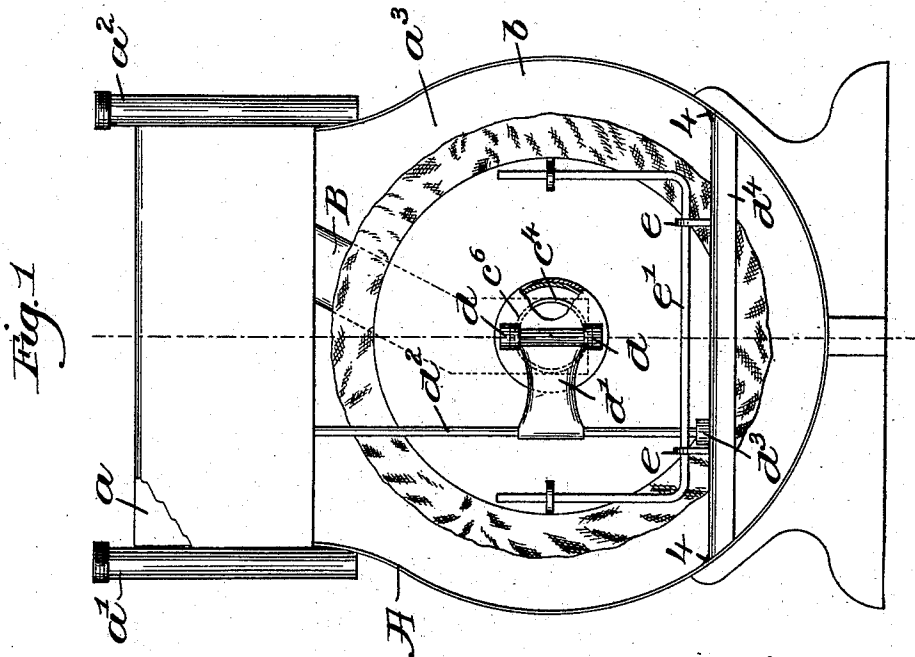
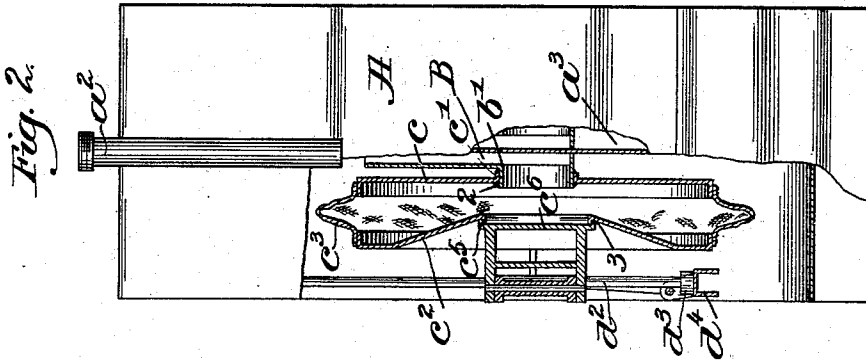


(No Model.)

E. McGRADY  
DRY GAS METER.

No. 524,859.

Patented Aug. 21, 1894.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

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## DRY GAS-METER.

SPECIFICATION forming part of Letters Patent No. 524,859, dated August 21, 1894.

Application filed January 20, 1894. Serial No. 497,572. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD McGRADY, of Stoneham, county of Middlesex, State of Massachusetts, have invented an Improvement in Dry Gas-Meters, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to what are known as "dry meters" for measuring gas and the like. Meters of this class usually contain two chambers, one a measuring chamber containing the bellows which is alternately inflated and collapsed by the passage of the gas through the meter, the other a distributing chamber containing one or more valves actuated by the movements of the bellows and to control the passage of the gas to and its discharge from the said bellows, the registering mechanism being also actuated from and by the movement of the bellows. In meters of this class as heretofore constructed the inclosing shell or case has been rectangular in shape, and the distributing and measuring chambers within the casing also necessarily rectangular in shape, that is, having flat side walls. The bellows, however, is for the best results made circular in form, and in order that the inclosing case and the measuring chamber be not excessively large it has heretofore been necessary to reduce the size of the rectangular chamber to such a degree that the bellows contact with the side walls of the chamber on at least three and usually all four of the sides. In order to preserve the leather of which the flexible part of the bellows is composed and to make the latter pliable it is customary to thoroughly saturate the leather with oil. This oil, together with that usually contained to a greater or less degree in the gas or fluid passed through the meter, tends, after a time, to oxidize or thicken and cling to the side walls of the chamber, it then acting to retard the free and easy movement of the bellows, the latter after a time becoming stuck to the side walls of the chamber and preventing proper operation of the meter. The bellows contacting with the bottom of the chamber prevents the latter being thoroughly cleaned when necessary.

