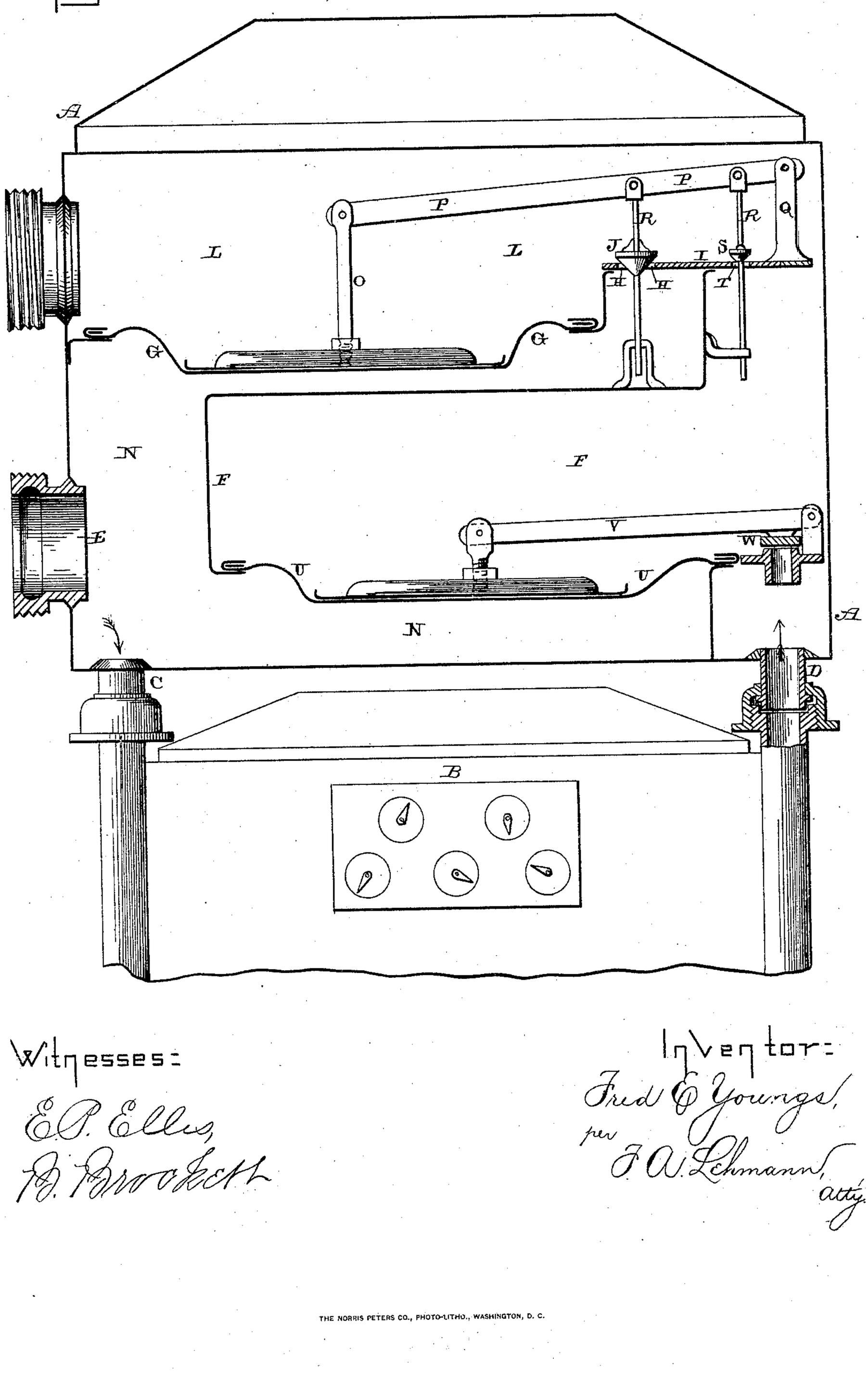
(No Model.) 2 Sheets—Sheet 1.

F. E. YOUNGS.

PROPORTIONAL METER.

No. 473,544. Patented Apr. 26, 1892.

Fig. 1.



