

W. G. KENT.
LIQUID METER.

(Application filed Aug. 5, 1901.)

(No Model.)

2 Sheets—Sheet 1.

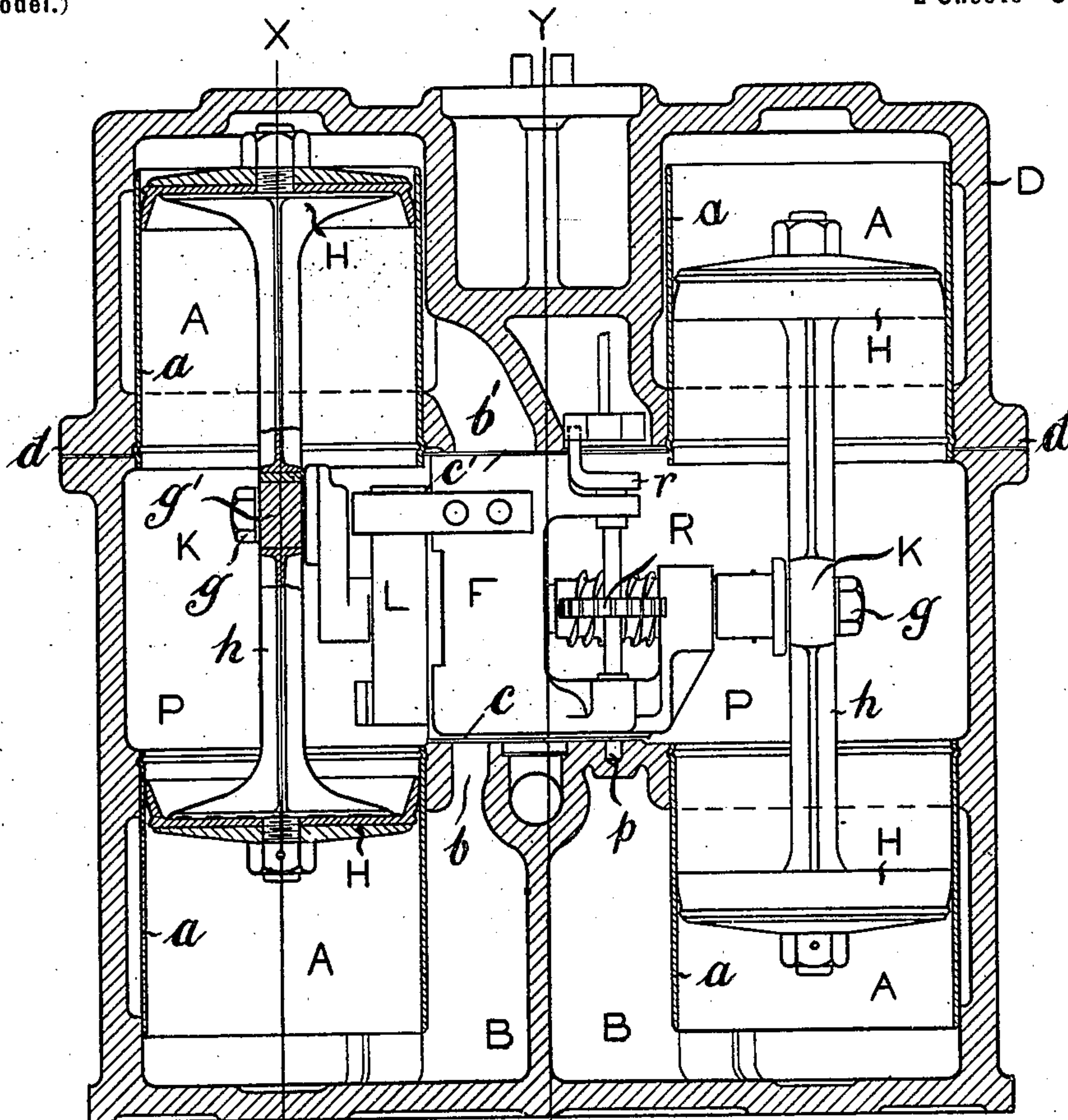


FIG. 1.

