(No Model.)

2 Sheets—Sheet 1.

E. B. DE LA MATYR.

GAS METER.

No. 578,865. Patented Mar. 16, 1897.

Fig. 1.

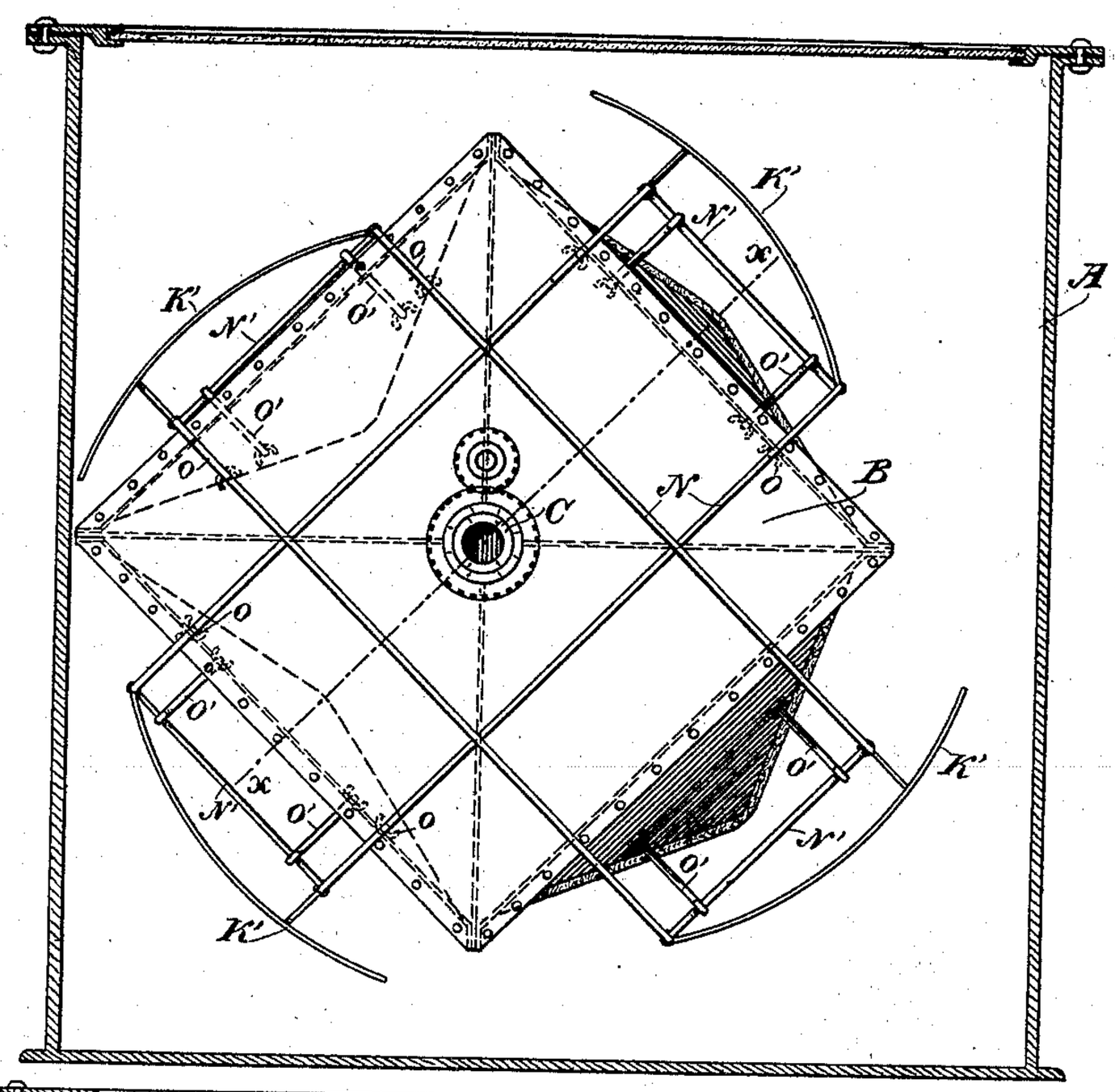
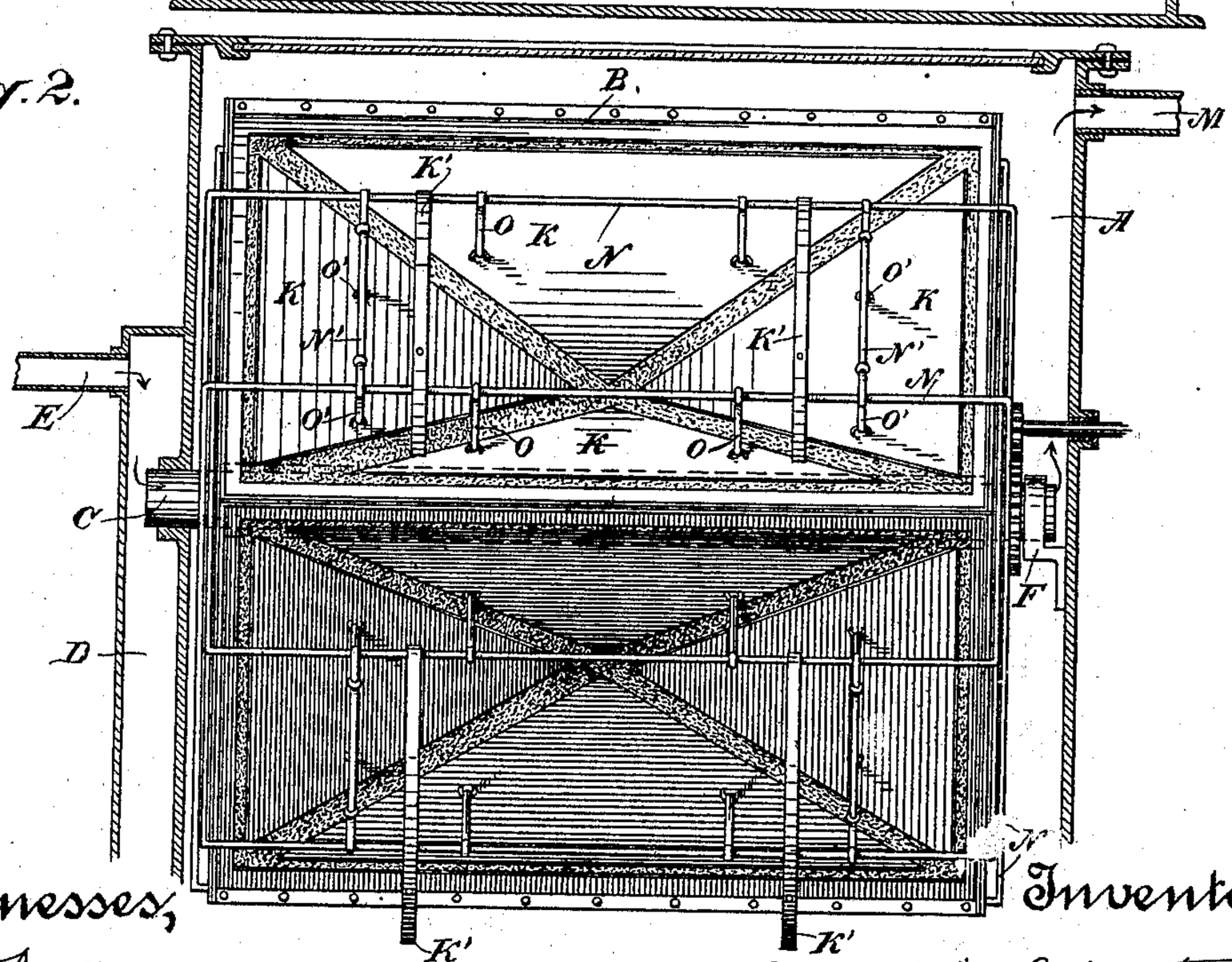


