

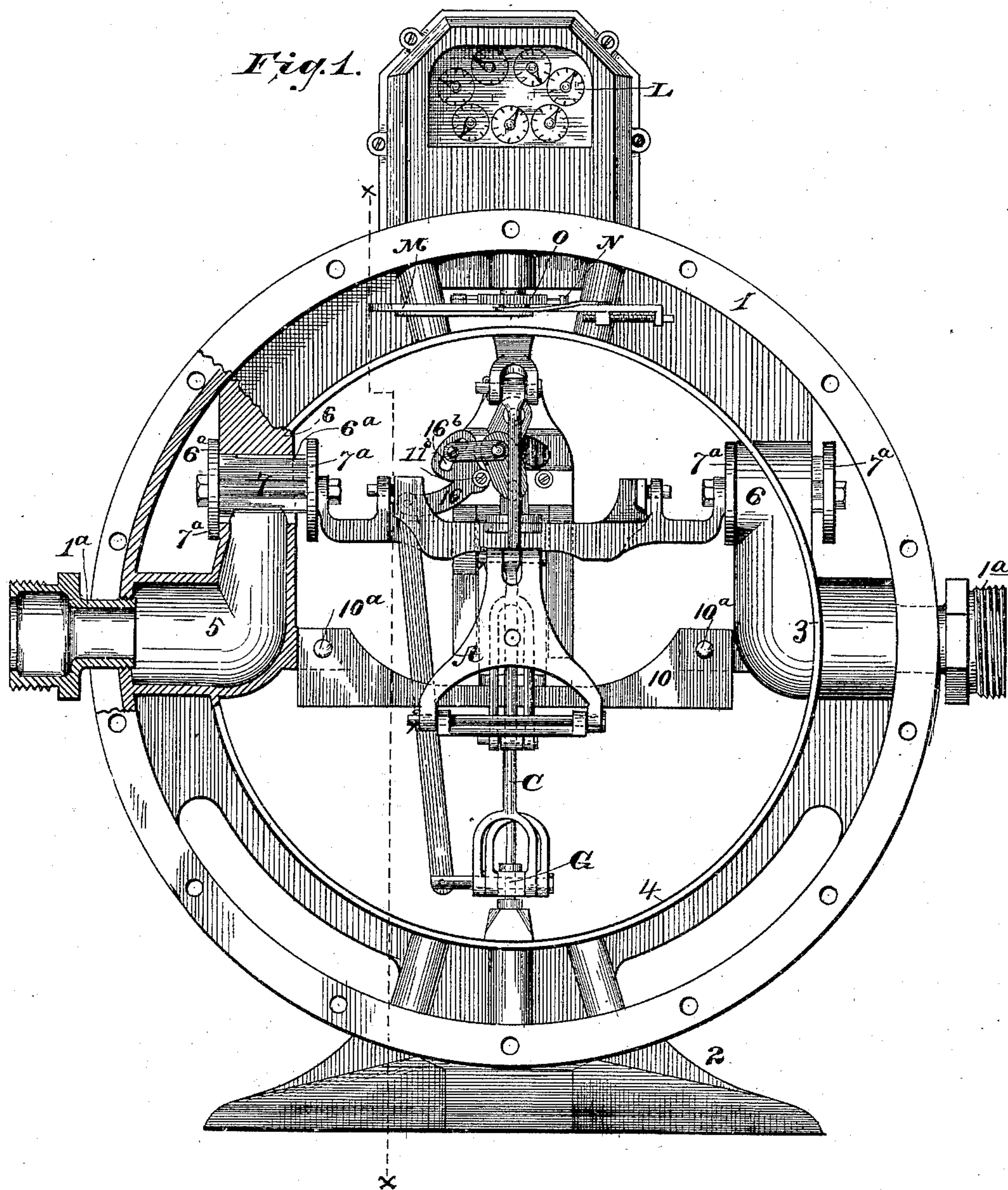
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4 Sheets—Sheet 1.

J. STIDHAM & J. B. WALLACE.
GAS METER.

No. 445,757.

Patented Feb. 3, 1891.



