

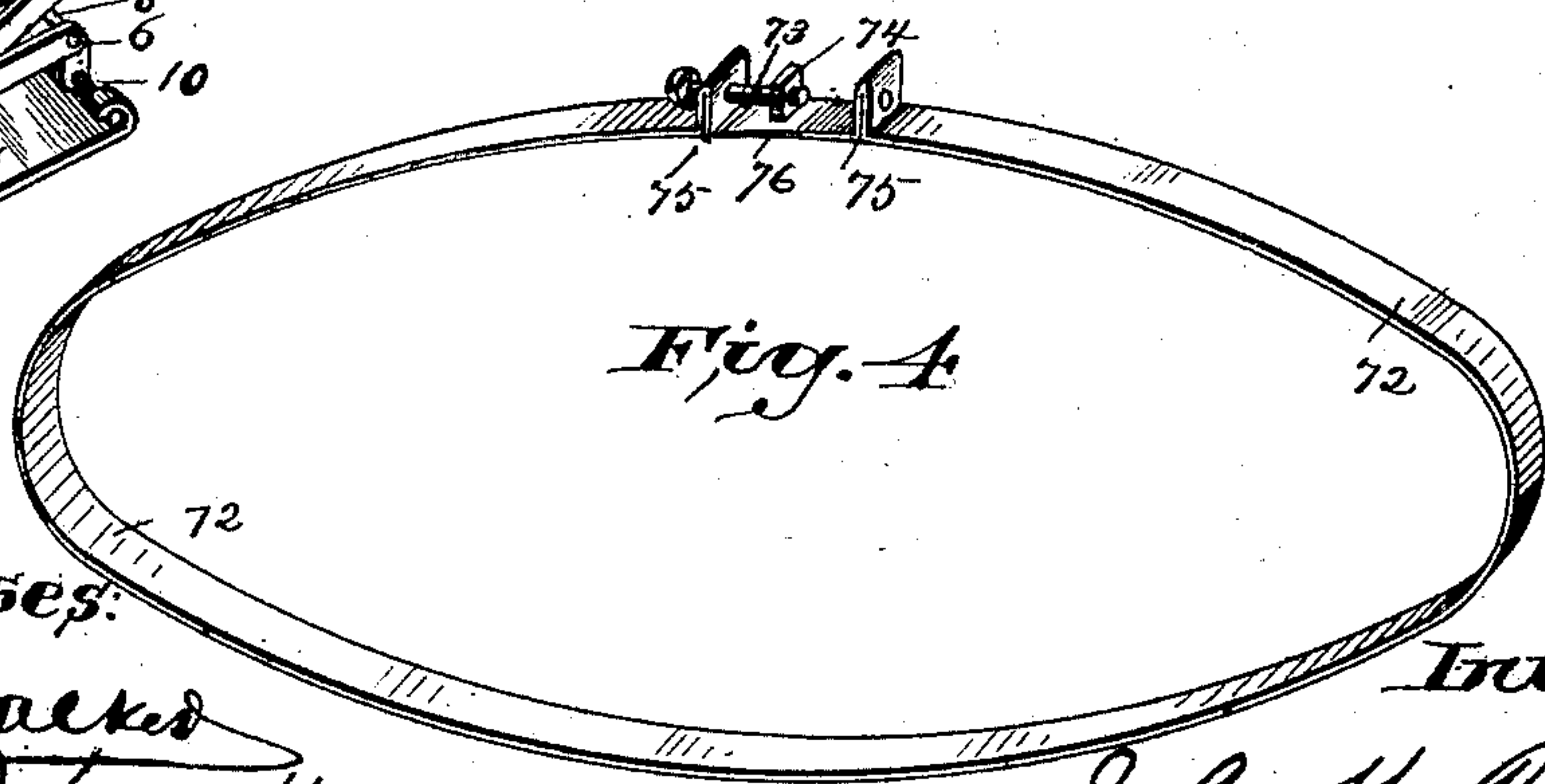
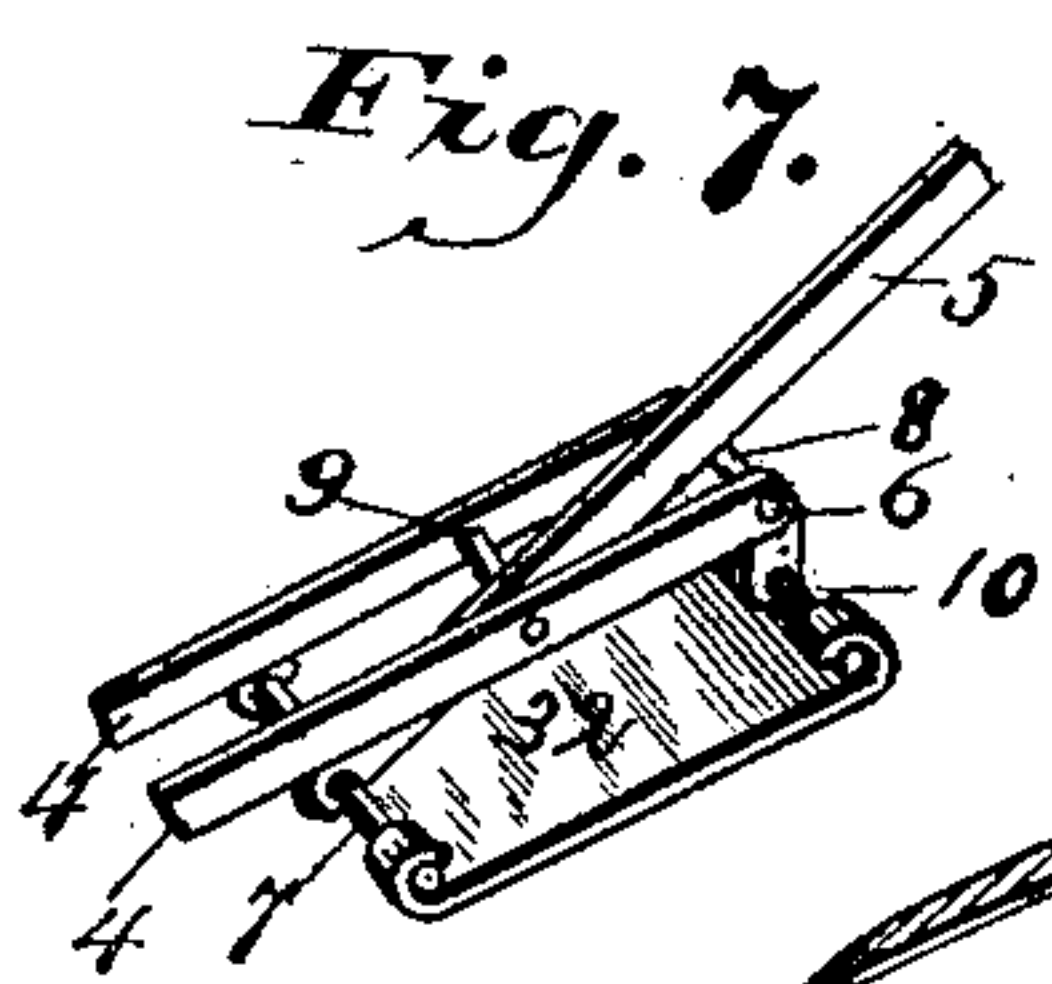