In meters as heretofore constructed it has

been customary to attach the inner or back diaphragm of the bellows at its periphery to the back of the measuring chamber, and when it becomes necessary to remove the bellows for boiling out or cleaning the meter the bellows in being removed is usually ruined owing to the difficulty of detaching the back diaphragm from the rear wall. Again, the actuating spindle connected with and actuated by the movement of the bellows, together with the equalizer are usually mounted in bearings upon the bottom of the chamber. This is objectionable for reasons above stated, as it interferes with the easy cleaning of the chamber.

The object of this invention is to improve meters of the above class, first, by making the measuring chamber circular or semicircular in shape in order that its side walls may at all points conform to and clear the bellows; second, in mounting the bellows in a novel manner to be described, whereby it may be easily removed without injuring the same, and third, in mounting the actuating spindle and equalizer upon a carrier supported above the bottom of the measuring chamber in such position and manner that it may be readily removed when desired, and is at all times free and clear from the bottom leaving the latter easy to clean.

Other features of this invention will be hereinafter described in the specification and pointed out in the claims.

In the drawings, Figure 1 represents in face view a meter embodying my invention, a part of the front wall being removed to expose the bellows and connected devices within the measuring chamber, and Fig. 2, a right hand side view of the meter shown in Fig. 1, also broken away to expose the bellows in section.

Referring to the drawings, A represents the inclosing case of a meter embodying my invention, the same being constructed to provide a distributing chamber *a*, of usual rectangular shape and size, in the upper part of the meter, the gas or fluid to be measured being conducted thereto and discharged therefrom through usual inlet and outlet pipes *a'*, *a''*, at opposite ends of the meter. The valve mechanism and port leading thereto and therefrom within the distributing chamber

are and may be of usual and desired construction and need not, therefore, be herein shown nor described in detail.

The meter herein shown, in accordance with the usual custom, is provided with two measuring chambers located at opposite sides the meter and separated by a middle wall or partition  $a^3$ , see Fig. 2. A measuring bellows is arranged within each of these chambers, but as the construction and operation of each is the same and as the two are connected in usual manner with and to operate the distributing devices within the distributing chamber  $a$ , a detailed description of one measuring chamber with its bellows and attachments will be deemed sufficient.

B is the pipe or passage which conducts the gas from the measuring chamber to the interior of the bellows, said passage, as herein shown, terminating at the center of the measuring chamber  $b$  in an opening surrounded by a circular lip  $b'$ , Fig. 2, about which is placed the back diaphragm  $c$  of the bellows, said diaphragm having a rearwardly extended flange  $c'$  which encircles and fits the lip  $b'$ , as shown. The front diaphragm  $c^2$  is connected with the back diaphragm by the usual leather strip or bellows  $c^3$ , the said front diaphragm having an opening  $c^4$  at its center surrounded by an out-turned flange  $c^5$ , see Fig. 2. The opening  $c^4$  in the front diaphragm is closed by a disk  $c^6$  having a flange which embraces and incloses the lip  $c^5$  on the diaphragm, see Fig. 2.

In constructing the meter the front and back diaphragms of the bellows are first connected by the leather  $c^3$ . The back diaphragm of the bellows is then applied to the lip  $b'$  on the port or passage B and secured in position by solder, indicated by the black filling 2, Fig. 2, the solder and soldering iron being inserted through the opening  $c^4$  in the front diaphragm. The back diaphragm having been secured in position the opening  $c^4$  in the front diaphragm is then closed by applying the disk  $c^6$  and securing it in position by solder indicated by the black filling 3, Fig. 2. The disk  $c^6$  is provided with two ears  $d, d'$ , between which is jointed the arm  $d'$ , fast on the actuating spindle  $d^2$ , journaled at its lower end in the bearing  $d^3$  on the bridge  $d^4$  and passed upwardly into the distributing chamber  $a$  to work the valves therein in usual manner. The bridge  $d^4$  is arranged, as shown, at a considerable distance above the curved bottom of the measuring chamber, the said bridge being preferably U-shaped in cross-section, as shown in Fig. 2, and at its ends secured in suitable manner, as by solder, to the side walls of the chamber. Upon this bridge piece I have also placed two bearings  $e$  for the usual equalizer  $e'$  which compels the diaphragm to move in and out always in a proper vertical plane.

