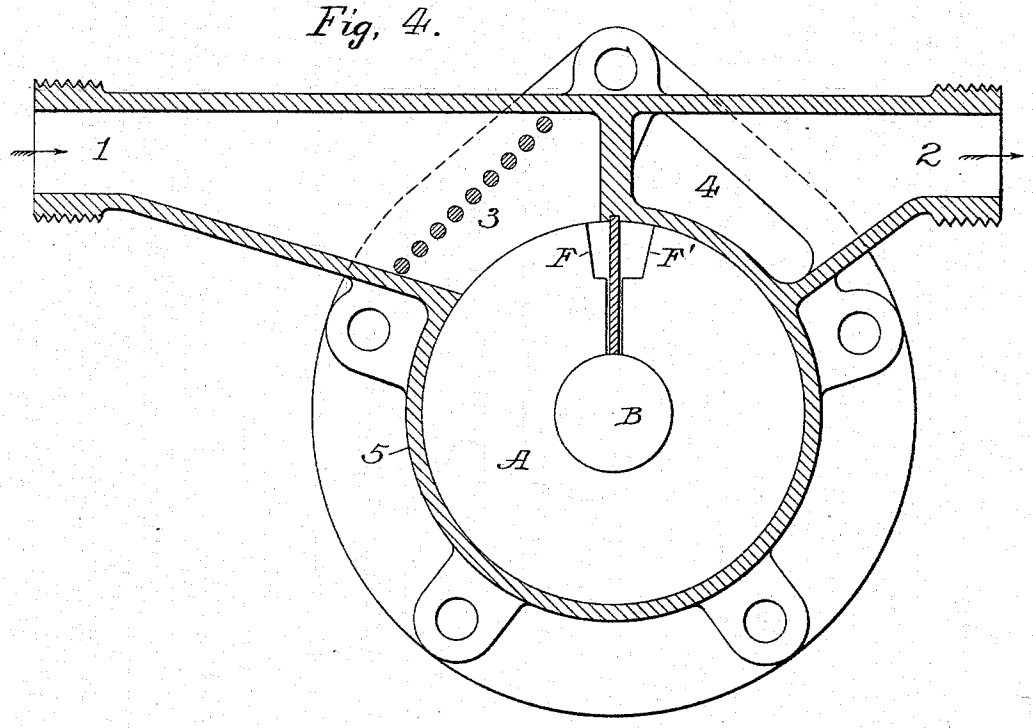
Fig. 4.



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UNITED STATES PATENT OFFICE.

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DISK WATER-METER.

SPECIFICATION forming part of Letters Patent No. 527,535, dated October 16, 1894.

Application filed March 15, 1892. Serial No. 425,009. (No model.)

To all whom it may concern:

Be it known that I, LEWIS HALLOCK NASH, a citizen of the United States, residing at South Norwalk, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Fluid-Meters, of which the following is a specification.

My invention consists of certain novel parts and combinations of parts, the several features of which will be separately pointed out in the claims concluding this specification. Before specifying such claims I will describe the structure illustrated in the annexed drawings.

The following description read in connection with the accompanying drawings will enable any one skilled in the art to which my invention relates to understand its nature and to practice it in the form in which I at present prefer to employ it; but it will be understood that my invention is not limited to the precise form herein illustrated and described, as various modifications may be made without departing from its spirit and without exceeding the scope of the concluding claims.

Referring to the annexed drawings, Figure 1 shows a nutating piston in cross section. Fig. 2 is a bottom view of the same. Fig. 3 is a side view of the same. Fig. 4 shows a horizontal section through a meter case of ordinary construction, the piston being in place.

The piston shown in the accompanying drawings is conical but the invention is equally applicable to other forms of nutating pistons.

A is the disk and B the ball of the piston. These may be made of any suitable material. It is not necessary that the ball and disk both be made of the same material although they may be if desired.

C is a pin by means of which the motion of the piston is communicated to the dial mechanism.

