

(No Model.)

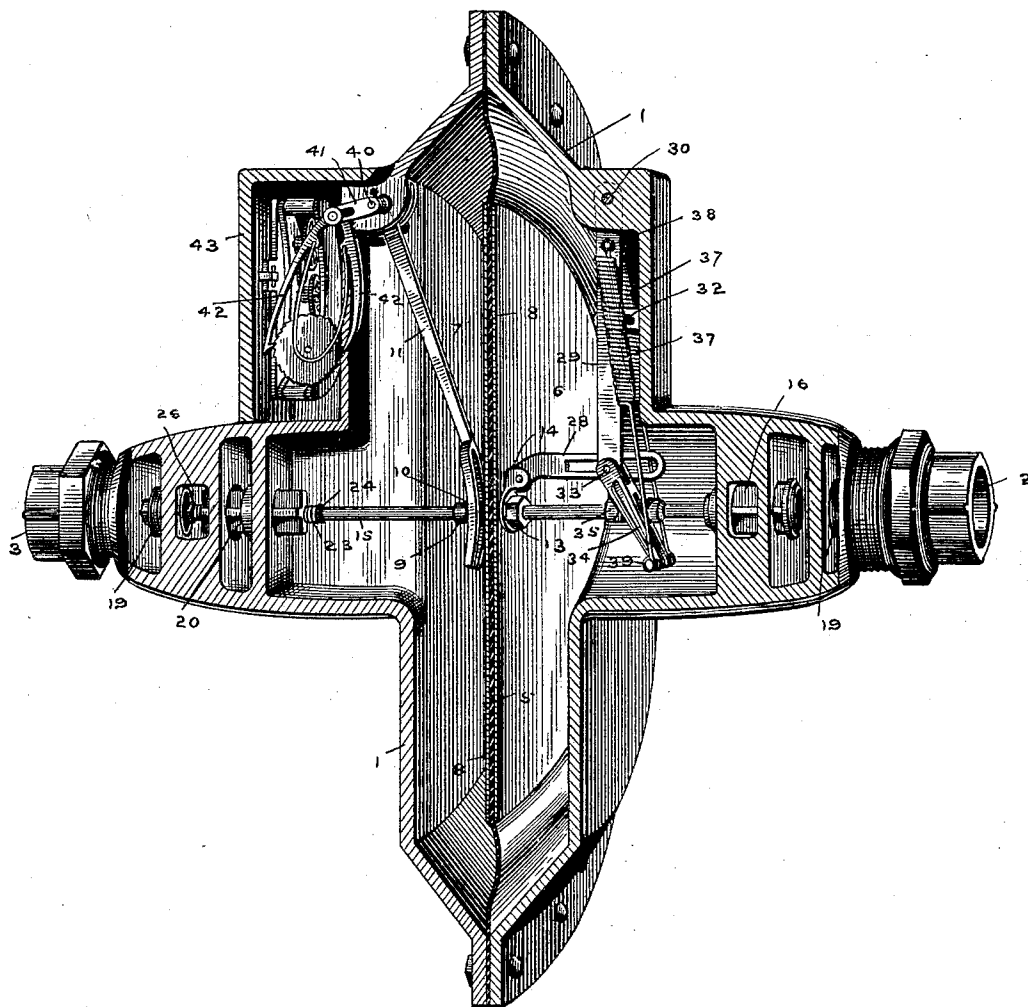
2 Sheets—Sheet 1.

J. B. KNICKERBOCKER.
GAS METER.

No. 468,008.

Patented Feb. 2, 1892.

FIG. 1.



Witnesses

H. D. Nealy.
C. P. Griffith

Inventor

James B. Knickerbocker

By his Attorney

C. P. Jacobs,

(No Model.)

2 Sheets—Sheet 2.

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FIG. 2.

