

(Model.)

2 Sheets—Sheet 1.

P. WELLS.
Water Meter.

No. 241,261.

Patented May 10, 1881.

Fig. 1.

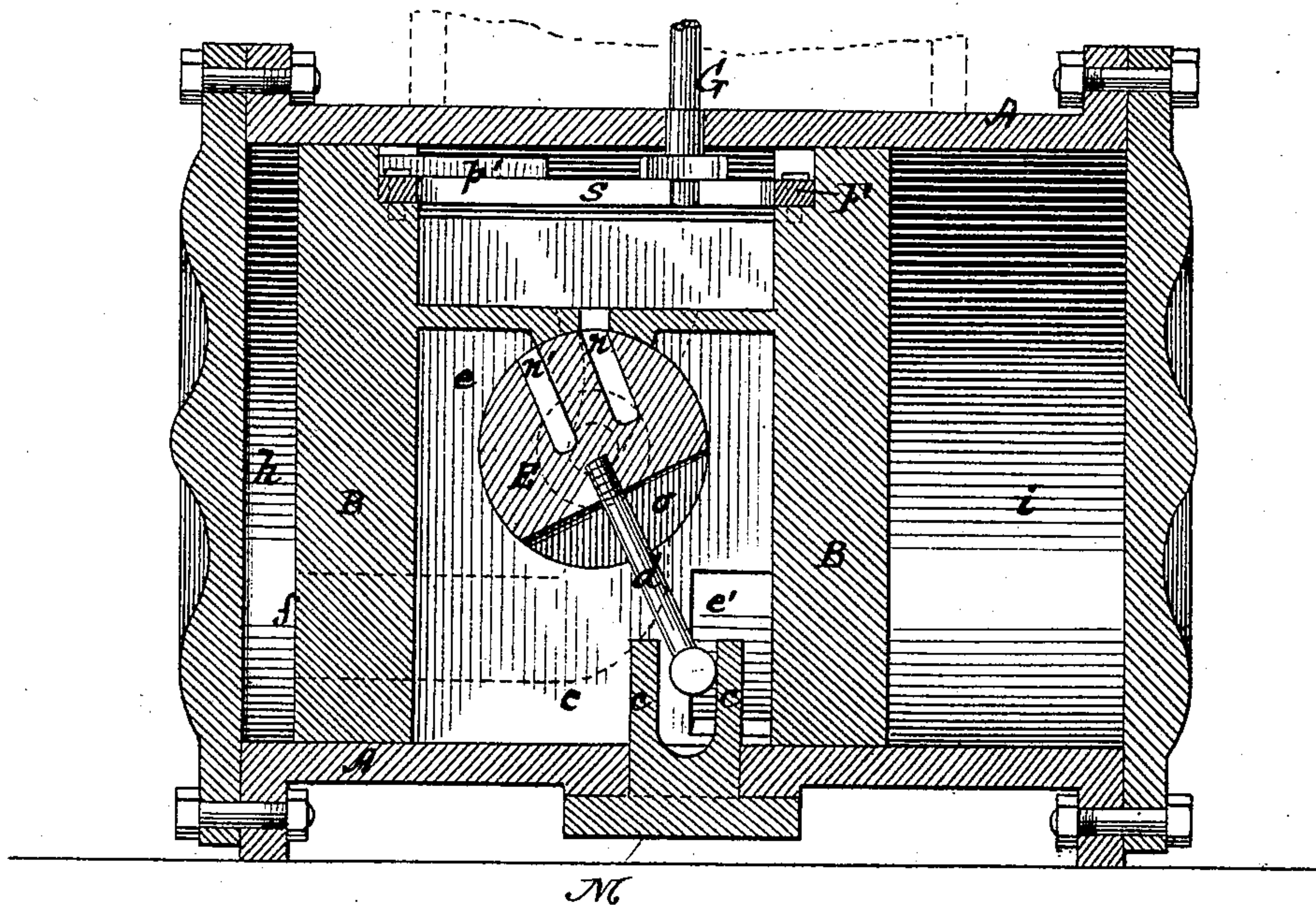
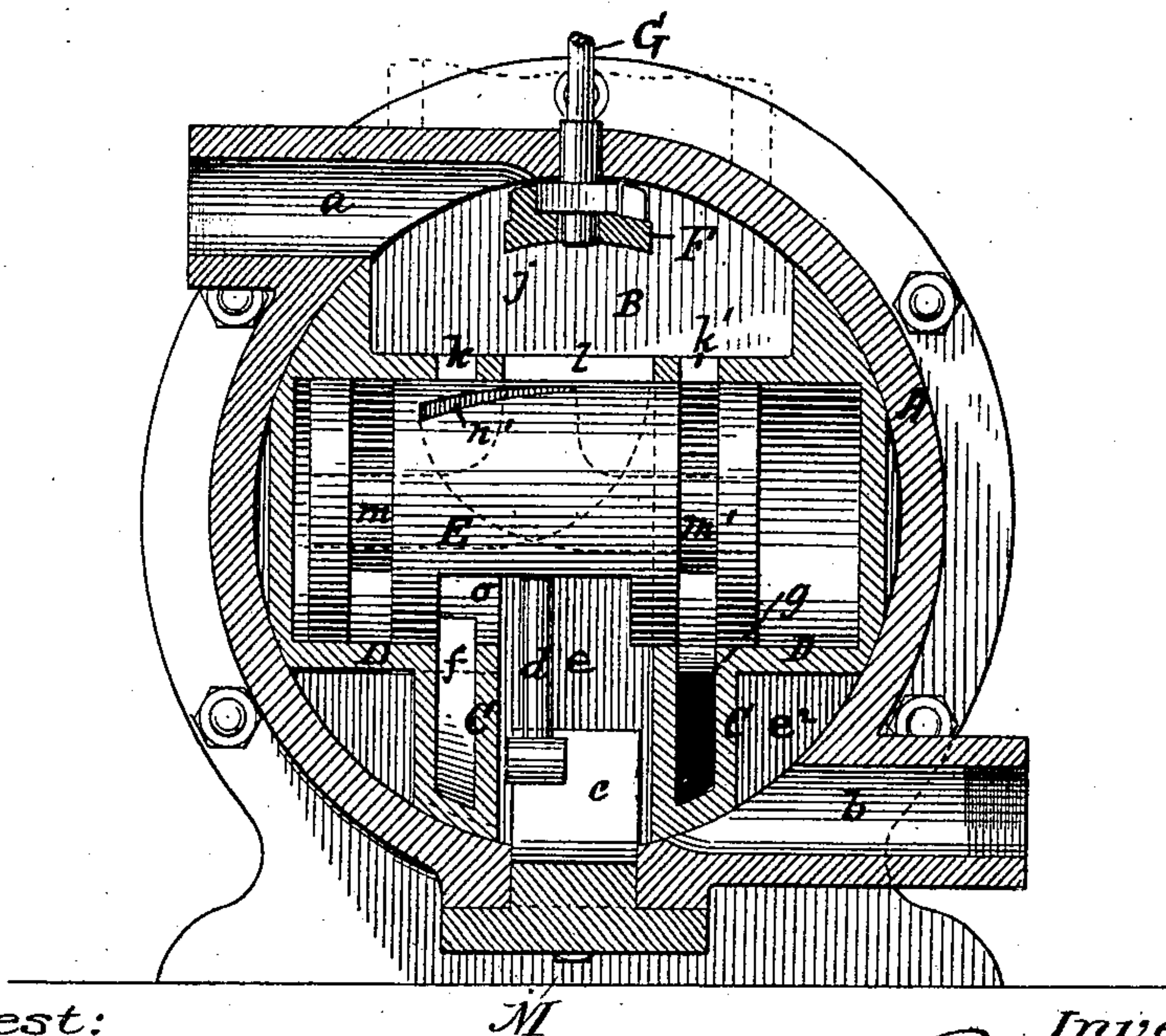