Witnesses:

E. S. Walker

Jas. W. Graham

Inventor:

John Stidham
Jacob B. Wallace

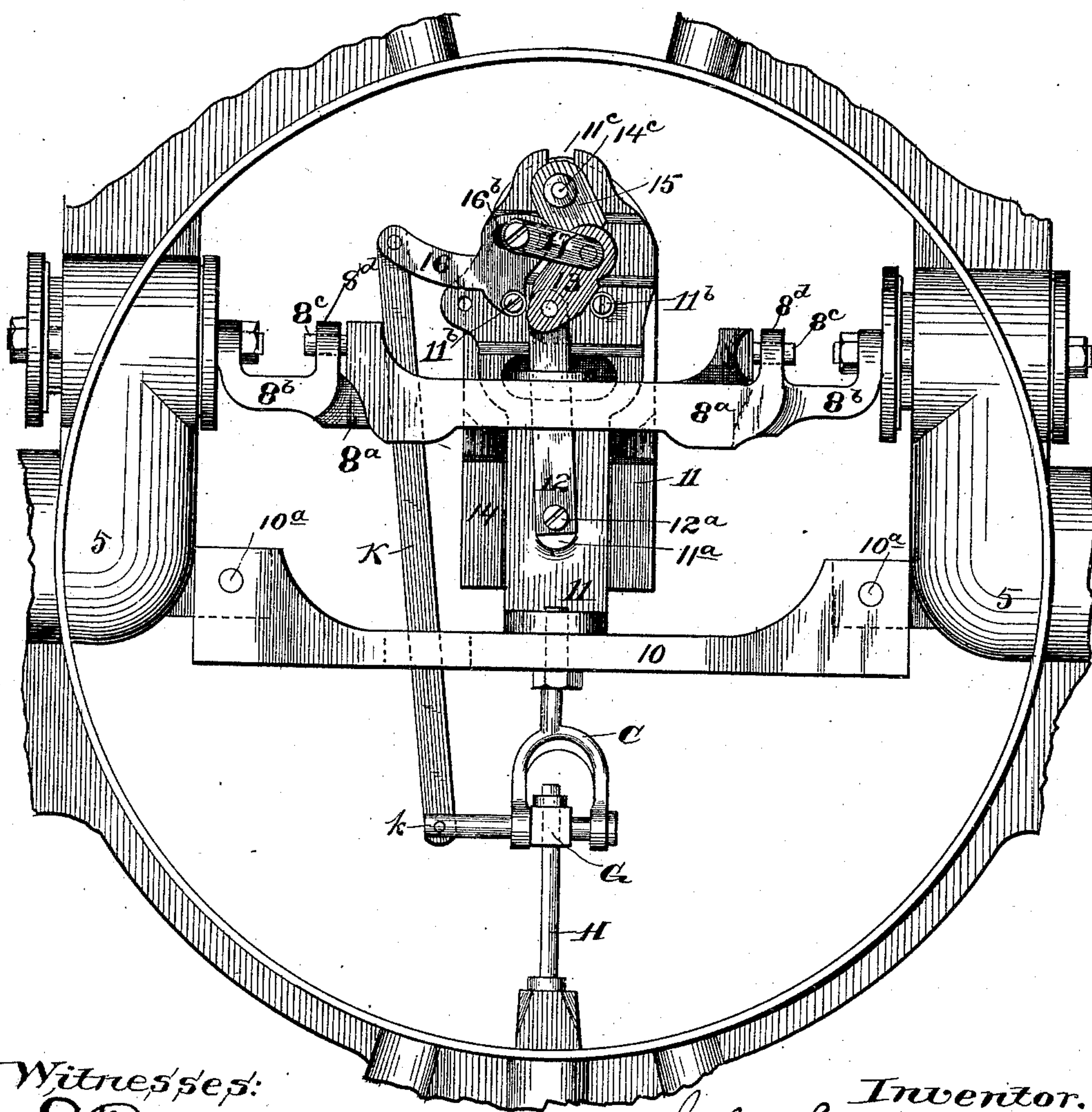
by F. W. Rutter Jr atty

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Fig. 2.



Witnesses:

E. J. Walker

Jas. W. Graham.

Inventor.

Inventor.
John Stidham
Jacob B Wallace,
by F.W. Ritter & Co

(No Model.)