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

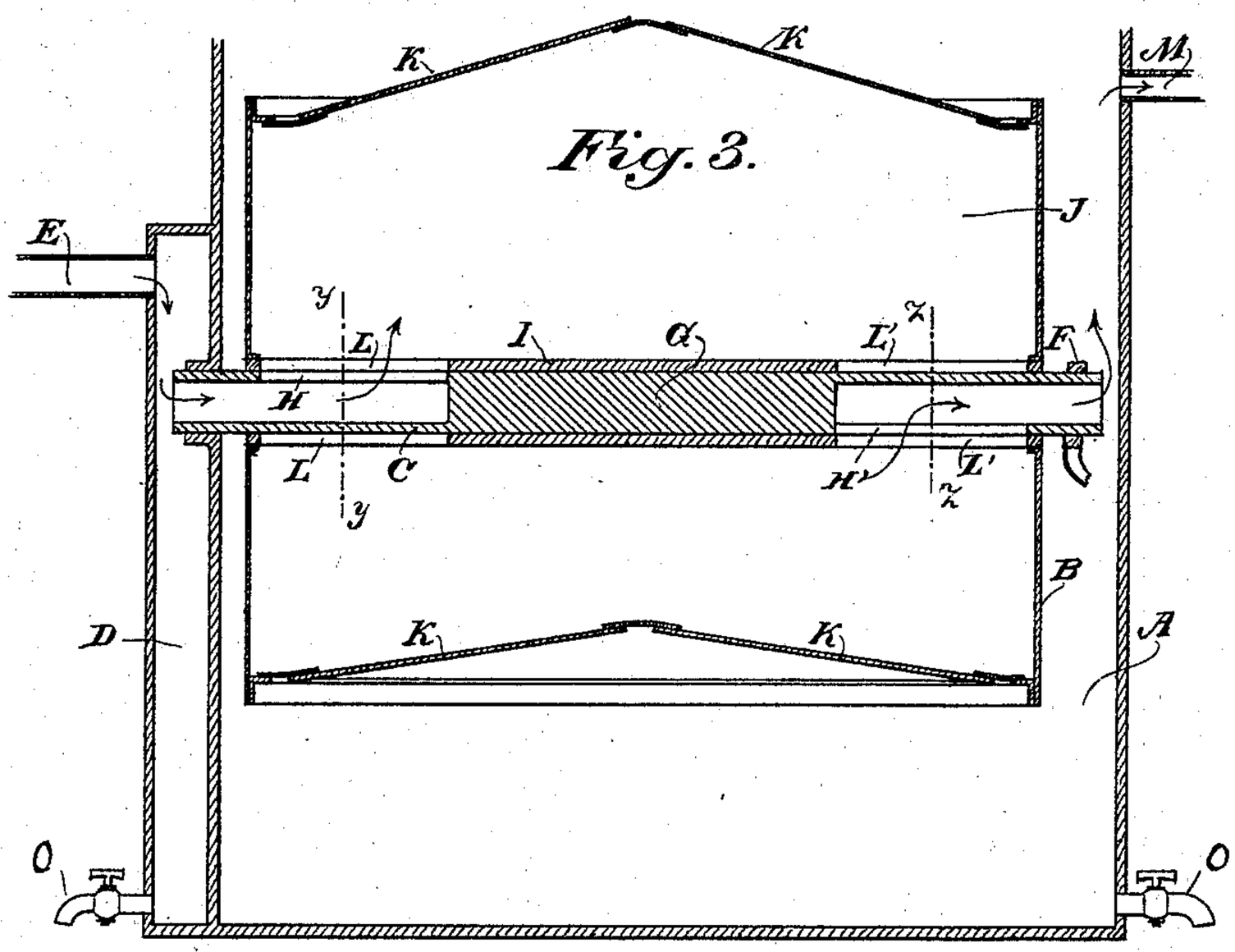


Fig. 4.

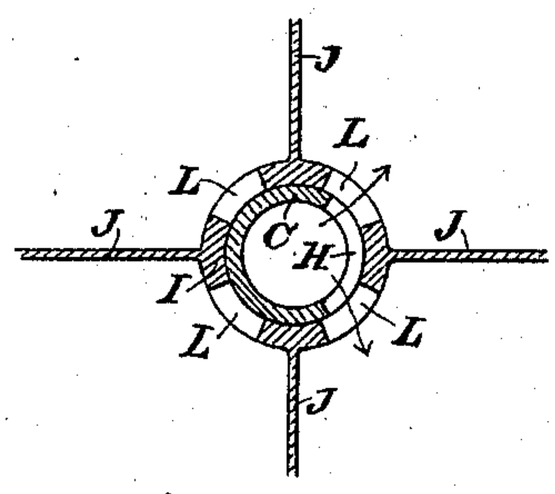
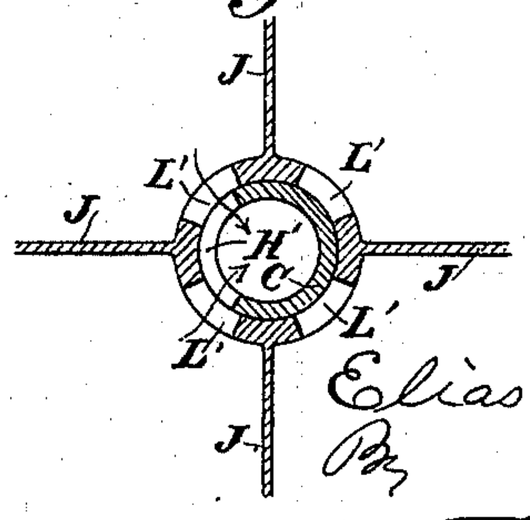


Fig. 5.



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UNITED STATES PATENT OFFICE.

ELIAS B. DE LA MATYR, OF SAN FRANCISCO, CALIFORNIA.

GAS-METER.

SPECIFICATION forming part of Letters Patent No. 578,865, dated March 16, 1897.

Application filed November 15, 1895. Renewed July 1, 1896. Serial No. 597,786. (No model.)

To all whom it may concern:

Be it known that I, ELIAS B. DE LA MATYR, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Gas-Meters; and I hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to a novel gas-meter or apparatus for measuring gas which is adapted for the continuous flow of gas therethrough and which is actuated by such flow so as to accurately indicate the quantity of gas which passes through it.

An apparatus embodying my invention embraces as a main feature of construction a revolving measuring-drum having a plurality of compartments, each provided with a flexible diaphragm forming a movable side wall, the movement of which increases or decreases the area of the compartment, a valve actuated by the turning of the drum and acting to bring the compartments at the descending side of the revolving drum successively into communication with the supply-pipe and the compartments at the rising side of the drum successively into communication with the delivery-pipe, and means acting on the movable side walls of the compartments which are in communication with the delivery-pipe and operating to throw said walls inward, so as to force the gas from the said compartments at the same time that the compartments at the descending side of the drum are expanded by the force of the gas entering the same and to thereby constantly maintain a preponderance of weight at the descending side of the drum acting to keep it constantly in rotation. The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a view in central vertical section through the casing of a meter embodying my invention, taken on a plane at right angles to the axis of the revolving drum and showing the latter in end elevation. Fig. 2 is a similar sectional view showing the drum in side elevation. Fig. 3 is a sectional view taken on line *x x* of Fig. 1. Fig. 4 is a sectional view taken on line *y y* of Fig. 3. Fig. 5 is a sectional view taken on line *z z* of Fig. 3.