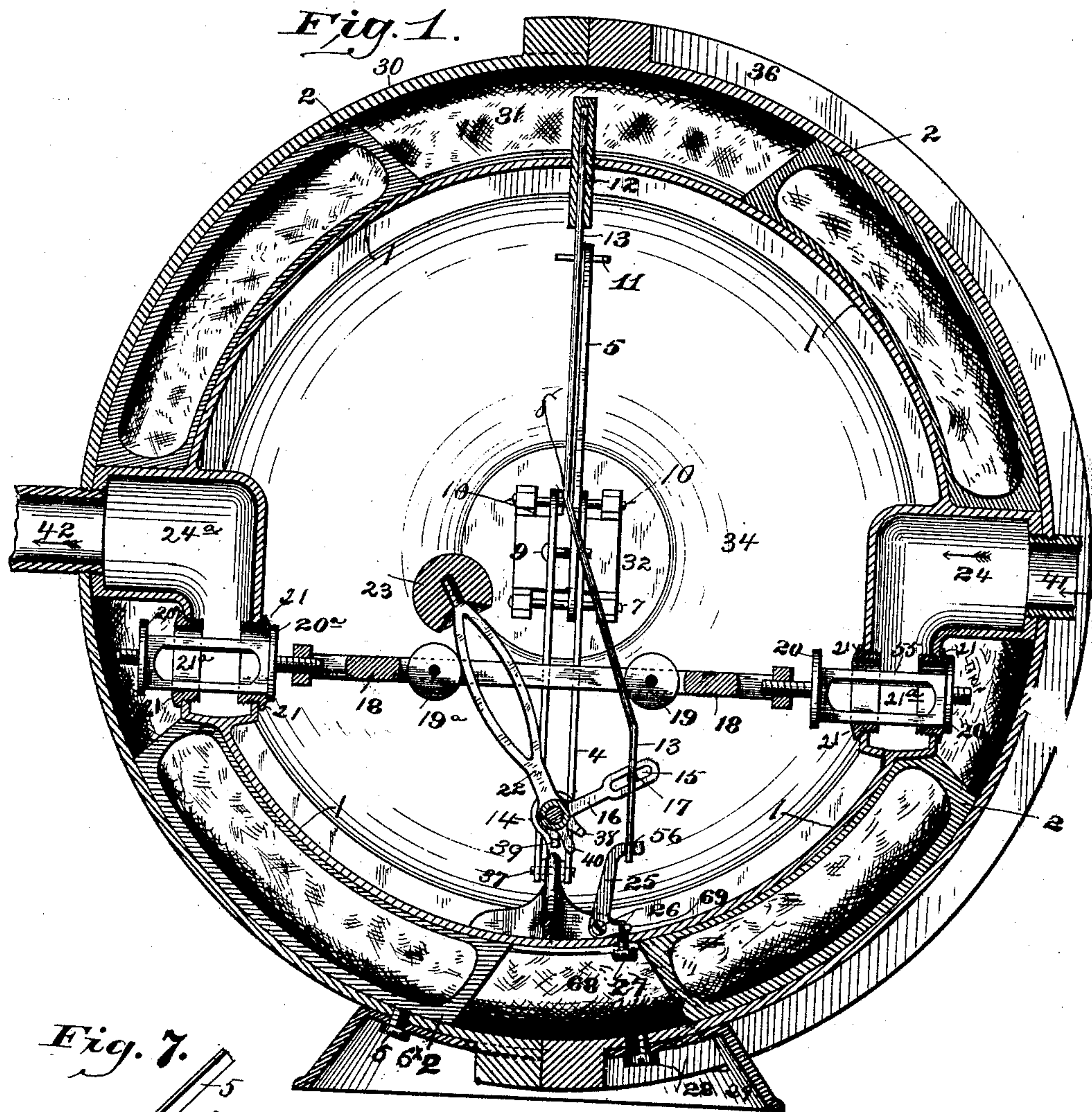
(No Model.)