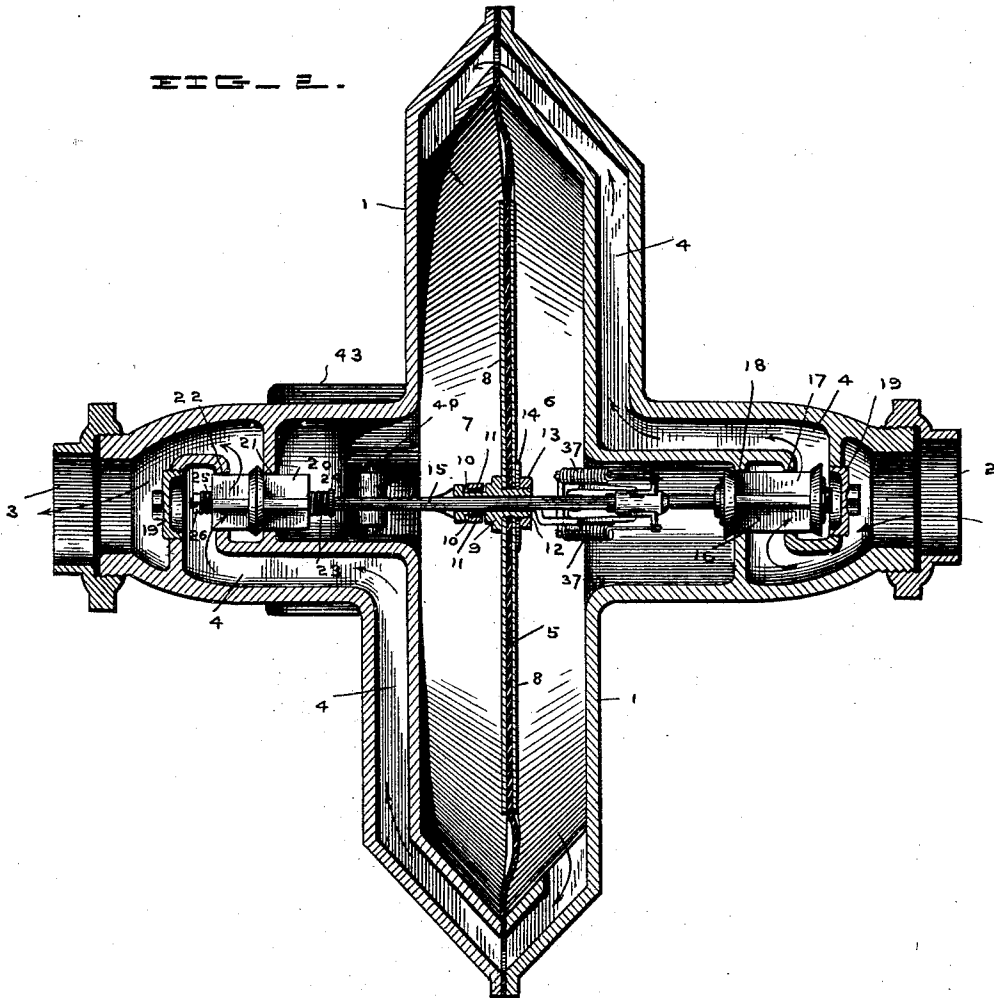
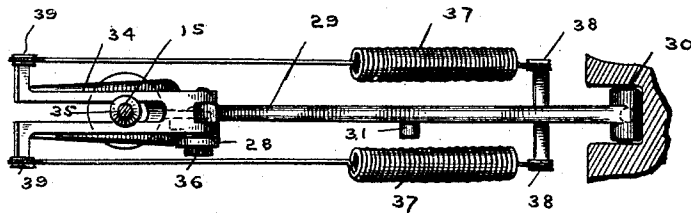


FIG. 3.



Witnesses

H. D. Neely.
E. P. Griffith.

Inventor

James B. Knickerbocker

By his Attorney

C. P. Jacobs

UNITED STATES PATENT OFFICE.

