No. 804,464. PATENTED NOV. 14, 1905.

E. HAAS.

GAS METER.

APPLICATION FILED JUNE 27, 1902.

2 SHEETS—SHEET 1.

Fig. 1.

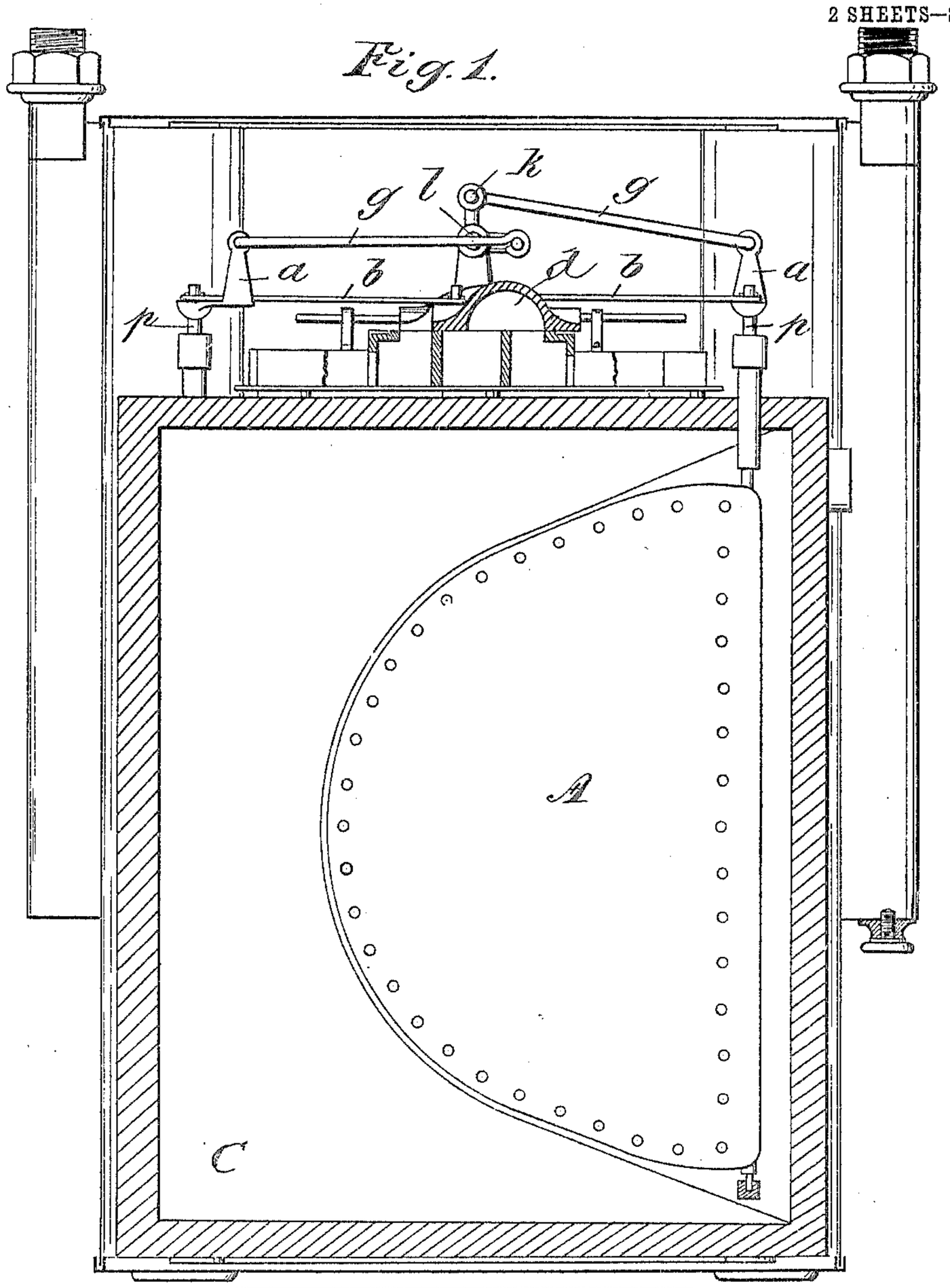
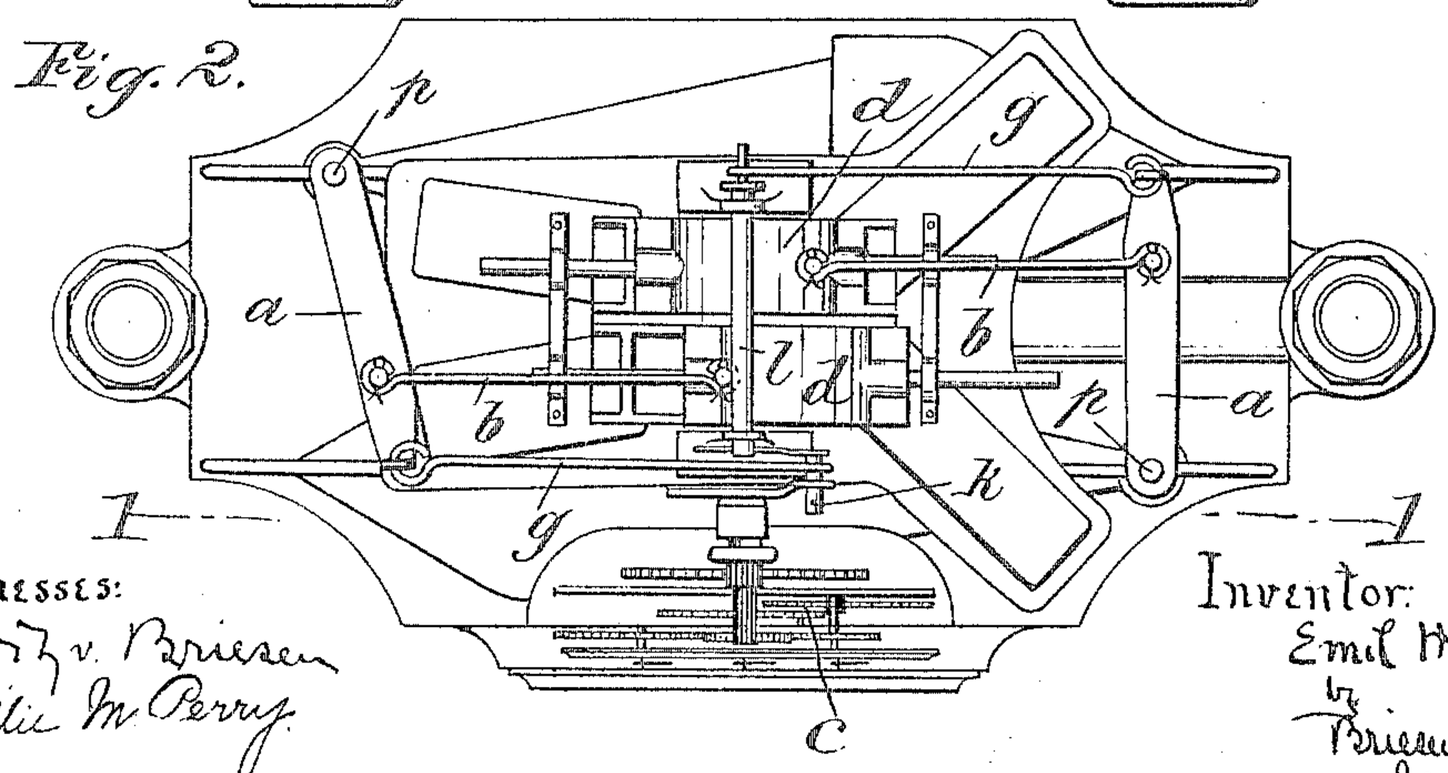