J. W. CULMER.  
GAS METER.

3 Sheets—Sheet 1.

No. 409,275.

Patented Aug. 20, 1889.



Witnesses:

E. W. Wacker  
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John W. Culmer  
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att'y



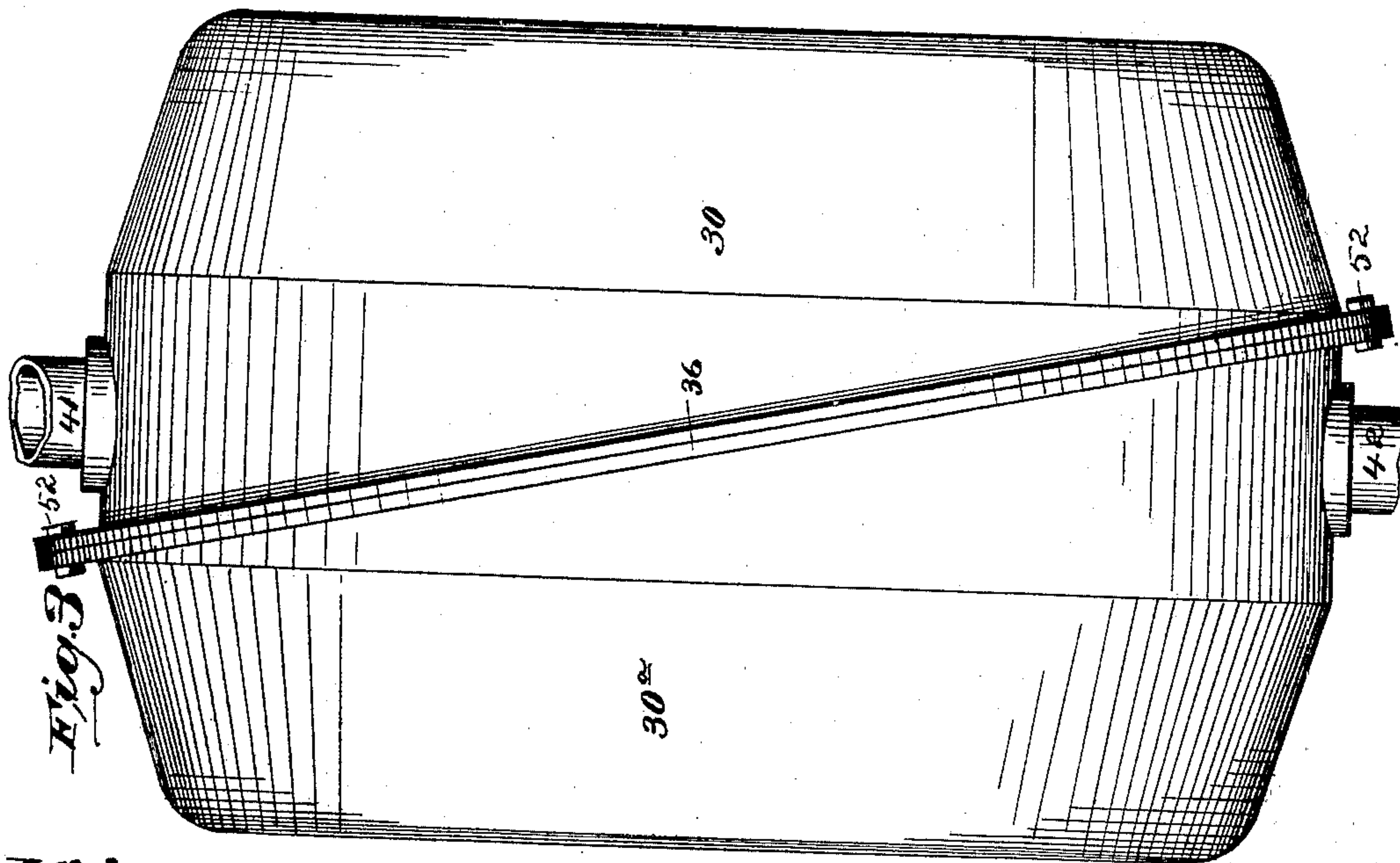
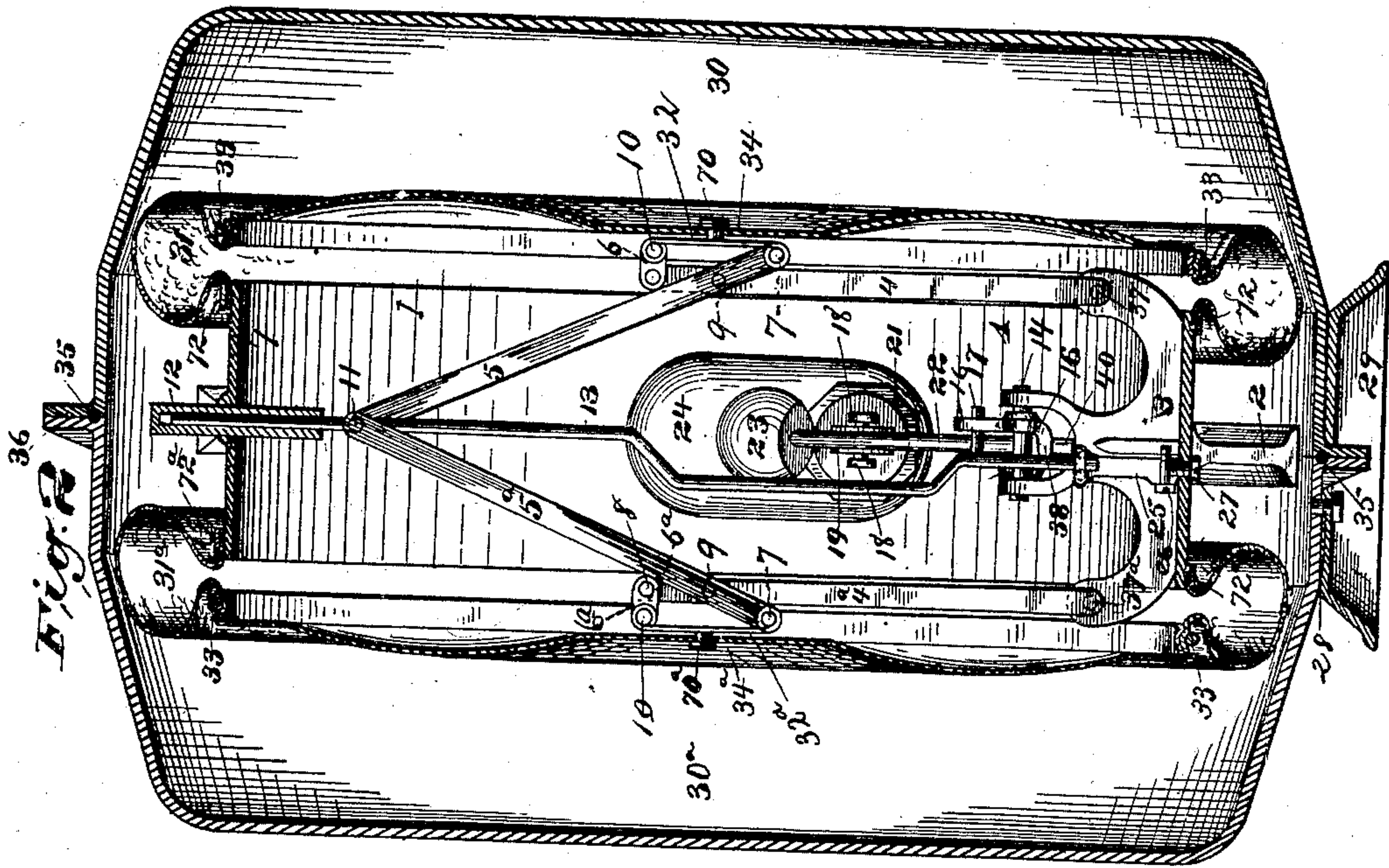
(No Model.)

J. W. CULMER.  
GAS METER.

3 Sheets—Sheet 2.

No. 409,275.

Patented Aug. 20, 1889.



Witnesses:

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(No Model.)

J. W. CULMER.  
GAS METER.

3 Sheets—Sheet 3.

No. 409,275.

Patented Aug. 20, 1889.

Fig. 6.