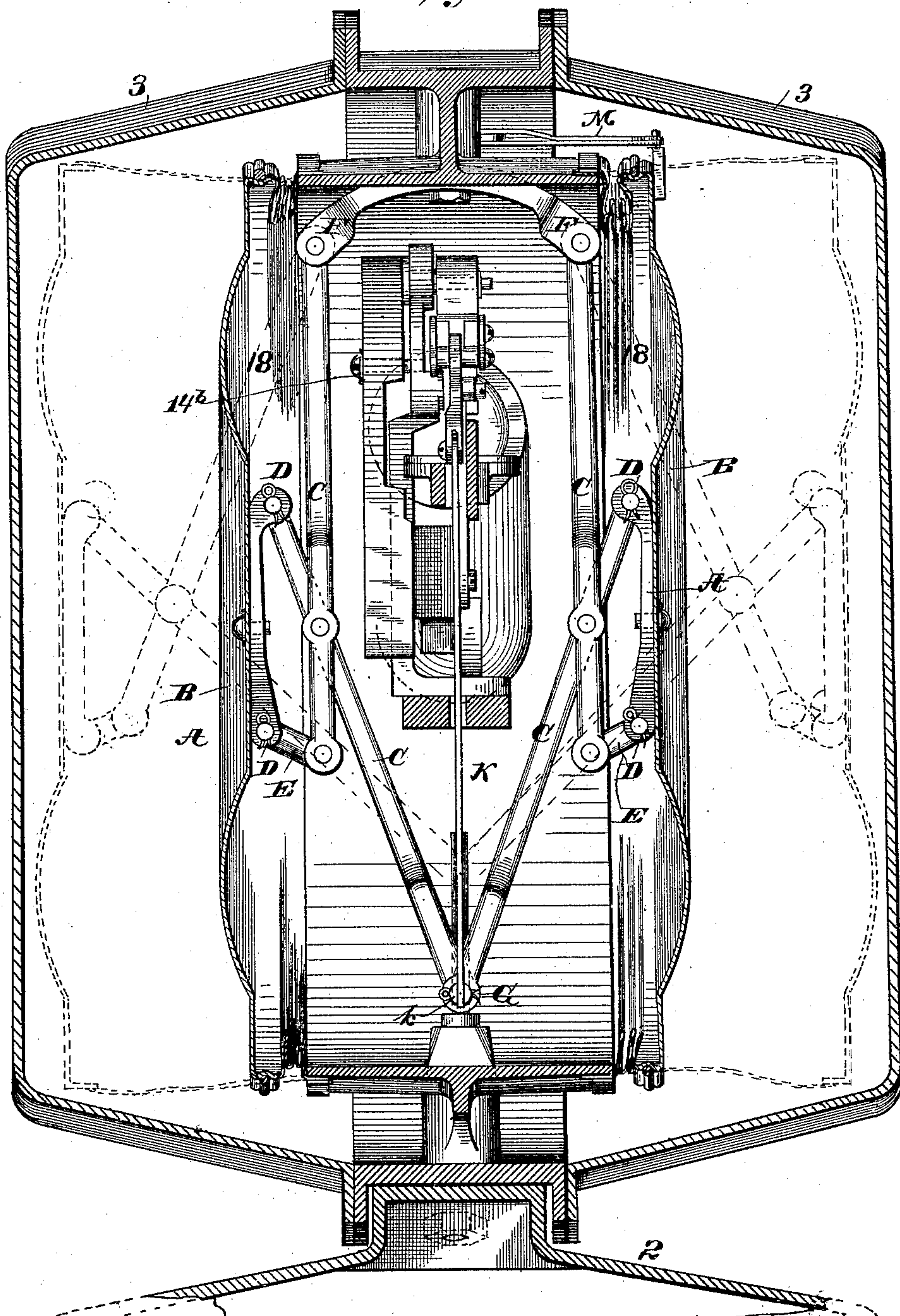
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Patented Feb. 3, 1891.

Fig. 3.



Witnesses:

E. Swank

Jac. W. Abram.

