

No. 654,309.

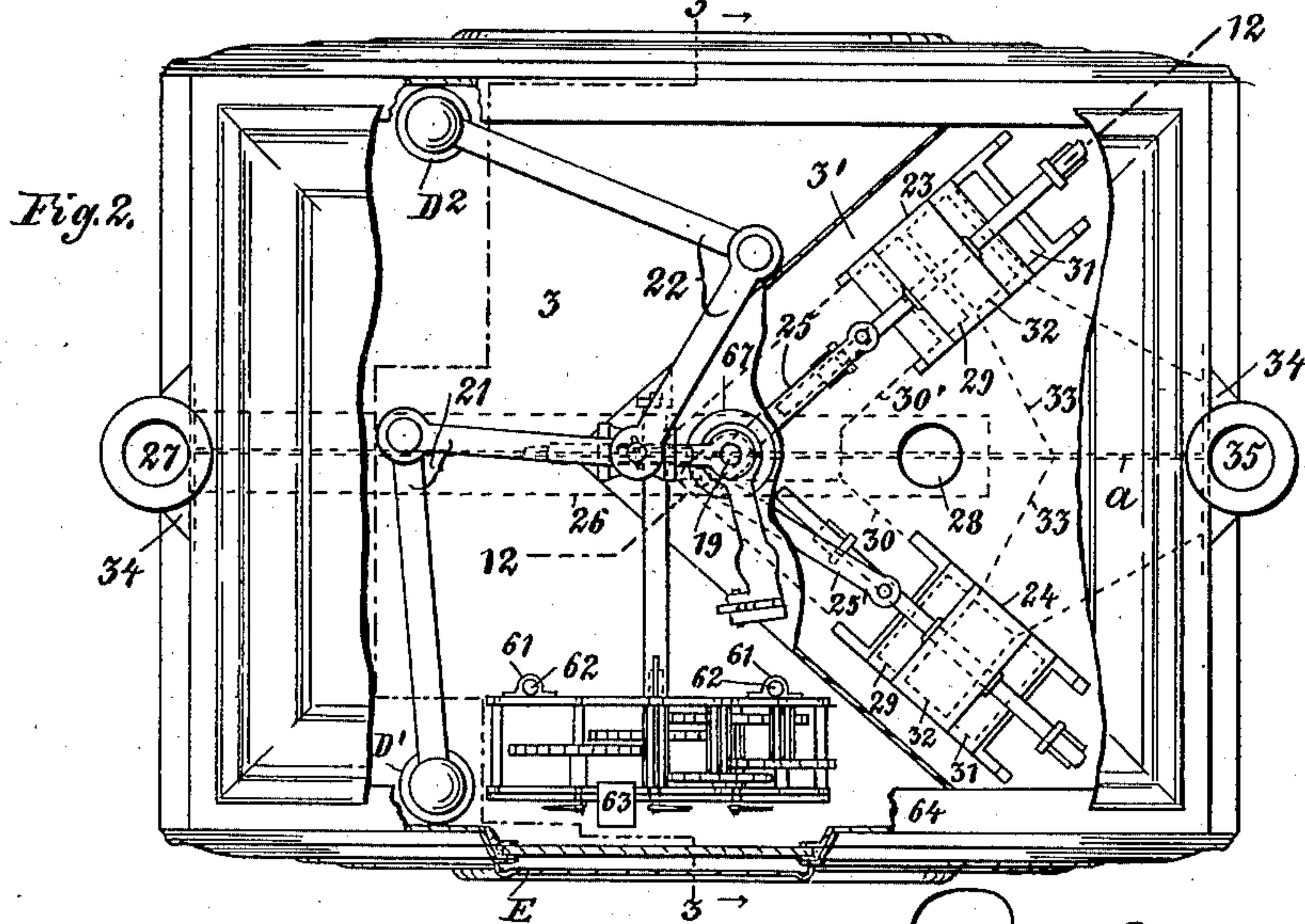
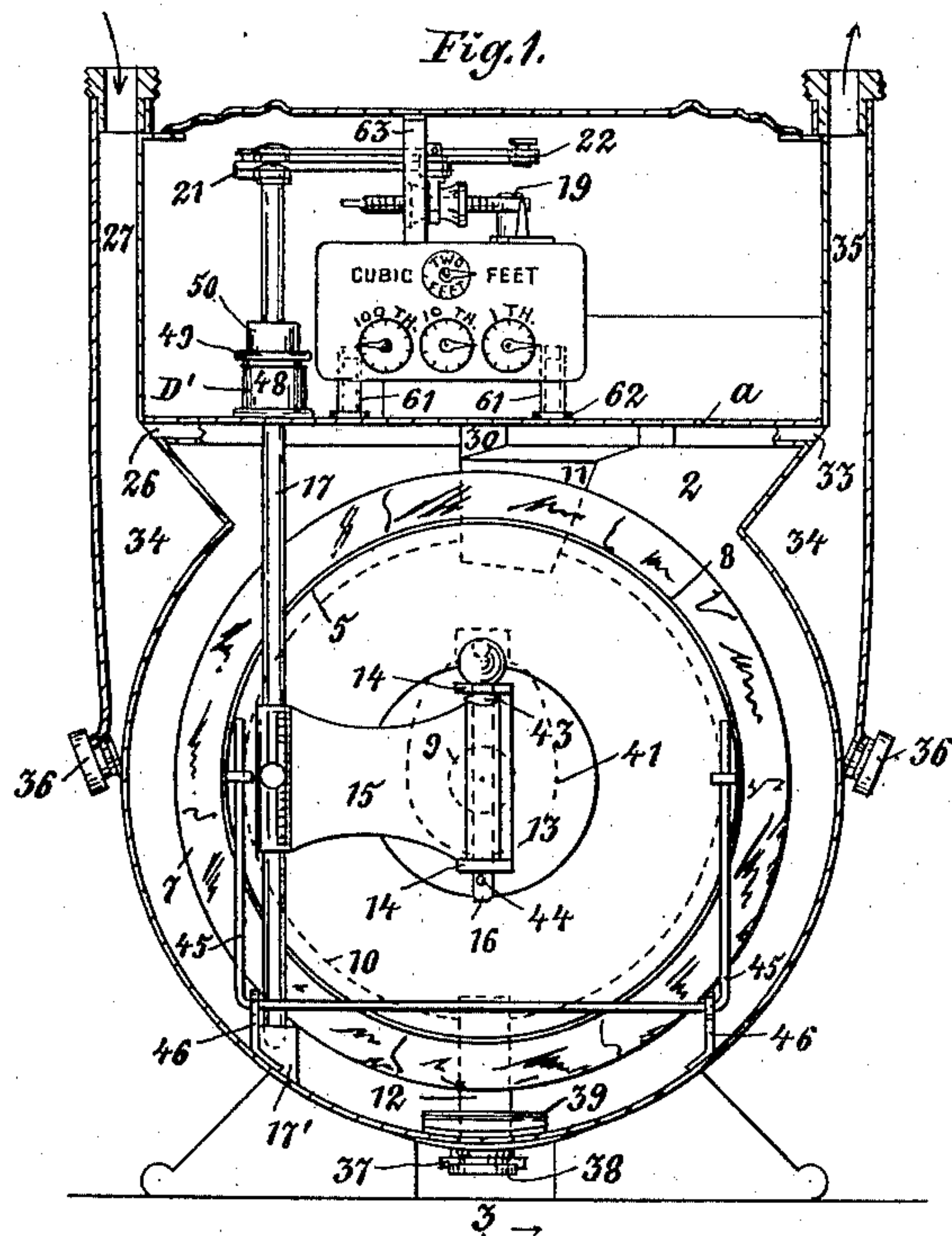
Patented July 24, 1900.

