

(No Model.)

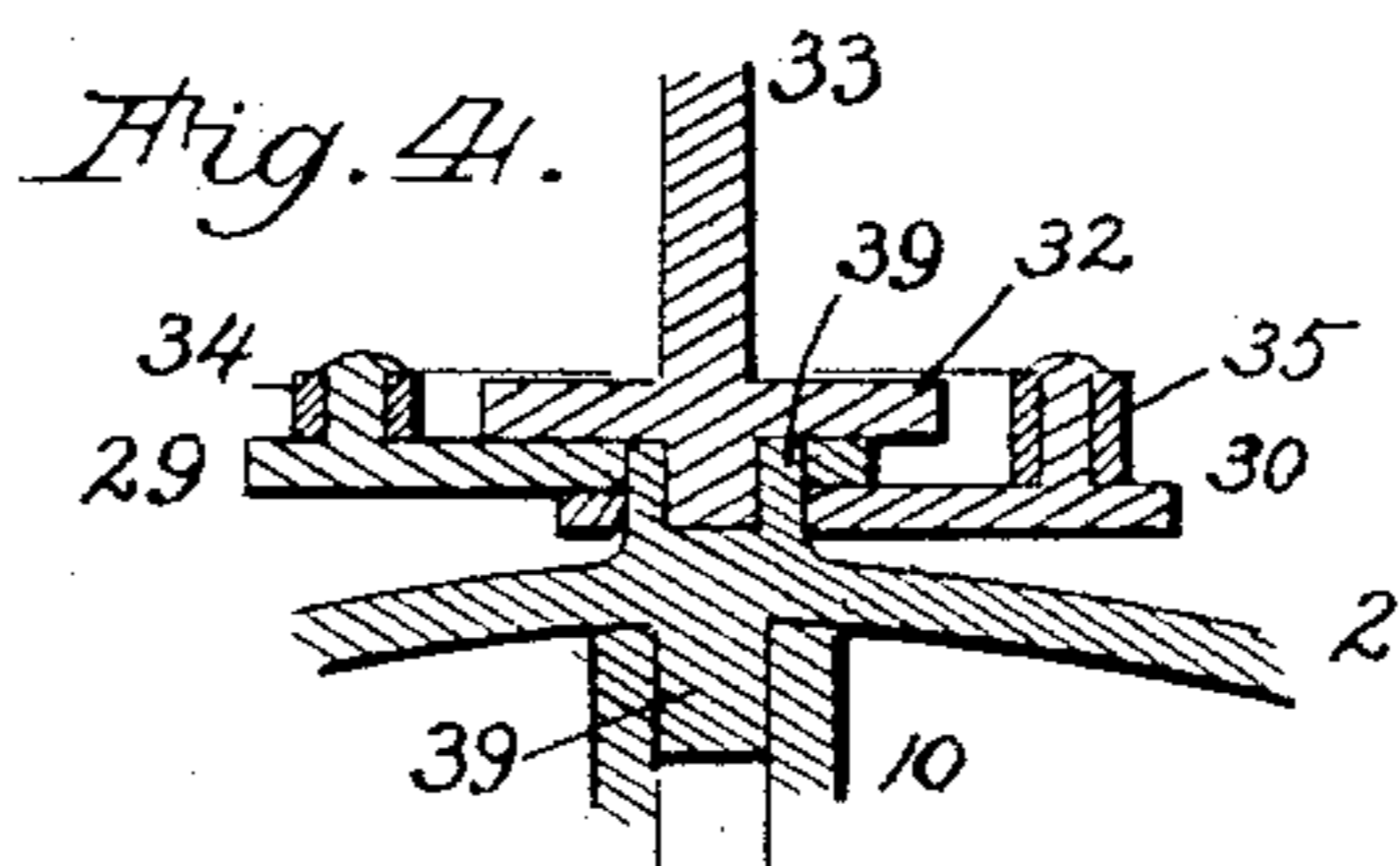
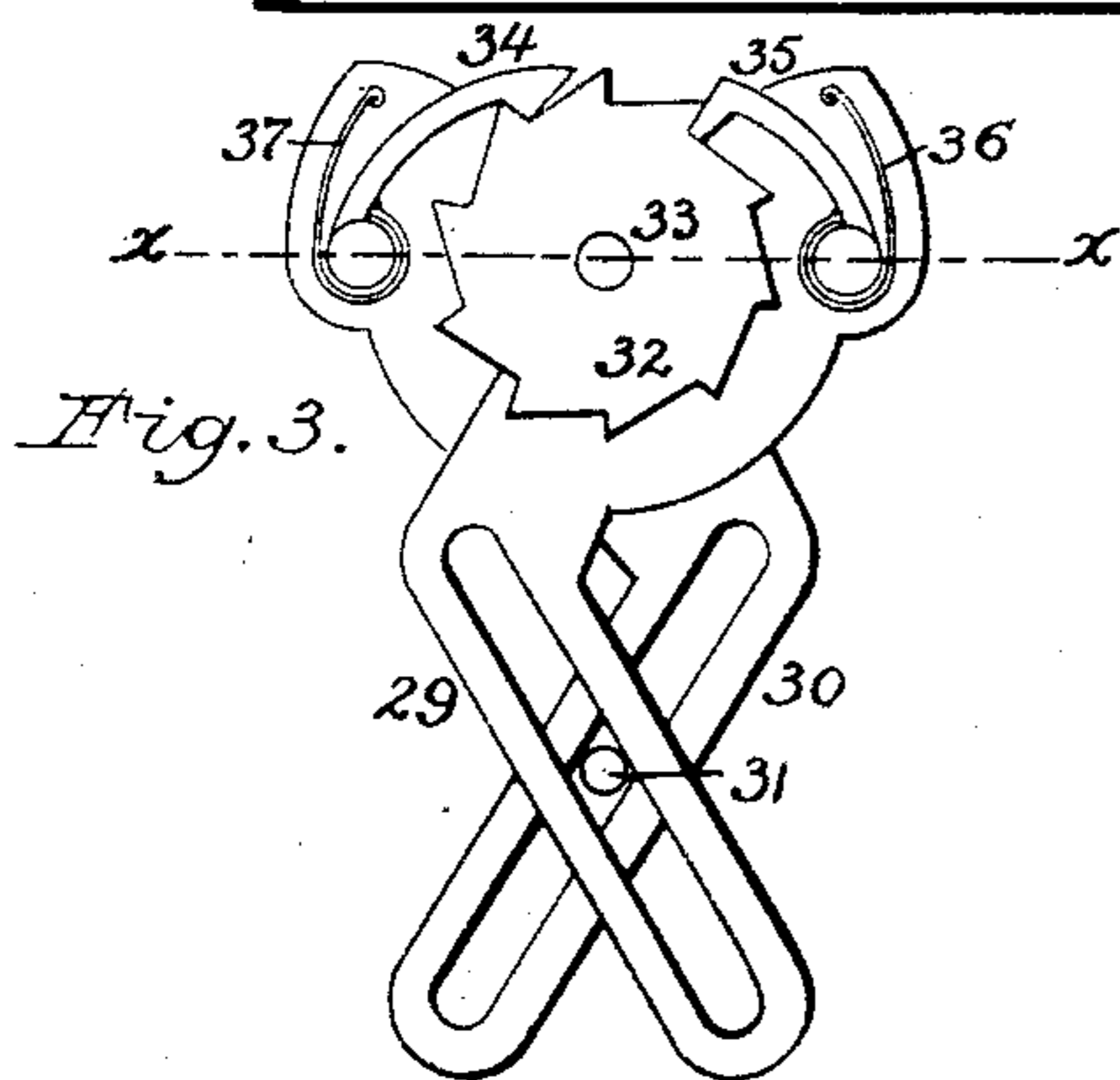