Fig. 2.



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Inventor:

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his attorney

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2 Sheets—Sheet 2.

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Fig. 3.

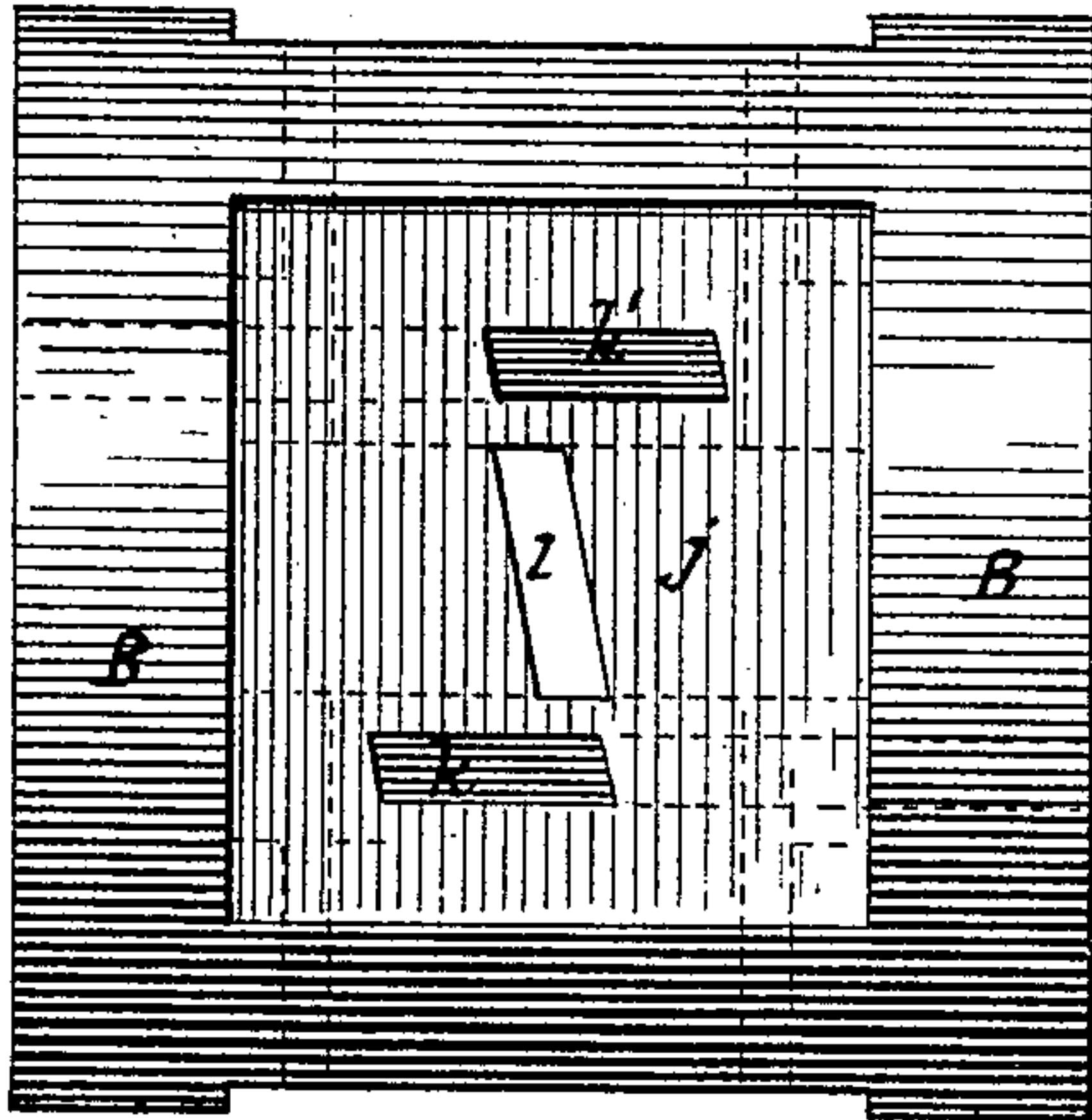


Fig. 4.

