(No Model.) 2 Sheets—Sheet 1.

L. H. NASH.

DISK WATER METER.

No. 537,062. Patented Apr. 9, 1895.

Fig. 2.

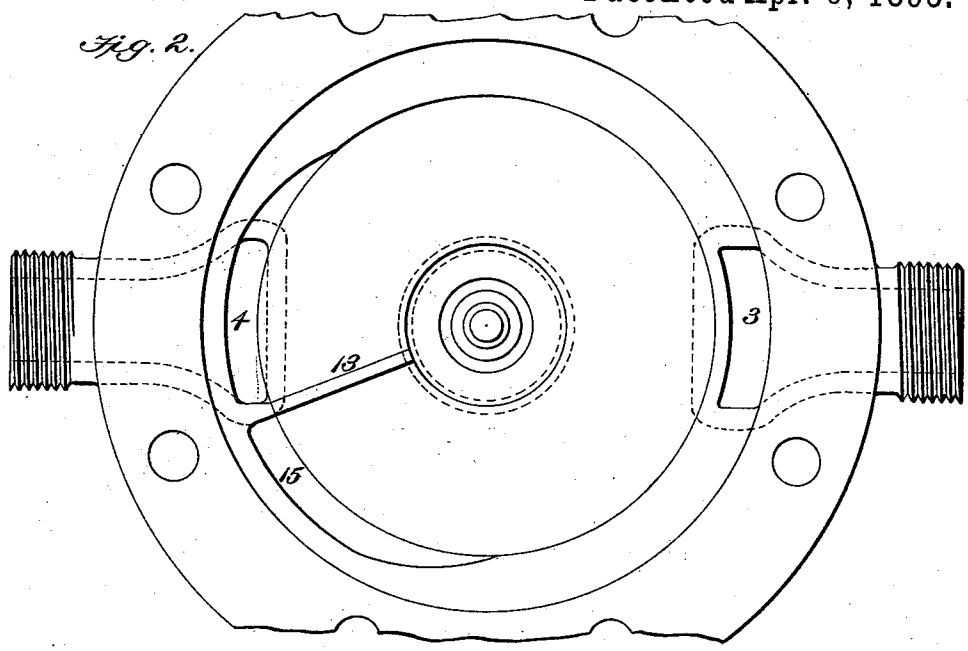
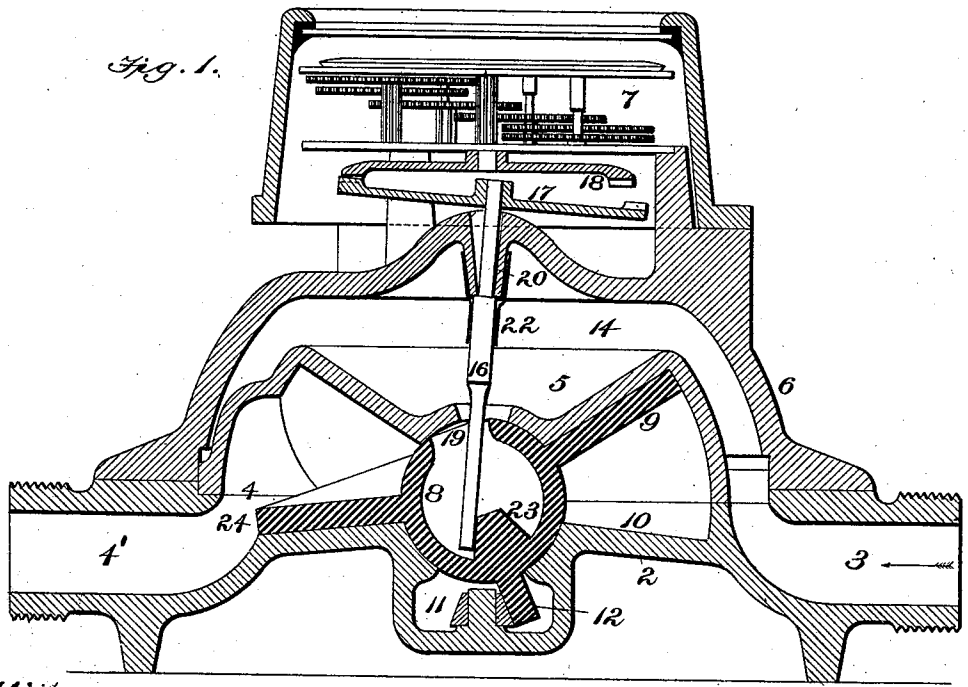