In said drawings, A indicates an outer inclosure, case, or housing, and B a revolving measuring-drum which is located within the case A and is mounted so as to turn freely therein on a horizontal axis of rotation. The case A may be made of any suitable shape and is made of proper size to allow the drum to turn freely therein. As herein shown, said case A is provided with a top wall or cap which is secured to the body of the case in any suitable manner and which is removable for the purpose of obtaining access to the interior mechanism for the purpose of inspection, adjustment, or repairs. The said drum B is provided with a plurality of compartments, each having a movable wall or diaphragm adapted to be expanded or thrust outwardly by pressure of gas within the compartment and to be forced inwardly by mechanical means to expel the gas from the compartment. The drum may have any desired number of compartments and a corresponding number of movable walls or diaphragms.

Gas is supplied to the meter by means of a supply pipe or passage E, which is connected with a chamber D, formed on the end wall of the case A and from which the gas passes to the compartments of the drum. A delivery-pipe M communicates with the interior of the case A and leads to the burner or place where the gas is consumed.

In connection with the said drum B, revolubly mounted as described, is employed a valve, which is actuated by the turning of the drum and which operates to admit the gas to and permit its exit from the several compartments of the drum in succession as the latter revolves, the pressure of the entering gas from the supply-pipe serving to expand the compartments as they are successively brought into communication with the said supply-pipe and the gas being expelled from the several compartments to the delivery-pipe by suitable operative connections by which the movable walls of compartments are forced inwardly when the said compartments are in communication with the delivery-pipe. The drum is constantly turned by the gravity of the movable walls of the expanded compartments, which, being at a greater distance from the axis of the drum than those of the contracted ones, operate to carry the side of

the drum at which the filled compartments are located downwardly, the said valve being so arranged that the compartments at the descending side of the drum will be in communication with the supply-pipe and those at the rising side of the drum will be connected with the delivery-pipe of the meter. The amount of gas passing through the meter is indicated by means of a suitable registering mechanism operated by the revolving drum.

Referring now to the particular features of construction in the drum herein shown, the same is constructed in detail as follows: The said drum B has the form of a regular polygon and is provided with two parallel end walls, which are arranged perpendicular to the axis of the drum and between which extend partition-walls by which the drum is divided into a plurality of compartments. For simplicity and compactness of construction said partitions are radially arranged and terminate at their outer ends at the angles of the polygonal drum. The drum herein shown for purpose of illustration has four compartments, and the end walls are therefore square in form, the compartments being formed by means of the said end walls and four radial partitions J, the four sides or faces of the drum being formed by the flexible walls or diaphragms of the compartments. Said movable walls or diaphragms are formed of leather or other suitable flexible material, which will be impervious to gas and least liable to be injuriously acted upon by it, together with metal plates K, so arranged in connection with the flexible material that they may be moved freely inward and outward to afford suitable expansion and contraction of the compartments. The flexible parts of the diaphragms are made sufficiently full to enable the latter to be thrust inwardly until close to the partitions J, so as to force approximately all of the gas from the compartments and to be correspondingly forced outward when the compartments are filled with gas.

As herein shown, the metal plates K are made of triangular form, and their outer edges are arranged parallel with the outer margins of the compartment-walls and have flexible connection with the same, so that the inner margins of the plates are free to move outwardly and inwardly. The flexible parts of the diaphragms in this instance consist of flexible uniting-strips, which form air-tight connections between the said plates and the margins of the compartments, as well as between the adjacent edges of the plates themselves, said strips being secured to said parts in such manner as to form hermetically tight joints. The flexible connections thus made permit the plates K to move outwardly under the pressure of gas entering the compartments and to be pressed or forced inwardly for the purpose of expelling the contained gas from the said compartments. Each of the compartments thus inclosed by the end walls of the drum, the partitions J, and the flexible walls provided with said plates K is adapted to contain a certain quantity of gas when the said walls are forced outwardly or distended, and the gas so contained in the compartments is expelled therefrom when the plates are forced inwardly. The adjacent edges of said plates are adjacent to each other, but out of contact, so that by thrusting the plates inwardly to the fullest extent practically all of the gas will be expelled from the compartments. In connection with the diaphragms so provided with movable plates devices are provided for forcing inwardly the plates on the rising side of the drum while those on the descending side are being forced outwardly by the entering gas, whereby a constant flow of gas from the compartments will be produced. As a simple and desirable means of so operating the diaphragms or movable walls of the compartments I propose to connect the movable plates K at one side of the drum with those on the opposite side thereof by suitably-arranged rigid connections which will insure the plates moving in unison. In the instance illustrated such rigid connections consist of rectangular yokes or frames N, which extend around the ends and sides of the drum and are made sufficiently larger than the drum to stand at a short distance away from its outer surface. Two of said frames N are shown as used in connection with each pair of opposite diaphragms, and the opposite longitudinally-arranged parts of said frames, which extend over the sides of the drum, are connected by links O with the several side plates K or those which extend from end to end of the drum. Transverse bars N′ unite the frames N, and these are connected by links O′ with the end plates K. All of the plates K on each side of the drum being connected with the two frames N, it follows that when the plates on one wall are expanded by the interior pressure of the gas flowing into the compartment beneath it those on the opposite wall will be to an equal extent forced inward by the action of the connecting-frames N. The several opposite pairs of diaphragms of the drum are separately connected by rigid connections, so that each pair operates independently of the others. The displacement of weight with relation to the center of motion, caused by the forcing out of the plates forming the side which is being expanded and the drawing in of the plates forming the opposite one which is being contracted, causes the drum to continuously rotate, as before stated.