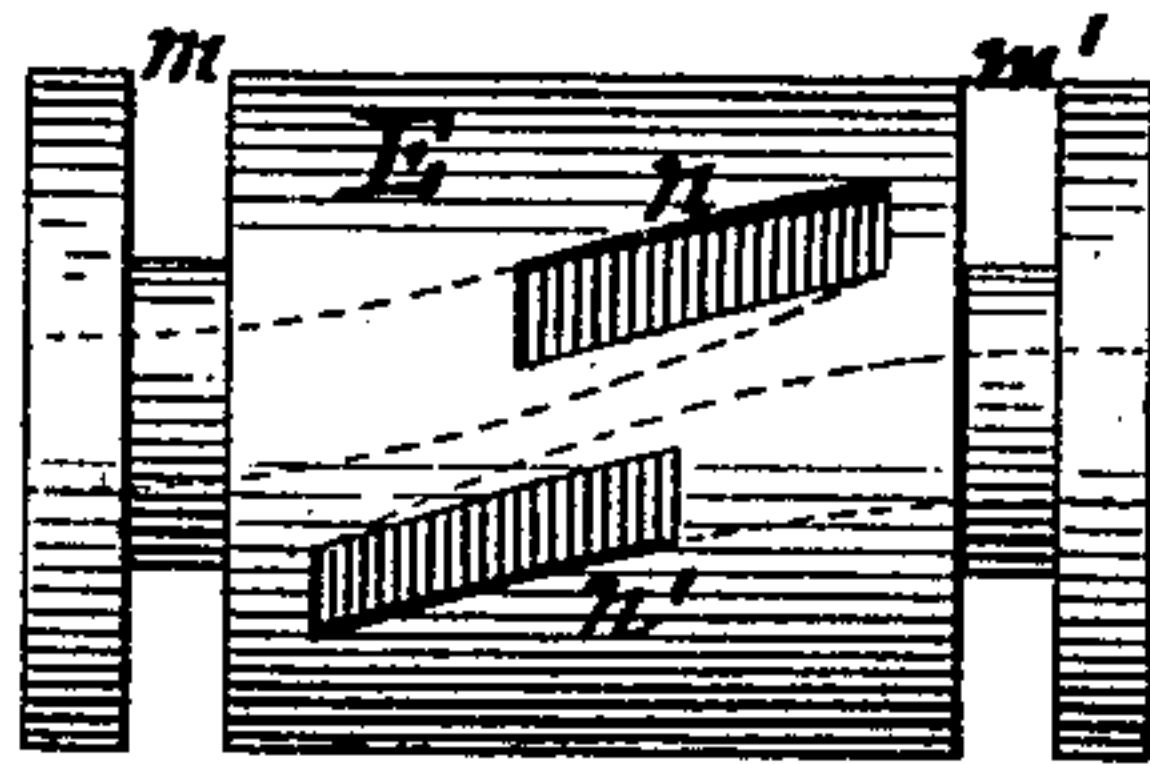
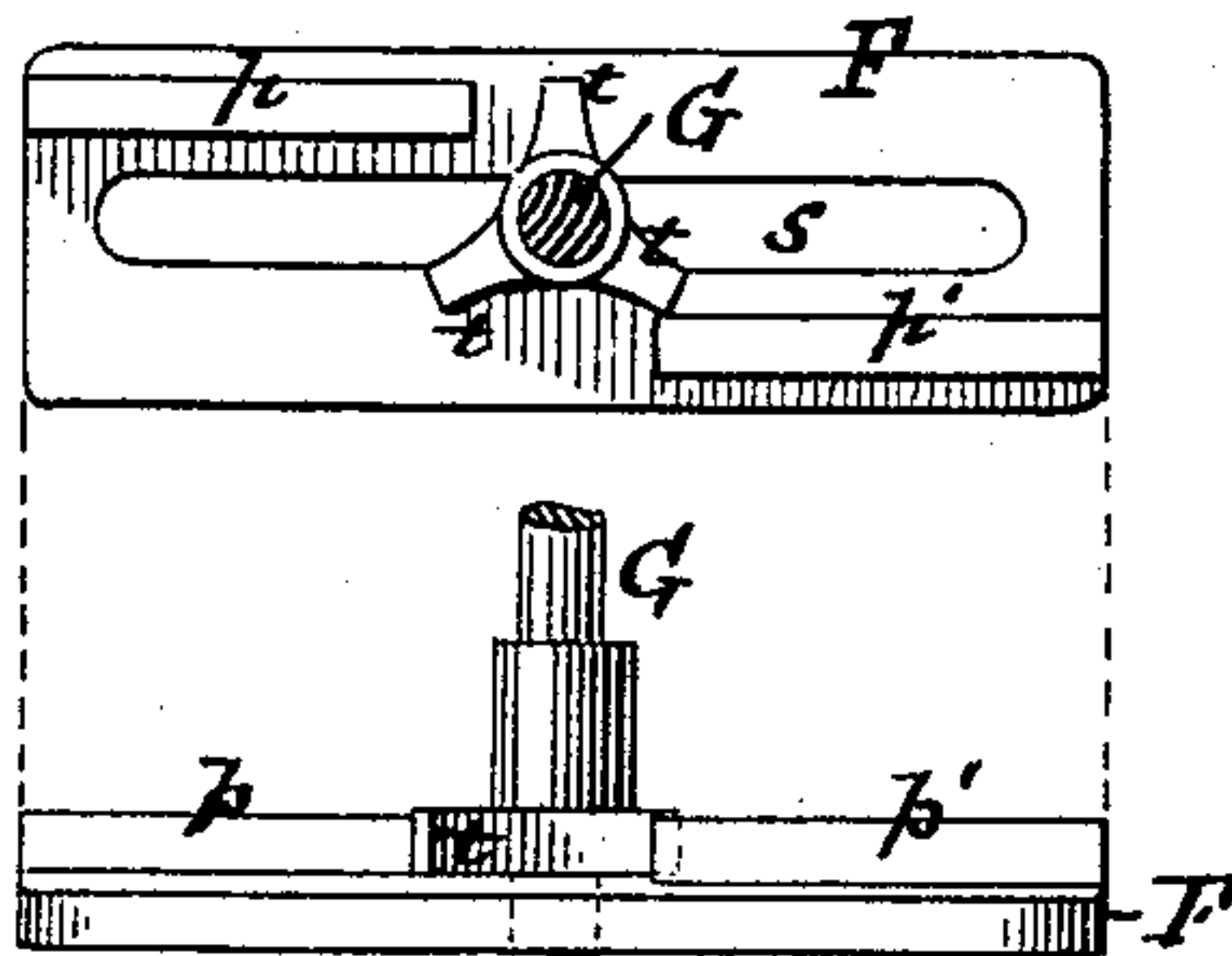


