Jan. 3, 1939. M. HELM ET AL 2,142,844

DIAPHRAGM FOR DRY GAS METERS

Filed Dec. 10, 1936

Fig. 1.

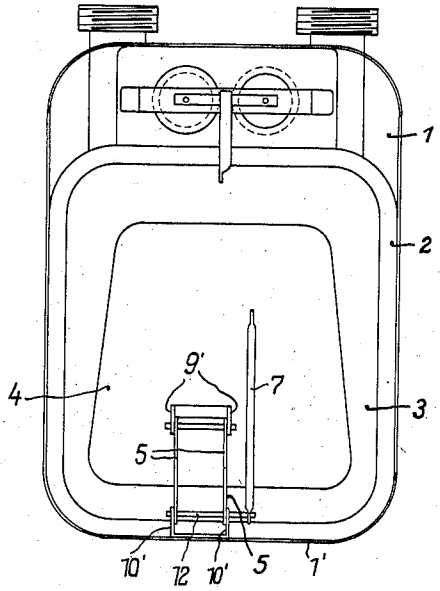


Fig. 2.

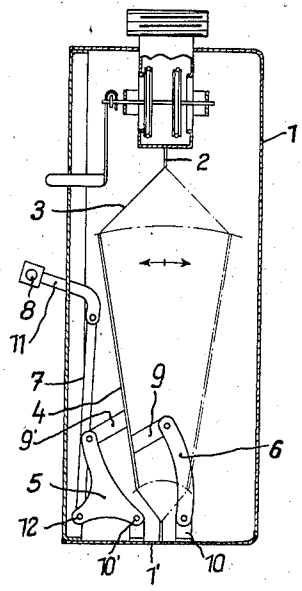


Fig. 3.

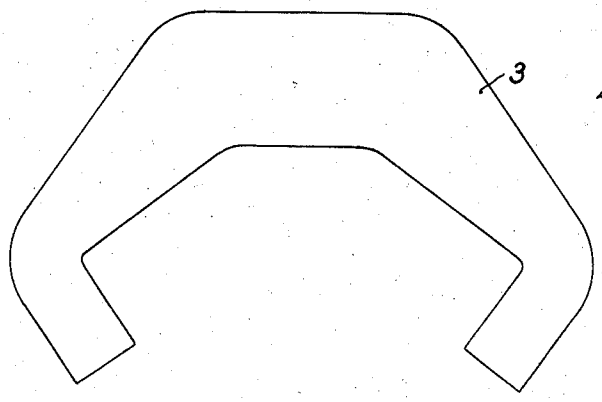
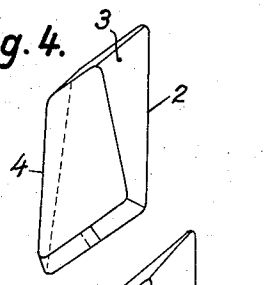


Fig. 4.



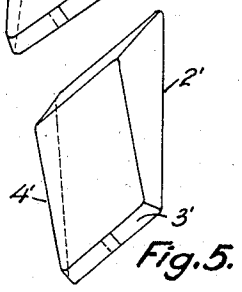


Fig. 5.

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DIAPHRAGM FOR DRY GAS METERS

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In Germany December 11, 1935

1 Claim. (Cl. 73—279)

This invention relates to an improved construction of the diaphragm for dry gasmeters and aims at providing for such gasmeters a diaphragm, especially a leather diaphragm, which renders possible to use a particularly economically cut piece of the leather and to obtain with a diaphragm constructed according to this invention not only a particularly simple construction of the gasmeter, but also a perfectly satisfying operation of the same especially as regards the behaviour of the diaphragm when oscillating from the one of its two end positions into the other thereof, in that the oscillations do not entail folds in the leather other than trifling ones. In other words, the diaphragm, or its leather-piece respectively, operates approximately foldless, which is obtained by such a shape of said piece that it presents, at least in its end-positions, a geometrical figure of an accurately definite shape and size. This improved diaphragm answers the demand that it presents, when being in its end-positions, preferably plane surfaces around the stiff or rigid bottom or centre portion which the leather piece surrounds and encloses. This demand cannot be complied with if there are, as in the known dry gasmeters, symmetrical or nearly symmetrical distances extending over all four sides between the diaphragm bottom and the clamping folds provided at the inner surfaces of the wall of the casing of the meter.

Now, according to this invention, the leather piece of the diaphragm is so cut out of the flat leather plate, and the rigid bottom pertaining to, and cooperating with, it is so shaped that when these members are united with one another the breadth of the diaphragm between said bottom and said clamping folds is not everywhere the same but changes in a certain predetermined measure, viz. so, that in spite of the oscillations of the complete diaphragm (leather piece and bottom) the leather piece presents in its end positions at least approximately plane, if not preferably plane surfaces, and while the leather piece is moved from the one of its end positions into the other one the formation of folds in it is so trifling that it can be practically completely neglected.

