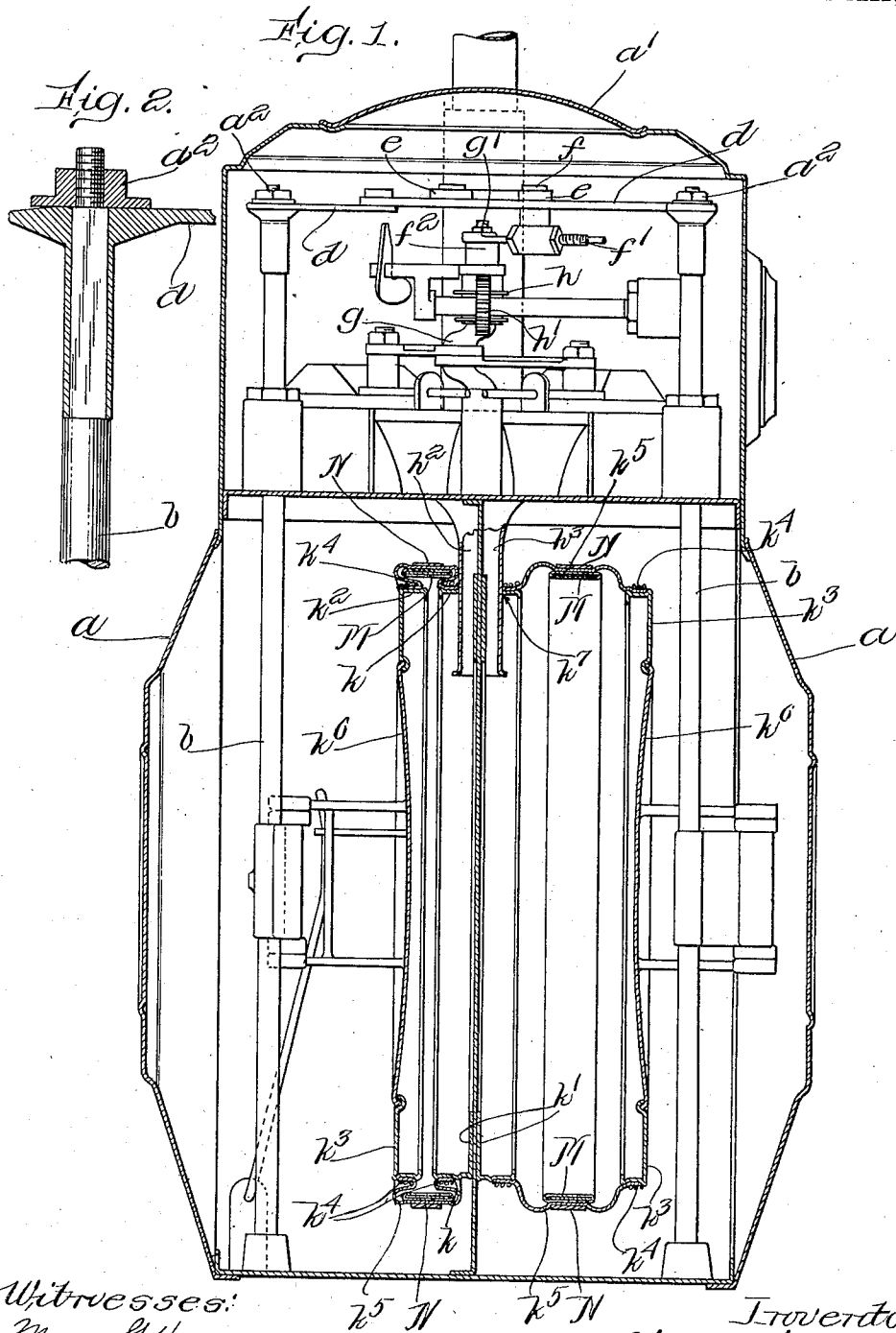


C. & R. W. LAWSON.
GAS METER.
APPLICATION FILED OCT. 19, 1910.

1,066,023.

Patented July 1, 1913.

2 SHEETS—SHEET 1.



Witnesses:
Mary Hennessy
Ida A. Cichow.