Fig. 5.



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UNITED STATES PATENT OFFICE.

PARKER WELLS, OF LYNN, MASSACHUSETTS.

WATER-METER.

SPECIFICATION forming part of Letters Patent No. 241,261, dated May 10, 1881.

Application filed February 15, 1881. (Model.)

To all whom it may concern:

Be it known that I, PARKER WELLS, of Lynn, Essex county, Massachusetts, have invented certain new and useful Improvements in Water-Meters, of which the following is a specification.

My invention relates to reciprocating-piston water-meters; and the object I have in view is to simplify the meter and reduce the number of parts required for its construction without impairing its efficiency.

The improvements which I have devised render it feasible to virtually employ but three castings in making the meter, the one the meter case or shell, the next the piston, and the third the valve. Each of these parts may, if desired, be cast entire and then fitted to the others with but slight additional trouble and expense.

In my improved meter I adopt the same general plan which distinguishes the water-meter described in my Letters Patent No. 188,214, of March 6, 1877—that is to say, I employ a plug or cylindrical regulating-valve which has a combined rocking and longitudinally-reciprocating movement, the rocking motion on its axis being obtained from the meter-piston, and the longitudinally-reciprocating movement being imparted to it by the pressure of water admitted alternately to opposite ends of the cylinder in which it has its seat, all the water which passes through the meter discharging from a central eduction-passage located in the meter-case at a point between the heads of the piston; but in the present instance, instead of placing the valve in a separate chest built for it on the exterior of the meter-case, I put it in the piston, and I form the passages through which water is conducted to and from the ends of the meter-case in the piston itself, and modify the arrangement of the various other ports and passages, so as to accommodate them to the changed conditions of their use.

The nature of my improvements and the manner in which the same are or may be carried into effect can best be explained and understood by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical central section of a meter embodying my invention in its preferred form. Fig. 2 is a transverse vertical central section of the same. Fig. 3 is a plan

view of the piston. Fig. 4 is a like view of the valve. Fig. 5 represents, in side elevation and plan, the shaft for giving motion to the registering mechanism and the plate by which said shaft is caused to rotate.