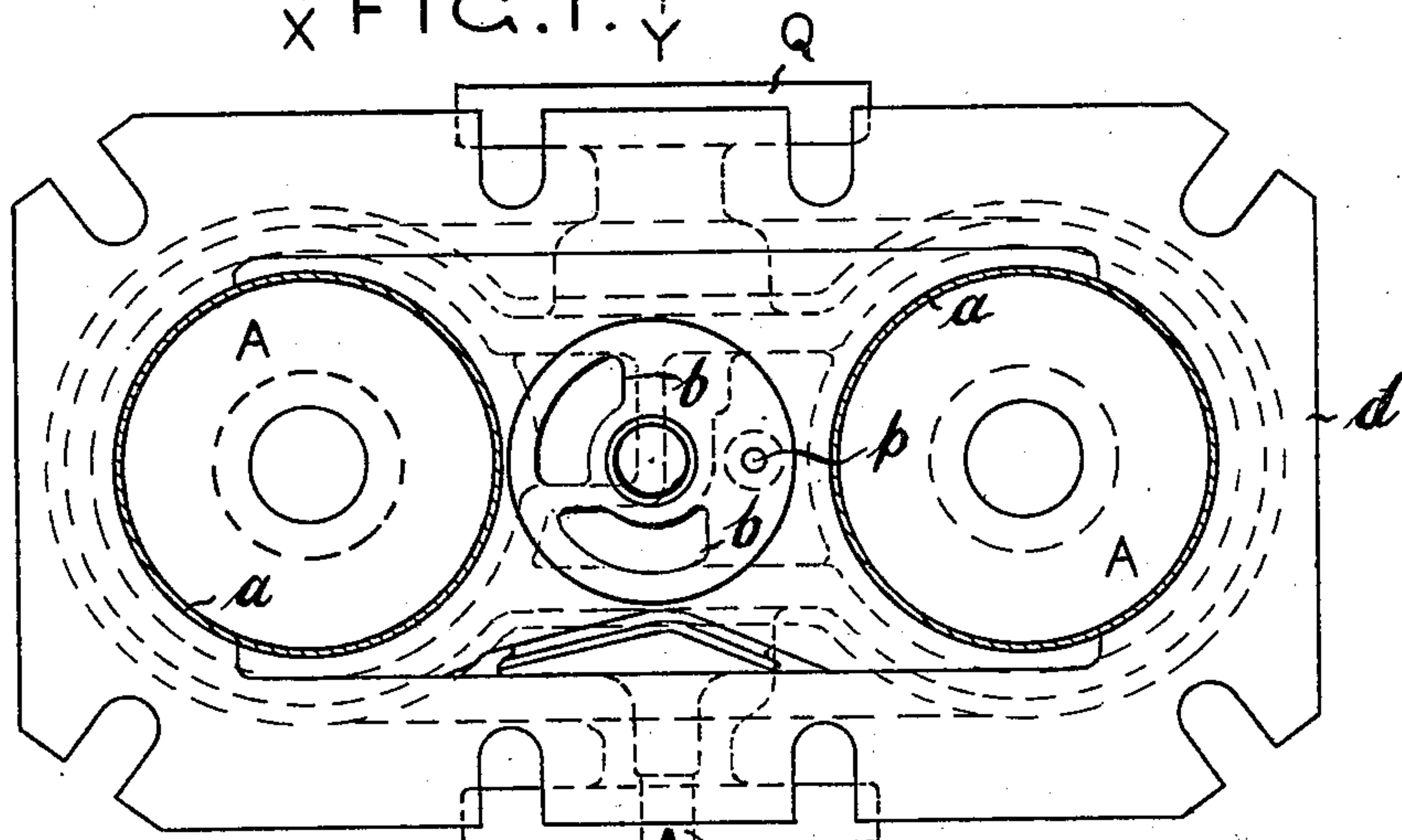


FIG. 2.