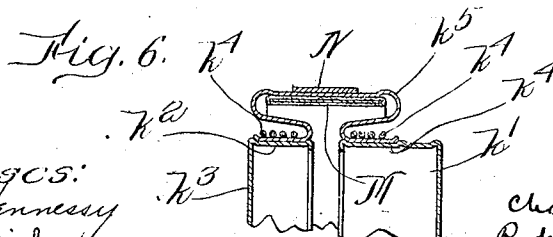
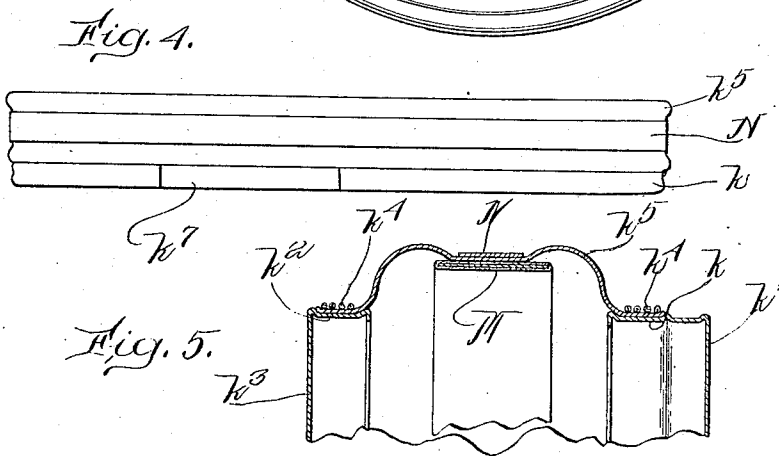
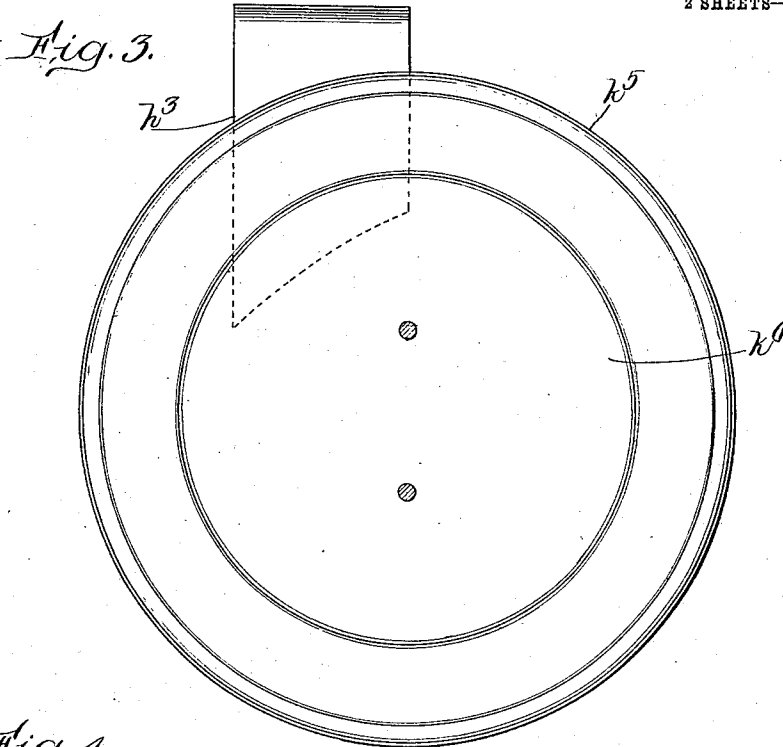
Inventors:
Charles Lawson,
Robert W. Lawson,
by George A. Rockwell,
Atty.

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UNITED STATES PATENT OFFICE.

CHARLES LAWSON AND ROBERT W. LAWSON, OF BOSTON, MASSACHUSETTS.

GAS-METER.

1,066,023.

Specification of Letters Patent.

Patented July 1, 1913.

Application filed October 19, 1910. Serial No. 587,834.

To all whom it may concern:

Be it known that we, CHARLES LAWSON and ROBERT W. LAWSON, both of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Gas-Meters, of which the following is a specification.

The main objects of our invention are to accurately measure the gas, to provide for action of the bellows and to improve the construction of the meter.

Our invention consists primarily in means for controlling the movement of the bellows.

A feature of our invention is the construction of the walls of the bellows.

Another feature is a connection between the crank-arms and rock-shafts which does away with the use of solder with the result that the crank-arms may be removed without the necessity of breaking solder.

In the drawings Figure 1 is a vertical central section through the bellows but showing the gearing, valves, and rock-shaft in elevation; Fig. 2 is an enlarged sectional detail of the connection between one of the crank-arms and its rock-shaft; Fig. 3 is a side view of the bellows and channel; Fig. 4 is a top plan of the bellows; Fig. 5 is a broken sectional elevation of the bellows inflated; and Fig. 6 is a broken sectional elevation of the bellows deflated.

The main casing has removable side plates *a* and a removable cap-plate *a'*, removal of the side plates furnishing access to the two sides of the motor chamber and removal of the cap-plate furnishing access to the distributing chamber, the plates being soldered in position when the meter is in condition for operation.

Rock-shafts *b* *b* have their upper portions square in cross-section to engage square holes in the ends of crank-arms *d* *d*. The extreme upper portions of the rock-arms are threaded to engage nuts *a*² *a*² which keep the crank-arms in place. The crank-arms *d* *d* are connected by links *e* *e* with an adjustable wrist-pin *f* carried by the arm *f'* having sleeve *f*² to operatively engage the upper portion of crank-shaft *g*. A nut *g'* holds the sleeve *f*² to the crank-shaft *g* and thereby the use of solder is avoided. The crank-shaft *g* carries a worm *h* meshing with a worm-wheel *h'* operatively connected with dial mechanism (not shown). The valve mechanism is of ordinary construc-

tion and supplies gas through channels *h*² *h*³ to the bellows as usual.