Witnesses:

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Inventor:

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

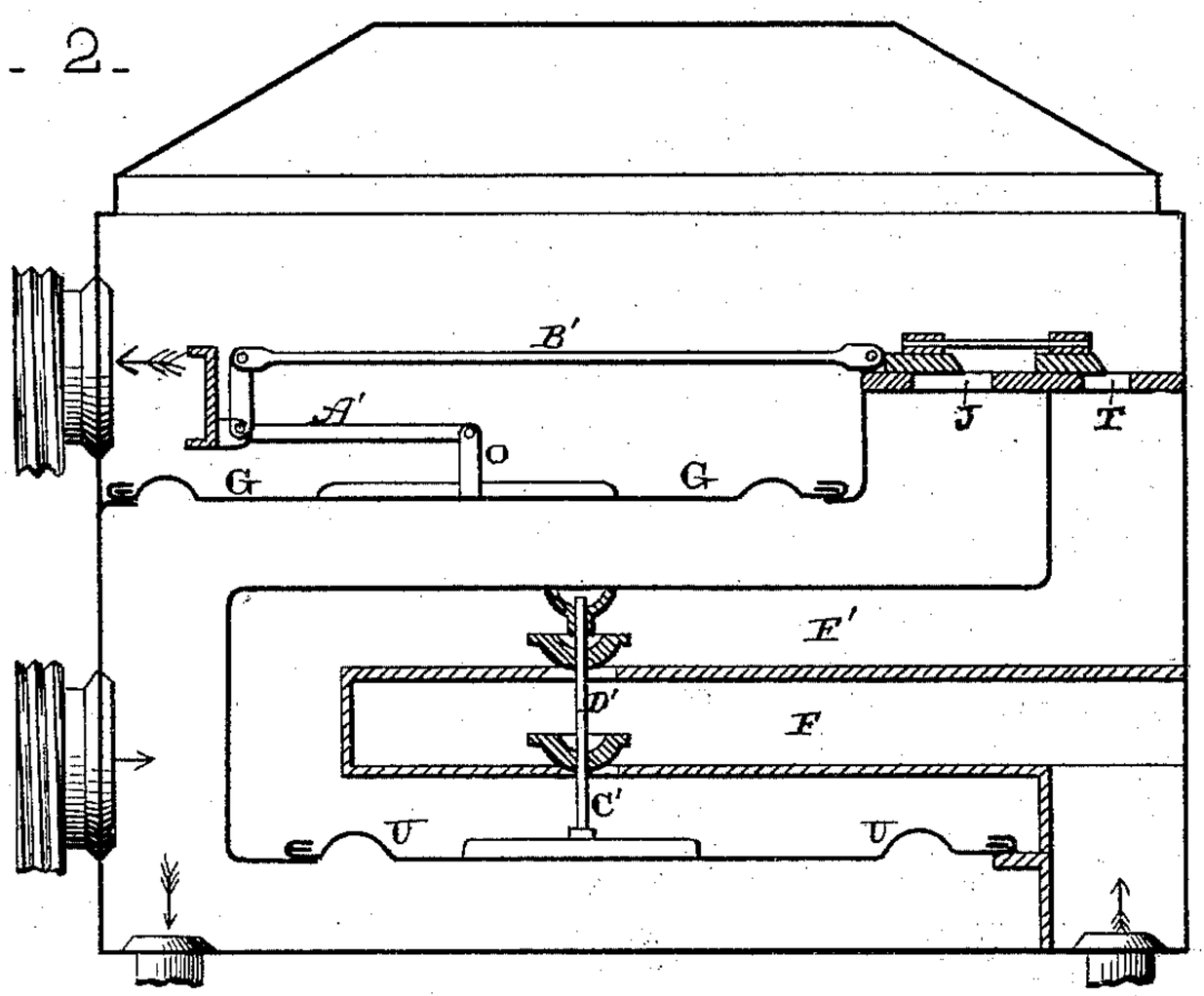
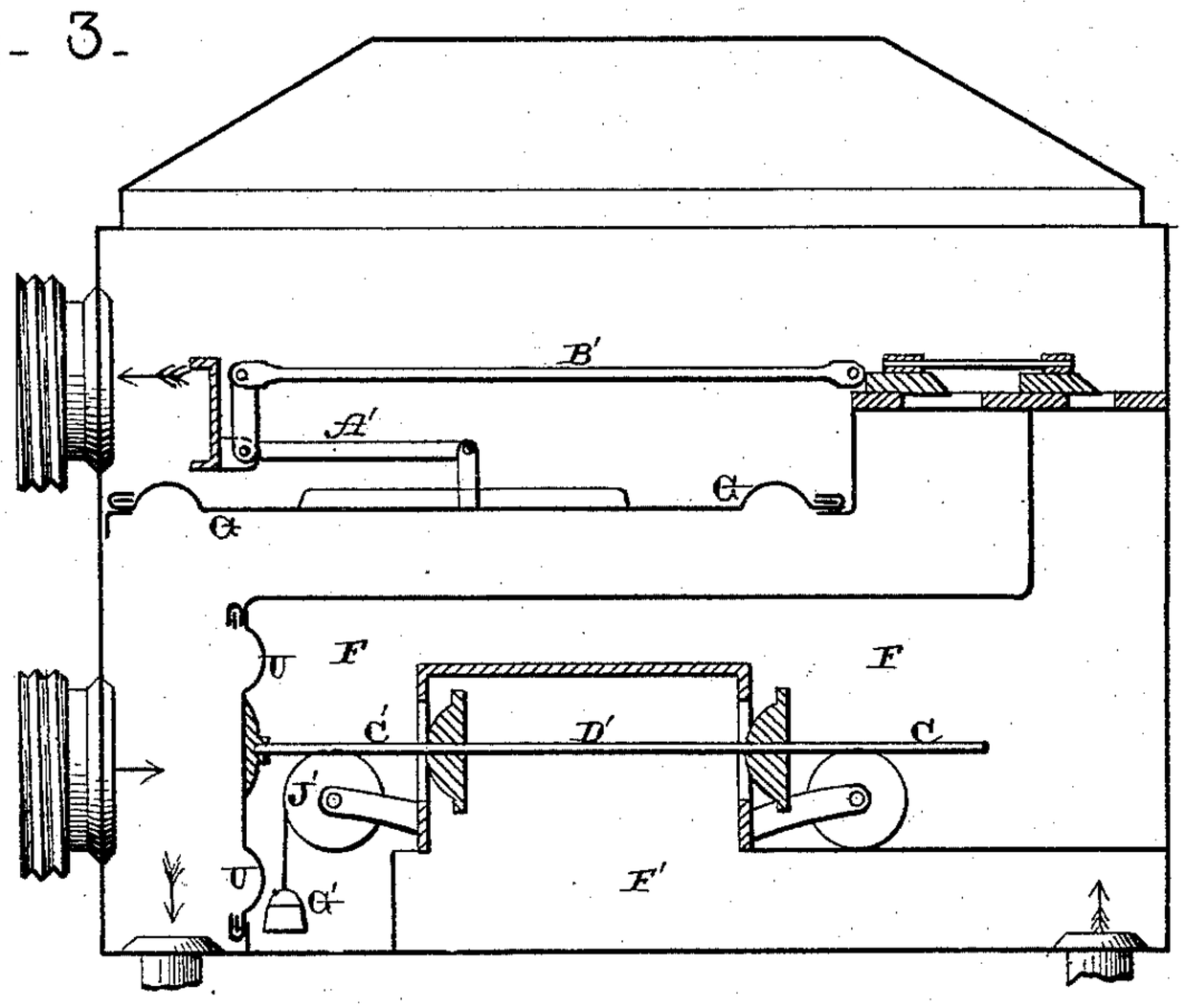


