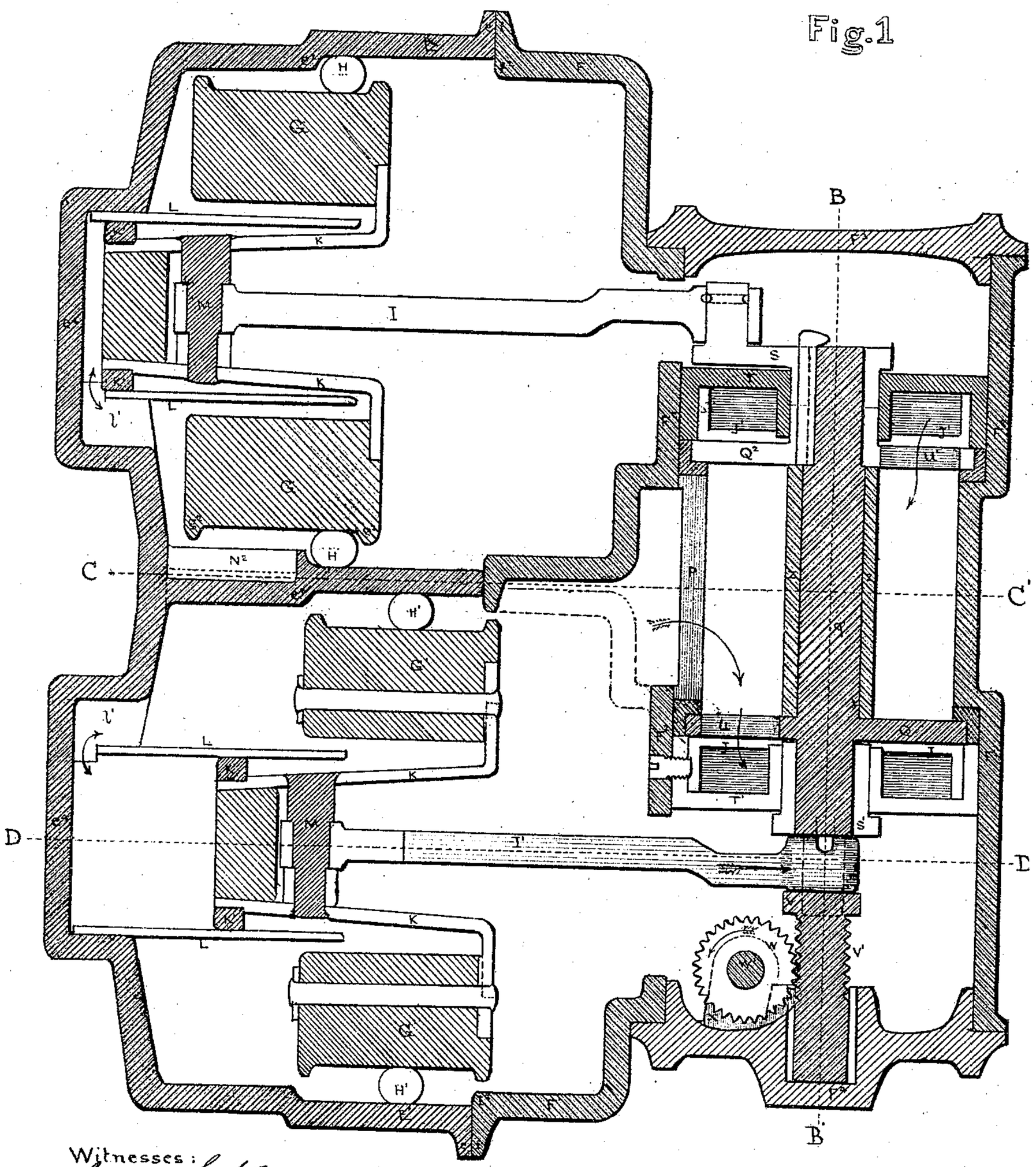
3. Sheets. Sheet. 1.

R. Creuzbaur,

Liquid Meter.

No. 103989. Patented June 7. 1870.

Fig. 1



Witnesses:
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3. Sheets. Sheet. 2.

Liquid Meter.

No. 103,989. Patented June 7. 1870.