A. EHEBALD.
GAS METER.

(Application filed Nov. 24, 1899.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:

Jno A. Paulson
C. L. Nielson.

By

Adam Ehebald, Inventor
Schreiter & Mathews
his Att'ys

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3 Sheets—Sheet 2.

Fig. 3.

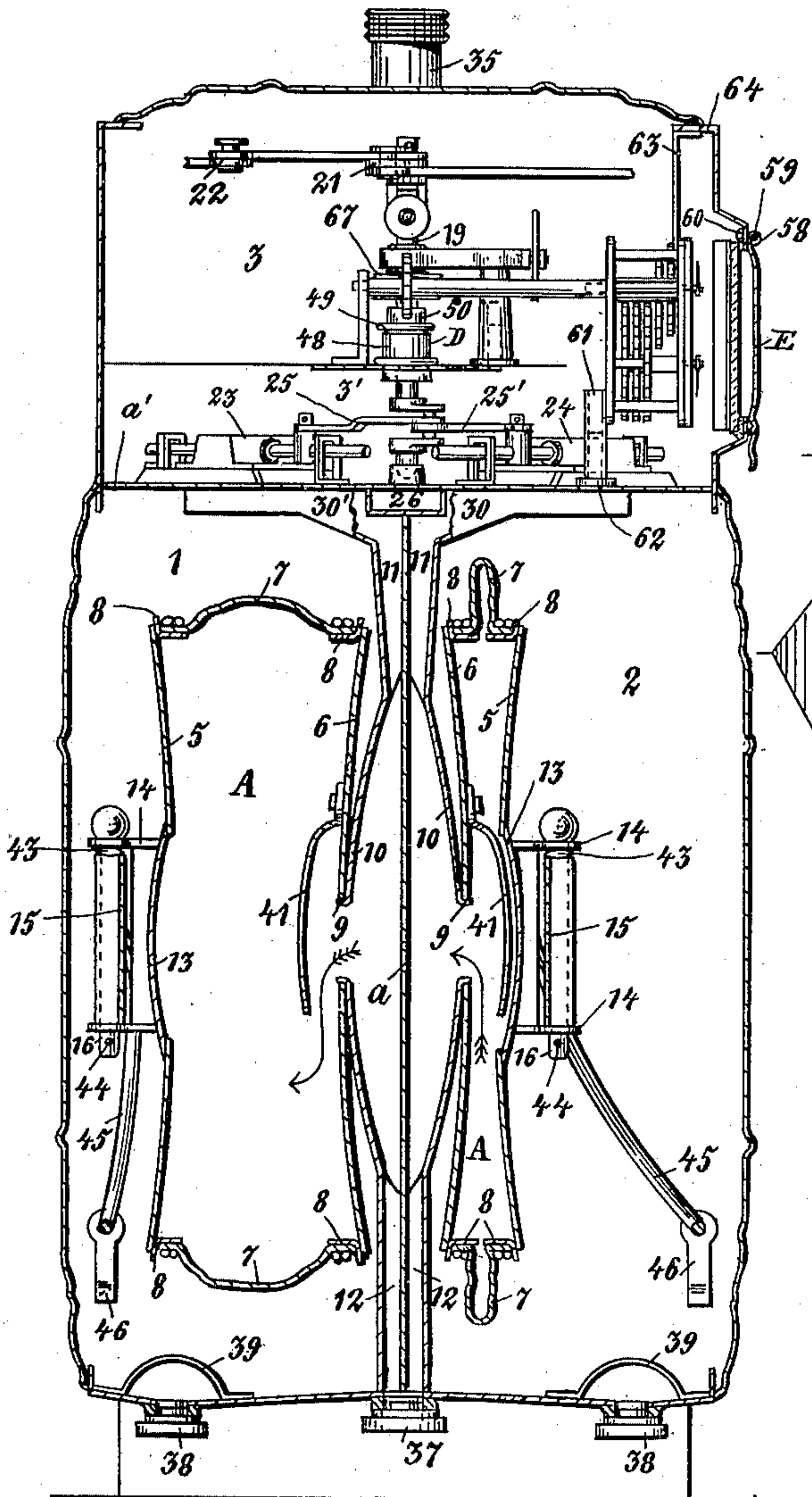


Fig. 4.

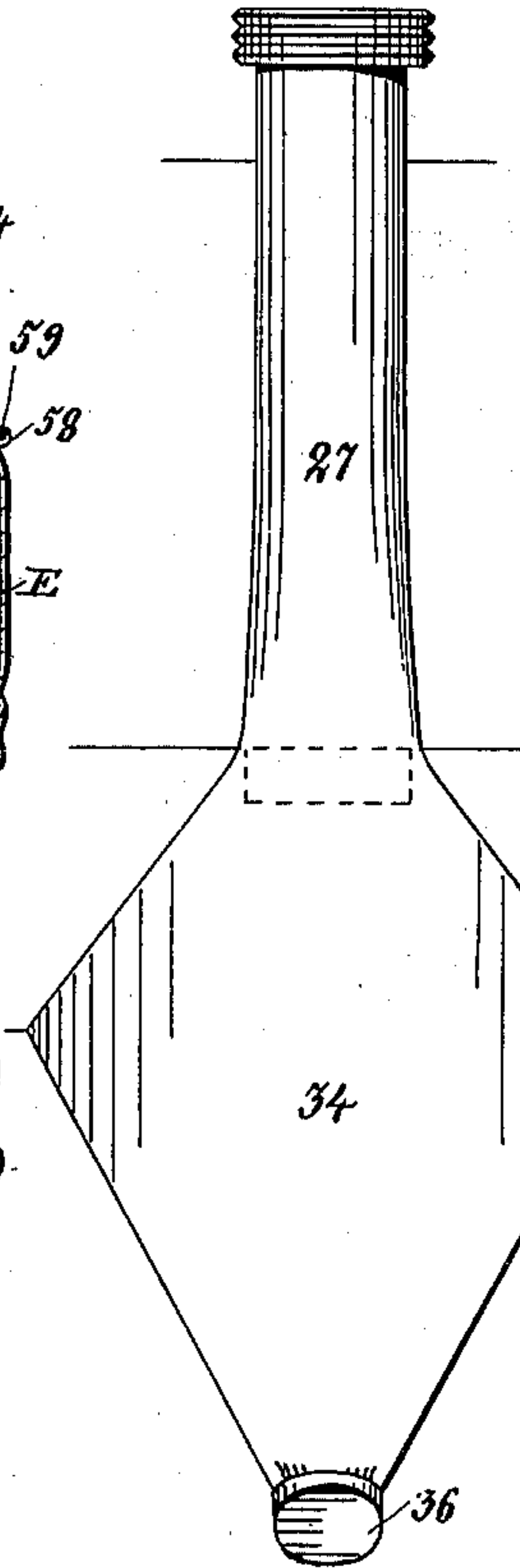


Fig. 5.

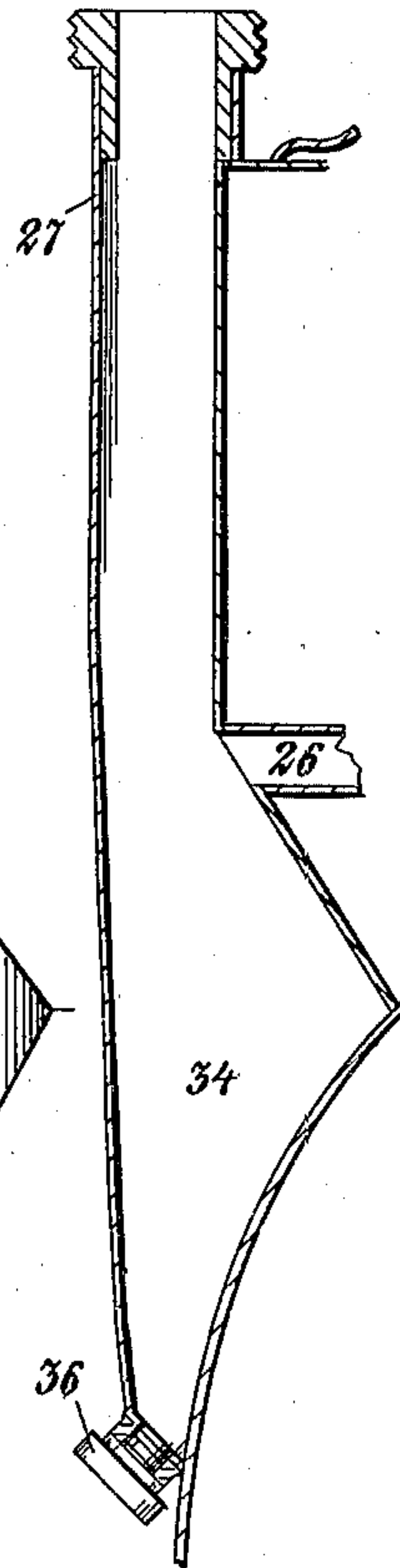


Fig. 6.