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRED E. YOUNGS, OF ALLEGHENY, PENNSYLVANIA.

PROPORTIONAL METER.

SPECIFICATION forming part of Letters Patent No. 473,544, dated April 26, 1892.

Application filed August 2, 1889. Serial No. 319,591. (No model.)

To all whom it may concern:

Be it known that I, FRED E. YOUNGS, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Proportional Meters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in proportional meters; and it consists in the combination of an inclosing case, an upper weighted diaphragm, a valve-lever connected to and operated by the diaphragm, and the proportional valves which are connected to the lever with a chamber formed in the case, a lower weighted diaphragm, and the valve-lever connected thereto and operated by the diaphragm and a tally-meter, as will be more fully described hereinafter.

The objects of my invention are to provide a proportional meter in which the loss of pressure of the gas in passing through the meter is constant without regard to changes of volume and to insure accuracy of the proportional measurements without regard to the friction in the tally-meter.

Figure 1 is a vertical section of a meter which embodies my invention. Figs. 2 and 3 show modifications of my invention.

A represents the casing of the meter, which can be of any desired shape, size, or construction which may be preferred, and B the tally-meter, which is connected thereto at the points C D. The gas enters at the inlet E and fills the entire lower portion of the casing around the chamber F, and while a portion of this gas passes through the tally-meter B into the chamber F the other portion passes up under the upper weighted diaphragm G and passes through the opening H, which is formed in the partition I, the area of which is controlled by the valve J. The weight placed on the diaphragm G is proportioned to the area of the diaphragm, so as to cause the pressure in the chamber L to be less than in the one N by a certain definite amount. This difference in pressure between the two chambers is regulated by the valve-lever P, which is connected to the weight at one end by the link O and to the standard Q at the other. To this lever, between the link O and the standard Q, are connected the two valve-rods R, to which the valves J S are secured, and these valves control the openings H T through the partition I. I do not limit myself to the precise construction here shown, because this arrangement of parts may be varied indefinitely without departing from the spirit of my invention.