Fig. 1.



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By Johnson & Johnson
his Attorneys.

(No Model.) 2 Sheets—Sheet 2.

L. H. NASH.

DISK WATER METER.

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Fig. 4.

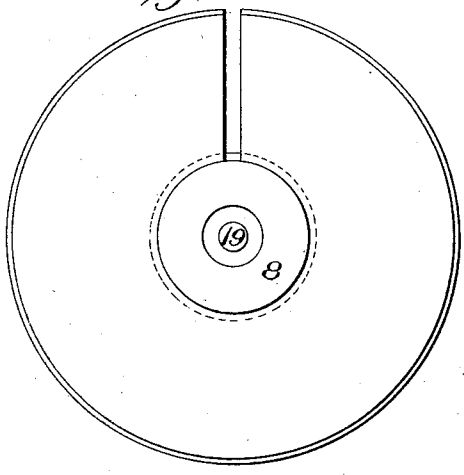


Fig. 6

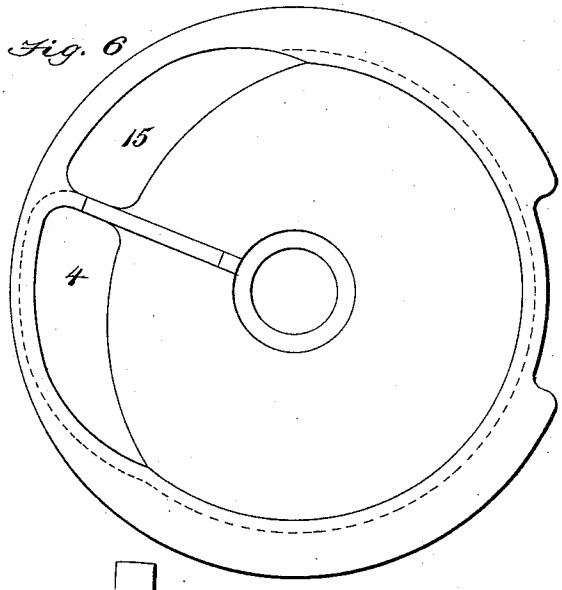


Fig. 5.

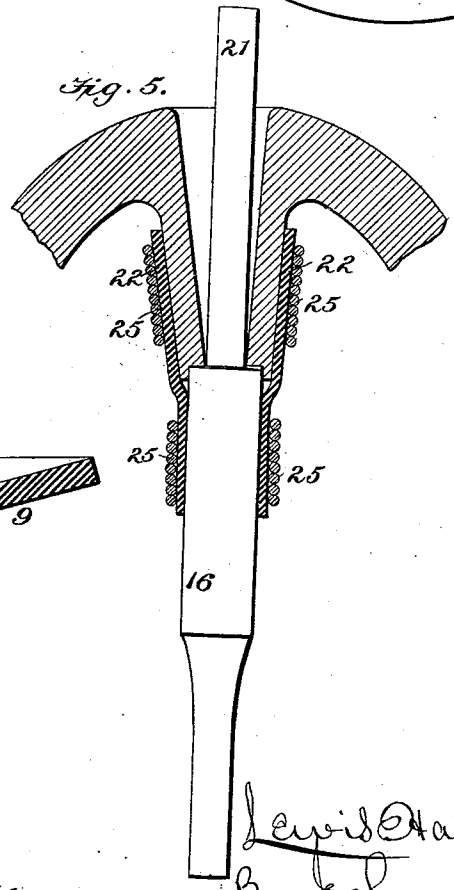
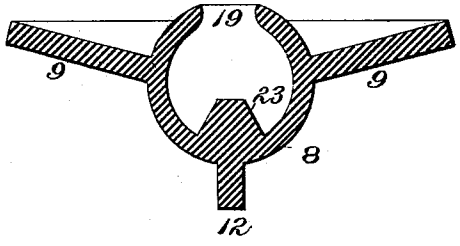