JAMES B. KNICKERBOCKER, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE
KNICKERBOCKER METER COMPANY, OF SAME PLACE.

GAS-METER.

SPECIFICATION forming part of Letters Patent No. 468,008, dated February 2, 1892.

Application filed March 30, 1891. Serial No. 386,902. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. KNICKERBOCKER, of Indianapolis, county of Marion, and State of Indiana, have invented certain
5 new and useful Improvements in Gas-Meters; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like figures refer to like
10 parts.

My invention relates to the construction of devices for measuring the flow of gas or other fluids and will be understood from the following description.

15 In the drawings, Figure 1 is a longitudinal section of my device. Fig. 2 is a central cross-section of Fig. 1. Fig. 3 is an enlarged top view of the yoke and spring mechanism.

In detail, 1 is the divided casing, having an
20 inlet 2 and outlet 3, and a channel or passage-way 4 for the gas leading from the inlet to the gas-chamber and from thence to the outlet.

5 is the diaphragm secured between the
25 halves of the casing and dividing the interior into the gas-chambers 6 and 7. The diaphragm is composed of a central flexible sheet with metal backing-plates 8 on either side thereof.

30 9 is a bolt, its lower end notched at 10 on each side to receive the bifurcated arms of the lever 11, which operates the registering mechanism. This bolt is threaded at its opposite end 12 and passes through the diaphragm, and 13 is a nut which works thereon
35 and is turned down against the base-plate of a shoe 14, holding the parts in place.

15 is the valve-rod, which passes loosely through the central opening of the bolt 9,
40 and 16 is a double valve mounted on one end of this rod, the flanges of the valve closing alternately the ports 17 and 18 in the casing.

19 are screw-plugs closing openings at the inlet and outlet ends of the casing for allow-
45 ing access to the valves.

20 is the outlet-valve mounted on the opposite end of the rod 15, the flange of the valve being central upon its body and operating upon ports 21 and 22, as shown in Fig. 2.

50 23 is a spring mounted on the valve-rod and bearing against the collar 24 on the one

side and the valve on the other, and 25 is a similar spring bearing against the opposite end of the valve and held in place by a nut
26 on the end of the rod, the object of the
55 nut and springs being to adjust the valves when first put in place. To the shoe-clamp 14 is pivoted the slotted arm 28.

29 is an arm pivoted at 30 to the casing and provided with a boss 31, which works in
60 a slot 34 in a block connected also to the casing, which limits the movement of the arm 29. This arm is pivoted below by a pin 33 to a yoke 34, whose arms straddle the enlargement 35 of the valve-rod notched on
65 either side, the shoulders of the enlargement being beveled in opposite directions, as shown in Fig. 1, to allow the angular movement of the yoke-arms 34. The pin 33 passes through the slot in the arm 28, and has a head 36,
70 which holds the slotted arm 28 in place between the head and the end of the yoke.

37 are coiled springs connected at their upper ends to projections on either side of the arm 29, the ends of the wire being bent around
75 circular grooved heads 38 on such projections, the extended wire ends of these springs being also formed into loops which fit over the grooved heads 39, formed on the ends of the yoke-arms 34, as shown in Fig. 3, this ar-
80 rangement being intended to avoid the unnecessary friction and straining of the connections.

40 is a shaft having bearings in the casing, to which shaft the forked lever 11 is connected
85 at its upper end.

41 is a crank mounted on the outer end of this shaft and outside the casing 1, which operates the detents 42 of the ordinary registering mechanism, which is inclosed in a casing
90 43, removably attached to the meter-casing.

Having thus indicated in detail the several parts of the mechanism, I will now proceed to describe its operation.