Each bellows has an inner metal ring *k* with a flange *k'* and an outer metal ring *k*² with a projecting flange *k*³. These rings are connected by a cord winding *k*⁴ with the flexible leather portion *k*⁵. The flanges *k'* may be soldered directly to the wall which divides the motor chambers. The inner rings *k* *k* are recessed at *k*⁷ to receive the channels *h*² and *h*³. Plates *k*⁶ are soldered to the flanges *k*³ and are connected to the rock-shafts *b* in the usual way. Our use of flanges *k*³ is very important because it enables us to solder the plates *k*⁶ in place without injuring that portion of the leather which engages the rings *k* and *k*². Heretofore the plates have been soldered directly to the rings and so close to the leather that the latter is frequently burned by the soldering iron or the cord winding is burned or in other ways the bellows are weakened and may therefore become leaky and inaccurate.

Within the bellows and at its central portion we provide a ring or strap *M* of aluminum or other fairly stiff material preferably having a cloth protecting covering. This ring engages the central portion of the leather and prevents the latter from extending too far within the bellows. Outside the bellows we provide a ring or strap *N* of leather or other suitable material which engages the leather portion *k*⁵ centrally and prevents the latter from extending outwardly farther than a predetermined distance. This ring *N* is preferably narrower than ring *M*. It will be clear that rings *M* and *N* make it certain that the central portion of the bellows will always be of the same diameter so that the leather *k*⁵ will never extend inwardly or outwardly too far and thereby render the action of the bellows inaccurate and lacking in uniformity. It will be noticed that the parts of the leather *k*⁵ on either side of the rings will be rolled on the rings *M* and *N* when the bellows is deflated and this rolling is very important in conducing to the accurate operation of the bellows, especially because with our arrangement of straps the leather will be rolled and thereby all cracking of it will be avoided. With our construction it will also be noticed that thin leather may be used and this is of great practical importance be-

cause heretofore thick leather had to be used and thick leather has two great objections, one being that the thickness prevents uniform action of the bellows and the other
 5 being that thick leather has a strong spring action which interferes with the normal operation of the gas.

Except for the bellows the general operation of our meter is as usual so that we need
 10 not describe the mode of operation generally but we do desire to point out that in using our meter the bellows open and close with a piston and cylinder action, the diameter of the central portion of the bellows being the
 15 same whatever the position of the side walls of the bellows may be. In other words, our central band is a cylinder of constant size and the side rings are pistons of constant size. It will be clear that with our construction the motor chamber may be smaller
 20 for bellows of a given capacity because the diameter of the bellows being no larger when the bellows are deflated than when they are inflated the motor chamber need
 25 only be high enough to accommodate the bellows and need not be larger as heretofore to accommodate the deflated bellows. Again with a given height of motor chamber we may use bellows of greater capacity than
 30 heretofore for the reasons just given.

A great advantage of our bellows is that the leather portion will never approach nearer to the bottom or top of the motor chamber than a point which may be predetermined with the result that the leather
 35 cannot come in contact with the top or bottom of the chamber as heretofore sometimes happened. Such contact has resulted in unequal and inaccurate measurement of the gas
 40 and in some cases the leather has stuck to the chamber adhering through the medium of condensed gas. Our meter always gives the same amount of gas for a given stroke.

Another advantage is that in soldering
 45 on the side caps of the bellows the soldering iron will not harm the leather by burning or otherwise which has frequently happened in prior constructions.

Our connection between the rock-shafts and crank-arms is especially important when
 50 those members are to be disconnected because no solder has to be broken away.

Other advantages will be manifest from the above description.

We do not claim the novel shaft or its
 55 combination with the crank arm in this specification as we intend to make that the subject of another specification.

What we claim is:

1. A gas meter comprising bellows consisting of a single chamber and having a flexible portion; a metal ring engaging the center of the flexible portion on its inner surface; and a leather strap engaging the center of the flexible portion at its outer surface.
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2. A gas meter comprising bellows consisting of a single chamber; and a movable member outside the outermost portion of the bellows to keep the diameter of that portion constant during the operation of the meter.
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3. A gas meter comprising bellows consisting of a single chamber; a movable member outside of and engaging the bellows at
 75 its central portion; and a movable member inside of and engaging the bellows, the latter member engaging the bellows directly opposite the former member.

4. A gas meter comprising bellows consisting of a single chamber; a flat strap engaging the central portion of the bellows at the outside; and a second flat strap engaging the central portion of the bellows at the inside and directly opposite the first strap,
 85 the first strap being narrower than the second.

5. A gas meter comprising bellows; and a flat stiff strap inside of, and engaging, the bellows and substantially as wide as the deflated bellows.
 90

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Witnesses:

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