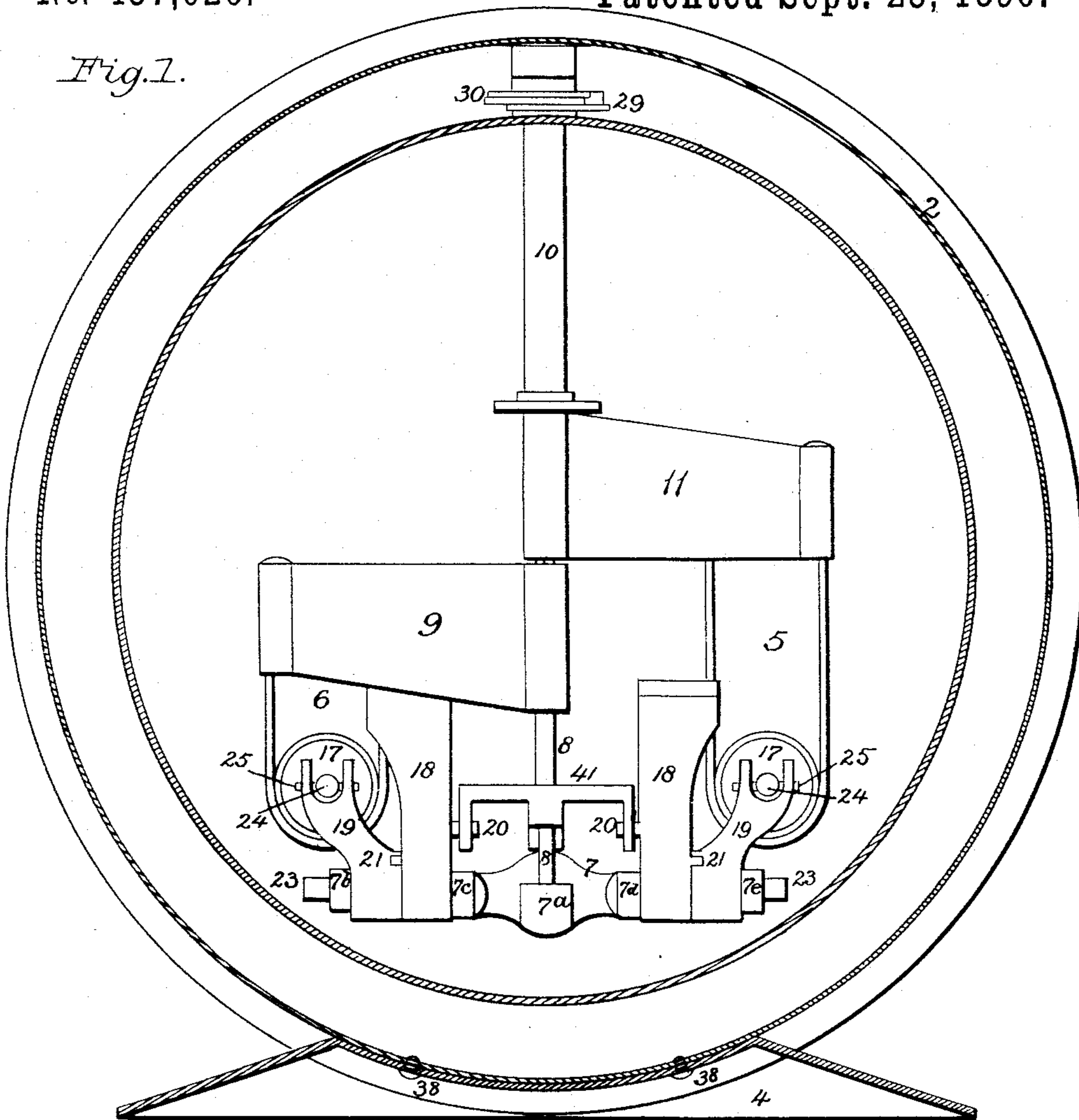
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J. W. CULMER.
GAS METER.