The gas enters through the inlet 2 and
95 passes onward through the port 17 in the direction of the arrows and around through the passage-way 4 to the gas-chamber 7 on the left-hand side of the diaphragm, as shown in Fig. 2. The expansion of the gas forces the dia-
100 phragm to the right, carrying with it the shoe 14 and the slotted arm 28 until such arm has

moved the full length of its slot, when it will
 contact with the pivot-pin 33 of the arm 29,
 carrying with it its connected yoke 34 on-
 ward until the arm 29 and yoke 34 have
 5 passed a straight line with respect to each
 other. This movement thus far having been
 accomplished by the force of the gas against
 the tension of the springs 37, the latter will
 then be free to exert their force and will op-
 10 erate to throw the yoke 34 to the left, such
 yoke at the same time striking the shoulders
 on the enlargement 35 of the valve-rod, throw-
 ing the valve-rod with its valves to the left,
 closing the ports 17 and 22, cutting off the
 15 upper part of the passage-way 4 and allow-
 ing the gas to enter into the gas-chamber 6
 through the port 18, the gas from the cham-
 ber 7 passing out directly through the port
 21 and escaping at the outlet 3. As the
 20 chamber 6 begins to fill, the diaphragm will
 be forced to the left until the pin 33 contacts
 with the end of the slot in the arm 28, and
 the lever 29 and yoke are carried with the
 diaphragm until their center pivot has passed
 25 the line of the springs 37, when the valve-rod
 and its valves will be thrown to the right,
 bringing the springs back to their first posi-
 tion.

It will be seen by the construction and op-
 30 eration of the spring-controlled shifting mech-
 anism that the valves are always held firmly
 against the ports through the pressure of the
 yoke 35 on the shoulders of the valve-rod
 enlargement, and there is no chance what-
 35 ever of one of the ports remaining open and
 allowing the escape of gas, both valves being
 mounted on the same rod and operated by
 the same mechanism at one and the same
 40 time, and for this reason it makes no differ-
 ence in what position the meter is set.

As will be observed in the construction of
 this meter the diaphragm is pierced, the valve-
 rod passing loosely through it. At the first
 glance it might seem that this would afford
 45 an outlet for the escape of gas under pres-
 sure from one chamber to the other; but it has
 been demonstrated by careful experiment
 that the gas will not escape, inasmuch as the
 pressure upon one side equals that upon the
 50 other, and the amount of gas that would leak
 through is practically inappreciable, and no
 evil result whatever has followed from the
 passage of the rod through the diaphragm.
 By doing this I accomplish the result of con-
 55 necting the valves on either side, so that
 there is no independent action of either and
 no danger of one valve moving without the
 other, thus affording an escape for the gas
 directly through the machine, for even if the
 60 lever-arm 29 and the yoke 34 of the shifting
 mechanism pause in a straight line or upon
 a balance the least particle of gas would dis-
 turb the balance and the springs would throw
 the valves over.

65 The advantages of the construction herein
 described are several—namely, there is a con-
 stant and regular tension at all times upon

the valves, and therefore there can be no leak-
 age of gas. Again, the throw or movement
 of the valve from one seat to the other is prac- 70
 tically instantaneous. Hence there is no loss
 of gas while the valve is traveling from one
 seat to the other, which is a common fault
 with meters of the ordinary description. In
 these the movement of the valve is slow, or, 75
 as it is termed, "lazy," and hence where a large
 quantity of gas is used there must necessarily
 be a considerable amount allowed to pass
 through the valves without registration, where-
 as in my device the greater the duty the tighter 80
 the valves hold, and there can be no loss by
 leakage; neither can the valves be jarred
 from their seats.

What I claim as my invention, and desire
 to secure by Letters Patent, is the following: 85

1. In a gas-meter, a casing composed of two
 equivalent parts, inlet and outlet connections
 on opposite sides of such casing, a flexible dia-
 phragm centrally secured therein, inlet and
 outlet valves seated in the partitions formed 90
 in the halves of the casing adjacent to the in-
 let and outlet openings, a valve-rod passing
 through the diaphragm and connecting such
 inlet and outlet valves, adjusting-springs
 coiled upon such rod for setting the valves, a 95
 bolt passing through the diaphragm having
 a central opening through which the valve-
 rod loosely passes, a shoe connected to one
 end of such bolt, a slotted arm pivoted to such
 shoe, and a spring-controlled lever pivoted at 100
 one end to the casing and to a yoke at the other
 end which straddles the valve-rod, the pivot-
 pin of such levers passing through the slot
 of the arm connected to the diaphragm, where-
 by the throw of the valve is automatically ef- 105
 fected by the spring-lever mechanism when
 the lever has reached a certain point, all com-
 bined substantially as shown and described.