WITNESSES:

Adelaide C. Gleason

INVENTOR
Walter George Kent

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2 Sheets—Sheet 2.

FIG. 3.

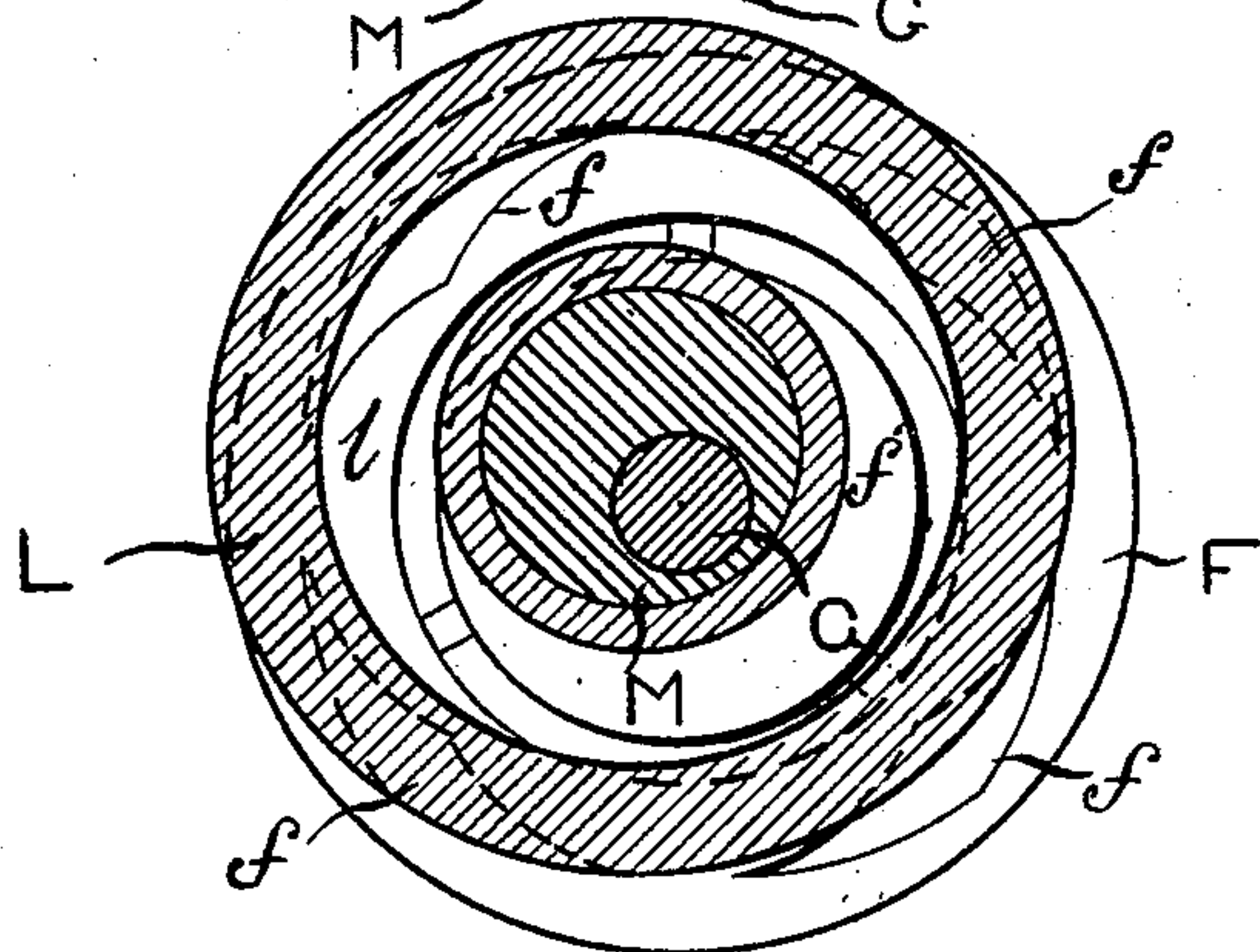