A is the cylindrical meter case or shell, of any approved size and external configuration, closed by heads bolted or otherwise secured to it in the usual way, and cast with the water inlet and outlet passages *a b*. It is also provided on its interior, at a point between the heads of the piston, with lugs *c*, (the same being applied to the meter-case after the piston is put in place,) between which lies the lower end of the arm *d*, by which the rocking movement of the valve on its axis is obtained. To facilitate the application of lugs *c* to the meter shell or case they are formed upon the inner face or end of a plug, M, which, after the piston is fitted into the cylindrical meter-shell, is inserted and secured tightly in a hole formed for it in said shell, as shown plainly in Figs. 1 and 2.

The piston, like that shown in my patent hereinbefore referred to, has two connected heads, B, with an exhaust-space, *e*, between them. In the present instance, however, the sides of this space are bounded by the walls C, which contain the passages *f g*, leading to the ends of the piston, and support the cylindrical valve-chest D, which receives the valve. The cylindrical valve-chest extends crosswise of the piston, as shown in Fig. 2, and is in reality composed of two short cylinders closed at their outer ends and supported each in one of the walls C, so as to have free communication with the exhaust-space *e*, except in so far as they are shut off therefrom by the valve. The passage *f* at one end opens into the valve-seat on one side of the exhaust-space, and at the other end extends out through one head of the piston, so as to communicate with the space *h* between that head and the adjoining head of the meter-case. The passage *g* opens into the valve-seat on the other side of the exhaust-space, and extends through the opposite head of the piston, so as to communicate with the space *i* at the opposite end of the meter. The exhaust-space *e* is at all times in communication with the outlet *b* through one or more openings, *e'*, in the wall C, which communicate with the space *e*² (on the opposite side of the

wall or rib,) that always communicates with the outlet *b*. The piston on top is formed with a recess, *j*, communicating at all times with the inlet *a*, and in the bottom of this recess are the ports *k*, *k'*, and *l*, which communicate with the interior of the valve-cylinder and are for admitting water, the former to the ends of the meter-case and the latter to the valve-cylinder.

The piston thus formed, while it may be made of separate pieces properly fitted and secured together, is nevertheless so organized that it may be made entire of a single casting, and this is the preferred mode of constructing it, the subsequent operation of grinding and finishing such parts as may require to be ground or otherwise finished involving but little additional expense.

The valve *E*, like the valve described in my aforesaid Letters Patent, is a plug-valve provided with two circumferential grooves or passages, *m m'*, near its ends, and also with two passages, *n n'*, extending from the top of the valve through the opposite ends thereof. On its under side it has an exhaust passage or recess, *o*, and from this side extends the arm *d*, hereinbefore referred to. That part of the valve-chest in which the port *l* is formed, and against which the portion of the valve containing the mouths of the passages *n n'* is seated, is so formed that when the one passage is in communication with the port the other will be in communication with the exhaust-space *e*, as indicated in Fig. 1, and the ports *k k'*, passages *m m' f g*, and exhaust passages or recess *o e* are so placed with relation to one another, as shown in Fig. 2, that when the inner end of passage *g* is shut off from communication with exhaust *e*, and is in communication with port *k'* through passage *m'*, passage *m* will be out of communication with passage *f* and port *k* and in free communication with the exhaust-space *e* through recess or passage *o*.

In the position of parts shown in the drawings the piston has completed its stroke to the left, this being due to the admission of water through port *k'* and passages *m' g* to the end *i* of the meter, the water from the other end of the meter passing off through the exhaust-space *e*, with which the passage *f* is in communication. Owing to superior pressure of exhaust-water discharged from end *h*, the valve (although it occupies the position shown, in which its passage *n* is in communication with inlet-port *l*, and its passage *n'* in communication with exhaust-space *e*) does not move until the piston has about completed its stroke; but then, being relieved from back-pressure, the water from the right-hand end of the valve-chest is free to pass out through passage *n'* into exhaust-space *e*, while the valve, by the inlet-water entering the valve-chest through port *l* and passage *n*, is moved to the right, thus throwing the passage *g* into communication with the exhaust *e* and bringing the passage *m* into line with port *k* and passage *f*, so that the inlet-

water can enter the end *h* of the meter-case, and so drive the piston to the right-hand end of the case. In so moving, the valve, which is carried by and partakes of the movement of the piston, is partly rotated by means of its arm *d*, which is retained at the lower end between lugs *c*, so that by the time the piston has moved the full distance in this direction the passage *n'* will be in communication with port *l*, and the passage *n* in communication with exhaust *e*, and consequently the valve will again be in readiness to shift. Thus the valve, while carried by and following the movement of the piston, has independent rocking and longitudinally-reciprocating movements of its own, due, the former to its connection with the meter-case, the latter to the action of the inlet-water admitted alternately to opposite ends of the valve-chest in which it is seated.