By reference to Fig. 1 it will be seen that the lower part of the inclosing case of the meter, that is, the part surrounding and con-

stituting the side walls of the measuring chamber  $b$ , is nearly circular in shape thereby conforming to the external shape of the bellows contained within the chamber, the said chamber being of sufficient size to leave a space on all sides between its walls and the said bellows so that the latter can never come in contact with the side walls at any point. By making this chamber circular or semicircular in shape the necessary space or clearance between the bellows and the walls of the chamber is obtained without making the said chamber unnecessarily large.

If it were attempted to make the measuring chamber of the ordinary rectangular shape of sufficient size to leave proper clearance between its side walls and the bellows, said chamber would be so large that it would require too much time and gas to fill it during the operation of the meter; this difficulty, however, is obviated by constructing the said chamber as herein shown. Any oil or condensation from the gas or fluid passed through the meter, is directed by the curved sides of the chamber to the bottom thereof where it collects and is easily removed. The bridge piece  $d^4$  is, however, at such a distance above the bottom as to permit removal of the sediment without interference or obstruction.

When it is necessary to boil or clean the meter the bellows must first be removed, and by my improved construction this may be easily accomplished without injury to the bellows, for by running a soldering iron around the edge of the disk  $c^6$  on the front diaphragm, said disk may be quickly removed, and the soldering iron may then be inserted through the opening  $c^4$  in the front disk and run about the outside of the lip  $b'$  to loosen the rear diaphragm when the entire bellows may be removed intact and without injury.

If for any reason it becomes necessary to remove the bridge piece  $d^4$  a soldering iron applied at the points 4, 4, quickly loosens the same.

This invention is not restricted to the exact construction shown for the same may be varied more or less without departing from the scope of the invention.

The invention is not restricted to any particular construction of bellows other than the method of applying the same herein shown and described, nor is the invention limited to any particular registering or distributing mechanism, for the same may be varied without affecting the essential points of this invention, the latter relating solely to the measuring chamber, its shape, construction, and manner of mounting the bellows and its attachments therein.

I claim—

1. In a meter of the class described, an inclosing shell containing distributing and measuring chambers, and a passage leading from the former to and terminating in the latter chamber in an opening surrounded by a raised lip; combined with a bellows ar-

5 ranged within said measuring chamber and consisting of front and back connected diaphragms, the latter having an opening to receive said lip, and an opening in said front diaphragm closed by a removable disk, substantially as described.

10 2. In a meter of the class described, an inclosing shell containing distributing and measuring chambers, and a passage leading from the former to and terminating with an open end in the latter chamber, combined with a bellows located in said measuring chamber, and consisting of front and back flexibly connected diaphragms, an opening in  
15 said back diaphragm registering with the open end of said passage, and means to secure said back diaphragm in position, and an opening in said front diaphragm through which access to said back diaphragm within  
20 the bellows may be had and a closure for the opening in said front diaphragm, substantially as described.

25 3. The herein described bellows for dry gas meters, the same consisting of front and back flexibly connected diaphragms, the front diaphragm provided with an opening through which access may be had to the back diaphragm for fastening the latter, and a closure for said opening, substantially as described.

4. In a meter of the class described, the inclosing case having distributing and measuring chambers, and a bellows within the latter, combined with a substantially horizontal bridge supported at its ends by the sides of the said inclosing case above the bottom of  
30 said measuring chamber, to leave a clear space below, for cleaning purposes and an equalizer carried by said bridge, substantially as described.

5. In a meter of the class described, the inclosing case having distributing and measuring chambers, and a bellows within the latter, combined with a bridge supported at its ends by the sides of said inclosing case above the  
35 bottom of said measuring chamber, to leave said bottom clear, for cleaning; an actuating spindle connected with said bellows, and a bearing therefor on said bridge, substantially as described.

In testimony whereof I have signed my  
40 name to this specification in the presence of two subscribing witnesses.

EDWARD <sup>his</sup> X McGRADY.  
mark

Witnesses:

FREDERICK L. EMERY,  
AUGUSTA E. DEAN.