Particularly advantageous is a shape of the leather piece in which this piece when connected with the rigid bottom so as to constitute together with it the complete diaphragm, forms in the end positions of the same a sort of a truncated pyramid. The top surface of this pyramid is formed by the rigid diaphragm bottom, which extends, relatively to the rectangular base of the pyramid, not parallel thereto but in a certain angle. Said top surface constitutes then a trapezoid, in consequence whereof the diaphragm bottom has the same shape. It is also possible to cut the leather in such a way that the diaphragm bottom has quadrangular or square shape. In these cases the base must have trapezoidal shape.

The invention is illustrated diagrammatically and by way of example on the accompanying drawing on which Figure 1 is a view of the interior of the measuring chamber of a gasmeter provided with a diaphragm constructed ascording to this invention. Figure 2 is a vertical transverse section through the same. Figure 3 shows a flat piece of leather so cut as to be adapted as to form later on the rim-like yieldable or bendable portion encompassing the movable, oscillatable portion of the diaphragm. Figure 4 is a perspective representation of a complete diaphragm drawn to a greatly reduced scale relatively to the other figures and Fig. 5 is a modified form of diaphragm.

On the drawing, 1 denotes the casing of the gasmeter, 2 is a narrow frame provided at the inner surface of the walls of said casing and serving for holding the leather piece which I term "cup" in the following portion of this specification, and which surrounds the rigid diaphragm bottom 4 and is firmly connected therewith. The bottom 4 is connected by a link 9 with an arm 6 pivoted to element 10 on the bottom 1' of the casing 1, and is further connected by links 9' with lever-like members 5 pivoted to element 10' likewise on said bottom and being connected by an axle 12 and a rod 7 with an arm 11 secured to an axle 8 connected in turn with a mechanism for controlling the valves and for transmitting the movements to a counting mechanism. We have abstained from showing and describing said mechanism, the valves, etc., because these members do not form parts of the invention.

When the diaphragm is in the one or the other of its end-positions (the one being shown in Fig. 2 in full lines, the other in dotted lines), it forms a truncated pyramid, the top surface of which extends at an angle with respect to the base, or bottom surface and the sides of which have a breadth which increases in the one direction and decreases, therefore in the opposite direction, as appears from Figs. 1 to 4. In Fig. 5 this same condition holds true generally but is slightly modified in that the diaphragm 4' in

this modification becomes rectangular and the frame 2', or rather the opening in the frame, becomes trapezoidal shaped due to the fact that the plane of the rigid member 4' is perpendicular to the axis of the pyramid and the plane of the base, or frame, is at an angle to this axis. The shape of the flexible diaphragm member 3' is, therefore, generally of the same shape as the member 3 differing therefrom only in the lengths of the sides which changes in accordance with the changes in the sides of the diaphragm and the frame opening. The breadth of the upper horizontal side of the truncated pyramid corresponds with the largest breadth at the upper end of the vertical sides of the same, and the breadth at the lower horizontal wall of the truncated pyramid corresponds with the breadth at the lower end of the vertical sides of the same, as appears especially from Figs. 2 and 4.

Owing to the fact that the portion of the casing constituting the measuring chamber on the one or the other side of the diaphragm, as the case may be, is substantially conical when the diaphragm is in the one or the other of its end-positions, the flow of the current of gas streaming through the respective chamber, that is, the active measuring chamber, is improved in such a manner that the gas pressure producing the oscillations of the diaphragm by reason of the difference of the gas pressure between the two sides of the diaphragm is more favorably utilized for the purpose in view.

In the constructional form shown in the drawing by way of example the members 5 and 6 are supported below the diaphragm (at 10 and 10') which has rendered it possible to suspend the diaphragm below its point of gravity.

We claim:

In a dry gasmeter the combination of a casing, a frame within said casing, and a diaphragm attached to said frame, said diaphragm comprising a rigid quadrilaterally shaped central portion, means for supporting said rigid portion comprising links arranged on opposite sides of said rigid portion and pivoted to said rigid portion and to the bottom of said casing for guiding said rigid portion through said frame in spaced relation to the sides of said frame, and a flexible border portion attached to said rigid quadrilaterally shaped central portion and to said frame, said flexible portion being so shaped as to form with the rigid portion a truncated pyramid in either of its two extreme positions, the base of said pyramid being a quadrilateral of trapezoidal shape having its widest side at the bottom of said frame and the upper surface of said pyramid being the said rigid central portion whereby said rigid portion is moved through said frame to its extreme positions with a minimum of folding of the flexible portion during its passage through the said frame.

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