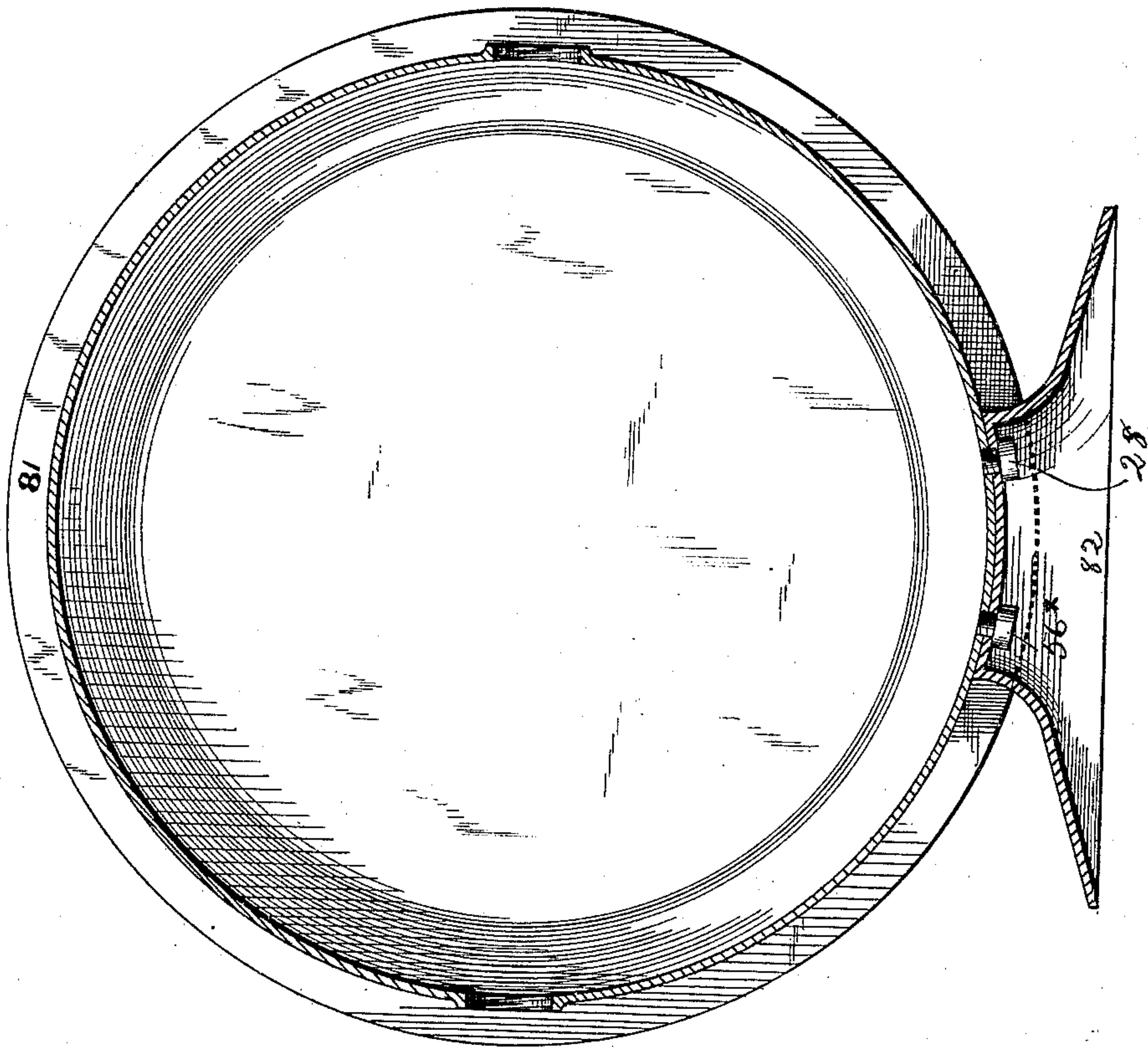
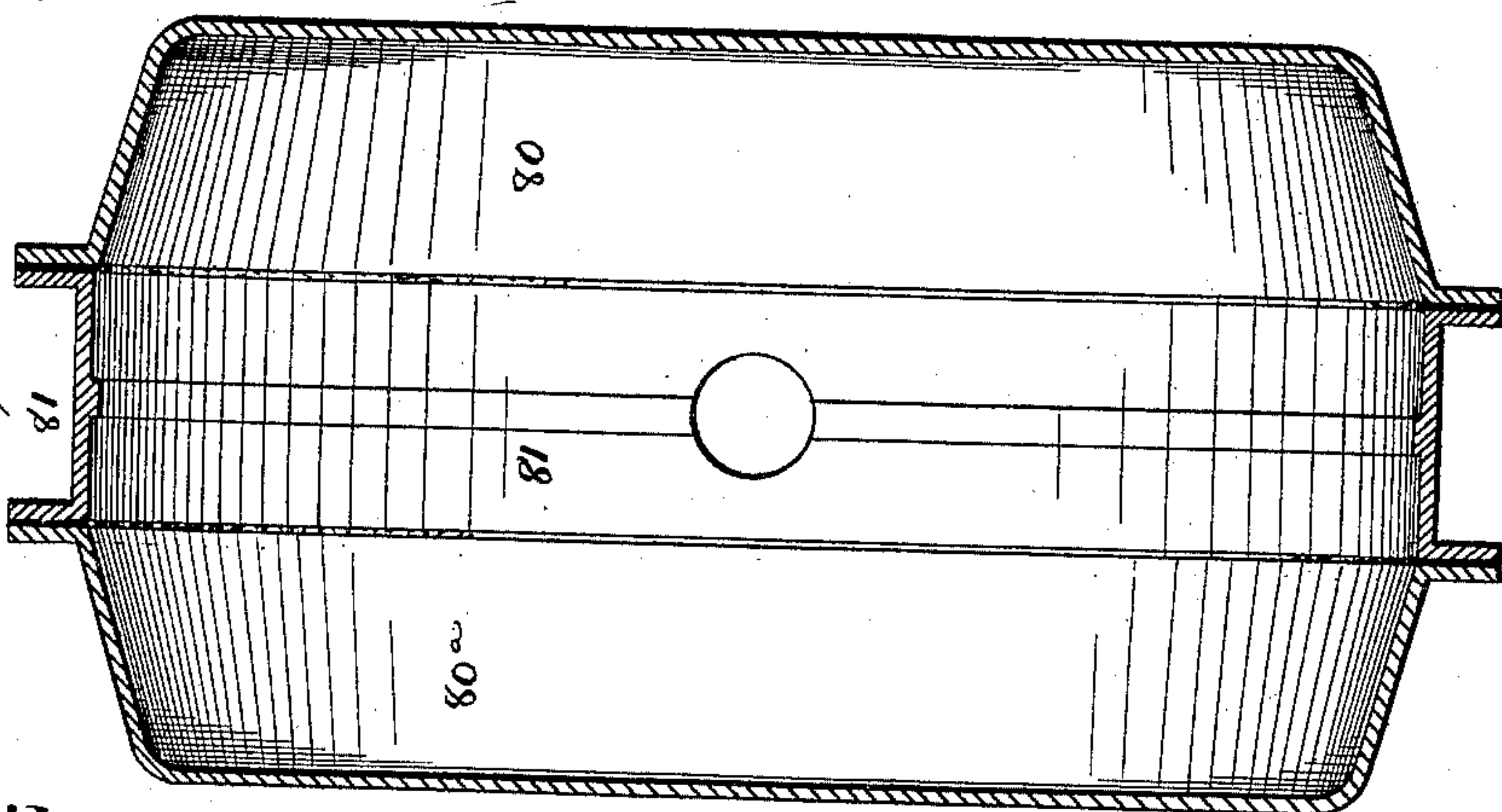


Fig. 5.