The chamber F is formed inside of the casing A and may either be of the shape here shown or any other that may be preferred. The greater portion of the bottom of this chamber is formed by the lower weighted diaphragm U, to which the valve-lever V is connected. The valve W, which is secured to this lever, regulates the flow of the gas from the tally-meter B into the chamber F. The pressure of the gas in the chamber N against the under side of the weighted diaphragm U serves to operate the lever V, so that the valve W will only allow the gas passing from the tally-meter to enter the chamber F with a certain regulated degree of pressure, and the pressure in this chamber F is a certain regulated amount less than the pressure in the chamber N without regard to the volume of the gas passing through the meter.

The weights on the diaphragms G U are so proportioned that the differences in pressure between the chamber N and chamber L are always a certain amount greater than the difference in pressure between the chamber N and chamber F. This permits of making the opening T in the partition I, controlled by the valve, larger than it would be made if the fall in pressure were as great from the chamber F to the chamber L as it is from the chamber N to the chamber L. To illustrate, if the fall in pressure from the chamber N to the chamber L be made four times as great as the fall in pressure from the chamber F to the chamber L the size of the opening T may be given twice the area it would have if the fall in pressure were the same, and still maintain the same ratio of flow through the openings T and H. The gas in passing from the chamber N through the tally-meter and valve W into the chamber F always loses a certain definite amount of its pressure, no matter how much pressure is absorbed by the tally-meter, so long as the pressure absorbed by the tally-

meter is less than the fixed difference in pressure between the chamber N and chamber F.

In Fig. 2 another form of proportional valve is shown and which is operated by the diaphragm G.

I do not limit myself to any particular form of valve mechanism, because this can be varied at will without departing from the spirit of my invention.

In the construction shown in Fig. 1 the form of the valve is made such that in all positions of the stroke of the valve or lever the ratio of the area exposed in the valve T to that of the area exposed in the valve J always remains the same, and the flow of the gas in passing through one of the openings will always bear the same ratio to the flow of gas in passing through the other opening, no matter in what position the valve may be placed.

In Figs. 2 and 3, instead of the valve mechanism shown in Fig. 1, there is an L-shaped lever A′, connected to the link O of the weighted diaphragm G, and to the upper end of the lever A′ is connected the operating-rod B′, to which the proportional valve is secured. Instead of the lever V and valve W (shown in Fig. 1) there is connected directly to the diaphragm U a valve-rod C′, controlling the balance-valve D′. This valve D′ controls the passage of the gas from the tube or chamber F′ into the chamber F.

In Fig. 3 the same valve mechanism is shown as in Fig. 2 connected to the upper diaphragm G. Instead of the lower diaphragm U being placed horizontally it is here placed vertically and is weighted by having a weight G′ fastened by means of a cord, wire, or chain to the rod C′ of the balanced valve D′. The cord, wire, or chain passes over a pulley J′, placed in the chamber F, as shown, and by exerting its pressure endwise against the rod E′ serves to weigh the diaphragm and cause it to act exactly as shown in Fig. 1. The operation of the gas upon the diaphragms and all of the parts and the fall in the pressure of the gas in passing from one of the chambers to the other are the same in all the figures of the drawings, and these changes may be varied indefinitely without departing from the spirit of my invention.

Having thus described my invention, I claim—

In a proportional meter, the combination of an inlet-chamber, an outlet-chamber, a meter-delivery chamber, a tally-meter, a weighted diaphragm U, placed between the inlet-chamber and meter-delivery chamber, a valve placed between the tally-meter and meter-delivery chamber and operated by the weighted diaphragm U in such a manner as to cause a constant fall or difference of pressure between inlet-chamber and meter-delivery chamber, a weighted diaphragm G, placed between the inlet-chamber and outlet-chamber, a proportional valve, one opening of which is placed between the inlet-chamber and outlet-chamber, and the other opening placed between the meter-delivery chamber and the outlet-chamber and operated by the weighted diaphragm G in such a manner as to cause a constant difference or fall of pressure between the inlet and outlet chambers and between the meter-delivery and outlet chambers, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRED E. YOUNGS.

Witnesses:

EWELL A. DICK,

E. P. ELLIS.