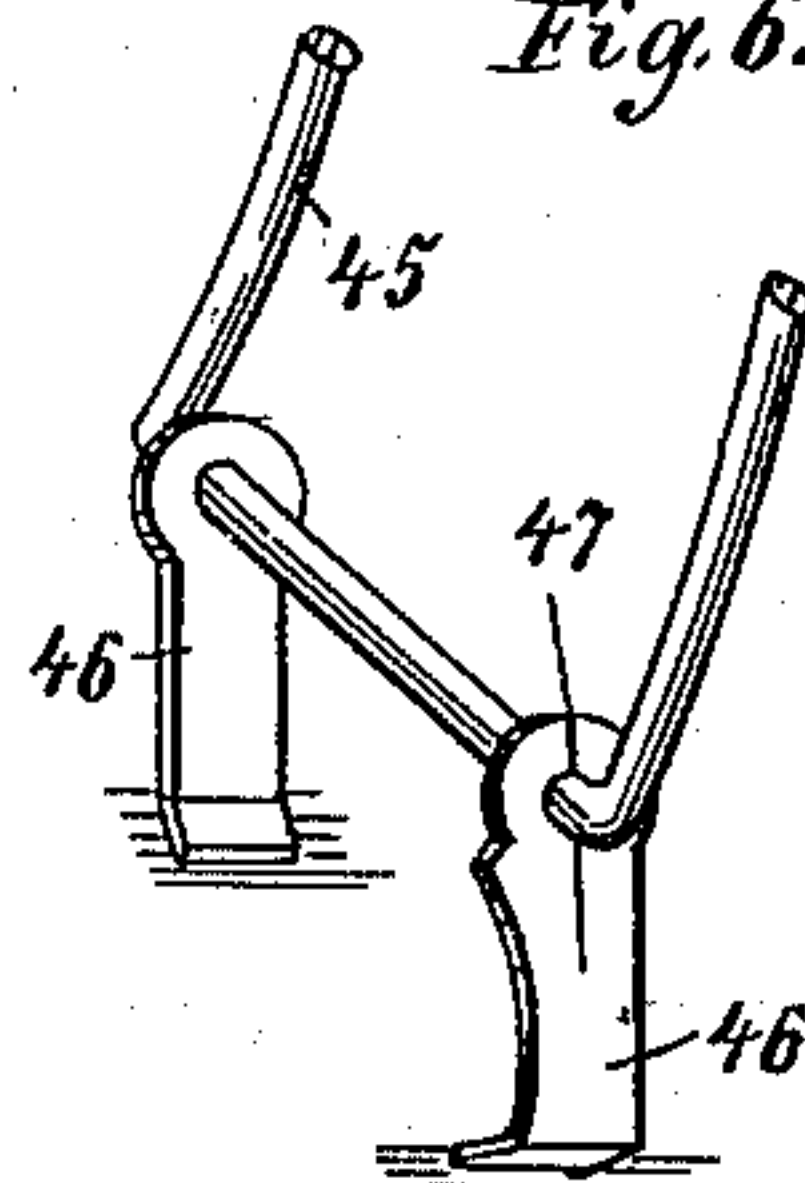
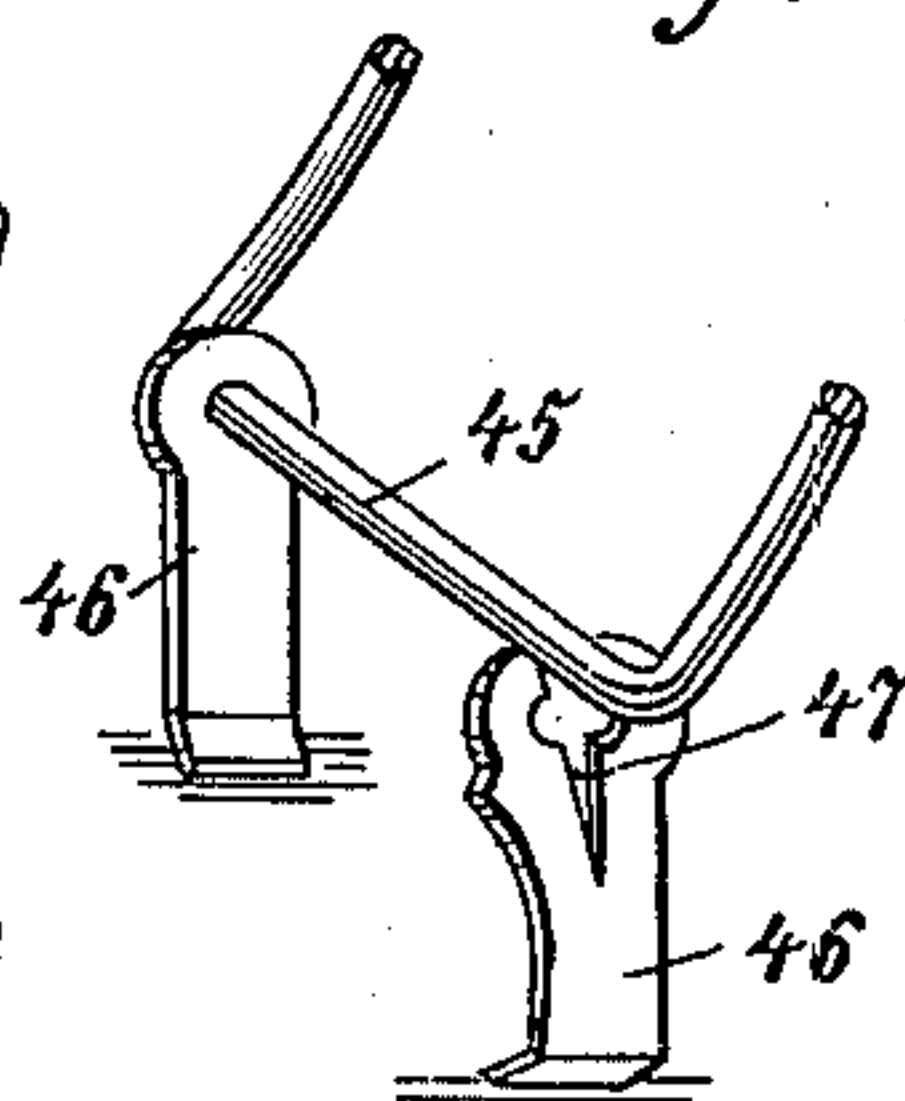