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

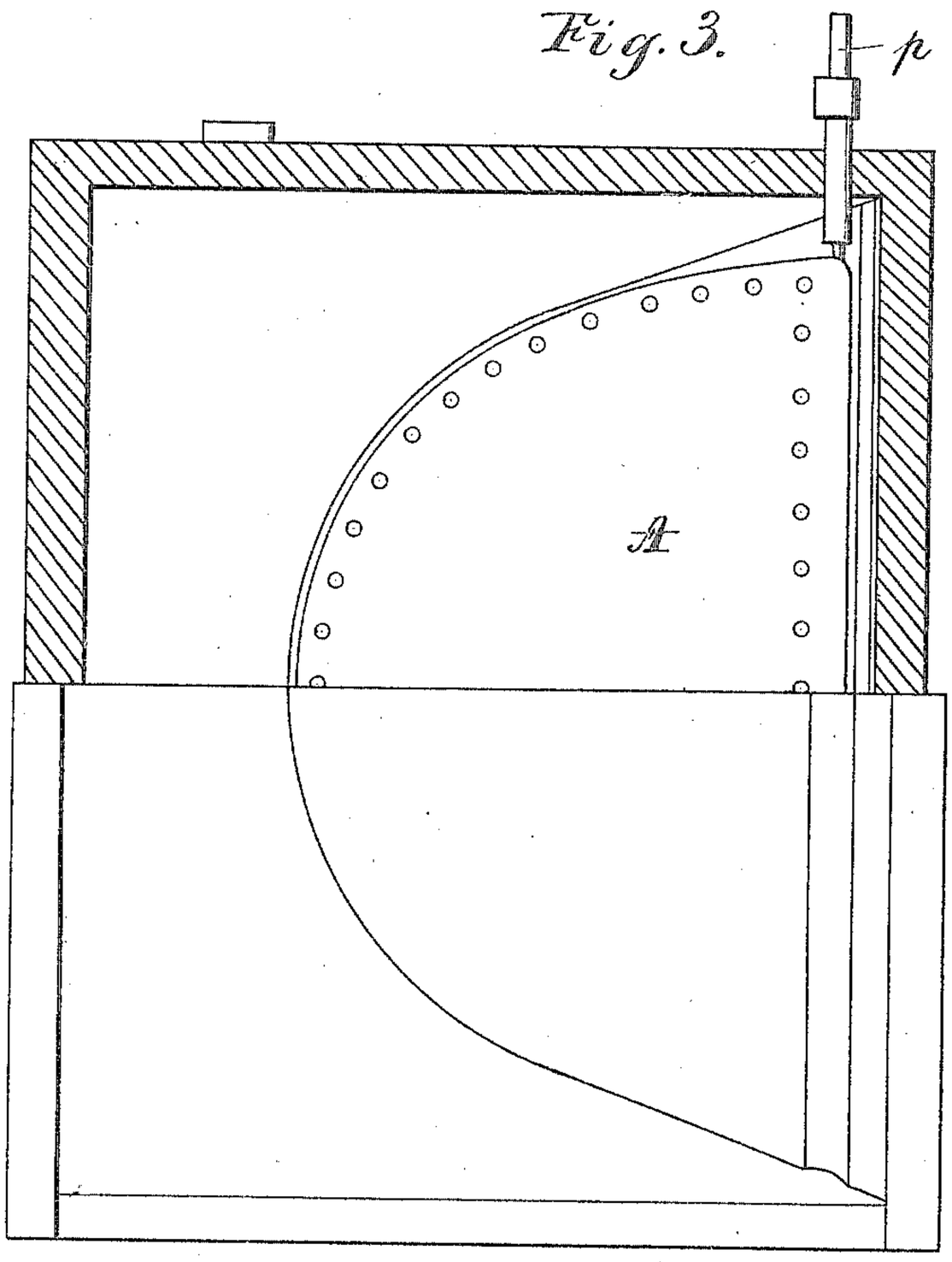
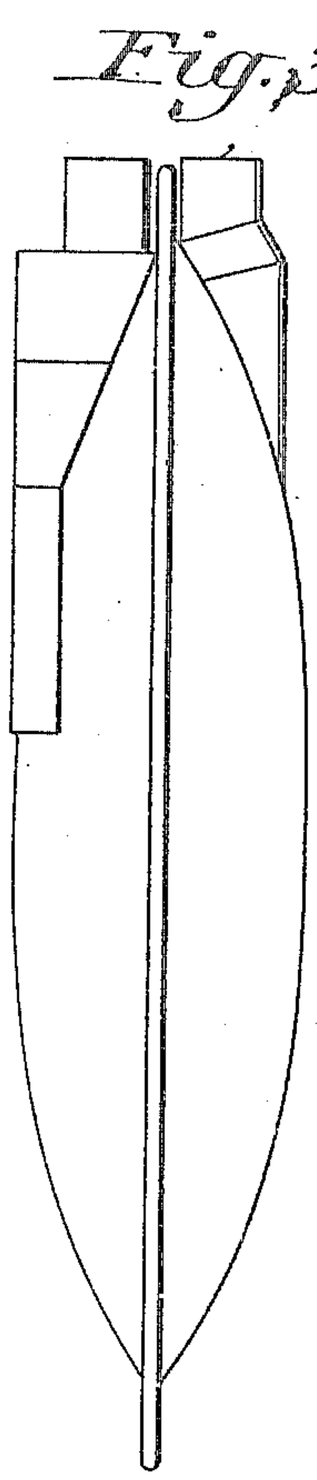