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Inventor

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# UNITED STATES PATENT OFFICE.

JOHN W. CULMER, OF NEW BRIGHTON, PENNSYLVANIA, ASSIGNOR TO  
JOHN H. LOGAN, OF SAME PLACE.

## GAS-METER.

SPECIFICATION forming part of Letters Patent No. 409,275, dated August 20, 1889.

Application filed March 28, 1889. Serial No. 305,092. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. CULMER a citizen of the United States, residing in the borough of New Brighton, county of Beaver, and State of Pennsylvania, have invented certain new and useful Improvements in Gas-Meters; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, wherein—

Figure 1 is a vertical transverse section of a meter embodying my invention. Fig. 2 is a vertical longitudinal section of the same at right angles to the section, Fig. 1. Fig. 3 is a plan or top view of the preferred form of meter-case. Fig. 4 is a detached view of the strap or band for securing the bellows to its ring. Fig. 5 is a vertical longitudinal section of a modified form of meter-case, and Fig. 6 is a vertical transverse section of said modified form of meter-case. Fig. 7 is a detached perspective view of one of the spiders for connecting the levers 4 4<sup>a</sup> and 5 5<sup>a</sup> with one of the disks 34, which forms a head of the bellows.

Like symbols refer to like parts wherever they occur.

My invention relates to that type of "dry meters" in which the measurement is effected by the reciprocating action of two disks or pistons operating within an inclosing-case, and alternately expanding and contracting under the pressure from the service-pipes, the amount or volume of fluid expelled at each pulsation or stroke of the pistons forming the unit of measurement.

In this type of meter it is necessary to the accuracy of the measurement and to the durability of the machine that the disks or pistons shall at all points of their stroke maintain a perfect parallelism each to the other. Heretofore this result has been obtained by the use of the "flag-staff," rotating in a stuffing-box and step in the one direction, and by a "fork" or two or more arms working in slotted guides upon the disks in a direction at right angles with the "flag-staff flag." The flag-staff has been utilized to carry a bell-crank, which, in combination with a complementary bell-crank from the opposite disk, completed the rotary motion which actuated

the valve system and the counting or registering device. The whole has been inclosed within a case of sheet-tin or light sheet metal built up of several parts and jointed with solder, liable to give way if exposed to sudden severe pressure.

The improvements which I have devised in the class of dry meters hereinbefore specified may be generally stated as follows: First, I provide an independent central ring, which forms a foundation or support for the operative mechanism of the meter, and also a coupling or foundation for the sections of the meter shell or case, which construction greatly strengthens the meter and facilitates the fitting up of the same; second, I provide the independent central ring, which forms a foundation for the structure, with inflow and outflow chambers at diametrically - opposite points, one of said chambers provided with appliances for connecting it with the supply-pipe, and the other adapted to be connected with the pipe which conveys the measured gas to the burners, each of said chambers being provided with openings within and without the ring in a right line and upon a horizontal plane when the ring shall be set up in place; third, in combining with said independent central or foundation ring a mechanical movement erected within said ring and connected to the disks or pistons of the meter, which movement is actuated by the stroke of said disks, and a guide for the rod by which the reversal of the valves is effected from said mechanism, and an adjusting device adapted to be operated from without the ring for regulating the stroke; fourth, in a case composed of sections each having the form of an oblique section of a cylinder, with its square end closed and its oblique end flanged for packing and making fast to its counterpart, the long side of one end and the short side of the other half of each section of the case joining to form an approximately cylindrical case; fifth, in a case-base provided with a diagonal slot for the admission of the oblique flanges of the case, and with openings for the reception of studs to secure it to said case; sixth, in providing the base and case or the studs which connect the two with openings, whereby access may be had to the adjusting



devices, and, finally, in certain details of construction and special combinations of the several elements constituting the meter, all as will hereinafter more fully appear.

5 I will now proceed to describe my invention more specifically, so that others skilled in the art to which it appertains may apply the same.

The main elements which give character to the construction are the independent central ring 1, which forms the foundation, support, or point of attachment for the operative parts, bellows, &c., and which permits the operative mechanism to be fitted and set up before being incased; the sectional case 30 and 30<sup>a</sup>, adapted to inclose and secure the independent central ring and its adjuncts after the parts have been fitted and set up and secured thereto, and the detachable base for the support of the whole.

In carrying out my invention I construct the ring 1 of any approved material—in practice I have found gray cast-iron to answer well—and I provide said ring with perforated flanges or webs 2, to support it when in position in the case 30 30<sup>a</sup>. At diametrically-opposite points I construct the chambers 24 24<sup>a</sup>, and fit said chambers with screw-threaded openings to receive the inflow-pipe 41 and the outflow-pipe 42. I also provide each of said chambers 24 24<sup>a</sup> with two ports or valve-openings—one inside and the other outside of the ring 1—which four openings or ports are bored or reamed in a line each with the others and their surfaces outside the chambers faced off to constitute seats 21 for valves 20.

55 indicates three-leaf guides of such diameter as shall permit them to move easily in a horizontal line within the ports 21<sup>a</sup>, and of a length sufficiently greater than the length of the line from the outside of the valve-port inside the ring to the outside of the valve-port which is outside of the ring to constitute the stroke of the valve. I have found that three-eighths inch is sufficient stroke; and when my chambers are two inches, outside measurement, I construct the guides 55 two and three-eighths inches in length. I fit the stem at either end of each guide with the valves 20 20. These valves may be of any approved form or material. I prefer, however, to construct a valve of brass having fitted to it a leather face; or it may be grooved for the reception of an annular ring of leather or other material which shall strike upon the metallic face of the port 21<sup>a</sup>. I fit the ports of the opposite chamber with similar three-leaf guides 55 and valves 20 20, and connect the inner extremities of the two guides by means of the guide-rod 18, which is provided at points equidistant from its center and from either end with the rollers 19 19, said rollers being rotatably fixed within a slot in the guide-rod. It will be seen that when the guide-rod 18 is thrown to the one end of its stroke the port on the inside of the ring at that end and the port upon the outside of the

ring at the opposite end of the valve system are closed, and the condition is reversed at the reversal of the stroke.

At a point within the ring 1 and equidistant from the centers of the valve-ports 21<sup>a</sup> 21<sup>a</sup>, and at a right angle with a line drawn horizontally through the centers of said ports, I make fast the standard 3, which forms the base of the actuating mechanism, and at a point diametrically opposite to the said standard I construct or affix the tubular guide 12.