Fig. 3.



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UNITED STATES PATENT OFFICE.

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DISK WATER-METER.

SPECIFICATION forming part of Letters Patent No. 537,062, dated April 9, 1895.

Application filed June 17, 1892. Serial No. 437,036. (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 Improvements in Disk Water-Meters, of which the following is a specification.

My present invention relates to fluid meters and consists of certain novel parts and combinations of parts, which will be separately pointed out in the claims concluding this specification.

In the drawings I have illustrated a meter embodying in total combination all the features of improvement which constitute my present invention. These improvements are not, however, necessarily connected or combined in this way but they may be employed separately in meters otherwise different in general operation and construction from that shown. It will likewise be understood that my said invention designated in the claims of this specification may be embodied in forms different from those shown, since various modifications not affecting the principle, and mode of operation, broadly considered, may be employed without exceeding the scope of said claims.

For the purpose of informing those skilled in the art to which my invention appertains, or with which it is most nearly connected, of the nature of my present inventions and for the purpose of instructing them how the same may be particularly and advantageously employed, I will now describe the devices illustrated in the accompanying drawings, which show the forms which I at the present prefer to employ.

In the said drawings, Figure 1 represents a vertical longitudinal section through a meter case. Fig. 2 is a top view of the lower casing of said meter. Figs. 3 and 4 show a sectional and top view of the piston. Fig. 5 is an enlarged view of a part of the registering device. Fig. 6 is a top view of the interior meter case 5.

The meter case is made of any suitable metal or material, such, for instance, as iron or brass, or a combination of metals or materials.

2 is the lower section or base of the case and it is provided with an inlet passage 3 and an outlet passage 4. Upon this base is set a conical case 5 and over it an inclosing cover 6, upon which the dial mechanism 7 is supported.

9 is a disk piston (see Figs. 4 and 3) which has a rolling or nutating motion. It is provided with a convex bearing 8 working into the concave bearing on the cases 2 and 5. Projecting downward from the piston is a stem 12 operating in connection with a tapered roller 11, fixed to the case 2.

13 is a radial abutment dividing the measuring chamber between the inlet and outlet ports. The piston is split (see Fig. 4) and straddles this abutment.

16 is an arm or secondary piston connected with the registering mechanism to which it transmits the movements of the piston to designate the amount of water which has passed through the meter.

22 (see Fig. 5) is an elastic band or tube embracing a pipe 20, formed on the inclosing case, and also the said rod 16, thereby making a water tight joint and preventing water from the meter case passing up into the chamber containing the index mechanism. The arm 16 extends into the interior of the ball joint 8 of the piston and into contact with a stud 23 which causes the rod 16, as the piston rolls around, to describe at its lower end a circular movement. On the upper end of the arm 16 is attached a crown gear wheel 17, which operates a corresponding crown gear wheel 18, to which the index train of gearing is attached. The wheel 17 has, say, one more or less teeth than the wheel 18 and hence, for each complete rolling movement of the wheel 17, the wheel 18, which is attached to a stationary support and capable of revolving on its axis, will turn a distance equal to the width of one of its teeth and this motion will be, by any suitable train of gearing, communicated to the several dial indices to indicate the number of cubic feet of water which has passed through the meter.

The water or other fluid measured by the meter, enters by the passage 3 into the chamber 14 between the case 5 and the case 6. Thence it passes through port 15 into the measuring chamber and moving the piston

around, finally escapes through port 4 and passage 4′ into the service pipe.