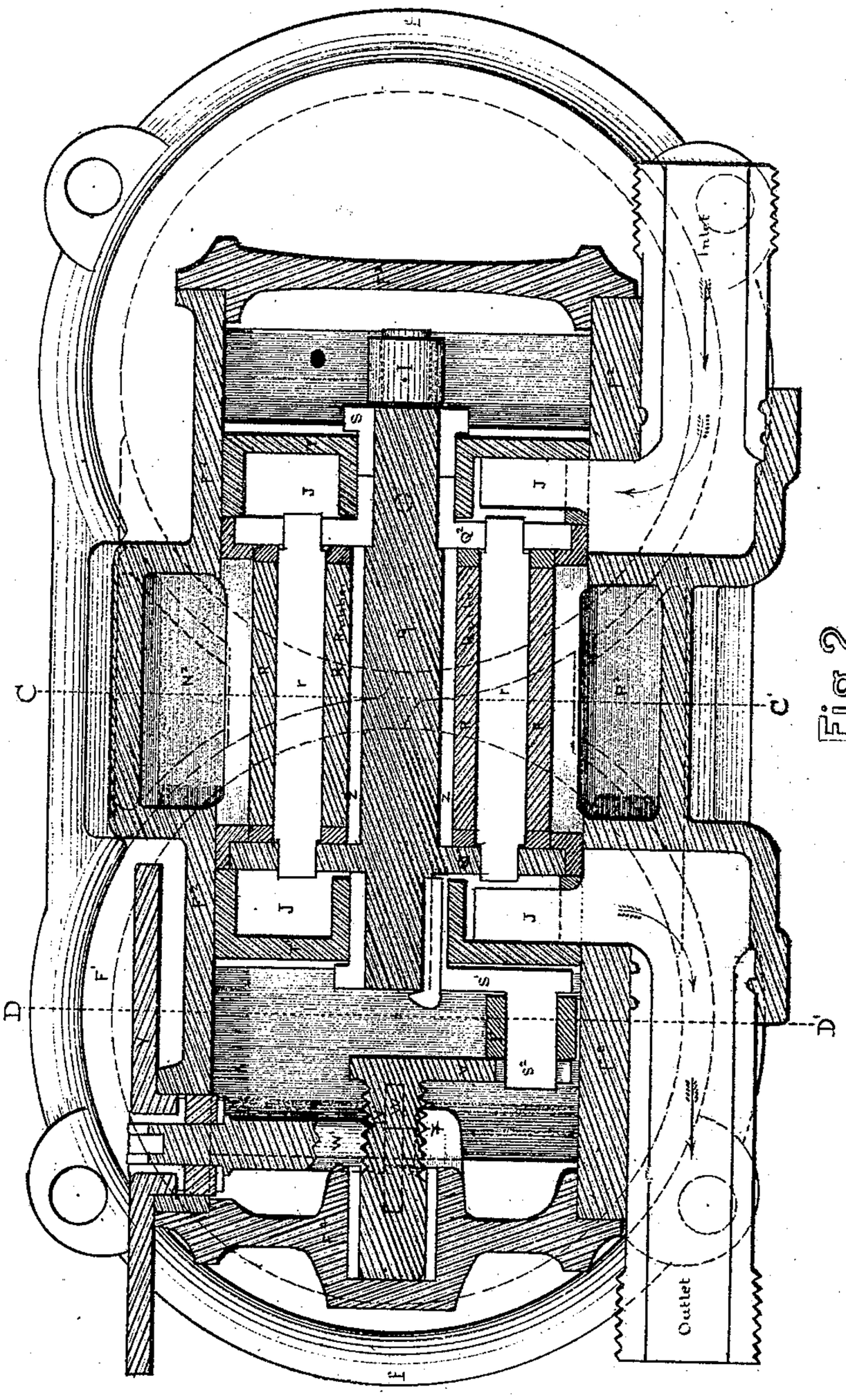

Fig. 2

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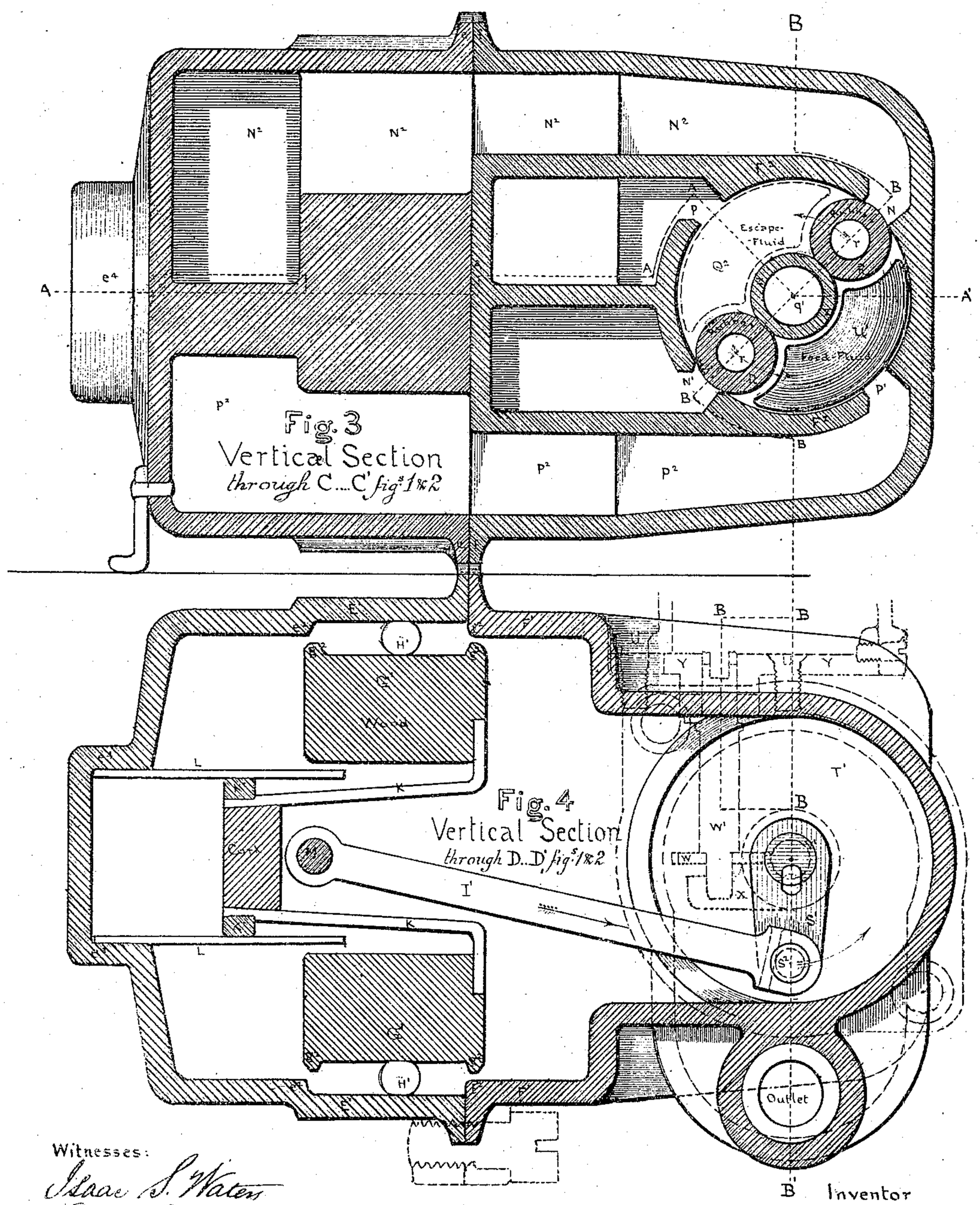
3. Sheets, Sheet 3

R. Greuzbaur,

Liquid Meter.

No. 103,989. Patented June 7. 1870.



Witnesses:
Isaac S. Waters
Richd D. Plate

UNITED STATES PATENT OFFICE.

ROBERT CREUZBAUR, OF BROOKLYN, E. D., NEW YORK.

IMPROVEMENT IN LIQUID-METERS.

Specification forming part of Letters Patent No. **103,989,** dated June 7, 1870.

To all whom it may concern:

Be it known that I, ROBERT CREUZBAUR, of the city of Brooklyn, E. D., in the county of Kings and State of New York, have invented an Improved Fluid-Meter, of which the following is a specification.

The first part of my invention relates to the general arrangement of the meter, which has for its object to produce highly-efficient action, combined with great economy.

The second part of my invention relates to the construction of the valve, which combines with simple construction and freedom from injurious side pressures the adaptation for the application to the same of cylindrical rolls, usually made of rubber, which change the course of the fluid through the ports by rolling directly upon and over the same, as herein clearly set forth.