As hereinbefore stated, the valve which admits the gas to and permits its exit from the compartments of the drum is operated by the turning of the latter and acts to admit gas from the supply-pipe to the compartments which are at the descending side of the drum and to connect the delivery-pipe with the compartments at the ascending side of the drum, the admission of gas at the descending

side being necessary in order that the diaphragms at that side shall be maintained at a greater distance from the axis of the drum than those at the ascending side in order to keep the drum in constant rotation. Said valve is also so made as to admit the gas to and permit its exit from two or more of the compartments at once, this construction being necessary in a gas-meter in order that the flow of gas from one compartment may begin before that from a preceding one has been cut off, so that a constant flow of gas may be maintained. Moreover, I propose to so construct the valve that it will admit gas to the descending compartments until the same reach a point below a horizontal line passing through the axis of the drum, so that the filling of the compartments will be aided by the gravity of the diaphragms, the weight of which will tend to distend the compartments as soon as the compartment reaches a position in which the descent of the diaphragm by gravity will carry it outward or away from the axis of the drum.

A valve embodying the above-named features of construction may be made in a number of different ways, but I prefer for simplicity of construction and ease of operation a rotary valve or one consisting of stationary and movable parts, of which the movable part is rotative and is attached to and turns with the drum itself. A valve of this kind is therefore shown in the accompanying drawings as illustrating one practicable embodiment of my invention. In such rotary valve the stationary and movable parts will be provided with ports, of which those in the part attached to the drum are connected with the compartments of the same, and those in the stationary part will communicate with the gas supply and delivery pipes, and to secure the result above stated, of a continuous flow of gas through the meter, I propose to make the ports in the stationary part of such size or length circumferentially that they will be in communication with two of the ports in the rotating part at once, or, in other words, of such length as to extend at each end beyond the part of the movable valve-seat which separates the ports therein.

Referring now to the construction illustrated in means for revolubly supporting the drum and in the means by which the gas is admitted to and allowed to escape from the compartments, these parts are shown in the drawings as follows: The drum B is provided with a centrally-arranged tube or sleeve I, which extends between and is attached to the end walls of the drum and to which the radial partitions J are attached at their inner edges. Pivotal support for the drum is afforded by means of a fixed hollow shaft C, which passes through the sleeve I and on which the drum turns. Said shaft C is supported at its ends on the end walls of the case A and at its end adjacent to the chamber D extends through the end wall into said chamber and is in open communication therewith, Fig. 2. The opposite end of said shaft is supported on the opposite end wall of the case by means of a bracket F, provided with a recess in which the shaft rests. The end of the shaft at this end of the case communicates with the interior of the case, outside of the drum, by means of a suitable opening, herein shown as formed by leaving a space between the extremity of the shaft and the adjacent inner surface of the side wall of the case. The said shaft is provided with a central plug or diaphragm G, which prevents the passage of gas therethrough.

In one side of the shaft C and near the inlet end thereof is formed a slot or port H, and upon the opposite side thereof, at the opposite or discharge end of the shaft and beyond the plug G, is formed a corresponding slot or opening H′. The said sleeve I has formed in it, in the same plane with the opening H, a plurality of inlet-ports L, corresponding in number with the compartments of the drum and severally opening into the said compartments. Similarly near its opposite end said sleeve I is provided with similarly-arranged exit-ports L′. Said inlet and outlet ports L L′ operate, in connection with the openings H H′ in the shaft C, to form a valve by which the entrance of gas to and its exit from the compartments are controlled.

By reason of the arrangement of the ports described one or more of the inlet-ports L and exit-ports L′ of the drum will always be opposite the supply and exit ports H H′ of the hollow axle C, so that the gas will flow constantly from the chamber D to the compartments at the descending side of the drum and also from the compartments at the rising side of the drum into the casing A and thence to the delivery-pipe M. As before explained, the entering gas expands the compartments of the descending side by forcing the plates K outwardly into convex form, while the gas is expelled from the compartments at the rising side of the drum by the forcing inwardly of the plates K into concave form, as clearly seen in Fig. 3, the rotation of the drum being caused by the disturbance of the balance caused by such shifting of the walls or plates, as before described. It follows from the above that each compartment will be successively filled and exhausted, the same being filled as it is descending at one side of the drum when its inlet-port L coincides with the port H, and being emptied when at the rising side of the drum when its exit-port L′ coincides with the port H′. The said ports H and H′ are made of a length circumferentially which is greater than the distance between the two adjacent ports of the drum, and it follows from this construction that gas will begin to enter each of the compartments before it is cut off from the adjacent one in advance of it and will similarly continue to flow from each of the compartments before it ceases to flow from the adjacent one in ad-

vance of it. This construction therefore insures a continuous, uninterrupted, and uniform flow of gas through the apparatus regardless of variations of pressure or quantity used.