2. In a gas-meter, a casing composed of two
 equivalent parts, inlet and outlet openings on 110
 opposite sides thereof, a flexible diaphragm
 centrally secured therein, outlet and inlet
 valves seated in partitions formed in the
 halves of the casing adjacent to the inlet and
 outlet openings, such valves connected by a 115
 rod passing through the diaphragm for secur-
 ing their simultaneous action, a bolt passing
 through a central perforation in the dia-
 phragm and loosely mounted on the valve-rod,
 a lever engaging with one end of such bolt 120
 and connected to a suitable registering mech-
 anism at the other, and a spring-controlled
 lever mechanism pivotally connected to the
 opposite end of such bolt for automatically
 effecting the throw of the valves when the 125
 levers have passed their centers, substantially
 as shown and described.

3. In a gas-meter, a casing composed of two
 equivalent parts, inlet and outlet connections
 on opposite sides thereof, a single flexible 130
 diaphragm centrally secured therein, such
 casing providing a channel for the passage of
 gas through openings in and near the edge of
 the diaphragm, inlet and outlet valves seated

in partitions formed in the halves of the casing adjacent to the inlet and outlet openings and connected by an adjustable valve-rod passing through a central opening in the diaphragm, and a spring-controlled lever mechanism connected to such rod and to the diaphragm for automatically effecting the throw of the valves when the jointed levers have passed their centers, all combined substantially as shown and described.

4. In a gas-meter, an automatic lever mechanism for effecting the throw of the valves, connected at one end to a rod uniting the inlet and outlet valves and at the other to a diaphragm, composed, substantially, of an arm 29, pivoted at one end to the casing and at the other end to a yoke 34, such lever and yoke also connected on each side by a spring 37, a slotted arm 28, such levers actuated by contact with such arm when operated by the movement of the diaphragm, whereby when the levers have reached a certain point the automatic tension of the springs serves to effect the throw of the valves, all combined substantially as shown and described.

5. A gas-meter comprising a hollow casing composed of two similar halves having inlet and outlet openings on opposite sides thereof, a flexible diaphragm centrally secured between such halves, outlet and inlet valves seated in partitions formed in the casing adjacent to the outlet and inlet openings, an adjustable rod passing through the diaphragm, connected to such valves, and means,

such as a spring-lever mechanism, normally operating against the pressure of the gas upon the opposite side of the diaphragm, such levers controlled by springs that automatically effect the throw of the valves when the action of the diaphragm has carried the spring-levers beyond a certain point, in combination with a dial-registering mechanism connected with the casing and actuated by a lever connected on one side of the diaphragm, substantially as shown and described.

6. In a gas-meter, inlet and outlet valves mounted on opposite ends of a rod passing centrally through the diaphragm, in combination with a spring-lever mechanism pivoted to the casing and bearing against a projection on the valve-rod, whereby a uniform tension is exerted upon the valves at all times, substantially as shown and described.

7. In a gas-meter, inlet and outlet valves connected by a rod passing through the diaphragm, and a jointed lever pivoted to the casing, having a limited lateral movement controlled by the springs and bearing against the valve-rod, whereby a tension is constantly exerted thereon, substantially as shown and described.

In witness whereof I have hereunto set my hand this 27th day of March, 1891.

JAMES B. KNICKERBOCKER.

Witnesses:

H. D. NEALY,

C. P. JACOBS.