The standard 3 I construct with a broad base to form a firm bearing within the ring and extend the said base to the front and back of the ring 1 to form the bearings for the pivots 37 37<sup>a</sup>. I also extend the standard 3 upon one side within the ring to form a support for the adjusting-lever 25, which is pivoted on the shoulder-screw 26, said screw being passed through said lever into the base of the standard 3. The upper portion of the standard 3 I provide with vertical lugs, which are bored in a line parallel with the centers of the pivots 37 37<sup>a</sup> for the reception of the pivot 14.

22 indicates a trip-arm provided with a hub at or near its lower end, said hub fitted to rotate easily upon the pivot 14, upon which it is placed. The long upper end of said trip-arm passes up within the slot of the valve-rod 18, and its upper extremity is provided with a weight 23, while the lower end is contracted in the form of the tail 40. Upon the same pivot 14 I fit loosely the crank-lever 16, which I provide at its hub with the right-angled fingers 38 and 39, which extend on either side of the tail 40 of the trip-arm, and the arm of this lever I provide with the slot 15 for the admission of a pin, stud, or roller 17, placed at a greater or less distance from its center. It will be readily understood that when the crank-lever 16 is moved downward from a horizontal line the finger 38 is brought into contact with the tail 40 of the trip-arm 22, and carries said arm with it until it passes the angle of ninety degrees, when the trip-arm falls by gravity, strikes the roller 19, and reverses the relative position of the valve system, and that when the crank-lever is moved in the opposite direction the valves are again reversed, or brought back to the first position.

I construct the adjusting-lever 25 with its upper end turned at an angle with the body of the lever, and I provide this angle with a slot or recess for the easy admission of the upright rod 13. I pivot the adjusting-lever 25 to one side of the standard 3 by means of the shoulder-screw 26 and extend the body of the lever from the hub at an angle approximating the curve of the ring 1 to admit of the adjusting-screw 27. This adjusting-screw I fit through the body of the ring 1, and construct its inner end with an annular groove fitted into a slot in the lower angle 69 of the adjusting-lever 25, by which means the lever can be operated from the outside of the ring 1.



13 indicates a vertical rod of such form that it shall in action move free and clear of all the actuating mechanism. I insert the upper end of said rod 13 into the tubular guide 12 and its lower end into the slot or recess of the adjusting-lever 25. At a point upon the vertical rod 13 determined by the approximate amount of stroke required I affix the pin or stud 17, and, if desired, I may adjust a cylindrical sleeve upon such pin, forming a roller to avoid friction, and pass such pin 17 through the slot 15 of the crank-lever 16. If, now, the adjusting-lever 25 be moved inward through an arc of a circle described around its pivot or central screw 26 by means of the adjusting-screw 27, the necessary stroke of the vertical rod is shortened and the reversal of the valves obtained with less displacement, while the reversal of this adjustment lengthens the stroke and increases the displacement.

4 4<sup>a</sup> 5 5<sup>a</sup> indicate levers of any approved material or metal. The levers 4 4<sup>a</sup> are connected at their lower extremities to the standard 3 by means of the pivots 37 37<sup>a</sup>, in such a manner that they may move freely through an arc upon such pivots, and all pivots within the mechanism are fitted in like manner and to admit of similar motion. The upper ends of the levers 5 5<sup>a</sup> are connected to the vertical rod 13, before referred to, by means of the pivot 11. The levers 4 4<sup>a</sup> are set up so that a line drawn through the center of the ring 1 shall mark the centers of the pivots 9 9, and said pivots are passed through proper holes in levers 4 5 and 4<sup>a</sup> 5<sup>a</sup>, so that as the levers 4 4<sup>a</sup> swing outward through their arc the pivots 7 7 in the outer ends of the levers 5 5<sup>a</sup> are carried outward upon a horizontal line through the combination of the curves described by their travel. The levers 4 4<sup>a</sup> and 5 5<sup>a</sup>, instead of being connected directly to the bellows-heads, are connected to intermediate spiders 32 32<sup>a</sup>, which are in turn detachably connected with the bellows-heads. This facilitates the setting up of the several parts of the meter. The spiders 32 and 32<sup>a</sup> (see Fig. 7) consist of separate plates, each provided on its back with a threaded lug or bolt 70, (see Fig. 2,) adapted to pass through a central hole in the disk or bellows-head 34 or 34<sup>a</sup>, and to be secured to said head by means of a nut 70<sup>a</sup>, or equivalent means. On the face of each of said spiders are two sets of eyes or bearings for the reception of pivots 7 and 10.

The lower ends of levers 5 5<sup>a</sup> are connected directly with the pivots 7 7, held by the lower set of eyes or bearings of the spiders 32 32<sup>a</sup>, and to the pivots 10 10, held by the upper bearings of said spiders, I connect the upper ends of levers 4 4<sup>a</sup> by means of short intermediate levers 6 6<sup>a</sup> (or links) and pivots 8 8. Thus the spiders 32 32<sup>a</sup>, and consequently the pistons or bellows-heads, are maintained in a parallel position at all points of their stroke.

It will be seen that the weight of the entire

mechanism rests upon the pivot 11 on the vertical rod 13, and so tends to expand the levers to the outer end of the stroke. I attach the disks 34 34<sup>a</sup> to the spiders 32 32<sup>a</sup> by means of a nut upon the outer side of each disk screwed upon a threaded stud forming part of each spider and passing through central openings in the disks, and the weight of said disks, together with the leather attached to them, bearing upon the outer ends of the levers 5 5<sup>a</sup>, balances the weight of the mechanism and equalizes the action of the gas upon the disks at all points.

The disks 34 and 34<sup>a</sup>, which constitute the heads or pistons of the bellows and are of suitable proportions for the purpose, I construct of stamped or otherwise-formed sheet metal with a periphery turned in at an approximately right angle with their outer surface, and this angular rim I corrugate or crease for the better retention of the sealing cement or varnish and of the wires with which the leather of the bellows is made fast to the disk. The disks, with their leather attached, being first placed upon the spiders and made fast by means of the nuts 70<sup>a</sup>, the surface of the ring 1 is coated with sealing material, the free edge of the leather 31 is drawn over the edge of the ring a sufficient distance, and the flat band 72 fitted down near or at the edge of the leather, and is then drawn tight by means of the screw 73 and nut 74 passing through both of the angular folds 75 75, thus securing the bellows to ring 1. This band 72 I construct of flat sheet metal of the proper section for the required strain, making the folds 75 75 at a right angle with the band and allowing one end to extend for a short distance beyond the fold, that the other end may be drawn upon it and the whole caused to embrace the leather tightly in every part. The angular projection I perforate, punch, or drill for the admission of the screw or bolt 73. The mechanism having been erected to this point may be fitted into a case of any approved form.