Fig. 3a.



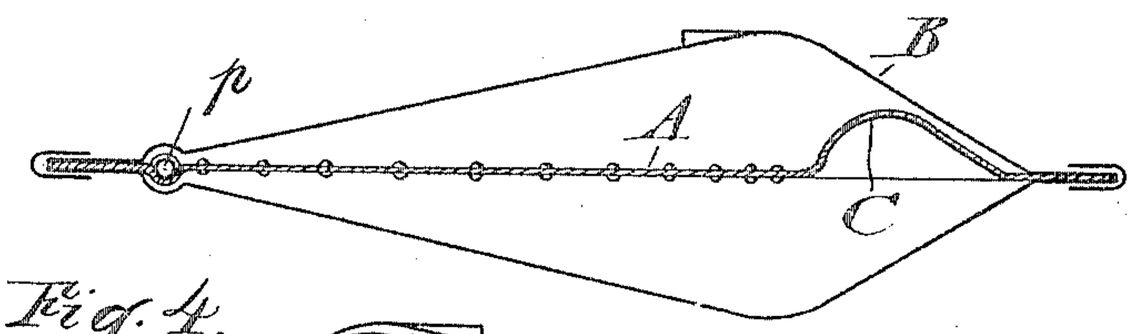
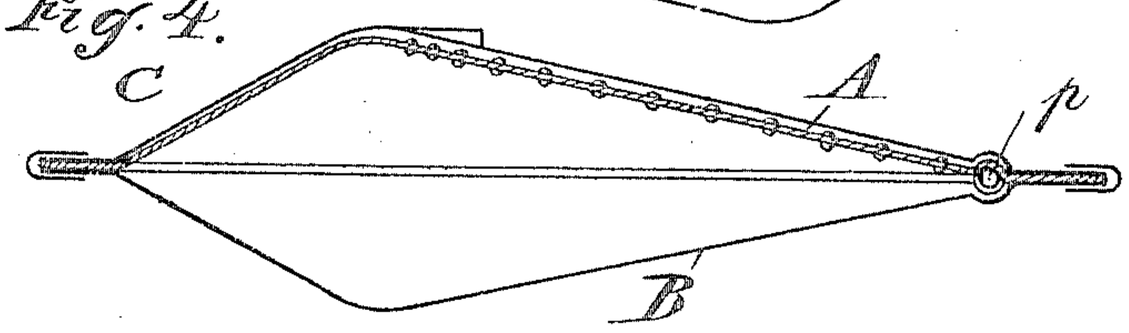


Fig. 4.