Inventor

Inventor
John Stidham
Jacob B Wallace
by Wm. Rutter Jr atty

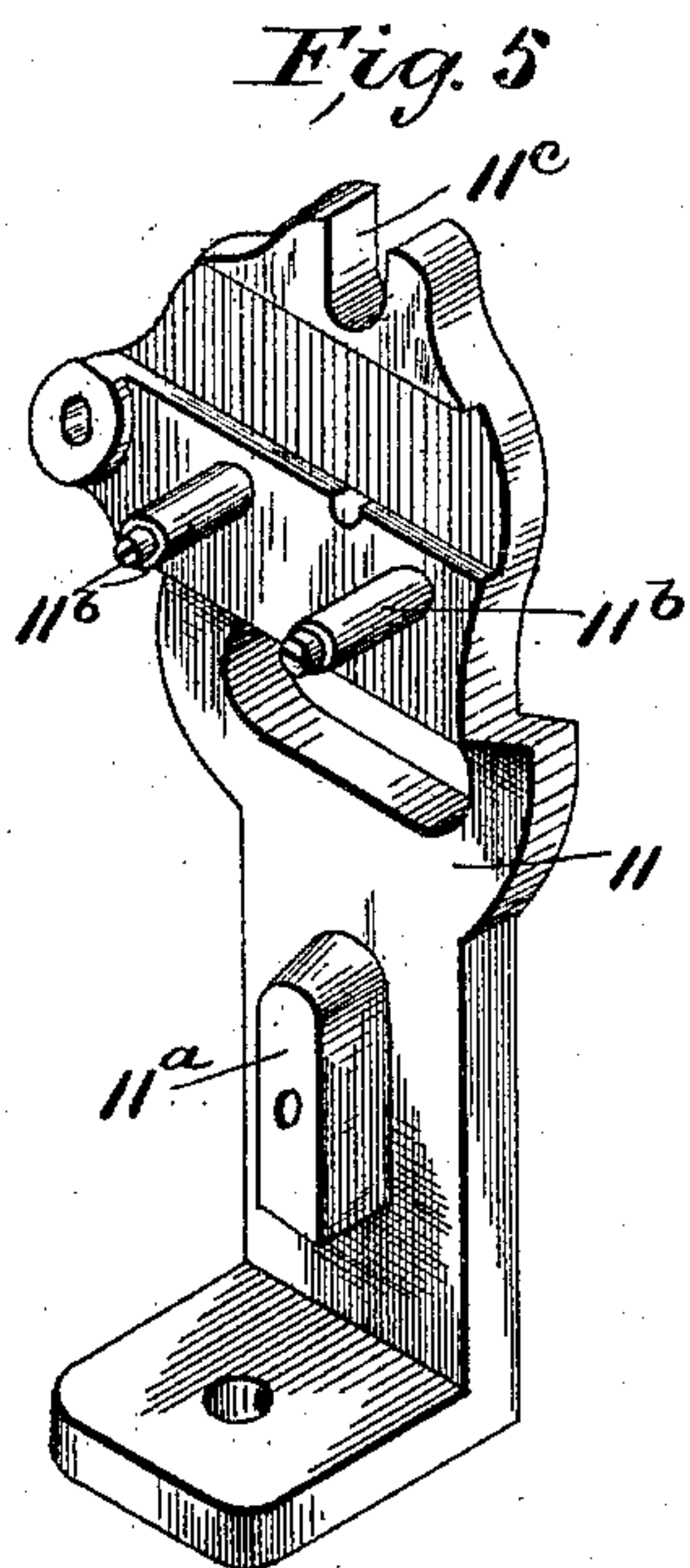
