

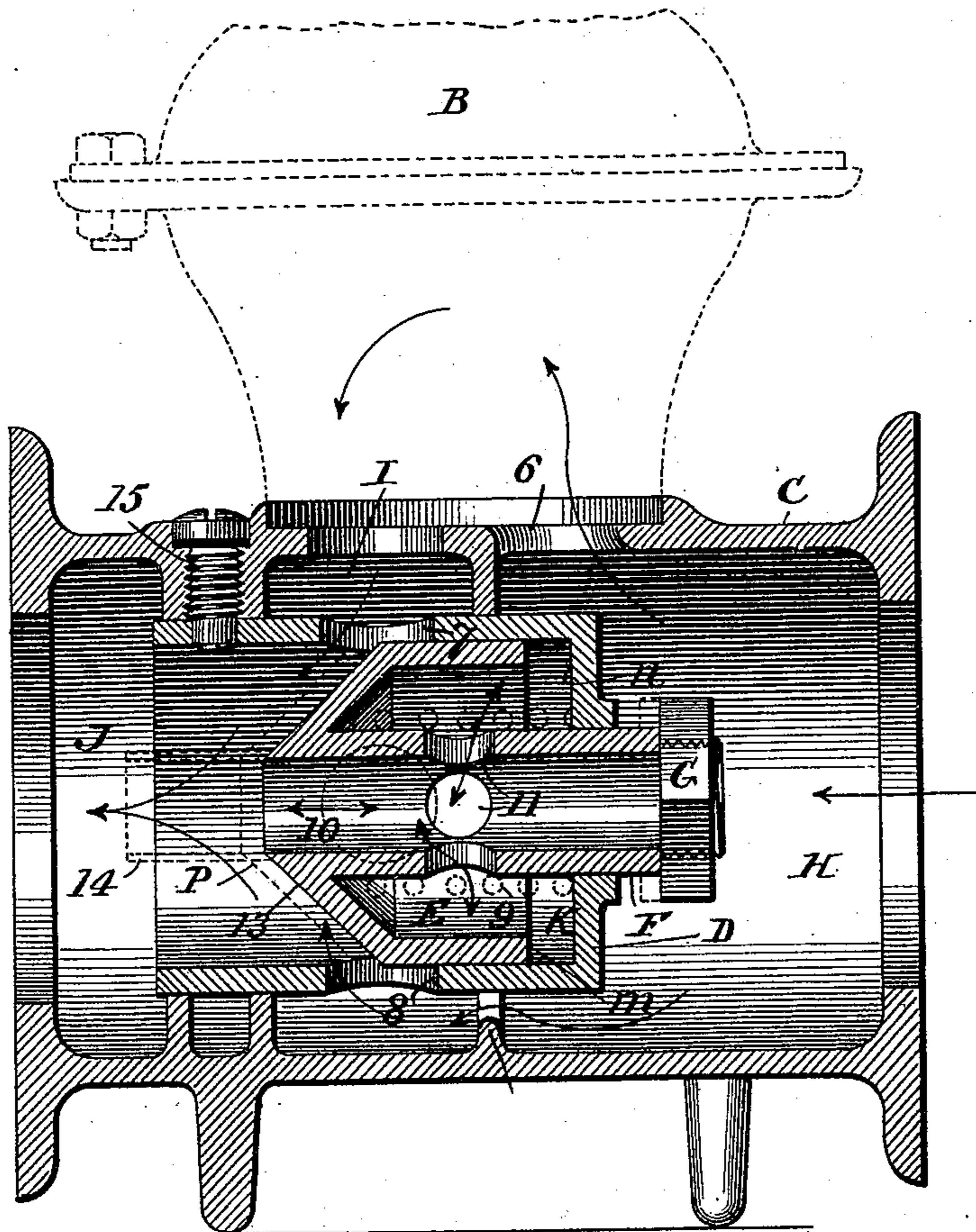
(No Model.)

J. THOMSON.

POSITIVE PROPORTIONAL WATER METER.

No. 485,438.

Patented Nov. 1, 1892.



Witnesses

Geo. H. Hinkel

Allen V. Robson

Inventor

John Thomson

17 Foster Freeman
Attorneys

UNITED STATES PATENT OFFICE.

JOHN THOMSON, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE THOMSON
HYDRAULIC COMPANY, OF NEWARK, NEW JERSEY.

POSITIVE PROPORTIONAL WATER-METER.

SPECIFICATION forming part of Letters Patent No. 485,438, dated November 1, 1892.

Application filed July 1, 1892. Serial No. 438,692. (No model.)

To all whom it may concern:

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

This is an invention in positive proportional water-meters, the general object of which is to inferentially indicate a large quantity of fluid by measuring an aliquot part thereof; and the invention particularly relates to certain detail improvements upon my patent of May 31, 1892, No. 476,104.