Fig. 7.



Witnesses:

Wm A. Paulson
C. L. Nielson.

By

Adam Ehebald,

Inventor

Schreiter & Mathews
his Att'ys

No. 654,309.

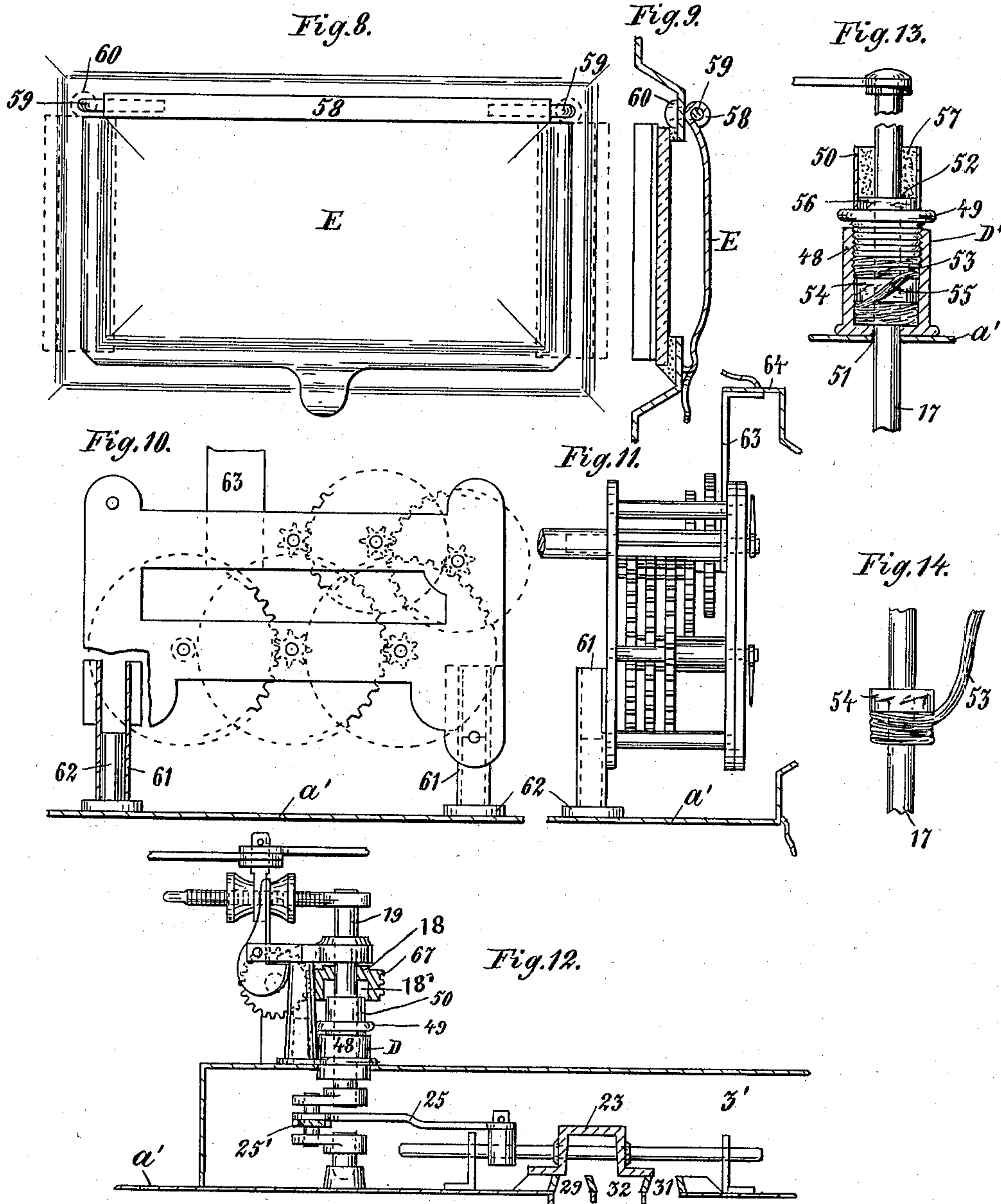
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3 Sheets—Sheet 3.



Witnesses:
Jno A. Paulson
C. C. Wilson.

Adam Ehebald, Inventor
By
Schreiter & Mathews,
his Att'ys

UNITED STATES PATENT OFFICE.