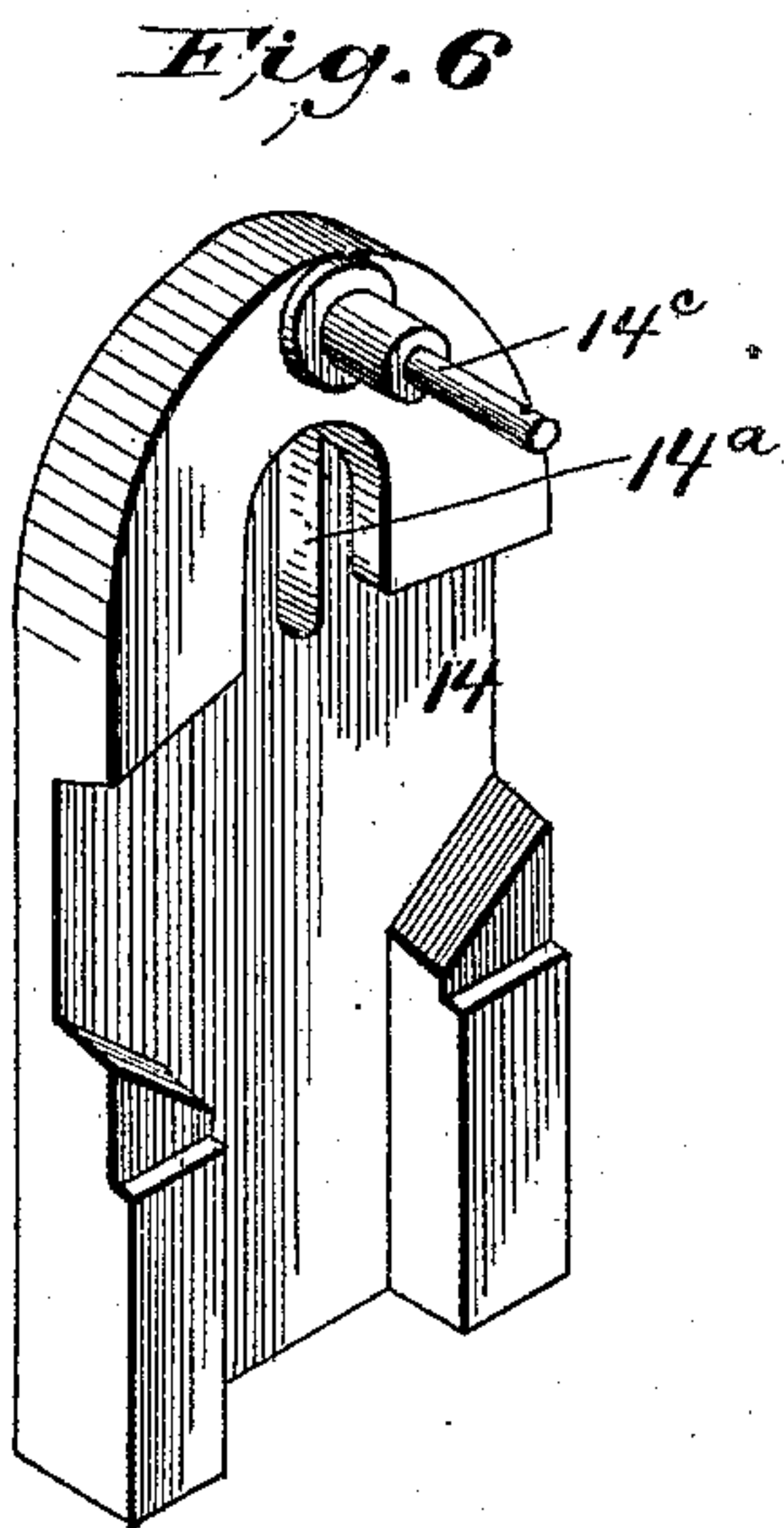
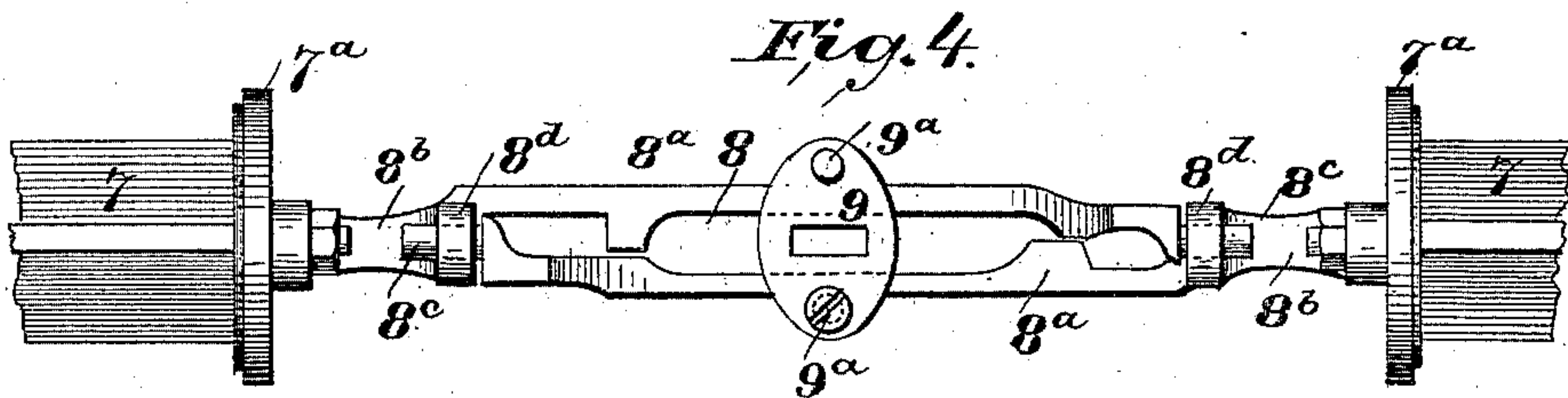
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Jas. W. Graham