For the ordinary service required I prefer the following-described forms:

I construct a case of any approved material, preferably of gray cast-iron, having its division-line drawn diagonally across its horizontal plane. In those I have constructed the longer side of the casting has a depth of eight inches and the shorter side a depth of four inches, the castings being interchangeable, and when fitted together by means of the flanges upon their open ends forming a cylinder of twelve inches in length with a slightly-conical form from the center to each end. The size or proportions, however, form no part of the invention, as they will differ with different-sized meters. At the proper point in the longer side of such casting I form the opening for the admission of the pipe 41 or 42, as the case may be, it being only necessary that said opening shall correspond with the threaded opening in the cham-



bers 24 or 24<sup>a</sup> of the ring 1, and at a point upon the lower portion of the casting 30 30<sup>a</sup>, I drill and tap a seat for the reception of the stud-bolts or screws 28 56<sup>x</sup>. For the support  
5 of said case I construct a base 29, having a diagonal slot or groove for the reception of the flanges 36 and openings for the admission of the stud-bolts or screws 56<sup>x</sup> 28.

In setting up the meter I place the ring 1,  
10 which supports the completed mechanism, within one half of the case 30, where it is retained centrally by means of the web 2, surrounding the ring 1, and make it fast in place within the case 30 by passing the connecting  
15 sleeve or pipe 41 through the opening in the case and screwing it tightly into the threaded opening in the chamber 24. I then place the other casting 30<sup>a</sup> in place, screw its connection through the opening into the corresponding  
20 chamber 24<sup>a</sup> on that side, make tight the openings, and also the flanges 36, by means of the packing 35 and bolts or screws through the flange 36, and secure the base 29 in its place by means of the screws 56<sup>x</sup> and 28, connect there-  
25 with a counting or registering device in any approved manner, and the machine is ready for proving. Should it require adjustment such adjustment is effected by changing the amount of stroke by means of the adjusting-lever 25  
30 through the medium of the screw 27, which is operated by the removal of the stud 28 and the introduction of a suitable screw-driver or equivalent tool within the base 29, as hereinbefore specified.

35 In meters of certain size or capacity it is desirable that the device should be set up in another form. For such cases I construct the outer ring 81 flanged on both sides and fitted to the web 2 of the inner ring 1. This ring  
40 is fitted with openings corresponding with the threaded openings in the chambers 24 of the ring 1, and with a base 82 fitted between the flanges of the ring 81, said base being made fast to said ring by means of the studs 56<sup>x</sup> and  
45 28, as in the other case. The ends 80 80<sup>a</sup> are constructed of gray cast-iron, or of drawn or stamped sheet metal of a deep-dished form, and provided with flanges corresponding to the flanges of the ring 81. In this case the  
50 inner ring 1 and outer ring 81 are fitted together and mounted upon their base 82. The mechanism is set up in place, the disks and leathers fitted, sealed, and fastened as in the other case, and the two ends are packed and  
55 made fast to the flanges of the central ring by means of nuts and bolts, screws, or any other approved device, a counting or registering device is attached and the meter proved, as before described.

60 The operation of the completed device is as follows: The disks being closed or at the limit of their short stroke, as shown in Fig. 2, the gas entering through the chamber 24 by means of the inlet-pipe 41 in the direction  
65 shown by the arrow (see Fig. 1) will pass into the interior of the ring through the open port 21<sup>a</sup> at the right hand of Fig. 1 and expand the

disks until they reach the long or outward limit of their stroke. By means of this expansion the gas in the outer portion of the  
70 case between the disks and the case will be expelled through the open port 21<sup>a</sup> at the left hand of Fig. 1 through the chamber 24<sup>a</sup>, and through the outlet-pipe 42 to the place of consumption. The outward motion of the  
75 disks 34 34<sup>a</sup> moves the vertical rod 13 down through the medium of the levers 5 5<sup>a</sup>, and with it, through the pin 17 in the slot 15 of the crank-lever 16, the trip lever or rod 22 will be carried over until it passes the center, when  
80 it will fall upon the roller 19 and change the relative position of the valve system and change the flow of gas, the gas now flowing through the inflow-chamber to the outside of the ring, while that inside the ring is ex-  
85 pelled through the outflow-chamber to the point of consumption.

The ports 21<sup>a</sup> 21<sup>a</sup> in the chambers 24 24<sup>a</sup> may be bushed with any approved material for use with any gas or other fluid having a cor-  
90 rosive effect upon the material of the ring 1; but, whether bushed or not, it is necessary that the openings shall be in line and that their faces shall be made parallel for the perfect action of the valves. I do not confine  
95 myself to any special type of valve, nor to any special material as a body or facing for the valves, but prefer a valve-body constructed of brass and fitted with an annular ring of leather, said ring cemented into a circular  
100 groove turned in the face of the valve.

I may use in place of the stud 28 a hollow stud or screw fitted with a plug, effecting the adjustment through the hollow screw, rather than disturb that by which the base 29 or 82  
105 is made fast to the case. In any case the opening through which the adjustment is effected must be made gas-tight, by means of a plug or other device, after adjusting.

Having thus described my invention, what I  
110 claim, and desire to secure by Letters Patent, is—

1. In a gas-meter, the combination, with a detachable sectional case, of an independent central bellows-ring provided with an inflow  
115 and an outflow chamber at diametrically-opposite points of the ring, and peripheral projections for maintaining said ring centrally within the case, substantially as and for the purposes specified.

2. In a gas-meter, the combination, with an outer case, of an independent central ring provided with inflow and outflow chambers at diametrically-opposite points in said ring, and with a peripheral perforated web for  
125 maintaining said ring centrally within the case, substantially as and for the purposes specified.

3. In a gas-meter, the independent central bellows-ring 1, having the opposite inflow and  
130 outflow chambers 24 24<sup>a</sup>, provided with threaded openings at diametrically-opposite points in the periphery of said ring, and with valve-openings on both sides of said ring, in



combination with a suitable outer shell or case, said bellows-ring being independent of the outer shell or case, substantially as and for the purposes specified.

5 4. In a gas-meter, the combination, with an outer shell or case, of a ring 1, having inflow and outflow chambers 24 24<sup>a</sup>, provided with ports within and ports without the said ring, said ports being arranged in a horizontal line  
10 and having their faces parallel, and connected valves for controlling said ports, said bellows-ring being independent of the outer shell or case, substantially as and for the purposes specified.

15 5. In a meter, the combination, with a suitable case, of a ring adapted to support the operative parts of the meter, said ring having oppositely-placed inflow and outflow chambers and an intermediate guide, a standard  
20 arranged within the ring for the attachment of said operative parts, and a rod which moves in said guide and is connected with the operative mechanism, substantially as and for the purposes specified.

25 6. In a meter, the combination, with a suitable case, of a foundation-ring for the operative mechanism of the meter, said ring having inflow and outflow chambers provided with ports on both sides of said ring, a rod-guide at  
30 right angles to said ports, a standard diametrically opposite to said rod-guide for attachment of the operative mechanism, valves, mechanism for actuating said valves, and a rod which moves in said guide and is con-  
35 nected with the valve-operating mechanism, substantially as and for the purposes specified.