The figure of the drawing is a vertical central section of the invention.

The component parts of the device are the measuring mechanism B, (indicated in dotted outline,) the main casing C, the valve D, the valve E, the plunger F, and stop-nut G.

The water passes from the main inlet-chamber H in two streams, one up through the opening 6, then through the measuring mechanism to the intermediate chamber I, thence through the port 7, and finally to the main outlet-chamber J. The other stream passes on all sides of the valve-casing direct to and through the ports, as 8, and thence joins the first stream in the main outlet-chamber. The several said ports are arranged in a single series radially in the valve-casing.

In the patent herein referred to a spring is employed as a necessary element to the operation of the device. The spring 9 (shown in dotted outline in the accompanying drawing) is similarly disposed; but this may or may not be used, according to circumstances. The movement of the valve toward the outlet-chamber is limited by the nut G, while its movement toward the inlet-chamber is limited by the contact of the end *m* of the valve against the inclosing head *n* of the valve-casing. The channel 10 and connecting-openings 11, formed in the plunger, are for the purpose of permitting the free displacement of water to and fro between the chamber K back of the valve and the main outlet-chamber.

The operation is as follows: Under the static condition, if the spring is employed, the valve will be forced forward until stopped by the nut; but if the spring is not used the

valve will simply remain in the position at which it stood at the last rate of flow which passed through the meter. Presuming, however, that the valve is at the position limited by the nut or that denoted by the dotted lines P, the delivery will then be through the small forward openings of the ports, which are not covered by the valve, and the valve may remain stationary; but upon sufficiently increasing the draft the several radial jets which pass through the ports will directly impinge upon the conical face 13 of the valve, after which the said several jets abruptly change their direction of flow to a sharp right angle. The consequence of this is that the impact of the jets upon the inclined surface of the valve, together with the reaction of the entire volume after it will have passed the ports, is entirely resisted by the valve, which when the reactive force is sufficient will be shifted backward, uncovering the ports and compressing the spring, if a spring is employed. It will now be seen that concurrent with this action the increase of pressure of the inlet-chamber over that of the outlet-chamber will act upon the end of the plunger and that the effect of any difference of pressure which may exist between the chambers is to force the plunger and the valve attached thereto forward toward the main outlet-chamber. We thus have two opposing forces acting upon the valve—that is, the pressure of the main inlet-chamber, acting upon the head of the plunger to force the valve toward the outlet-chamber and the direct impact and reaction of the discharged volume coacting to force the valve and plunger backward toward the inlet-chamber, which will result in moving the valve back and forth until some position of equilibrium between the opposing forces will have been reached. In such action of the valve the water in chamber K is, as already explained, displaced through the channel formed in the plunger to the main outlet-chamber J, and vice versa when the valve is shifted forward. It remains to be here pointed out, as in the instance of the patent cited, that the object of limiting the forward movement of the valve to always expose a portion of the port area is to insure the starting of the meter, as with-

out this provision, should the valve be forced forward sufficiently to entirely lap the ports, the meter would be inoperative and the flow might be entirely stopped. The advantages
5 that would accrue from employing a spring in connection with the device would be to adapt the meter to be used in any position and to increase the difference of pressure between the working chambers at low rates of
10 flow, as it coacts with the pressure upon the plunger, tending to force the valve forward to close the ports. The device, as described, however, is perfectly and positively operative by the combined impact and reaction of the
15 discharge and the differences of pressure between the inlet and the outlet chambers. A necessary condition to the operation of the device is that the area of the plunger where it is exposed to the pressure of the main inlet-chamber shall be less than that of the effective area of the valve. The object of this
20 is that the impact of the discharge and the reaction thereof shall (by acting upon a greater area than the direct pressure upon the plunger) insure that the valve be driven back-
25 ward for any uniform increase in the rate of discharge.

The dotted outline 14 indicates that the channel 10 may be extended outward beyond
30 the immediate vicinity of the plane of reac-

tion, whereby the discharged volume shall by inductive effect tend to make the chamber K negative to the main outlet-chamber J. The stud-screw 15 is to secure the valve-casing in proper relative position.

What I claim is—

1. In combination, the measuring mechanism, the main casing, the valve-casing having a series of radial ports, the valve having an inclined face, the plunger connected to the valve, having its end exposed to the pressure of the main inlet-chamber, and the displacing-channel to connect the space back of the valve with the outlet-chamber, substantially
40 as described.

2. In a proportional meter, a controlling-valve adapted to be operated to open a series of ports against a resilient resistance by the impact of the volume discharged through the ports when said volume is directed upon an
50 inclined face of the valve and at approximately a right angle to its axis, substantially as described.

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

JOHN THOMSON.

Witnesses:

ROBERT S. CHAPPELL,
JOHN MCKINNON.