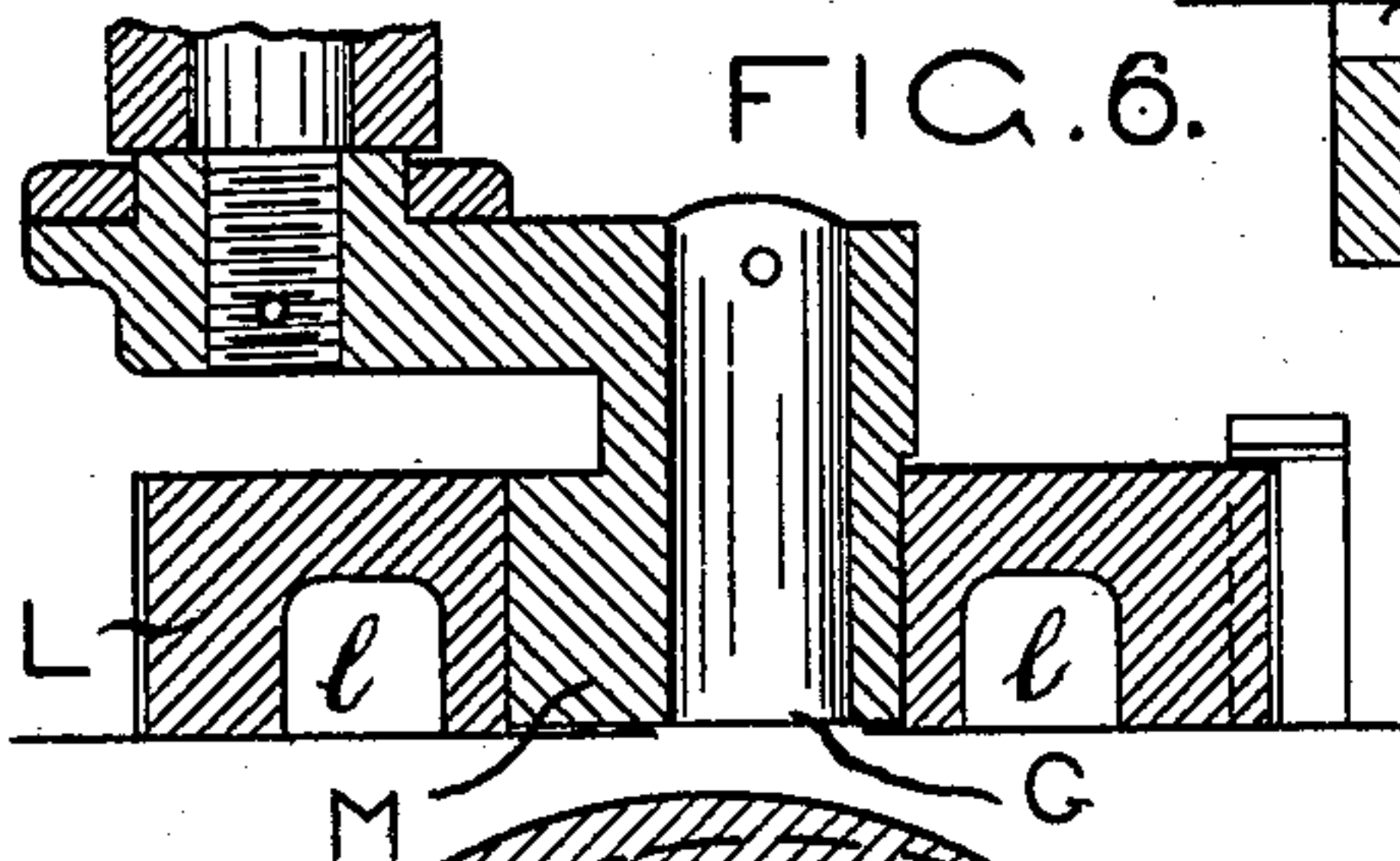
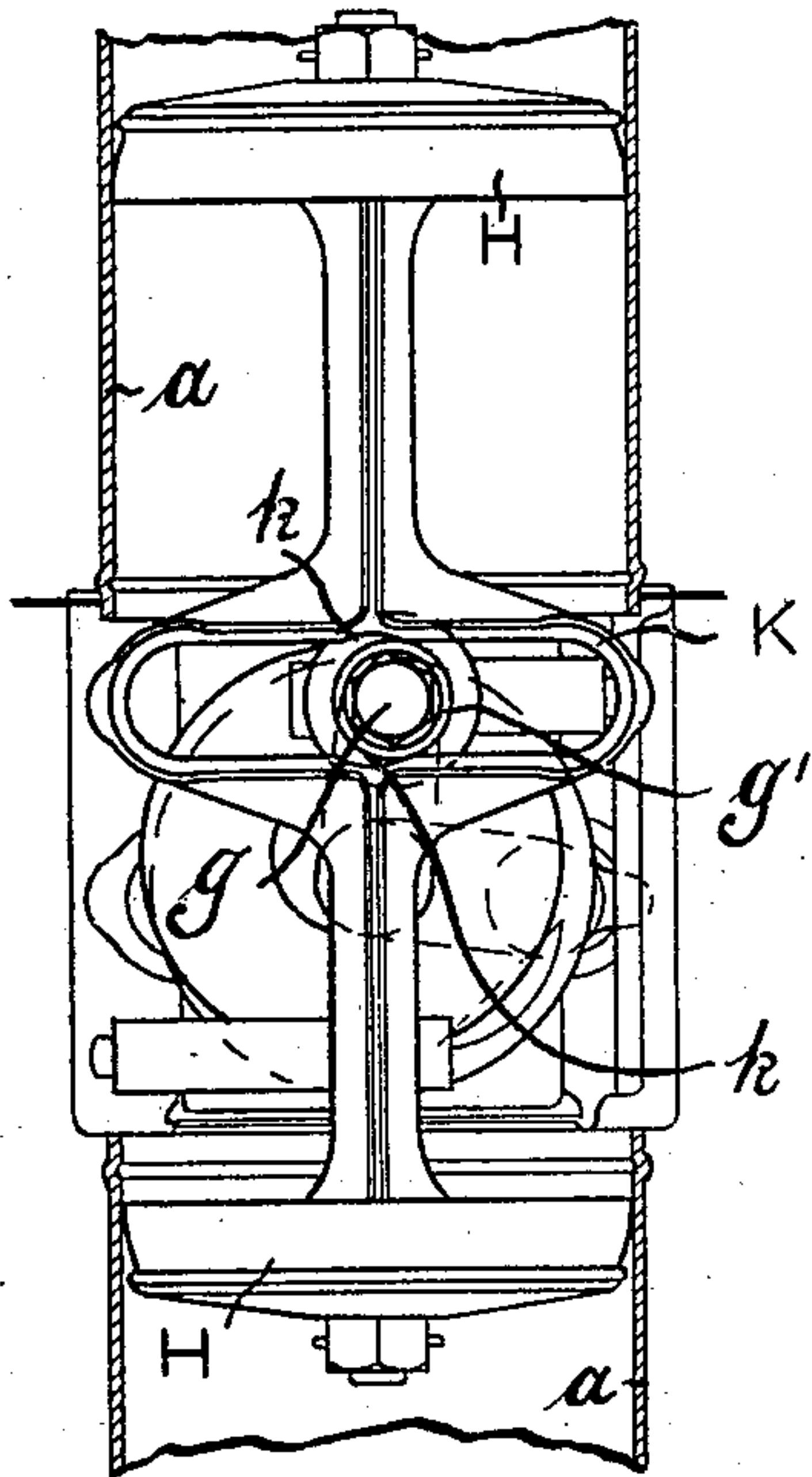