No. 437,020.

Patented Sept. 23, 1890.

Fig. 1.



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Fig. 2.

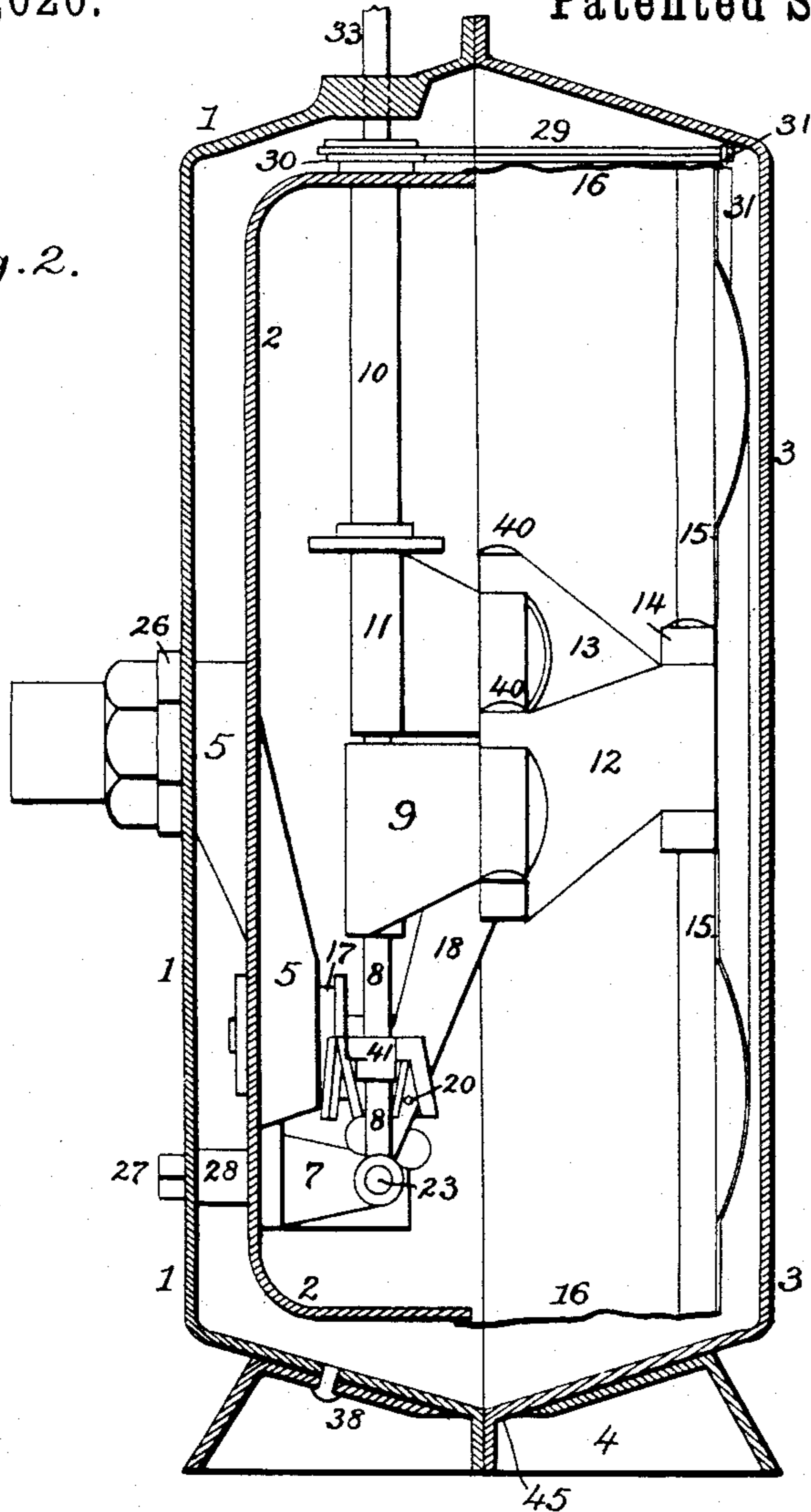