Inventor.

John Stidham

Jacob B. Wallace

by F. M. Rutter & atty

UNITED STATES PATENT OFFICE.

JOHN STIDHAM, OF ROCHESTER, AND JACOB B. WALLACE, OF BEAVER FALLS, ASSIGNORS TO THE METRIC METAL COMPANY, OF BEAVER FALLS, PENNSYLVANIA.

GAS-METER.

SPECIFICATION forming part of Letters Patent No. 445,757, dated February 3, 1891.

Application filed August 13, 1890. Serial No. 361,910. (No model.)

To all whom it may concern:

Be it known that we, JOHN STIDHAM, of Rochester, and JACOB B. WALLACE, of Beaver Falls, both in the county of Beaver and State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Meters; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a meter embodying our invention, the outer casing and bellows-head or piston removed to show the valve-operating mechanism, and one of the valve-pockets shown in section. Fig. 2 is a view similar to Fig. 1, one set of levers which impart the movement of the bellows to the operating-rod and the spider which connects said levers to the bellows-head having been removed to show more clearly the toggle mechanism, sliding weight, and singletree for actuating the valves. Fig. 3 is an end view of the valve-operating mechanism, the section of the casing, outer and inner rings, &c., being on the line $x x$, Fig. 1. Fig. 4 is a detached plan view of the singletree and valve-rod which connects the valves, portions of the valves being shown attached thereto. Fig. 5 is a detached perspective view of the toggle-post, and Fig. 6 is a detached perspective view of the sliding weight for operating the toggle-joint.

Like symbols refer to like parts wherever they occur.

Our invention relates to the construction of that class of meters in which the measurement is effected by displacement from opposite sides of a reciprocating piston or pistons, (or bellows-heads,) and the inlet and outlet valves receive their motion from or are shifted by the pistons through suitable intermediate mechanism.

The several objects we have in view are as follows: first, the substantially instantaneous reversal of the inlet and outlet valves at the close of the piston movement and the holding of said valves tightly locked and seated until the period for their reversal ar-

rives, and this we accomplish by means of toggle-joint mechanism controlled by a shifting weight or weighted lever, which feature embodies the first point of our invention; second, to insure the accurate operation of the toggle-joint mechanism for reversing the valves, notwithstanding the meter may not set level, and this we accomplish by combining with said toggle-joint mechanism a vertical sliding shifting-weight, which feature embodies the second point of our invention; third, to enable both valves to be operated by one lever, and this we accomplish by combining with the rod which couples the valves a "singletree" or slotted plate, through which passes one lever of the toggle, which feature embodies a third point of our invention.

There are other minor features of invention, all as will hereinafter more fully appear.

We will now proceed to describe our invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings, 1 indicates the outer central ring of a meter casing or shell, provided with a suitable base 2, and having at opposite points ports or openings 1^a for the attachment of the inlet and exit pipes, and 3 3 indicate the end sections, which when in place complete the outer shell or casing and form the meter-chamber exterior to the bellows.

4 indicates the inner central ring or chamber which supports the operative mechanism of the meter. Said inner ring 4 is provided at opposite points corresponding to the position of ports 1^a of the outer ring with passages or chambers which lead upward from ports 1^a and constitute pockets 5 or receptacles immediately below the valves for collecting any dirt or dust and preventing it from entering the meter or clogging the valves.

Extending through the inner ring 4 at opposite points thereof are the valve-chambers 6 6, two in number, each having two seats 6^a, one on the inside and the other on the outside of said inner central ring. These valve-chambers 6 communicate with the valve-

pockets 5, and are located in the upper part of the ring 4, in order that the drainage shall be downward from the valves in the valve-pockets, and thence through the inlet and outlet pipes away from the meter, in order to carry off and free the meter from moisture due to condensation or other cause.

7 indicates leaf-guides arranged in the valve-chamber, so as to move easily in said chamber, and each of a length sufficiently greater than its valve-chamber to constitute the stroke of the valve. Attached to the stems of said leaf-guides 7 7 at either end are the valves 7^a 7^a, &c., which may be of brass or other suitable metal with the usual facing of leather or equivalent material. These valves are connected by any suitable valve-rod 8, so as to move in unison or be shifted simultaneously.

In the present instance (see Figs. 2 and 4) we have shown for purposes of illustration a compound; a valve-rod 8 composed of two parallel twin sections 8^a 8^a, each section provided at one end with an arm 8^b, by which it is secured to its valve at the opposite end with a pin 8^c to engage with its fellow and at a suitable intermediate point with an eye 8^d to receive the pin 8^c of its fellow. Such a construction of valve-rod allows for compensating adjustment of the valves and has its advantages, but is not essential, as any other form of valve-rod which couples the valves, so that they will move in unison, can be substituted for the form of valve-rod shown. At substantially their mid-length we couple said twin sections 8^a 8^a by means of a slotted plate or singletree 9, pivoted on each of said sections 8^a by a single pivot-screw 9^a, or in other suitable manner. This slotted coupling-plate or singletree permits the passage of one of the levers of the toggle mechanism by means of which the valves are shifted, and in the case of a single valve-rod would have as its equivalent a longitudinal central slot in said rod.