ADAM EHEBALD, OF NEW YORK, N. Y.

GAS-METER.

SPECIFICATION forming part of Letters Patent No. 654,309, dated July 24, 1900.

Application filed November 24, 1899. Serial No. 738,181. (No model.)

To all whom it may concern:

Be it known that I, ADAM EHEBALD, of New York, county and State of New York, have invented certain new and useful Improvements in Gas-Meters, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, wherein—

Figure 1 is an elevation partly-sectional view of my improved gas-meter, the front wall of the meter being removed. Fig. 2 is a top partly-sectional view thereof, a section of the top plate broken away to show the operating mechanism. Fig. 3 is a sectional view on line 3 3 indicated in Fig. 2. Figs. 4 and 5 are elevation and sectional views, respectively, of inlet and outlet pipes, showing the construction of their condensation-pockets. Figs. 6 and 7 are isometric views of the guide-wires for the bellows, Fig. 7 showing how the guide-wires can be removed from their lugs. Figs. 8 and 9 are elevation and sectional views, respectively, of the index-door. Fig. 10 is a front elevation of the index-frame and mechanism, the dial of the index being removed. Fig. 11 is a side view thereof. Fig. 12 is a sectional view on line 12 12 indicated in Fig. 2. Fig. 13 is a sectional view of a stuffing-box. Fig. 14 is a view showing how the packing is applied to the flag-wire.

My invention relates to all gas-meters known as "dry" meters; and it consists of the hereinafter-described improvements in the construction of such meters as set forth in the United States Letters Patent No. 448,643, granted to me March 24, 1891. These improvements are illustrated in the accompanying drawings, in which similar characters of reference indicate corresponding parts in all the figures of the drawings.

The casing of my improved gas-meter is divided by partitions *a* and *a'* into three compartments or chambers 1, 2, and 3. These compartments are air-tightly closed and isolated from each other. In each of the compartments 1 and 2 there is a piston-bellows A, each consisting of two metallic disks 5 and 6 and of a collapsible rim 7, suitably secured to flanges 8, joined to disks 5 and 6 on their circumference.

In the meters heretofore known the disks 6 of the piston-bellows are soldered on their

periphery to the partition-wall *a*, and as it is quite often necessary to remove the piston-bellows for repairs the disks 6 must be removed by chiseling from the partition. In my improved construction this trouble is avoided. Disks 6 are secured at 9 to disks 10 by soldering or screwing them on air-tightly. The latter are soldered on their entire circumference to the partition-wall *a*. Inlet-tubes 11 connect with the spaces confined between disks 10 and partition-wall *a* on the upper end of the meter and drip-tubes 12 below. When taking apart the meter, it is only necessary to loosen disks 6 around the aperture at 9, whereupon the piston-bellows may be removed. To disks 5 are secured plates 13, on which are mounted flags 15, swinging on pins 16 between lugs 14 of the carriage-post. Flag-wires 17, set in bearings 17' and stuffing-boxes *D'* and *D''*, are secured to the other ends of flags 17. They operate crank-shaft 19 by means of toggle-joints 21 and 22 as the piston-bellows A pulsate. Valves 23 and 24 are connected by links 25 and 25', respectively, to the same crank-shaft 19, and are thus operated by the actions of the piston-bellows A, opening and closing alternately the ports through which the gas passes to and from the compartments 1 and 2 and to and from the piston-bellows A and from the meter into pipe 35, connecting with the outlet-pipe. The gas enters the meter through pipe 27 and passes through channel 26 and aperture 28 into compartment 3' and through ports 29 and channels 30 and 30' into inlets 11 and through these inlets into the piston-bellows A and through ports 31 into the compartments 1 and 2. These ports of admission are opened and shut alternately by valves 23 and 24, which at the same time in reversed order open and close ports 32, permitting the gas to escape from the meter through channels 33 into the pipe 35.

It is well known that illuminating-gas always carries a considerable quantity of corrosive vapors and other condensable substances, which accumulate in the meter, causing the parts of the meter to rot and rust. It is also well known that where meters are exposed to low temperature these accumulations of condensed moistures are liable to freeze and to render the meters inoperative.

To avoid as much as possible these ill effects of condensation, I provide both the inlet and the outlet pipes 27 and 35 with pockets 34, extending below the channels 26 and 33, respectively, in which the products of condensation accumulate. Similar pockets or drip-tubes 12 are provided connecting with the space between the partition-wall *a* and disks 10, to which piston-bellows A are secured. The aggregations accumulating in pockets 34 may be discharged through apertures provided in their bottoms and normally closed by drip-screws 36. The aggregations in pockets 12 are discharged through apertures closed by a similar drip-screw 37, and from the compartments 1 and 2 through apertures provided in the bottom of the casing closed by drip-screws 38. These apertures are in the lowest point of the casing of the meter, and therefore the meter can be drained at any time without changing its position.

The diameter of the piston-bellows is considerably smaller than the diameter of the casing and the piston-bellows are so located in the casing that their flexible rims 7 do not come in contact with the walls of the casing in any position.

The considerable clearance between the rims 7 of the piston-bellows and the walls of the casing prevents the condensed substances accumulating in the casing to come in contact with the rim, and the rotting of these rims is avoided and the period of usefulness of the meter greatly extended.

To avoid any possibility of piercing the rims 7 of the piston-bellows A by a suitable pointed instrument inserted through the apertures closed by the plugs 38, plates 39 are provided. These are secured to the casing, preferably soldered thereto, as shown in Fig. 3.