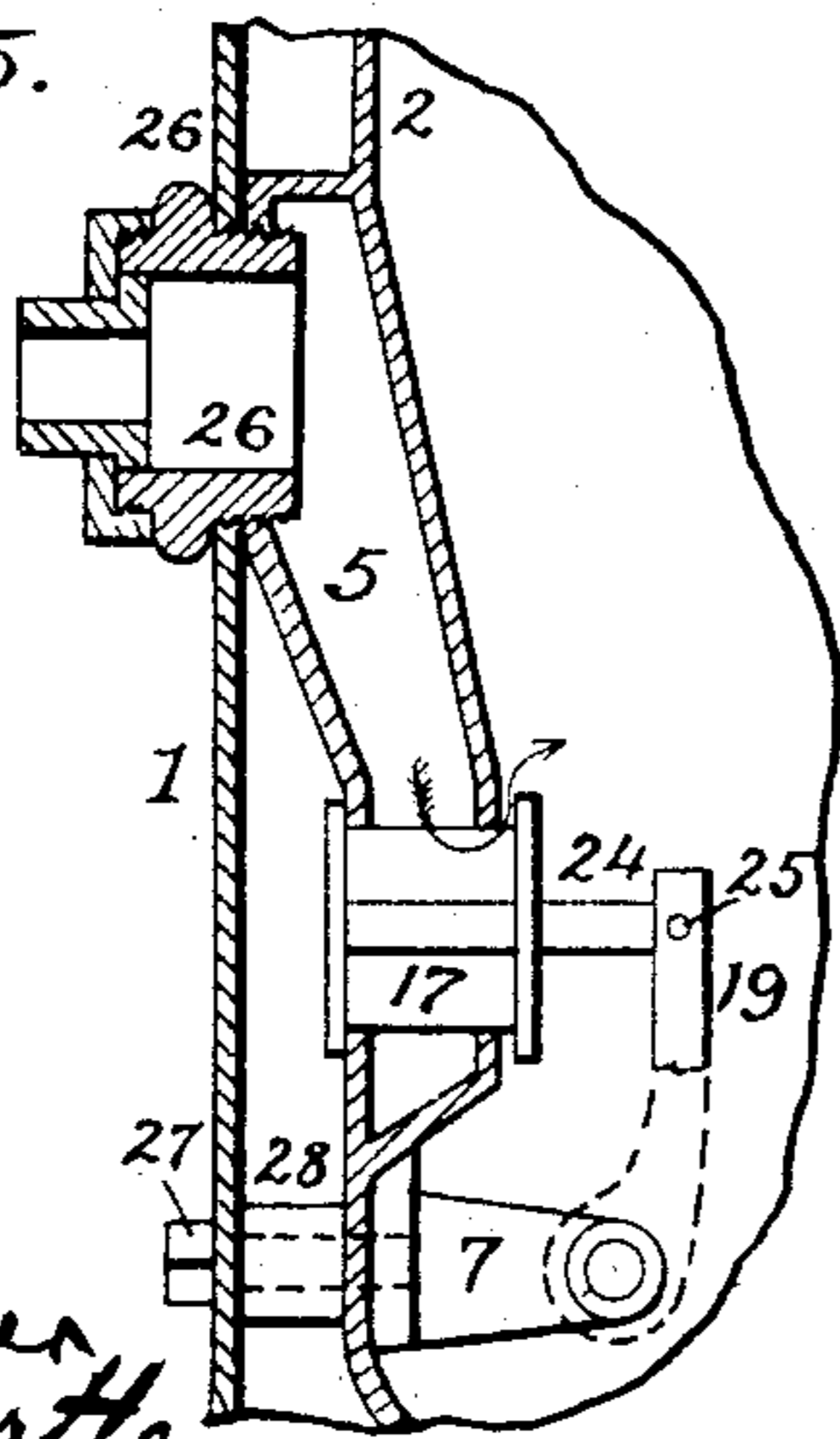


Fig. 5.



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(No Model.)