This is a general description of the mechanism illustrated in the accompanying drawings and of the method of operation of the meter.

I will now describe more fully some of the parts of the device and will briefly refer to some of the advantages which result from the use of such improved devices.

I do not deem it necessary to describe in detail the operation of the piston shown in the drawings, as water meters having pistons operating with a motion of nutation are not new.

The piston may be made of any suitable material. It is controlled by two separate and independent means, one being the pressure of the fluid passing through the meter, as will be hereinafter described, and the other being the controlling device below the ball-bearing of the piston, already described, although, of course, it will be understood that it is not necessary to control the piston by both these means either, without the other, being for general purposes sufficient, although both may be used if preferred as I have shown.

Referring to Fig. 5, read in connection with Fig. 1, it will be seen that the pressure of the water upon the rod 16, which stands constantly in a canted position, is to bring the shoulder on the rod down squarely on its seat on the shoulder of the tube 20 and thus to force the rod into a perpendicular position; but the rod 16 can never stand upright because the pin 23 keeps it in a canted position. The water pressure thus constantly exerted is utilized to preserve the joint forming contact between the piston and its case walls. This result is, in the meter shown, due to the fact that the pin 23 is below the center of the piston. It could not be so conveniently placed in such position if it were not for the fact that the ball joint of the piston were hollow. I prefer this form because it permits of the use of a longer rod 16 without increasing the height of the meter case, but the stud might be placed above the center of the piston and the parts proportioned and arranged so as to still utilize the water pressure to preserve the joint contact of the piston.

I do not claim broadly a device operated by water pressure for keeping the piston in contact with its case walls, as such matter is included in a patent granted to me April 7, 1891, No. 449,820. I do, however, claim it broadly in connection with a rolling or nutating disk piston; and I also claim among other things, broadly, a rod connecting the registering mechanism with a piston, whether nutating or not, which rod is acted upon by water pressure, said pressure being communicated to the piston to preserve its joint-forming function. The device shown in the accompanying drawings contains other improvements over those shown in said application, such, as for instance, the improved elastic joint or connection where the registering rod passes out of the meter case, consisting of a tube or sleeve of elastic material such as india rubber. It also shows an improved form of rod and shoulder. It is, of course, advantageous to have the elastic diaphragm or sleeve subjected to the minimum flexure, as constant flexure will in time destroy such elastic material. In all structures of this character with which I am acquainted an elastic diaphragm has been employed such, for example, as that shown in my said patent. This necessitates the use of a shoulder on the rod 16 of comparative large circumference and, of course, the larger the diameter, the greater the flexure and the shorter the life of the parts. Besides the constant bending backward and forward of the diaphragm speedily causes it to cut itself in two. By the use of a rod constructed as in Fig. 5 I diminish this flexure to the smallest possible amount but more than this the action of the rod 16 as it revolves in a canted position is to compress and extend the walls of the tube 22 and not to bend them back and forward as it would be in the case of a diaphragm set substantially at right angles to the length of the stem 16. This is a very important consideration and I have found by experiment that a tube such as 22 will last for a long time.

I prefer to have the tube 22 retained in position merely by its own elasticity and gripping force, although it might be attached in any other way, as, for instance, by wrapping wires around the ends. The socket on the end of the tube 20 may be omitted. The shoulder on the rod 16 in that case would bear on the end of the tube 20. I prefer to employ the socket shown because it prevents portions of the rubber sleeve crowding in between said shoulder and its seat, under the influence of water pressure.

In the foregoing specification I have incidentally referred to a few of the obvious modifications which may be adopted in practicing my invention, but I have not endeavored to specify all the modifications which might be employed, because I understand that such an enumeration is not required here, and would not be desirable even if it were possible, the object of this specification being to instruct others skilled in the art to practice my invention in the present preferred form in useful combinations, and to enable them to understand the nature; and I desire it to be distinctly understood that mention by me of a few modifications is in no way intended to exclude others not referred to, but which are within the spirit and scope of my several inventions.