FIG. 5.

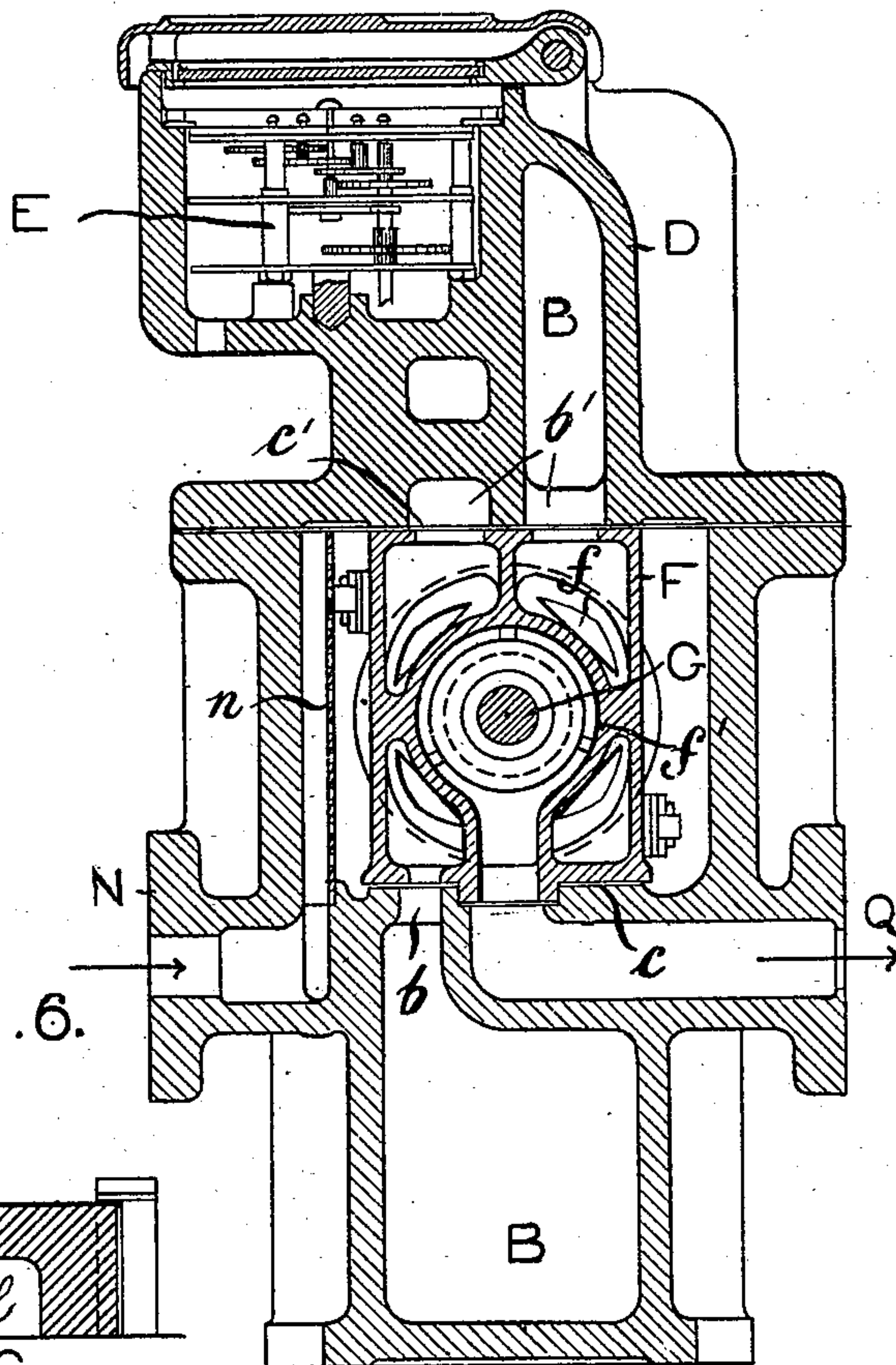


FIG. 4.