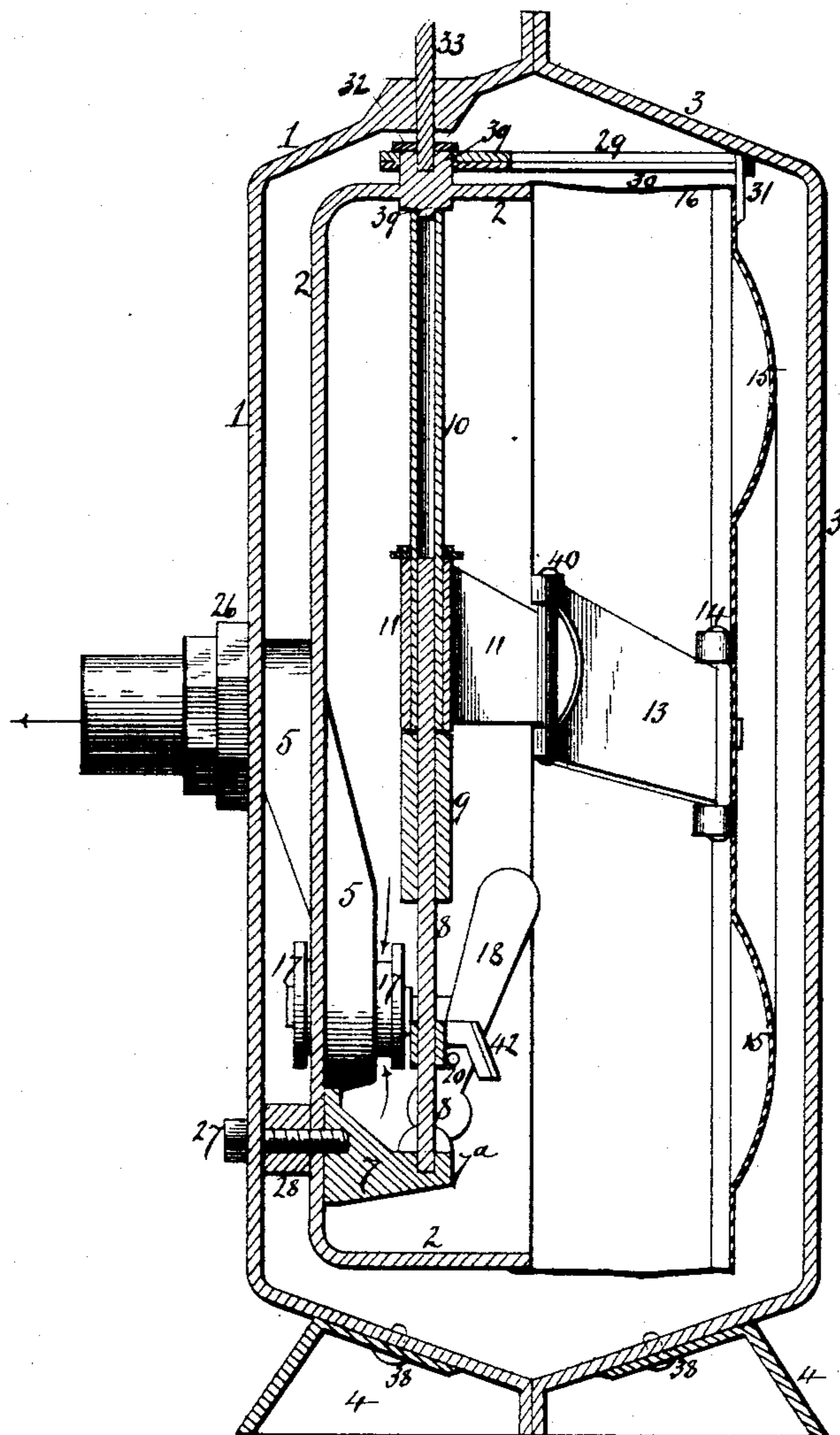
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Patented Sept. 23, 1890.

Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN WOODRUFF CULMER, OF NEW BRIGHTON, PENNSYLVANIA.

GAS-METER.

SPECIFICATION forming part of Letters Patent No. 437,020, dated September 23, 1890.

Application filed April 23, 1890. Serial No. 349,092. (No model.)

To all whom it may concern:

Be it known that I, JOHN WOODRUFF CULMER, a citizen of the United States, residing at New Brighton, in the county of Beaver and State of Pennsylvania, have invented new and useful Improvements in Gas-Meters, of which the following is a specification.

My invention relates to that class of dry meters which operate by the expansion and collapse of one or more bellows within a chamber-forming case; and the improvements I have made in such meter I will now describe in connection with the accompanying drawings, and specifically point out in the claims concluding this specification the precise devices, construction, and combinations of devices which constitute my said improvements.

Figure 1 is a vertical diameter section of a meter embodying my invention. Fig. 2 is a vertical transverse section of the same. Fig. 3 is a plan view, and Fig. 4 a vertical cross-section, of the register-operating device, taken on the line $x x$ of Fig. 3; and Fig. 5 is a vertical section taken through the inlet-chamber and its valve. Fig. 6 is a vertical section taken centrally through the meter, showing the connection of the rod 8 with the tube 10 and the connection of the latter with the upper stud 39 of the bowl.