In the accompanying drawings, Figure 1 is a horizontal section through the line A A′, Fig. 3. Fig. 2 is a vertical section through B B′, Figs. 1, 3, and 4. Fig. 3 is a vertical section through C C′, Figs. 1 and 2. Fig. 4 is a vertical section through D D′, Figs. 1 and 2.

The general arrangement of the meter is upon the old plan of two pistons reciprocating in separate cylinders, operating, by connecting-rods, a revolving valve, which is common to both. The special and novel arrangement is as follows: The shell of the meter consists of the body of the same, E E′, constituting the main portion of the two cylinders, and of the head F F′ F^2, which forms the balance of the cylinders and the valve-casing. These two parts E E′ and F F′ are joined by flanges *e* and *f*. The valve-cylinder F^2 F^2 is closed at the ends by covers F^3 and F^4.

G G are the pistons, which in this instance are made of wood, as giving economical construction with high efficiency, on account of its approximation in specific gravity to that of water. The wood is prepared with oil or similar substance before the piston is shaped. The pistons are packed with the well-known rubber roll-packing H H′. To prevent displacement of these rolls, the pistons are provided with flanges g^2. For the same purpose, as well as to save material, the cylinders are made smaller in the rear portion, so as to form the shoulders e^2, which confine the rolls in that direction. The other ends of the cylinders or chambers in which the pistons reciprocate, formed by the head F F′, are also made smaller than the central portion, so as to save material, and, principally, to form shoulders f^2, which retain the rolls in this direction. To guide the pistons in a true parallel motion, and to give to the connecting-rods I I′ sufficient length, the sleeves K are used. They are fastened to the pistons, as shown, by screws or rivets. The small ends of these sleeves have each an enlargement, K′, which slides loosely in a pipe or cylinder, L, the latter being firmly driven into the recess e^4 of the shell, unless formed by the outside shell, as hereinbelow named. The small or rear ends of these sleeves K may be closed by a metal diaphragm, cast in one piece with it, or they may be filled with cork or other suitable substance, as shown. The openings *l′* allow the water to enter and escape from the pipe L as the piston recedes or advances. Instead of these openings, however, the enlargement K′ may be grooved, so as to allow the fluid to pass it.

The connecting-rods are pivoted upon pins M, or may be suitably fastened in any other convenient manner, each near the end of its sleeve K, so as to give the rod as much length as practicable.

Instead of using pipes L, the elongations e^4 of the cylinders may be made long enough to serve in their place. In that case the conical sleeves K would be fastened on the rear side of the pistons. Such construction, with the disadvantage of causing an unsightly protrusion, gives, on the other hand, better guidance to the pistons, together with longer connecting-rods. With such construction, the elongated ends e^4 can be left open in the rear, with an end cover, so that the connecting-rods can be fastened to the bottoms of the cones K after the pistons are pushed home, and after the two parts of the meter are bolted together.

The valve-casing, *per se*, which is the central portion of smallest diameter of the casing F^2, has four slots or ports, N N′ and P P′, equal distances apart and at an angle of forty-five degrees with a vertical or horizontal line, as shown in Fig. 3. The two opposite ports, N N′, connect with the two opposite ends of cylder E F, and the two ports P P′ connect with the ends of cylinder E′ F′.

The moving parts of the valve are the trans-

verse disk Q, formed in one piece with shaft q', the similar disk, Q^2, made separately and fastened upon shaft q', and a longitudinal partition, which divides the space between these transverse disks into two equal chambers. This partition may be simply a metal plate reaching from one transverse disk to the other across the chamber formed by them, and cast in one piece with the disk Q. The outside edges of this partition, which takes the place of shaft q', must be sufficiently wide to give the necessary lap when crossing the ports; or the partition may be formed, as represented on the drawings, by two cylindrical rolls, R R, made of rubber or other suitable material, each formed upon a shaft, r', which revolves freely in and is carried by the transverse disks Q Q″, and by a metal sleeve, Z, which revolves freely upon the shaft q'. When these disks Q Q^2 are revolved by the cranks S S′, the rubber cylinders will roll over the surface of the central valve-chamber, and thus roll upon and over the ports, and over two opposite ports simultaneously. The opposite sides of sleeve Z are carried in opposite directions by the two rollers R R, which revolve the sleeve with them. The two cranks S S′ are set at right angles to each other at angles of forty-five degrees to the ports, and in such manner that when the ports of one cylinder are covered the relative piston will be at one of the extreme ends of its stroke. The hubs of the cranks are confined by and revolve in stationary cupped disks T T′. Each of the latter, in combination with the transverse disks Q Q″, inclose a space, J, which connects, as shown, the one with the inlet and the other with the outlet. The two chambers in the valve are set in communication—the one with the inlet-passage and the other with the outlet-passage—by the two openings U U′, on opposite sides with reference to the partition named, which openings communicate directly with spaces J J′, as shown in Fig. 1. Greater simplicity can be attained by using, instead of the cranks S S′ and stationary cupped disks T T′, another pair of disks provided with crank-pins, which take the place of the pieces T T′, and revolve with the disks Q Q″ and shaft q'.