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UNITED STATES PATENT OFFICE.

WALTER GEORGE KENT, OF LONDON, ENGLAND.

LIQUID-METER.

SPECIFICATION forming part of Letters Patent No. 693,032, dated February 11, 1902.

Application filed August 5, 1901. Serial No. 70,953. (No model.)

To all whom it may concern:

Be it known that I, WALTER GEORGE KENT, a subject of the King of Great Britain and Ireland, residing at London, England, have invented an Improvement in Liquid-Meters, (for which I have made application for Letters Patent in Great Britain under No. 5,994, bearing date March 21, 1901,) of which the following is a specification.

10 This invention relates to apparatus for measuring and registering the quantity of liquid passing therethrough, and has for its object the provision of an appliance which shall be more accurate than is usual in its measurement at very diverse velocities, which shall work silently without shock, which shall remain water-tight under wear by reason of a self-surfacing distributing-valve, and which shall permit the removal of the principal
20 working parts and the port-faces by the breaking of a single cover-joint, thus providing easy access for repair or replacement of worn parts without disturbance of connections to the pipes of exit and entry.

25 In order that my invention may be the better understood, I proceed to describe it with reference to the drawings hereto annexed and to the letters marked thereon.

Figure 1 is a transverse vertical section of
30 my meter. Fig. 2 is a plan of the same with top cover and all working parts removed. Fig. 3 is a vertical section at right angles to that of Fig. 1 through one of the cylinder-linings on the line xx . Fig. 4 is a vertical
35 section at right angles to that of Fig. 1 through the line yy , showing internal ports and counting-gear. Fig. 5 is a longitudinal section through the annular valve, and Fig. 6 is a transverse section through same.

40 I provide in my appliance four cylinders A A, arranged in two pairs, which are conveniently fitted with internal liners aa , leaving the extreme upper and lower ends of the cylinders in communication, through chambers B B of large capacity, with short ports
45 $b b'$, two, $b b$, Figs. 1 and 2, issuing on a lower port-face c , and the other two, $b' b'$, Figs. 1 and 4, on an upper port-face c' , formed in an upper cover D. This upper cover D
50 contains the upper cylinders, an upper port-face for the said ports of such cylinders, and

the counting mechanism E, the whole of which may be removed by breaking one joint at d . The port-faces $c c'$ are connected by a port-block F, through the center of which runs
55 the crank-shaft G, and in the body of which the ports $b b' b' b'$ are brought to a vertical valve-face in arrow-head or crescent ports ff , arranged symmetrically about the center of the port-block. The said port-block is held
60 in place only by the upper cover D and a dowel-pin p . In the cylinders are fitted pistons H, connected in pairs by connecting-webs h , having in each of their centers a horizontal slot K, forming with the crank-pins
65 g and revolving sleeve g' thereon what are termed "dog-cranks." The crank-pins g are at right angles to one another, so that one pair of pistons are at half-stroke with full flow while the others are at dead-center. 70

The above dog-crank arrangement has advantages as a connection between reciprocating pistons and a crank in a piston-meter, inasmuch as it conveniently admits of a recess K' being provided in the center of each
75 transverse slot K, by which the pistons are allowed a certain play or waste motion in the said slot at the end of their stroke to compensate for the partial cushioning of the liquid on its discharge at the end of the stroke,
80 caused by the gradual closing of the exit-ports, and this enables this meter to work without straining the pistons and cranks and without shock.