7. In a gas-meter, the combination, with the valves thereof, of a weighted drop or trip arm  
40 having a tail-piece, a pivoted crank-lever having fingers which inclose the tail-piece of the drop or trip arm and provided with a slot for the reception of an actuating pin or stud, and a rod connected with the disks or  
45 pistons of the meter and provided with a pin or stud which engages in the slot of the crank-lever, substantially as and for the purposes specified.

8. In a gas-meter, the combination, with a  
50 case, of an independent central ring provided with oppositely-placed inflow and outflow chambers and valves therefor, said valves connected by a suitable rod, a drop or gravity arm for actuating the valves, and a crank-  
55 arm for actuating the gravity or drop arm, said drop-arm and crank-arm pivoted to a standard on said central ring, substantially as and for the purposes specified.

9. In a meter, the combination, with the  
60 disks or pistons, of spiders attached thereto, levers 4 4<sup>a</sup>, pivoted, as at 37 37<sup>a</sup>, on a standard 3, and levers 5 5<sup>a</sup>, pivoted on the levers 4 4<sup>a</sup>, as at 9, and on a vertical rod which communicates motion to the valves, as at 11, said  
65 levers 5 5<sup>a</sup> being pivoted on the spiders, as at 7, and intermediate levers 6 6<sup>a</sup>, which connect

the levers 4 4<sup>a</sup> with said spiders or disks, substantially as and for the purposes specified.

10. In a meter, the combination, with a central ring, of two vertical parallel levers, each  
70 pivoted on said ring at one end and to the meter disk or piston at the other by an intermediate lever or link, a rod which actuates the valve mechanism, two levers, each of which is pivoted at one end to the rod which  
75 actuates the valve mechanism and at the other to a disk or piston of the meter, and also pivoted to the first-mentioned levers at an intermediate point, as at 9, substantially as and for the purposes specified. 80

11. In a meter, the combination, with a central ring and the valves of the meter, of two levers, each of which is pivoted at one end on the central ring or a standard supported  
85 thereby and at the other to a piston of the meter by an intermediate lever or link, a rod for communicating motion to the valves, two levers, each of which is pivoted to said rod at one end, to a meter-piston at the other, and to one of the first-recited levers at an inter-  
90 mediate point, a fixed guide for one end of the rod, which communicates motion to the valves, and an adjustable guide for the other end of said rod, substantially as and for the purposes specified. 95

12. In a meter, the combination, with the meter pistons and valves, of two parallel levers, each pivoted at one end to the meter-  
ring and at the other to the meter-piston by an intermediate lever, a rod which communi-  
100 cates motion from the meter-piston to the valves, two levers, each pivoted to the meter-piston at one end, to the said rod at the other, and to one of the first-recited levers at an intermediate point, a gravity or drop arm for  
105 actuating the valves, and a crank-lever for actuating the gravity or drop arm from the before-recited rod, substantially as and for the purposes specified.

13. In a gas-meter, the combination, with  
110 the valve mechanism and a rod for actuating the same from the meter-pistons, of an adjusting mechanism composed of a lever 25, attached at its hub to a standard 3 by a shouldered or pivot screw 26, having its upper  
115 portion bent and recessed to form a guide for the before-recited rod and its lower portion slotted to receive an adjusting-screw 27, and the adjusting-screw 27, substantially as and for the purposes specified. 120

14. In a gas-meter, the combination, with the meter-pistons, of two parallel levers, each of which is pivoted at one end to a standard  
125 arranged within the meter and at the other to one of the meter-pistons by an intermediate lever or link, two levers, each of which is pivoted on one of the first-recited levers, also to one of the meter-pistons, and to a rod which communicates motion to the meter-valves, and an adjusting-guide composed of a pivoted lever  
130 25, having its upper portion bent and slotted for the reception of the above-recited rod and



its lower portion slotted to receive an adjusting-screw 27, and said adjusting-screw 27, substantially as and for the purposes specified.

15 In a dry gas-meter, the combination, with the bellows piston or disk, of a detachable spider, as at 32, provided at its opposite edges with bearings for the attachment of the operative mechanism of said meter, substantially as and for the purposes specified.

10 16. A sheet-metal band for securing the bellows to its disk or to the meter-frame, said band having perforated angle-pieces adapted to receive a threaded clamping-bolt, and a lap-piece or extension end, substantially as and for the purposes specified.

15 17. In a dry gas-meter, the combination of central ring 1, bellows-leather 31, strap or band 72, provided with perforated angle-pieces 75 75, adapted to receive a threaded clamping-bolt and lap 76, and a bolt and nut for tightening the band, substantially as and for the purposes specified.

20 18. A gas-meter casing composed of two interchangeable halves, each having the approximate form of a slightly-conated cylinder, with its base diagonal to its axis and its small end closed, the diagonal open end having a flange for attachment to its complementary half and provided in its longest side with a port or opening at or near a point corresponding to the middle of the case, substantially as and for the purposes specified.

25 19. In a gas-meter, the combination of two interchangeable sections having oblique flanged open ends, said sections constituting a case, a base provided with a diagonal slot for the reception of the flange of the case-sections, and means for connecting the parts, substantially as and for the purposes specified.

30 20. In a gas-meter, the combination of an independent central ring for the support of the operative mechanism, said ring having threaded inflow and outflow ports at opposite points, and a case composed of two cylinder-

sections having diagonal flanged open ends 45 provided with ports corresponding to the ports of the central ring, substantially as and for the purposes specified.

21. In a meter, the combination of an independent central ring for the support of the 50 operative mechanism, said ring having inflow and outflow ports at opposite points, a case composed of two diagonal flanged open-ended sections, a base having a diagonal slot or seat for the flange of the case, and means for connecting the several parts, substantially as and 55 for the purposes specified.

22. The combination, in a gas-meter, of a central bellows-ring having diametrically-opposite inflow and outflow chambers with 60 threaded ports and with valve-ports on both sides of said rings, a tubular guide at right angles to said valve-ports, a standard diametrically opposite to said guide, two levers pivoted on the standard and to the meter-pis- 65 tons by interposed links or levers, two levers pivoted on the first-named levers and also on the meter-pistons, a rod which moves in the tubular guide and to which the last-recited levers are pivoted, an adjustable lever pivoted 70 on the standard and having a slot to receive the rod, a slotted crank-arm having projecting fingers and actuated by a pin on the rod, a gravity-lever or drop-arm actuated by the fingers of the crank-arm, a stem which con- 75 nects the valves of the meter and which is actuated by the drop-arm, and a sectional meter-case adapted to be secured to said central bellows-ring which supports the herein-before-recited mechanism, substantially as 80 and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 27th day of March, 1889.

JNO. W. CULMER.

Witnesses:

W. A. COVENTRY,  
J. H. LOGAN.