Referring to Fig. 2 D is the slit in the piston where it straddles the abutment E. Shown in dotted lines. F F′ are ports or passages in the piston at this point. These ports are cut all the way to the rim of the piston. The lines limiting the circumferential extent of these ports are radial and the port F′ is larger than the port F; but in its broader aspects the invention is not limited to either of these features nor is it limited to a piston in which ports are provided on both sides of the abutment.

Fig. 4 shows the piston above described in place in a case of ordinary construction in which 1 is the inlet spud; 2, the outlet spud; 3, the inlet port; 4, the outlet passage and 5 the spherical inner walls of the case. A is the piston; B, the ball bearing; F, the port connecting the inlet chambers above and below the piston and F′ the port connecting the outlet chambers above and below the piston.

There are at least three separate and distinct advantages resulting from making the port or ports in the piston extend to the rim thereof, or in cutting the piston away at its rim so that it does not touch the abutment, irrespective of all other features.

First. Without entering into a discussion of the function and utility of ports in the piston where it straddles the abutment, it will be sufficient here to call attention to the fact that there is a practical limit to the circumferential extent of these ports in an accurate meter designed for general use, for, leaving out of consideration water packing, there is a time in the motion of the piston when communication through said port is established between the inlet and outlet chambers. This is when the line of joint forming contact between the piston and its case reaches and while it is crossing said port. Up to a certain extent this does not practically interfere with the accuracy of the device, but if it goes beyond this it does. It is, therefore, desirable to have such port of the mimimum circumferential extent for a given capacity. As the line of contact between the piston and case is radial, it is obvious that a port of the given width near the piston will be reached by the line of contact before a port of the same width would be reached if it were farther from the ball, and that communication between the inlet and the outlet chambers would be established thereby for a longer space of time. Hence by cutting this port out to the rim of the piston the minimum width of the port may be obtained for a given

capacity. This is one advantage obtained by me in the form of piston and ports shown, but there are others hereinafter described independent of this, and the invention, broadly considered may be embodied in a structure to which this advantageous feature is not made use of. In this discussion I have employed the term "circumferential extent" to indicate not the actual width of the port, but its extent with relation to the line of contact between the piston and case.

Second. By cutting the port out to the rim of the piston, even where it is shaped so that the advantage above described is not secured, yet the life of the piston is increased and the liability of breaking diminished. It is well known that nutating or disk pistons sometimes break by reason of the friction between the slit in the piston and the sides of the abutment. In the form shown in Fig. 2 the piston is in frictional contact with the abutment only toward the ball, where it is strongest and where the leverage is least. Hence by cutting the piston away so that it does not touch the abutment at and for a distance back from its rim its liability to fracture is diminished irrespective of all other considerations.

Third. A consideration of the manner on which these nutating pistons work will make it plain that foreign substances are most liable to collect in the corners where the side walls of the case and the abutment meet, and that their presence will more or less force the piston away from its seat and more or less destroy its joint forming function; or if the piston be rigidly controlled by mechanical connections, will cause it to jam; in either case interfering with its proper action. By cutting the piston away at this point any particles of foreign matter lodging there will not interfere with the operation of the meter; and this advantage is obviously independent of either of the others described.

A nutating piston having either or all of the features above described may be used in connection with any suitable case and may be either controlled or uncontrolled by mechanical connection with the case or registering mechanism of the meter.

As I have before remarked the details illustrated and above described are not all essential to the several features of my invention separately considered. This will be indicated in the concluding claims, as in any claim the omission of an element, or the omission of reference to the elements mentioned, is intended to be a formal declaration of the fact that the omitted element or features are not essential to the invention therein covered.

Having thus described the nutating piston embodying in preferred form the several features of my present invention, what I separately claim is—

1. In a water meter, the combination with a suitable case, of a piston having a motion of nutation and a port extending to the rim of the piston establishing communication between chambers on opposite sides of the piston.

2. In a water meter, the combination with a suitable case, of a piston having a motion of nutation, a port extending to the rim of the piston establishing communication between chambers on opposite sides of the piston and a bearing surface near the ball therefor.

In testimony whereof I have signed this specification in the presence of witnesses.

LEWIS HALLOCK NASH.

Witnesses:

JOHN H. NORRIS,

GEORGE A. MAYLAND.