Upon the vertical port-face of the port-
85 blocks F works an annular valve L, (seen in longitudinal section in Fig. 5 and in transverse section in Fig. 6,) which has an annular recess or pocket l concentric with the valve on that face toward the ports. The valve re-
90 ceives a rotary translating movement from an eccentric-tumbler M, keyed to the crank-shaft G, which latter passes through the annular valve and port-face. By reason of the symmetrical and concentric annular form of the
95 valve L and its recess l its control of the ports over which it makes its rotary translating movement is not interfered with by any angular or rotary movement of the annular valve L relatively to its internal eccentric-
100 tumbler M. The valve, therefore, is left free to rotate or angularly move about the periph-

ery of the eccentric-tumbler M as it may think fit, and it is therefore constantly altering the position of its wearing-face to that of the port-block F on which it works, and thus perfect
5 regularity of wear and water-tightness are insured.

In Figs. 4 and 5 the arrow-head or crescent shaped ports *f* on the face of the port-block F are clearly seen, one communicating with
10 the outer ends of each of the cylinders A, respectively. There is also a central annular port *f'*, which is always in communication with the annular recess or pocket *l* of the valve L. The driving-liquid pressure enters by the ex-
15 ternal pipe N and passes through a strainer *n* to the central chambers P P, in which the cranks rotate. The driving liquid is thus situated on top of the annular valve L, and such port *f* as is exposed beyond the rim of the
20 annular valve (see Fig. 5) receives the liquid-supply and conducts same to its respective cylinder. The other port *f* at the opposite part of the port-face is in communication by the annular pocket *l* of the valve L with the
25 central annular port *f'*, and the liquid from that cylinder is discharging to the exit-pipe Q. The ports *f* are uncovered successively and are successively in communication with the central discharge-port *f'*. The meter
30 thus constantly operates under a liquid-pressure supply and discharges the same through the cylinders to the exit-pipe Q. The number of rotations of the crank-shaft G are recorded by a worm and worm-wheel R, trans-
35 mitted by the vertical shaft and crank-finger to any suitable counting and recording train E.

It will be observed as an essential result of my mode of construction that when the up-
40 per cover D is removed by the breaking of the single joint *d* not only are all the working parts exposed to view, but the port-block F, held only by a dowel-pin *p* in the lower port-face, the valve L, the crank-shaft G, and
45 the pistons H may be all lifted out for examination, repair, or renewal, leaving the lower port-face *c'* and short ports *b* therein open to view for cleansing, if necessary, as well as the port-face *c'* and ports *b'* in the upper cover
50 removed, and this may be done without dis-

turbance to the lower casting or to the entry and exit pipes connected thereto.

Having now described my invention, what I claim, and desire to protect by Letters Patent, is—

1. A liquid-meter consisting of, in combination, reciprocating pistons in cylinders; a single joint dividing cylinders at a port-face; a central removable port-block uniting cylinder-ports to a single valve port-face; a valve
55 fitted to operate over said valve-face; a pipe entry and exit to port-block situated in lower part of casting; and valve and piston driving connections passing through and connected with said port-block, adapted so as to allow
60 all working parts and port-block to be removed, upon disconnecting the parts at the said single dividing-joint.

2. In a liquid-meter, in combination, four reciprocating pistons paired in couples; four
70 cylinders in pairs, each pair adapted to receive one of the said paired pistons, placed parallel to one another; a two-throw crank-shaft, at right angles, connecting such paired pistons, having a bearing in a removable and central
75 port-block, a valve thereon; and a single dividing-joint between upper and lower parts of cylinder-castings, situated so as to enable all working parts and said port-block and valve to be removed upon disconnecting the
80 parts at said single joint.

3. In a liquid-meter, in combination, a removable port-block adapted to unite the ports of multiple cylinders with one port-face; a crank-shaft passing centrally through said
85 port-block and having a bearing therein; an eccentric keyed upon said central shaft; an annular valve, having an annular pocket or recess therein toward port-face, and fitted to move freely about the periphery of the said
90 eccentric; a dowel-pin adjustment to said port-block on port-face; and a jointed cover holding said port-block and shaft-bearing in place when bolted up.

In witness whereof I have hereunto set my
95 hand in presence of two witnesses.

WALTER GEORGE KENT.

Witnesses:

RICHARD A. HOFFMANN,

CHARLES CARTER.