The case is constructed of any approved material by casting, stamping, or other means, and is of the general form of two bolted flanged disks, one of which has perforations upon its side for the admission of the collared nipples 26 and the screw-bolt 27. The base 4 is of similar material, and is slotted in its longitudinal center for the admission of the flanges of the bolted cases 1 and 3, and the case 1 is made fast thereon by means of the screws 38 38, which pass through the base 4 into threaded openings in the case 1. The bowl 2 is of like material, and there are constructed upon its sides the inlet and outlet chambers 5 and 6, their one end extending within the bowl for a distance sufficient to allow free play of the valves and their other end extending outside of the bowl a sufficient distance to form a chamber whose area shall at any point equal the area of its port or outlet, as seen in Fig. 5. The valve end of each of these inlet and outlet chambers is bored out and its surfaces faced off a right angle

with said bore, and its outer end is faced off and threaded for the reception of the collared nipple 26. A stud 28, Figs. 2 and 5, is cast or otherwise affixed upon the outer wall of the bowl 2, and is faced off and threaded interiorly for the reception of the screw-bolt 27. At a point in the top of the rim of the bowl 2 and vertically in line with the stud 28 there is cast or otherwise affixed the stud 39, which extends within and without the rim of the bowl, and which is bored out outside the bowl for the reception of the ratchet-wheel stem 33 and turned off outside the bowl to receive the slotted arms 29 30, and said stud is slipped within the bowl for the reception of the tube 10. It will be seen that this form of construction permits all the machine-work to be done rapidly and accurately by the use of ordinary tools and without special devices. The machining of the bowl being finished, the valves 17 17 are placed within their respective ports, each pair of valves being attached to a stem 24 24. The collared nipples 26 are screwed through the openings in the case 1 into the threaded end of the chambers 5 6, and the machine is ready for the erection of the movement.

The foot 7 is constructed with a central hub 7^a and with two pairs of brackets—one pair at each horizontal extremity of the foot 7. These brackets 7^b 7^c 7^d 7^e are bored out upon a horizontal line for the reception of the pins 23 23, and the hub 7^a is drilled or centered for the reception of the rod 8. The foot is made fast within the bowl 28 in such a manner that the horizontal line passing through the pins 23 23 shall be at right angles with the vertical rod 8 when in position. Upon each of the pins 23 there is fitted a rocking lever 19, having its lower end bored for the reception of the pin 23 and its upper end crotched to embrace the valve-rod 24, and connected thereto by the pin 25, passing through the said valve-rod and through lateral slots in the crotched ends of the lever 19. Upon the pin 23, and in contact with the lever 19, is fitted the weight-lever 18, having its lower end fitted to rotate easily upon the pin 23 and its upper end enlarged or weighted to insure its drop upon passing the vertical center in rotating. Upon that side of this weighted lever in contact with the rocking lever 19 there are two projections 21

21, so arranged, relatively to each other and to the rocking lever 19, that when the weight-lever 18 is rotated upon the pin 23 at the moment of passing its vertical center the pin or projection upon that side from which the rotation begins is brought into contact with the rocking lever 19 and causes it to rotate with the said weight-lever 18 and to reverse the valves attached to said rocking lever, by means of the pin 25 passing through the valve-stem 24 and the crotched end of the rocking lever 19. The construction, arrangement, and operation of the valves and levers upon the pins 23 are in every respect similar, as described.

The rod 8 has made fast upon it a wing 9, with its inner end bored for the reception of a pin, and the tube 10 fits over the upper portion of said rod 8 and has made fast to said tube the wing 11. The outer ends of the wings 9 and 11 are connected with the links 12 13 by the pins 40 40, and the other ends of such links are in like manner connected to a spider 14, to which a disk 15 is attached in the ordinary manner of making such connections.

The lower end of the rod 8 is placed in its step or recess at 7^a, the upper end of the tube 10 is fitted within the projection 39, and the forked swinging lever 41 is made fast in place upon the rod 8. This swinging lever 41 is constructed with a central hub embracing the rod 8 and two arms extending in diametrically-opposite directions from said hub and forked or divided at their extremities, the forked portion being turned at a right angle to the arms, and spreading slightly as they extend downward. The forked arms are placed astride of the pins 20 20 and the hub made fast to the rod 8.

A disk 15, having a leather diaphragm 16 made fast to its periphery, is fixed to the spider 14 by a screw or bolt, and the other edge of the leather is made fast to the open edge of the bowl 2. Upon the upper outer edge of the disk 15 is attached by solder or otherwise fastened a vertical finger 31. (See Fig. 2.) The stud 39 upon the outer portion of the bowl 2 has placed over its outer periphery the plate 30, Fig. 3, having a slotted arm extending diagonally over the top of the leather diaphragm 16, and upon such plate a second counterpart plate 29, with its slotted arm extending diagonally across the arm of the plate 30 and also across the leather. At the intersection of these slots the finger 31 is inserted through both slots. A ratchet-wheel 32 is constructed with its stem 33 introduced upon the lower side of the wheel into the recess in the stud 39, and the stem 33 is elongated above the wheel to extend through a proper opening in the case 1. Outside such case this stem may be attached in any approved way to the primary wheel of a registering device, and such device may be attached to the case in any approved manner. Such connection and attachment, forming no part of my invention, is not shown.