The mechanism indicating the quantity of gas passing through the meter is also operated by the pulsations of the piston-bellows A, the connections being so adjusted that a certain number of motions of the piston-bellows indicates one cubic foot of gas. This arrangement is based on the assumption that by each expansion and contraction of the piston-bellows a certain quantity of gas is delivered and that the aggregate quantity of gas thus passing through the meter is one cubic foot.

In meters heretofore used when the gas is delivered under high pressure or when the quantity of gas passing through the meter nearly exceeds its capacity the piston-bellows do not work reliably, and then the registering mechanism is driven at a greater or less speed than that corresponding to the quantity of the gas actually passing through the meter, because the gas flowing into the piston-bellows at a high pressure expands them before it is fully filled, thus closing the inlet-ports, and then again the compression being correspondingly retarded the ports are fully closed, the gas passes through the meter without actuating the piston-bellows, and conse-

quently the meter registers less gas than actually passes through it. To avoid this and to secure a reliable working of the meter, I provide covers 41, which are soldered or otherwise affixed to disk 6, as shown in Fig. 3, and cover the apertures through which the gas flows into the bellows. These covers break the force of the current of gas and divert its flow downwardly, as indicated by the arrows. By this arrangement I obtain the result that the bellows expand gradually as the inflowing gas fills them and contract again in the same proportion as the gas escapes. The valves 23 and 24 then fully open and fully close the ports, and the meter registers safely the correct quantity of gas passing through it, the motions of the registering apparatus being governed solely by the actual quantity of the flow of gas through the meter.

Another improvement in the construction of my dry meter is embodied in the hinge or pivot connecting flags 15 to lugs 14 of the carriage-post. It is necessary that this connection be safe and working with the least possible friction.

In the meters heretofore used a fixed stud is usually provided in the lower lug and a short pin set or screwed through the upper lug into the bore of the flag. This arrangement is not satisfactory. If the parts of the joint are made snugly fitting, considerable friction is created, retarding the working of the flag. If the parts are not fitted snugly, the joggling interferes with the proper working of the flag. I therefore make the lugs 14 somewhat farther apart, or, as it is expressed more popularly, make the carriage-post longer, than the width of the flag 15 requires and fit pin 16 snugly into the bores of the lugs 14 and in the bore of the flag. This arrangement secures free and smooth working of the flag. To avoid sliding of the flag along the pin, I provide an elastic concave washer 43, which is inserted between the flag and the lug 14 and holds the same in position with the least amount of friction. Pin 16 is secured in its place by a cross pin or wire fastener 44, set in a transverse bore provided on its lower end.

A further improvement in the construction of the meter is illustrated in Figs. 6 and 7. When it is necessary to repair the piston-bellows, the guide-wires 45, which are journaled in lugs 46, greatly interfere with the work. Heretofore it was necessary to first remove the lugs 46 before the guide-wires could be disengaged. This involves considerable labor and trouble, and it is also difficult to replace them exactly in position and arrange the guide-wires after the meter is repaired. To avoid this trouble, I use lugs made of soft metal and split one of them, as shown in Figs. 6 and 7 at 47, transversely through the bore in which the guide-wires 45 are inserted. When it is necessary to disengage the guide-wires 45, the split lug is spread apart by screw-driver

or chisel, as shown in Fig. 7. The guide-wire is lifted from the bore and withdrawn by shifting to one side in the direction of the other lug. When the meter is repaired, the guide-wires are again replaced and the split lugs pressed together by pincers. This operation is much more simple and rapid.

Another improvement is embodied in the construction of the stuffing-boxes D, D', and D² and in the arrangement of the packing therein to prevent the escape of gas through the bearings of the flag-wires 17 and shaft 19. Each of these stuffing-boxes consists of a tubular box 48, soldered to the partition α' , as shown in Figs. 1 and 13, or sunk and soldered in an aperture made therefor in the partition, as shown in Fig. 12. The upper ends of these boxes 48 are open and screw-threaded and perforated plugs 49 screwed therein. The upper ends of these plugs 49 are enlarged into tubular cups 50. The flag-wires 17 or shaft 19 are snugly fitted in the bores 51 of the cups 48 and in the bores 52 of the screw-threaded plugs. There are two packings provided, one in the box 48 and another in the cup 50 of the plug. The packing in use in the box consists of a piece of soft twine 53 or similar material saturated with some semiconsistent fatty substance and of a plug 54. The twine packing is wound around the flag-wire or around the shaft for about one-fourth of the length of the box, and then the plug 54, which is preferably a cork washer boiled in oil or in paraffin and snugly fitted into the box, is set thereon, the twine packing being drawn over its side, as shown at 55 in Fig. 13, and then again wound around the flag-wire or shaft until a thickness is obtained filling about three-fourths of the box. Then the plug 49 is screwed in tightly, whereby the packing is compressed. The object of the described winding of the twine packing 53 is to facilitate the withdrawing of the same and of the washer 54 from the stuffing-box. When this is required, the plug 49 is unscrewed, the twine packing is unwound until the washer 54 is reached, and then by pulling it this washer is drawn up from the box, whereupon the remaining part of the packing is unwound and removed. The additional packing provided in the cup 50 consists of a washer 56, made of the same material as plug 54, and of a filling 57, of tallow or some other semiconsistent fatty substance, which is filled on top of the washer 56 somewhat compressed.