10 indicates a cross-bar or movement-frame for the support of the toggle mechanism, which frame may be secured to the opposite valve-pockets 5 5, as at 10^a 10^a, or otherwise suitably supported within the inner ring 4. Erected on said frame is a toggle-post 11 or vertical support, (see Figs. 2 and 5,) which passes to one side of the valve-rod 8, and is of such form as to permit the free movement of said valve-rod. On the lower part of the post 11 is a lug or projection 11^a for the pivoted attachment of the lower lever of the toggle mechanism, and projecting from the face of the post at a point above the valve-rod 8 are two guide-pins 11^b 11^b, which may be provided with anti-friction sleeves, if desired, and one of which pins may form the pivot of the lever which actuates the toggle mechanism. In the top of the said post 11 is a guide-slot 11^c for the passage of the suspension-pin of the shifting-weight of the toggle mechanism.

12 indicates the lower member or lever of a toggle mechanism, said lever pivoted below, as at 12^a, on the lug or projection 11^a of post 11. Said lever passes through the valve-rod 70 or through the slot of singletree 9 (see Fig. 4) and connects with the second member or lever 13 of the toggle above the valve-rod 8, which upper member 13 of the toggle stands between the two guide-pins 11^b 11^b of post 11. 75

14 (see Figs. 2 and 6) indicates a shifting toggle-weight of such general form as to slide vertically upon the rear face of toggle-post 11, which acts as a guide therefor. On the upper end of the shifting toggle-weight 80 14 is a projecting pin 14^c, provided with an anti-friction sleeve or roller, if desired, which pin projects through the guide-slot 11^c of the toggle-post 11 and is provided with a saddle-block 15, (see Fig. 2,) which rides upon the 85 upper member 13 of the toggle mechanism.

14^a is a vertical slot in the upper part of weight 14, through which passes a guide-screw 14^b, (see Fig. 3,) which preserves the relation of post 11 and weight 14 during the rise and 90 fall of the weight.

To a toggle mechanism of the general character hereinbefore described the piston or bellows-head which impart motion may be connected in any suitable manner. In the 95 present instance there are shown for such purpose spiders A A, attached to the heads B B of the bellows, with lazy-tongs or pivoted levers C C pivotally secured at D D to the spiders A, having motion-links E E, one lever of 100 each lazy-tongs anchored to the inner ring 4, as at F F, while the other lever of each lazy-tongs is connected pivotally to a sliding block G, vertically movable on a guide-post H, secured in the center of said inner 105 ring 4. Pivoted on said vertically-movable block, as at K, is a pitman or rod K, the opposite end of which is connected with one arm of a crank or elbow lever 16; said lever pivoted, as at 11^b, to a toggle-post 11 and connected by a link 17 with the member 13 of 110 the toggle mechanism hereinbefore described. As the bellows-heads or pistons B B have a continuous travel out and in, the movement transmitted to the toggle mechanism would 115 be continuous or progressive unless provision were made to guard against it and provide for the operation of the toggle mechanism only at the close of the bellows-stroke when the valves are to be shifted or reversed. 120 Therefore the connection between crank-lever 16 and link 17 is made by means of a slot 16^b, of such length as to permit the crank-lever 16 to actuate link 17 only at the close of the stroke of said crank-lever. 125

18 18 indicate the bellows-leather, which is connected to the inner ring 4 and to the pistons or bellows-heads B B in any suitable manner.

L, Fig. 1, indicates the usual registering 130 mechanism, which may be operated from the bellows-head B by levers M, pawls N, and

ratchet-wheel O, or by other efficient means, to register the volume of gas or other fluid which passes through the meter.

The general operation of the meter is the same as others of this class, in so far as the movement of the bellows or pistons is utilized to reverse the valves, and also in so far as the meter alternately receives and discharges from opposite sides of the pistons or bellows-heads; but in our invention the valve-rod is moved or shifted by one member 12 of a toggle mechanism acting on the valve-rod, said toggle mechanism 12 13 being moved to the central position by the mechanism which connects it with the progressively-moving bellows, and the toggle is then instantly thrown to the right or left, as the case may be, by the weight 14, having saddle 15, acting on the upper member 13 of the toggle to obtain an instantaneous reversal of the valves, and as the weight acts on the valve-rod through the intermediate toggle mechanism it effectually locks the valves on their seats until the instant of reversal arrives. As the valve-chambers and valves are located in the upper part of the meter, all moisture from condensation or other source will drain away from the valves and meter, while the valve-pockets arranged below the valve will trap and retain any dirt or dust, thus guarding the valves and meter against the entrance thereof.