The plate 29 is fitted with the pawl 35 and spring 36, and the plate 30 is fitted with the pawl 34 and spring 37.

The case 3 is placed over the disk, its flange introduced into the slot 45 in the base 4, and the case closed by the union of the flanges by means of screws or bolts or solder.

Assuming the meter to be connected with inlet and outlet pipes attached to the nipples 26, and to occupy the position shown in the section, Fig. 2, the inlet-valve would be open outside of the inner chamber and the outlet-valve would be closed inside the inner chamber, and the flow of gas would cause the disk to move inward, the chamber to collapse, and the gas contained within the chamber to be expelled through the outlet-valve. The motion of the disk would be transmitted to the rod 8 and tube 10 through their connecting links and wings. The swinging lever 41 would be rotated upon and by the rod 8 through a horizontal arc, and the forks thereon in contact with the pins 20 20 would cause the weight-levers 18 18 to rotate through a vertical arc upon the pins 23 23 until they pass the vertical center, when they drop by force of gravity and the projections 21 21 cause the levers 19 19 to be reversed and the relation of the valves to their ports thereby changed. The inlet-valve being now opened into the inner chamber and the outlet-valve opened from the outer chamber, the inner chamber is expanded by the inflowing gas, and the gas in the outer chamber is expelled through the outlet-pipe. The reciprocating motion of the disk 15 causes the finger 31 to impart to the plates 29 and 30 a rotative motion upon the hub 39, and thus through the pawls 34 35 a continuous forward motion is transmitted to the ratchet-wheel 32, and by it through the stem 33 to any approved registering device. It will be seen that this form of construction of case and bowl, which becomes a part of the case, admits of the erection therein of any form of actuating mechanism other than that shown and described; that it is cheap of construction, simple in form, and admits of access to all the working parts, and can be constructed and fitted with ordinary tools and without special appliances for the boring, facing, or threading of the chambers or ports.

It will be seen that the register-actuating device herein illustrated and described may be connected to a registering device either within or outside of the outer case, and may itself receive motion from a finger attached to any reciprocating part or member of the meter-actuating mechanism. It is obvious, therefore, that changes may be made in the construction of the various parts without departing from the spirit of my invention or the scope of the claims, and it will be understood that the precise construction set out herein has been given because it is the preferred construction.

In Figs. 2 and 3 the outlet-chamber is shown and the diaphragm or bellows is ex-

panded and about to undergo a collapse. The provision of the inlet and the outlet chambers extending both inward and outward from the disk side of the bowl gives the advantage of having these valve-chambers formed at one side of the meter-case in a single casting, of utilizing said chambers as the means of securing the bowl to the case in a simple and effective manner by external attachments, and of easily and conveniently mounting and securing all the parts together. The inlet and outlet chambers are formed so as to project the inner and upon the outer sides of the bowl and their walls stand vertically, and each has a screw-threaded opening in its upper outer vertical face and turned valve-openings in its inner lower part. The turned face of this threaded-chamber end forms a flat seat and tight joint upon the inner wall of the case, while the collared nipples screwed into said threaded-chamber ends form tight joints on the outer side of the case and also serve as couplings for the inlet and outlet pipes at the same side of the meter. The bowl is further secured to the case by the stud 28, having an interior screw-threaded bore and placed below and centrally between the valve-chambers, so as to abut against the inner wall of the case through which a screw-bolt 27 passes into said stud.

Referring to Fig. 6, it will be seen that the rod 8 extends up through the sleeve of the swinging wing 11, and the tube 10 is secured within said sleeve upon the upper end of said rod and upon the inner shouldered projection 39 of the bowl-rim, so as to form a firm and secure mounting for said rod within the bowl.

The arrangement of the bowl within one of the case-sections gives the advantage of operating the meter with a single collapsible and expansible diaphragm within the other section of the casing. It simplifies and renders the construction of the meter more compact and more durable, and gives the advantage of mounting the valves side by side in the flat face of a single casting, which is firmly secured to one of the flat faces of the case.

Having thus described my invention, what I claim is—

1. A gas-meter case consisting, essentially, of a longitudinal slotted base, a flanged half-case having openings for inlet and outlet nipples, for a stud-screw, and for a register-actuating stem, a bowl with ported inlet and outlet chambers having threaded openings coincident with the nipple-openings in the case, and a close half-case attachable by screws or other means to the working half and to the base, as shown and described, and for the purpose set forth.

2. In a gas-meter, a bowl or base for the reception and erection of an actuating and valve mechanism having ported inlet and outlet chambers with threaded outer openings, coincident with nipple-openings in an outer case, for attachment to and within such outer

case, by threaded-collar nipples, as and for the purpose set forth.