As another important feature of construction in the valve the ports H and H′ are so arranged that they will supply gas to and permit its exit from each compartment during the time the same is descending and until it reaches a point at which its diaphragm is so far below the level of the axis of the drum that it will tend to open or move outwardly by the action of gravity. For this purpose the ports H and H′ are shown as extending each through somewhat more than a quarter of a circle at one side of the hollow axle C. In the particular construction illustrated, Fig. 4, the gas will continue to flow into each descending compartment until such compartment reaches a point nearly beneath the axle. The arrangement of the said ports exactly as shown is not essential, however, it only being necessary that the supply of gas to the descending compartment be continued until the diaphragms shall reach such position that they will gravitate outwardly, and thus by their weight aid in the expansion of the compartments.

An important and valuable result secured by the arrangement of the ports last above referred to is that the full expansion of the compartments necessary for completely filling the ports occurs when the weight of the movable diaphragms at the descending side as well as the opposite ones at the ascending side, together with that of the movable parts which are employed to connect the diaphragms with each other, is acting in a direction to force outwardly the diaphragms of the compartment being filled and to force inwardly that compartment from which the gas is being expelled. The importance of this feature will be better understood by consideration of the fact that the power to actuate the drum is derived by the pressure of the gas only, and it is desirable that the least possible amount of pressure should be used in actuating the movable diaphragms. It will of course be understood that the pressure in the delivery-pipe, leading from the meter, will be less than that in the supply-pipe, as such difference is necessary in order to produce any motion at all in the diaphragms. At the same time it is desirable that this difference should be as small as possible, because the difference in pressure at the supply and discharge sides of the meter represents the loss of pressure arising from the operation of the meter or power consumed in actuating the same. From motives of economy it is therefore desirable that the power required for actuating the meter should be as small as possible, and it is also desirable that the meter should be actuated by a slight pressure, because the less power required the more sensitive and accurate will be the action of the meter in the measurement of the gas. Obviously by so constructing the valve that the gravity of the moving parts shall aid in moving said diaphragms less pressure of gas is required for this purpose and the meter operates more easily and by a less pressure than would otherwise be the case. When the valve is arranged as shown, the entering gas will have moved the diaphragms about half of their stroke only when the compartment is horizontally opposite the center of the drum, so that a greater part of the movement of the diaphragm takes place when the latter is nearly in a vertical plane or afterward and when the weight of the plates K acts to a little or no extent against the gas-pressure. After the diaphragm passes below such horizontal line the weight of the said plates and connected moving parts of course supplements the gas-pressure, as above pointed out.

Another important feature of my invention is involved in the use of the tight inclosure or case A, which surrounds the drum, in connection with a construction of the parts by which the space within such case and between the same and the drum is subject to the pressure of the gas at the delivery or outlet side of the drum. This result is secured in the construction shown by permitting the gas to pass from the compartments of the drum directly into said case and by connecting the delivery-pipe with the case, so that all the gas passes through such case on its way to the delivery-pipe. This particular construction, however, affords only one way of securing communication between the gas-delivery passage and the interior of said case, and the same result may be obtained by other mechanical arrangements of the parts. As a result of maintaining back pressure of gas within the case A, as described, such pressure will act on the outer surface of the several movable walls or diaphragms of the compartments, so that the effective pressure for filling the compartments and moving said diaphragms will not be equal to that with the supply-pipe, but will be only equal to the difference in pressures in the supply and delivery pipes. The internal pressure on the diaphragms by which the same are moved is therefore much less than it would be if the drum were operated without external pressure or in the open air. If the drum were allowed to operate under the latter conditions, the pressure within the compartments as the same are being filled would be equal to the full pressure in the gas-main, and the diaphragm being pushed out would be expanded with great pressure, while those of the compartments being emptied would be drawn inwardly with a correspondingly great pressure by reason of the mechanical connections between the parts. Moreover, the strains brought on the said connections between the opposite diaphragms by such excessive pressure would maintain all of the parts under such tension as to greatly increase the friction and thereby

lessen their freedom of movement, besides greatly increasing liability of leakage in the diaphragms and consequent loss of gas. Furthermore, the excessive pressure both in the compartments being filled and those being exhausted would tend to compress or bulge the flexible parts of the diaphragms outwardly between the edges of the plates, and this would considerably increase the capacity of the chambers being emptied and prevent the same from being exhausted to their maximum extent. Such excessive pressure does not have the same effect on the compartments being filled, which in any case cannot receive more than will effect their full distention, while the compartments being emptied will still retain considerable gas when the plates are drawn inwardly to the fullest possible extent by reason of the bulging out of the flexible parts of the partitions as the plates are thrust inwardly, as above stated. The operation of the drum without external pressure, therefore, would be subject to two serious difficulties, namely, that the operative parts would be moved under great tension and with great increase of friction and liability of leakage and that the measurement would be incorrect under variable pressures by reason of excessive pressure internally on the flexible parts of the diaphragms of the compartments being emptied. When the external pressure is present, however, the conditions are very different, and the parts not only operate with much less friction and more easily, but the measurement of gas is much more accurate. As before stated, the difference between the pressure inside and outside of the diaphragms is that required to move the working parts only, and as this is very slight the connections between the diaphragms at opposite sides of the drums are ordinarily subjected to but a very slight strain or pressure. This is well shown by actual test of the apparatus, from which it may be seen that in the working of the meter the pressure on the flexible parts of the diaphragm is very little and so slight that the said flexible parts are not flexed or bulged out to any material extent at all in the movement of the diaphragms. Moreover, the pressure on the diaphragms in this construction is practically the same without regard to the actual pressure in the supply and delivery pipes, so that the strain on the moving or working parts is also practically the same, whether the gas be supplied under great or little pressure and whether the rate of flow through the meter be rapid or slow. The presence of such external pressure therefore has the important advantage of rendering uniform the conditions under which the working parts operate and of thereby insuring uniform and accurate action of the meter in the measurement of the gas.