It is evident that the toggle mechanism might be weighted by a spring acting on the upper member 13, as well as by the vertical sliding weight and saddle chosen for purposes of illustration; but as such a construction, though like in kind, is not equally effective for all purposes, we have chosen as the preferred manner of weighting toggle mechanism a weight instead of a spring.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a meter, the combination, with the valve-rod, of a toggle-joint, one of the levers of which actuates the valve-rod, a weight for reversing the toggle, and suitable direct connections between the levers or links of the toggle-joint and a moving part of the meter, substantially as and for the purposes specified.

2. In a meter, the combination, with the valve-rod, of a slotted plate or singletree, a toggle mechanism which engages the slotted plate or singletree, a weight for reversing the toggle, and suitable connections between the toggle-joint and a moving part of the meter, substantially as and for the purposes specified.

3. In a meter, the combination, with the valve-rod, of a toggle-joint, one of the levers of which actuates the valve-rod, a vertically-sliding weight for reversing the toggle, and suitable direct connections between the levers or links of the toggle-joint and a moving part of the meter, substantially as and for the purposes specified.

4. In a meter, the combination, with the valve-rod, of a toggle-joint actuated from a moving part of the meter and which acts on the valve-rod, a toggle-reversing weight, and a saddle which is pivoted to the weight and rests on the toggle, substantially as and for the purposes specified.

5. In a meter, the combination, with the valve-rod, of a toggle-post, a toggle-joint pivoted to the toggle-post and connected with a moving part of the meter, and a vertically-sliding weight which rests on the toggle-joint and is guided by the toggle-post, substantially as and for the purposes specified.

6. In a meter, the combination, with a sectional valve-rod, of a slotted singletree or plate pivoted on each of the rod-sections, a toggle mechanism one member of which passes through the slotted plate or singletree, and connections between the toggle mechanism and a moving part of the meter, substantially as and for the purposes specified.

7. In a meter, the combination, with the valve-rod, of a toggle-post provided with guide-pins for the toggle mechanism, toggle mechanism pivoted to the toggle-post and arranged to actuate the valve-rod, a slotted weight which acts on the toggle mechanism and is arranged to slide on the toggle-post, and a guide screw or pin which maintains the relation of the weight to the post, substantially as and for the purposes specified.

8. In a meter, the combination, with the valve-rod, of a toggle-post, toggle mechanism pivoted on said post, a weight sliding on said toggle-post and acting on said toggle mechanism, and a slotted elbow-lever and link directly connected to the toggle-levers for actuating said toggle mechanism from a moving part of the meter, substantially as and for the purposes specified.

9. In a meter, the combination, with the valve-rod, of a weighted toggle mechanism for reversing the valves, a lazy-tongs movement or pivoted levers connected with the bellows-head and having one arm anchored on a fixed portion of the meter and the other pivoted to a movable block, a guide-post for the movable block, and a rod or pitman which connects the movable block with the toggle mechanism, substantially as and for the purposes specified.

10. In a meter, the combination, with the valve-rod, of toggle mechanism 12 13, sliding weight 14, interposed saddle 15, slotted elbow or crank lever 16, interposed link 17, and means for actuating crank-lever 16 from a moving part of the meter, substantially as and for the purposes specified.

11. In a meter, the combination, with a valve-rod composed of sections 8^a 8^b, of the pivoted slotted plate or singletree 9, toggle mechanism 12 13, sliding weight 14, interposed saddle 15, and means for actuating the toggle mechanism from a moving part of the meter, substantially as and for the purposes specified.

12. In a meter, the combination, with an
outer central ring for the support of the shell
or case, of an inner central ring for the sup-
port of the operative parts of the meter, said
5 inner ring having valve-chambers 6 6 in its
upper part, and pockets 5 5, arranged beneath
and leading down and away from said valve-
chambers, substantially as and for the pur-
poses specified.

In testimony whereof we affix our signatures, 10
in presence of two witnesses, this 12th day of
August, 1890.

JOHN STIDHAM.
JACOB B. WALLACE.

Witnesses:

F. L. GALLAGHER,
J. H. LOGAN.