3. In a gas-meter, the combination of a foot having a central projecting step to receive a vertical rod, and at its extremities brackets for the reception of horizontal pins, a screw for attachment to the vertical bottom or back of a bowl or base, with a bowl or base having inlet and outlet chambers and attached to and within an inner case by means of threaded-collar nipples passing through such outer case into threaded openings in the outer extremities of the inlet and outlet chambers, whereby the case is mounted ready for the fitting of its mechanism, as shown and described.

4. In a gas-meter, the combination of the foot 7, having at each extremity a weight-lever and a rocking lever with a rod rotative centrally between said levers, and bearing the forked swinging lever 41, engaged with the projections upon said weight-levers, as and for the purpose set forth.

5. In a gas-meter, the combination of two opposite weight-levers actuated by a forked swinging lever upon a rotative vertical rod, two opposite rocking levers crotched and pinned upon valve-stems, as 24 24, and embraced between projections upon said weight-levers, as 21, and rocking upon the horizontal pins 23 23, with weight-levers, with a rotative rod centrally stepped between said levers, a tube rotative upon said rod and stepped within a base or bowl at its top, wings upon said rod and tube linked to a disk, a leather diaphragm connecting such disk with said bowl, and an inclosing-case, as shown and described, and for the purpose set forth.

6. In a gas-meter, the combination of a vertical rotative rod with a ring, a vertical tube concentric with said rod and rotating about it, with a wing, the rod stepped at its bottom upon the foot 7, and the tube at its top within the stud 39, with the links 12 13, and spider 14, connected by vertical pins and forming a parallel device for the attachment of a disk or diaphragm, as and for the purpose set forth.

7. In a gas-meter, the herein-described register-actuating device, consisting, essentially, of two counterpart rotative plates with spring-pawls and diagonally-slotted arms, a finger attached to a moving disk and passing through the slots in said arms, and a ratchet-wheel engaged with said pawls and having a stem passing through the outer case for engagement with a registering device, whereby a continuous forward movement is given to the stem by the reciprocating movement of the disk, as shown and described.

8. In a gas-meter, the combination of an outer case, an inner collapsible chamber formed by an inlet and outlet chambered bowl, a disk and a diaphragm, leather connecting said disk and bowl, an actuating mechanism operating inlet and outlet valves and itself operated by the expansion and col-

lapse of said collapsible chamber and an outer case and base, with a register-actuating device consisting, essentially, of two counter-part plates bearing spring-pawls and having
5 slotted arms extending in diagonally-opposite directions, a ratchet-wheel engaged with said pawls and having a stem for attachment to a registering device, and a reciprocating finger passing through said slotted arms and rotat-
10 ing them upon a common center by its reciprocating motion, as shown and described.

9. In a gas-meter, an inclosing-case and an inner bowl, the latter formed with the inlet and the outlet chambers extending upon the
15 inner side and upon the outer sides of the flat face of said bowl, the upper end of each chamber having a flat turned face and a screw-threaded opening therein, the lower end of each chamber having a valve, suitable
20 valve-operating mechanism erected within said bowl, and screw-nipples for securing the threaded upper-chamber ends in coincident relation with inlet and outlet openings in said case, substantially as described.

25 10. An inclosing-case for gas-meters, constructed of two flanged sections, one of which has the inlet and the outlet openings in its flat side, in combination with a longitudinally-slotted base-support adapted to receive
30 the flanges of said case and secured thereto, substantially as described.

11. In a gas-meter, an inner bowl cast with the inlet and the outlet chambers, and an interior screw-threaded stud on its flat side, in
35 combination with the screw-nipples entering coincident openings in the case and in the upper-chamber ends, and the screw-bolt entering coincident openings in the case and stud, the valves, and the valve-operating mechan-

ism erected within said bowl, substantially as 40 described.

12. In a gas-meter, an interior bowl cast with the inlet and the outlet chambers on its flat side, in combination with the screw-nipples entering coincident openings in the case 45 and in the upper-chamber ends, the valves, valve-operating mechanism, and the register-actuating mechanism erected upon said bowl, substantially as described.

13. The combination, in a gas-meter, of the 50 inclosing-case, the bowl and its bellows, the valves, the rod 8, and the tube 10, both the latter stepped into the bowl, the valve-operating connections, arms rotatively pivoted upon said bowl having spring-actuated pawls 55 engaging a ratchet-wheel of the registering device, and a device connecting the bellows and the said rotatively-pivoted arms, substantially as described.

14. In a gas-meter, the inclosing-case, the 60 bowl and its bellows, the valves, the rod 8, and the tube 10, both the latter stepped into the bowl, the valve-operating connections, and means for operating the registering device, consisting of the slotted crossed arms rotat- 65 ively mounted upon the bowl, the spring-actuated ratchet-pawls carried by said arms, the ratchet-wheel of the registering device engaging said pawls, and the arm or finger engaging the said crossed slotted levers, sub- 70 stantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN WOODRUFF CULMER.

Witnesses:

LOUIS EDGAR,
JOHN P. EDGAR.