V is a drag-crank, pivoted in end cover, F^4, and carried by crank-pin S^2. Upon the shaft of this crank a screw-thread, V′, is cut, which works into pinion W upon shaft W′. The latter rests upon a step, X, cast upon cover F^4, and passes at the top through a stuffing-box in counter supporting-plate Y, which is screwed down upon the valve-casing, as shown in Fig. 4.

The inlet and outlet nozzles are laid into the mold, and the metal is cast around their ends. This is an efficient as well as an economical mode to embody them with the shell of the meter.

The operation of the meter is as follows: In Fig. 1 the piston G is at the extreme of its rear stroke, and its corresponding ports, N N′, Fig. 3, are covered by the rubber cylinders R the other piston, G′, is near midway of its forward stroke its front port, P, is in communication with the escape-passages, as shown, while its rear receives the pressure of the feed fluid through the bottom channel, P^2, and port P′, as shown in Fig. 3. When the piston G′ will have advanced a little more forward in the direction of the arrow, the rubber cylinders or rolls will have passed the ports N N′ in the direction of the arrows, Fig. 3, and will admit feed fluid through port N and top channel, N^2, to the rear of the piston G, and connect the front of the latter through port N′ with the escape-passages. When this piston G will have arrived near midway, and, through its connecting-rod and crank S, will have rolled the rubber rolls upon the ports P P′, the operation just described will be reversed, with the difference that piston G′ will be at the extreme end of its forward stroke and changing direction. It is evident that with only two ports serving one cylinder and piston such a roller-valve may be oscillated, instead of revolved, with the same result.

Aside of the advantages derived by the use of a rubber-roll valve, as described, by its capacity for rolling over impurities and small obstructions without perceptible hindrance and without leakage, and by its fitness to operate within an unfinished casing and without a lining to the same of non-corrosive metal, it is peculiarly applicable to meters wherein two pistons are connected by rods to a revolving shaft or valve, because it has little lap in crossing the ports, and because of the yielding nature of its rolls, which does away with the necessity of extra end play in the connecting-rod, as otherwise imperatively required.

I claim as my invention—

1. The valve-casing F^2, with its ports in combination with the valve formed of disks Q Q′ T T, and the three cylindrical revolving rollers R R and Z, with their shafts, substantially as described.

2. The cylindrical rollers arranged to (and caused to) roll directly upon and over the ports of a fluid-meter for the purpose of changing the course of the fluid through said ports, substantially as described.

3. The combination, with the valve-casing F^2 and its ports N N′ and P P′, of the revolving valve formed of the two end disks, Q Q″, or Q T′, Q″ T, and a diaphragm dividing the space between the latter longitudinally into two chambers, and so that the two edges of the latter cover and pass over two opposite ports simultaneously, or nearly so, substantially as and for the purpose hereinbefore set forth.

4. The combination, in a fluid-meter, with a valve and valve-casing two cylinders, E F E′ F′, two pistons, G G′, and their connecting-rods I I′, of the rubber-roll piston-packing H H′, substantially as and for the purpose hereinbefore set forth.

5. The combination, with the cylinders E F E′ F′, pistons G G′, of any construction, and piston-packing rolls H H′, of shoulders e^2 and

f^2, formed substantially as and for the purpose hereinbefore set forth.

6. The combination, with pistons G G′ and connecting-rods I I′, of the sleeves K K′ and of the pipes or cylinders L L, substantially as and for the purpose hereinbefore set forth.

7. The combination, in a fluid-meter, of a piston, G, a connecting-rod, I, and a piston-sleeve, K, placed on the end of the piston opposite to the connecting-rod I, substantially as and for the purpose hereinbefore set forth.

8. The combination, with the two reciprocating pistons G G′, connecting-rods I I′, and a revolving valve, of the drag-crank V, with the worm upon its shaft, and the registering-shaft W′, substantially as described.

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