It will be noted that the port *l*, as well as the mouths of the passages *n n'*, which register with it alternately, are made slanting or set at an angle relatively to the line of reciprocation of the valve. This I find of advantage, inasmuch as the arm *d* and lugs *c c* are in practice preferably so placed that the extreme movement of the piston in either direction will bring the passage *n* or *n'* only partially under the port *l*, thus admitting only a small amount of water at first to the valve-chest, the size of the opening subsequently increasing as the valve moves across, and thus gradually admitting more water. The object of this is to prevent pounding action on the valve, due to sudden admission of full head of water through an entirely-open valve.

With a view to register the amount of water passing through the meter, I make use of a longitudinally-slotted plate or bar, *F*, which spans the recess *j* longitudinally of the piston, and is seated at its ends in the heads *B*, so as not to project beyond the periphery of the piston. Upon the upper face of this bar, on one side of the slot *s*, is a rib, *p*, which extends parallel with the slot from one end of the bar to a point somewhat short of the center or middle of the same. On the opposite side of this slot a rib, *p'*, of similar length, extends from the other end of the bar. The rotary shaft *G*, which transmits movement to the register, extends down into the interior of the meter-case through a proper bearing and stuffing-box, and its lower end enters the slot *s*, in which it fits, but not so snugly as to interfere with free longitudinal movement of the piston. The effect of this arrangement is that the shaft acts to prevent the piston from turning, which is desirable on all accounts, and particularly in order to prevent liability of the registering-shaft getting out of working-connection with that part from which it receives movement. From the shaft project an uneven number of teeth, *t*—three in the present instance—which, as the bar *F* moves back and forth with the piston, are struck by one or the other of the ribs *p p'*,

the result being that the shaft obtains an intermittent movement of rotation always in the same direction.

5 The mode of operation of this device does not differ in a general way from that of the device for a like purpose described and shown in my Letters Patent No. 205,933, of July 9, 1878, but there is a material difference in construction and arrangement. In my present device
10 the registering-shaft serves to hold the piston against tendency to rotary movement, and whatever strain it is called upon to withstand from this cause is borne, not by the toothed wheel which operates in connection with the
15 ribs, but by the plain part of the shaft which projects into or through the slotted portion of the bar. The whole device, moreover, is simple, cheap, effective, and easy of application.

20 Having described my improvements, what I claim, and desire to secure by Letters Patent, is as follows:

1. The combination, with the meter case or shell and piston provided with a cylindrical valve, and with an exhaust-space between its
25 two heads, of the cylindrical valve mounted in and carried by the piston, and connected with the meter-shell by means of an arm which extends from said valve down through the exhaust-space of the piston and engages lugs
30 or projections on the interior of the meter-shell, between the two heads of the piston, as herein shown and described.

2. The meter-shell provided with the plug M, having internal lugs or projections thereon, as described, in combination with the piston and
35 the cylindrical valve seated in and carried by the same, and provided with an arm which extends down through the exhaust-space of the piston to engage said lugs, as and for the purposes set forth.

3. The combination of the meter-shell having inlet and outlet *a b* and lugs *c c*, the piston formed with exhaust-space *e* and passages *f g*, and provided with a cylindrical valve-chest
40 having ports *k k' l*, and the cylindrical valve formed with passages *m, m', n, n'*, and *o*, and provided with arm *d*, these parts being for joint operation, as herein shown and described.

4. In combination with the meter case and piston, the ribbed and slotted plate attached
50 to and carried by the piston, and the rotary register-shaft extending into the slot in said plate, and provided with teeth to operate in connection with the ribs, substantially as hereinbefore set forth.

55 In testimony whereof I have hereunto set my hand this 14th day of February, 1881.

PARKER WELLS.

Witnesses:

E. A. DICK,
N. C. LANE.