As shown in Fig. 12, the stuffing-box of the shaft 19 is set necessarily right underneath the worm-wheel 67, transmitting the motion of this shaft to the index mechanism. To avoid the necessity of always dismounting the gear and links set on shaft 19 whenever the packing is to be renewed or attended to, this worm-wheel is provided with an upwardly-extended hub 18 and a recess 18', into which the upper part of cup 50 may be receded when plug 49 is unscrewed from the box 48. By

this arrangement it is rendered possible to exchange or to refit the same at any time without dismounting the other parts of the mechanism.

Another part of my invention relates to the improvements in the manner of pivoting the door upon the casing covering the dial of the index. This is illustrated in Figs. 8 and 9. Heretofore this door E was hinged to the casing in the manner shown in Figs. 12 and 13 of my aforesaid Letters Patent No. 440,643. The defect of this arrangement rests therein that the hinge part of the door is easily twisted and torn and that when dismounting the door the hinge must be unsoldered along its entire length. In the arrangement shown in Figs. 8 and 9 the door E is provided with a tubular fold 58, extending its entire length, and is held to the casing by two pivots 59, bent at right angles and having their shorter ends soldered in the casing, as shown at 60 in Fig. 9, and their longer ends inserted in the tubular fold 58 of the door. The advantage resulting from this arrangement is that the bearing of the door is extended for its entire length, and thereby the liability to twist or break greatly reduced. Another advantage resulting therefrom is that the removing of the doors from the casing requires only the unsoldering of one of the pivots 59 from the casing, whereupon the door can be readily disengaged from the other pivot.

Another part of my invention relates to the manner of fixing the index mechanism in the meter. The index mechanism is mounted in a frame and must be secured in correct position to insure its proper operation. It frequently happens that this mechanism must be removed, and the greatest difficulty is then experienced in resetting it. This is due to the fact that in the meters heretofore employed the frame is provided with legs which are soldered upon the table or upper partition-wall α' , and of course it is not easy to set the frame again exactly in the old position. To avoid this trouble, I make the legs 61 of the index-frame tubular, as shown in Fig. 10, and provide two posts 62, which I secure to the table or partition α' in the required position. In addition to this I provide the flange 63, secured to the index-frame, and bent, as shown in Fig. 11. The bend of this flange corresponds with the distance between the partition α' and the flange 64 of the face portion of the casing of the meter. This flange is slid underneath flange 64, and in conjunction with studs 62, which fit snugly into the legs 61 of the frame, holds the index-frame securely in place. Flange 63 is moderately flexible to permit the withdrawing of it from engagement with flange 64 by bending the same, whereupon the index mechanism can be removed by lifting it upwardly. It is apparent that in this arrangement there is no difficulty experienced in removing and resetting the index mechanism in its place in the meter, and

that all trouble involved in readjusting the same relatively to the other parts of the meter is obviated.

I claim as my invention and desire to secure by Letters Patent—

1. The combination with a gas-meter comprising a hermetically-sealed casing divided into gas-tight compartments isolated from each other, piston-bellows operatively mounted in the compartments and connected with the mechanism actuating the registering device, an inlet and an outlet tube, channels connecting the inlet-tube, the compartments and the piston-bellows and channels connecting the piston-bellows and the compartments with the outlet-tube, of flexible guards secured to the inner disks of the piston-bellows and extending across the apertures thereof.

2. The combination with piston-bellows of a gas-meter provided with guide-wires, of lugs, for supporting the guide-wires, made of soft metal and split longitudinally through the bearing of the guide-wires.

3. The combination with piston-bellows of a gas-meter of convex disks secured to the partition-walls of the meter, having apertures in center provided with suitable flange for affixing thereto of the inner disk of the piston-bellows; the convex disks forming, conjointly with the partition-wall of the meter, chambers extending below the inlet-apertures of the piston-bellows; and of drip-tubes communicating with the chambers and provided with apertures for discharge of sediments accumulating in the chambers.

4. The herein-described means for connecting the flag to the outer disk of the piston-bellows consisting of a carriage-post having lugs wider apart than the width of the flag, a bore throughout the entire width of the flag, corresponding bores in the lugs of the carriage-post, a concave washer set between the flag and the carriage-post, a hinge-pin passed

through the bores in the lugs of the carriage-post and provided with a transverse bore on its lower end and a flanged head on its upper end and of a cross-pin set in the transverse bore of the hinge-pin.

5. The combination with the index-door of a gas-meter provided with a tubular fold, of two pivots bent approximately at right angles and having their short ends soldered in the casing of the meter and their longer ends inserted in the tubular fold of the door.

6. The combination with mechanism for transmitting the motions of the piston-bellows to a registering device and comprising a stuffing-box consisting of a box and a plug screwed therein, a crank-shaft journaled in the stuffing-box and driven by the pulsations of the piston-bellows, of a gas-meter, a worm-wheel set on the same shaft immediately above the stuffing-box and having a recess to admit the plug of the stuffing-box substantially as and for the purpose specified.

7. The combination with a gas-meter provided with mechanism for registering the quantity of gas passing through the meter set above the operating parts of the meter and driven by the apparatus conveying the gas into and from the meter, of means for fixing the mechanism removably in position, comprising studs affixed to the upper partition-wall, tubular legs secured to the frame of the registering mechanism and fitted on the studs, a flexible flange affixed to the frame and adjusted to engage with the flange of the face portion of the casing.

In witness that I claim the improvements described in the foregoing specification I have signed my name in the presence of two subscribing witnesses.

ADAM EHEBALD.

Witnesses:

JOHN A. PAULSON,
ROBERT VALENTINE MATHEWS.