I have shown in the drawings curved arms or plates K′ secured to the frames M, so as to move inwardly and outwardly with said frame. These arms are so disposed with relation to the side wall of the case, or a stop or projection arranged at the side of the case opposite the compartments which are descending and being filled, that the curved arms will be brought into contact with such stop or projection at the time the compartments are being filled, thereby giving slight frictional resistance to the turning of the drum at such time. Such frictional resistance will retard the movement of the drum in case it should move too fast, and thus allow time for the complete filling of each compartment. Said arms are so arranged, moreover, that when the compartments are full the arms will be retracted and will freely pass the stop, thereby leaving the drum free to turn except when the retarding device is needed. Such retarding device for the drum, while it may be useful in some cases, will not be necessary when the meter is working under ordinary conditions and circumstances, and its presence will not usually be necessary for the proper operation of the device.

Another important advantage gained by the construction described is that water which may be condensed in the several compartments will, by reason of the arrangement of the radial partitions J and the central arrangement of the inlet and outlet valve ports with respect to the drum, pass through the said ports into the case A or chamber D and may be drawn off from time to time through valves O or otherwise. The presence of water of condensation in the compartments of the drum or in contact with the moving parts or diaphragms is thus prevented.

An important advantage gained by the construction constituting my invention is that the registering or recording mechanism is actuated directly by the rotary movement of the compartments in which the gas is measured, thereby avoiding the use of levers or other similar reciprocating connections. Moreover, the meter made as described has very few parts, may be cheaply and easily made, can be readily repaired, and is simple in operation. Moreover, the drum being independent of the outer case, the latter can be readily opened to afford access to the working parts, which can be repaired and new parts substituted for those worn out, thereby enabling defective parts to be replaced without the necessity for an entirely new meter.

An important feature of the invention is embraced in the construction by which the valve is arranged to admit the gas to and permit its exit from two adjacent compartments of the drum simultaneously, for the reason that this construction affords a constant and uniform flow of gas through the meter, this being essential to the successful working of such a meter.

The special construction in the connections between the opposite diaphragms, in which such connections consist of frames extending opposite the faces or sides of the drum and

across the end walls of the same, has the advantage of affording the proper connection between said diaphragms in a simple and effective manner and without occupying room in the exterior case, it being obvious that the frames when so arranged do not extend outwardly from the axis of the drum to a distance materially greater than do the corners or angles of the drum, so that the exterior casing need not be made materially larger to accommodate said frames than it would be made if the frames were absent.

I claim as my invention—

1. A gas-meter comprising a revolving drum provided with a plurality of compartments having flexible walls or diaphragms, means acting on the diaphragms at the rising side of the drum to force the diaphragms inward, and a valve operated by the turning of the drum and constructed to admit the flow of gas to and its exit from two of the adjacent compartments simultaneously, whereby a constant flow of gas through the apparatus is maintained, substantially as described.

2. A gas-meter comprising a revolving drum provided with a plurality of compartments having flexible walls or diaphragms, means acting on said diaphragms at the rising side of the drum to force said diaphragms inwardly and a rotary valve comprising a valve-seat turning with the drum and having ports leading to the several compartments, and a stationary valve-seat having inlet and outlet ports which communicate with gas inlet and outlet passages and are each of such length as to establish connection with two adjacent ports in the moving part at once, substantially as described.

3. A gas-meter comprising an exterior closed case or inclosure, a revoluble drum mounted in said case and provided with a plurality of compartments each having a flexible wall or diaphragm, means acting on the said diaphragms at the rising side of the drum to force the same inwardly and a valve actuated by the turning of the drum and operating to admit gas to and permit its escape from two adjacent compartments in succession, substantially as described.

4. A gas-meter comprising a revoluble drum provided with a plurality of compartments having movable walls, a valve actuated by the turning of the drum and operating to admit the gas to and permit its exit from the said compartments in succession and a closed casing surrounding the drum, said casing being in communication with a discharging-compartment at the rising side of the drum, whereby a pressure is maintained on the outside of the drum equal to that in the delivery-pipe leading from the meter, substantially as described.

5. A gas-meter comprising a revoluble drum having the form of a regular polygon and divided into compartments by radial partitions extending to the angles of the polygon, the sides of the drum consisting of movable walls or flexible diaphragms, means for giving inward and outward movement to the walls or diaphragms whereby those at opposite sides of the drum are moved together, and a valve actuated by the turning of the drum and acting to bring the compartments successively into connection with inlet and outlet passages.