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UNITED STATES PATENT OFFICE.

EMIL HAAS, OF MAINZ, GERMANY.

GAS-METER.

No. 804,464. Specification of Letters Patent. Patented Nov. 14, 1905.

Application filed June 27, 1902. Serial No. 113,456.

To all whom it may concern:

Be it known that I, EMIL HAAS, manufacturer, residing at Rheinallee No. 31, Mainz, in the Grand Duchy of Hesse, Germany, have invented new and useful Improvements in Gas-Meters, of which the following is a specification.

The gas-meter of this invention belongs to that class of so-called "dry" gas-meters in which a membrane moving to and fro actuates at each reciprocation the registering apparatus and also a controlling device through the medium of a vane connected to the membrane and mounted to vibrate about an axis. In gas-meters of this type the part which is the most delicate and the most difficult to fix is the membrane, in connection with which the difficulty has presented itself that the membrane has suffered injury at those places where the creases converged and that the working of the apparatus has been so labored that perceptible differences of pressure were found between the entering and escaping gas. In these meters the plates were bounded by straight lines, being at most only rounded off at the corners and could only extend over a small part of the membrane itself, in consequence of which a complex folded crease was produced and in particular two large folds extending from the free corners of the flap to the corners of the measuring vessel. In the present invention these evils are obviated by the use of a single vane which extends from the axis so far beyond the middle of the measuring-chamber that a fold of the membrane cannot become wedged under its edge. Such a result is not attainable with the existing form of vane, with which the evils caused by the formation of sharp folds would only be aggravated by the proportionately greater limits between which the extremities of the vane would move. According to the present invention the vane is so formed that it extends outward from the axis in the form of a closed semicircular curve. It can thus be made much broader than hitherto, since the narrowest pieces of the membrane which have their points toward the axis then range themselves smoothly. Furthermore, it has become necessary to modify the measuring vessel itself. When the two vanes of the earlier forms of gas-meter were opened, the free length of the membrane was stretched between the edges of the vanes, so that it scarcely required any further hold. In the new gas-meter, however, in which only about one-third of the membrane is not covered by the vanes, it is necessary that opposite to the front end of the vane the measuring vessel should have a shape corresponding thereto, so that the membrane when distended shall lie close against the wall of the vessel at this place. The vessel thus becomes shaped somewhat like a mussel-shell, inasmuch as the greater part of the wall of the vessel is contracted to the shape of the vane whose top determines the highest point, while from this point the wall slopes downward in a gentle curve to the four angles of the measuring vessel, which are finished off with rounded corners. By this means the formation of creases is much reduced in the sense that sharp and large folds are no longer formed, but that in place thereof are produced a larger number of smaller puckerings, which are not harmful to the membrane. The smallness of the puckerings has also an important bearing on the accuracy of the gas measurement, since a large fold projecting inward into the measuring-space will swell outward to an extent varying according to the internal pressure and will thus affect the capacity of the measuring-space.

The accompanying drawings illustrate the principles of the improved gas-meter.

Figure 1 is a sectional front elevation, the section being taken on substantially line 1 1 of Fig. 2; and Fig. 2 is a top view of the gas-meter. Fig. 3 is a front elevation, partly in section, of the measuring vessel, showing the vanes only and the membrane. Fig. 3^a is an edge view of the measuring vessel. In Fig. 4 are shown the corresponding sectional plans and at the same time relative positions of two measuring vessels in one casing.