As I have before remarked many of the details and combinations illustrated and above described are not essential to my present invention broadly considered. All this will be indicated in the concluding claims, as the omission of an element from any given claim, or the omission of reference to the particular

features of the elements mentioned, is intended to be a formal declaration of the fact that the omitted elements or features are not essential to the invention therein covered.

Having thus described a machine embodying all my present invention, what I claim is—

1. In a water meter, the combination with the measuring chamber, of a piston operating with a motion of nutation, provided with a hollow ball-bearing open at one side, a pin within said ball-bearing and a rod connected with the registering mechanism projecting into the interior of said ball-bearing and controlled by said pin.

2. In a water meter, the combination with a measuring chamber of a piston operating with a motion of nutation, provided with a hollow-ball-bearing, a pin set in the interior of said ball, a rod connected with the registering mechanism projecting into the interior of said ball-bearing and provided with a water tight packing at the point where it leaves the meter case.

3. In a water meter, the combination of a piston operating with a motion of nutation, a rod connecting said piston with a registering mechanism acted upon by water pressure to force it to a given position, and means for transmitting the water pressure acting upon said rod to the nutating piston to preserve its joint forming function.

4. In a water meter the combination of a piston operating with a motion of nutation, pin attached to said piston below the axis thereof, and a rod acted upon by water pressure in contact with said pin.

5. The combination with the registering mechanism of a water meter, of a rigid tube, a rod connecting the registering mechanism with the piston passing through said tube and a flexible water-tight sleeve surrounding said tube and rod, said sleeve sustaining the pressure of the acting fluid on its outside.

6. The combination, with the registering mechanism of a water meter, of an opening between the case containing the measuring elements of the meter and the registering elements of the meter, of a rod having a lateral motion provided with a shoulder connecting the piston with the registering mechanism and a flexible water-tight packing arranged substantially parallel with the axis of said rod.

7. The combination in the registering mechanism of a water meter, of a tube, a rod having a lateral motion passing through said tube, a shoulder on said rod, bearing on said tube, with a flexible sleeve surrounding said tube and said rod and forming a water-tight joint.

8. The combination in the registering mechanism of a water meter, of a tube, a rod having a lateral motion passing through said tube and an elastic water-tight sleeve surrounding said tube and rod and forced against said rod by the pressure of the acting fluid.

9. In a water meter the combination of a piston and registering mechanism of a rod connecting said piston with said mechanism acted upon by water pressure to force it to a given position, and means for transmitting the water pressure acting upon said rod to the piston to preserve its joint-forming function.

10. In a water meter, the combination of a secondary piston acted upon by water pressure in one direction, a nutating piston and means, substantially as described for transmitting said pressure to the nutating piston to preserve its joint forming function.

11. In a water meter the combination with a measuring chamber, of a piston operating with a motion of nutation provided with a controlling device below its center of motion to control lifting from its seat and being free above its center of motion.

12. In a water meter, the combination with the measuring chamber, of a piston operating with a motion of nutation provided with a guide bearing below the center of motion of the piston to control lifting from its seat and unrestrained above the center of motion of the piston.

13. In a water meter, the combination with the measuring chamber, of a piston operating with a motion of nutation provided with an anti-friction guide-bearing below the center of motion of the piston to control lifting from its seat and unrestrained above the center of motion of the piston.

14. In a water meter, the combination with the measuring chamber, of a piston operating with a motion of nutation provided with a guide-bearing below the center of motion of the piston to control lifting from its seat and also with a yielding restraining connection.

15. In a water meter the combination with a measuring chamber, of a piston operating with a motion of nutation provided with a controlling device below the center of motion to control lifting from its seat and being free above its center of motion, said controlling device consisting of a roller fixed to a stationary support and a projection from the piston operating in connection therewith.

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