6. A gas-meter comprising a revoluble drum provided with a plurality of compartments each having a movable wall, and a valve actuated by the turning of the drum for supplying gas to and permitting its escape from the several compartments in succession, said valve being constructed to maintain the gas-inlet in communication with each compartment during the descent of the latter at one side of the axis of the drum from a point above to a point below the axis whereby the weight of the movable walls will aid in filling the compartment, substantially as described.

7. A gas-meter comprising a revoluble drum provided with a plurality of compartments each having a movable wall, means acting on the said movable walls to throw those on the ascending side inward when those on the descending side are thrown outward, and a valve comprising stationary and rotating valve-seats arranged concentrically to the axis of the drum, the stationary valve-seat having elongated ports which supply gas to the compartments continuously during their descent at one side of the axis of the drum from a point above to a point below the axis of the same and permit its escape from said compartments during their ascent at the opposite side thereof, to a point above said axis, substantially as described.

8. A gas-meter comprising a revoluble drum having the form of a regular polygon and having a plurality of compartments, the outer walls of which are formed by flexible diaphragms, a valve actuated by the turning of the drum and acting to bring the compartments successively into connection with inlet and outlet passages, and means for connecting the diaphragms on opposite sides of the drum, comprising rigid frames having longitudinal parts which extend over the flexible outer walls of the compartments, and transverse connecting parts which extend across the ends of the drums, substantially as described.

9. In a meter for measuring gas, an exterior casing, a hollow stationary shaft fixed therein having one end connected with a source of supply, and the other end discharging within the casing, a compartment-drum having a central sleeve fitting and turnable upon the exterior of the fixed hollow shaft, radial diaphragms extending from the sleeves to the angles of the drum, flexible exterior weighted sides movable to and from the center whereby the chambers in the drum are successively enlarged and contracted, passages through the stationary shaft and the drum-sleeve which are coincident when it ar-

rives at a certain point in its rotation whereby gas may flow into the corresponding member, other passages adapted to coincide upon the opposite end and opposite side of the shaft and sleeve, whereby the contraction of said opposite chamber will expel the gas, and connections between each opposite pair of movable sides whereby the expansion of one acts to contract the other.

10. In a gas-meter an exterior case having a horizontal hollow shaft fixed therein, the central part of said shaft being closed and the ends slotted upon opposite sides, a receiving-chamber exterior to the casing A upon one side with which the receiving end of the hollow shaft communicates, a bracket within the casing A by which the opposite end of the shaft is supported so that the discharge end opens into the exterior casing, a compartment-drum, the exterior sides of which are adapted to expand and contract so as to enlarge and diminish the compartments, a sleeve extending through the center of the drum fitting and turnable upon the stationary shaft C, slots or openings made in said sleeve, opening into each compartment and coinciding at one point of the revolution of the drum with the inlet-slots of the stationary shaft, other slots formed at the opposite end of the sleeve from each compartment adapted to coincide with the discharge-slot of the stationary shaft upon the opposite side of the inlet, connections made between the movable sides of each two opposite compartments of the drum whereby the expansion of one of said sides acts directly to contract the opposite side and expel the contents of its compartment, a register and mechanism connecting it with the drum whereby the amount passing through the apparatus is indicated.

11. In a gas-meter, an exterior containing case, a gas-supply chamber at one end, a fixed central hollow centrally-closed shaft, one end of which opens into said gas-supply chamber and the other is supported so as to deliver within the main exterior case and a discharge-passage from said case, a compartment-drum having a sleeve fitting and turnable upon the stationary shaft slots in said sleeve connecting with each compartment at opposite ends, a slot made in the stationary shaft near the inlet and with which each of the compartments is successively brought into communication by the rotation of the drum whereby gas is allowed to enter the compartment and expand the outer movable side, a corresponding slot in the opposite end of the stationary shaft situated upon the opposite side thereof with which each of the compartments successively communicates after having been filled and the connection with the supply cut off, yokes or frames surrounding the drum out of contact therewith and standards by which the opposite sides of said frames are connected with the movable sides of the opposite compartments of the drum whereby the expansion of one compartment acts directly to contract the other and expel the gas therefrom, and to so change the relative weights of the sides of the drum that the latter will be constantly rotated by the inflow and expulsion of the gas.

12. In a gas-meter, an exterior containing case with a supply-chamber, and a discharge-passage, a fixed hollow centrally-closed shaft, one end of which communicates with the supply-chamber and the other with the interior of the case, a compartment-drum with outwardly-expansible sides and a central bearing-sleeve revoluble upon the fixed shaft, slots in the shaft and sleeve near the inlet end, which coincide so that each chamber is filled with gas while traveling downward, discharge-slots which coincide when the chambers are traveling up the opposite side, rods connecting the movable sides of oppositely-situated chambers, whereby the expansion of the filling-chambers acts to contract and discharge those with which they are connected, curved arms carried by the movable sides and a stop so disposed that the arms carried by the chambers about to be emptied, will engage the stop and regulate the movement of the drum and each chamber will be expanded and filled and the one connected with it correspondingly contracted before the arms can pass the stop.

In witness whereof I have hereunto set my hand.

ELIAS B. DE LA MATYR.

Witnesses:
J. J. WARNER,
JOHN A. BECKWITH.