In the customary construction of gas-meter two vanes are placed in each measuring vessel. According to my invention only one vane A is employed in each vessel B, such vane being semicircular and secured to a rectangular diaphragm C. In line with the straight edge of the vane A is provided the pivot-axis *p*, which is extended in the upward direction and carries at its upper end a lever-arm *a*, which transmits the oscillating movements of the vane A to the rocking shaft *l* by means of the link *g* and crank *k*. In addition the arm *a* actuates by means of the sliding rod *b* a slide-valve *d*, which governs the admission of the gas into the measuring vessel B. The shaft *l* is connected with any suitable registering device, such as indicated

at *c* in Fig. 2. The axis *p* of the other vane A is also continued upward. It is held vertical by a bearing at its upper extremity fixed in the interior of the vessel. The one vane and partition-wall swing so as to be independent of the other, whose movements are precisely limited by the length of the stroke of the crank *k*.

It will be obvious that the one freely-movable vane A can quite closely approach the interior walls of the measuring-chamber only when no opposing influence resists its otherwise easy movement. In the course of time during the working of the gas-meter such resistance often arises unforeseen in consequence, for example, of the accumulation of condensation products from the gas, oxidation of the axle-pin, or of its bearing, &c. The effect of such influences is that the freely-moving vane A no longer completely traverses its path, and consequently there ensues a diminution of the measuring-space, with the result that an over measurement of gas passing through the meter is registered.

From Figs. 1 and 3 it will be plainly seen that the vane A as constructed according to my invention provides a much better lever for the pressure of the gas to act upon than did the vane of the earlier construction, so that the pressure necessary for working the gas-meter is smaller, while variations of pressure do not affect the result so much. At the same time it is apparent that by dispensing with the second vane the formation of sharp and mutually-opposed creases is avoided.

In Fig 4 is shown the mussel-shaped formation of the measuring-chamber B, as also the appearance of the vane A and membrane or diaphragm C, in two different positions. The vane is of approximately semicircular shape, with the axis *p* disposed approximately in a diameter that is substantially along the straight edge of the vane. One edge of the diaphragm C is riveted or otherwise secured to the curved edge or periphery of the vane, while the outer portion of the diaphragm is attached to the measuring chamber or casing B. In the upper meter the vane is shown in the middle of its swing with the membrane extended in a comparatively free space, while in the lower meter the vane is represented at the end of its movement, in which position both the vane and the membrane lie close against the mussel-shaped wall. It will be seen that the diaphragm is of sufficient width to allow the vane A to lie flat against the sides of the casing or vessel B, as shown at the lower portion of Fig. 4, the pivot-axis *p* being placed at the point toward which the walls of the vessel converge, so that the vane may swing against one wall or the other.

Now what I claim, and desire to secure by Letters Patent, is the following:

1. A fluid-meter comprising a casing having converging walls, a flat vane pivoted within the casing at the junction of said converging walls and adapted to lie flat against either one of said walls, a diaphragm secured to the casing and to the vane and of sufficient width to allow the vane to swing into contact with either one of said walls, and fluid-registering means controlled by the movement of the vane.

2. A fluid-meter comprising a casing of approximately mussel shape, forming a four-cornered structure with sides of unequal length, a vane pivoted within said casing at the corner at which the long sides meet, and adapted to lie flat against said sides and to swing from one of said sides to the other, a diaphragm secured to the opposite corner of the casing and to the free edge of the vane, and adapted to lie against the short sides of the casing, and fluid-registering means controlled by the movement of the vane.

3. A fluid-meter comprising two casings of approximately mussel shape, each forming a four-cornered structure with sides of unequal length, the long sides of one casing being adjacent to the short side of the other casing, a vane pivoted within each casing at the corner at which the long sides meet, and adapted to lie flat against said sides and to swing from one of said sides to the other, a diaphragm secured to the opposite corner of each casing and adapted to lie against the short sides thereof, said diaphragm being also secured to the free edge of the vane, a connection for causing the two vanes to move in unison, and fluid-registering means controlled by the movement of the vanes.

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

EMIL HAAS.

Witnesses:
ROBERT BÜHL,
EVA SATTLER.