No. 638,791. Patented Dec. 12, 1899.

T. B. WYLIE.

PROPORTIONAL GAS METER.

(Application filed Mar. 21, 1899.)

(No Model.) 2 Sheets—Sheet 1.

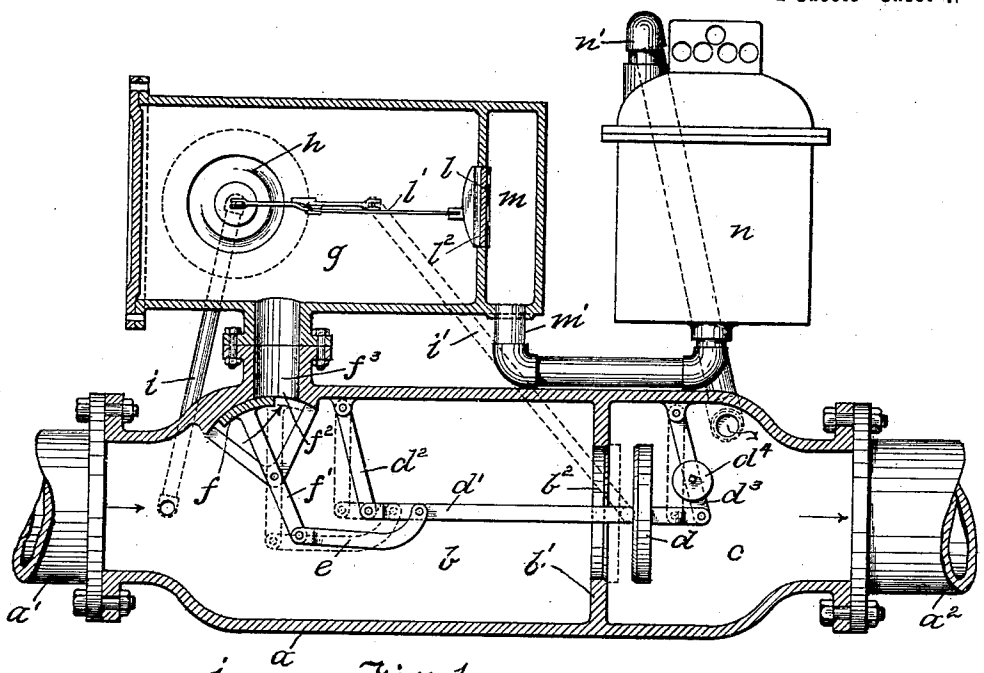


Fig. 1.

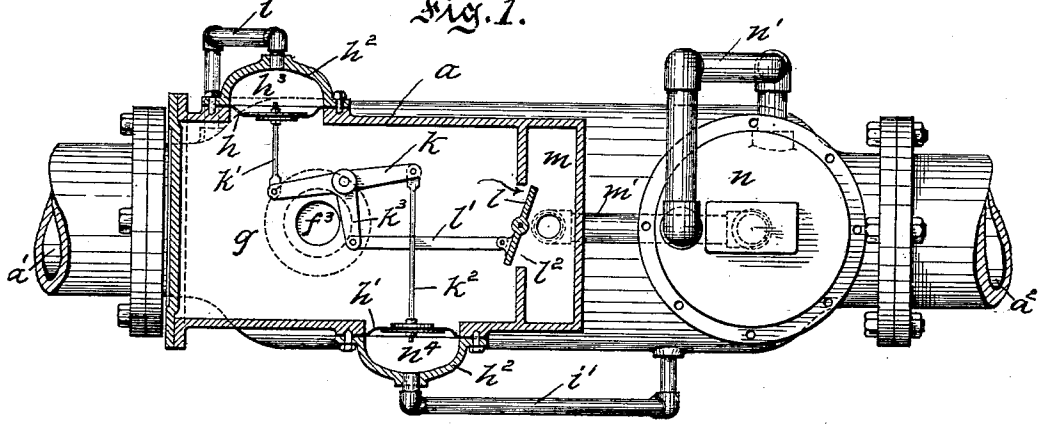


Fig. 2

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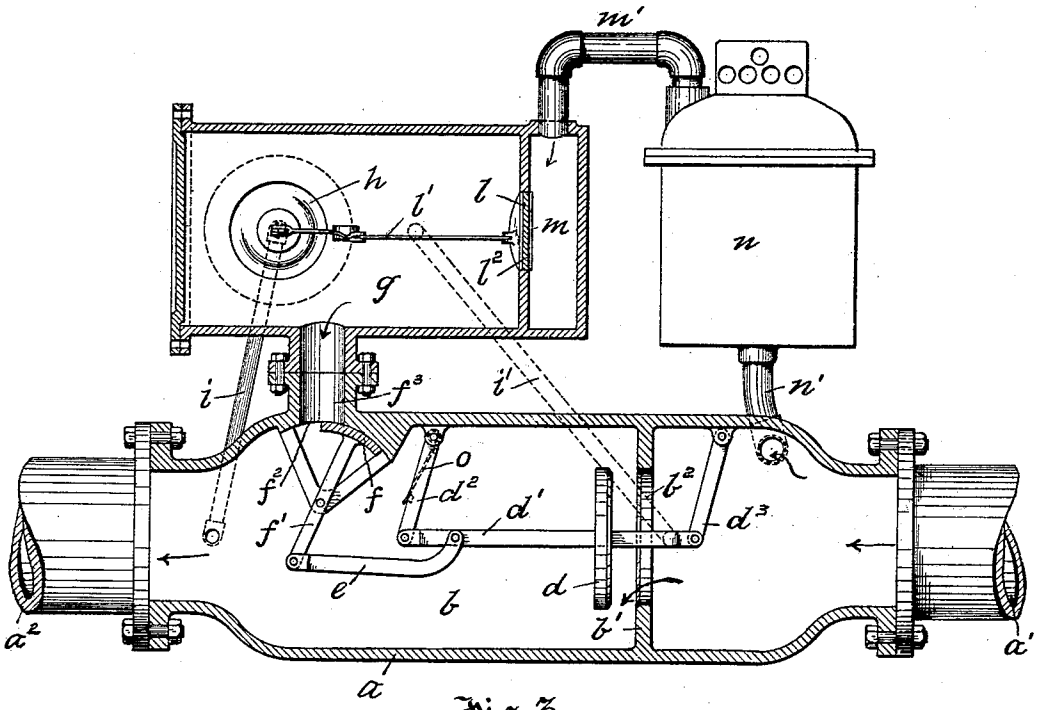


Fig. 3.

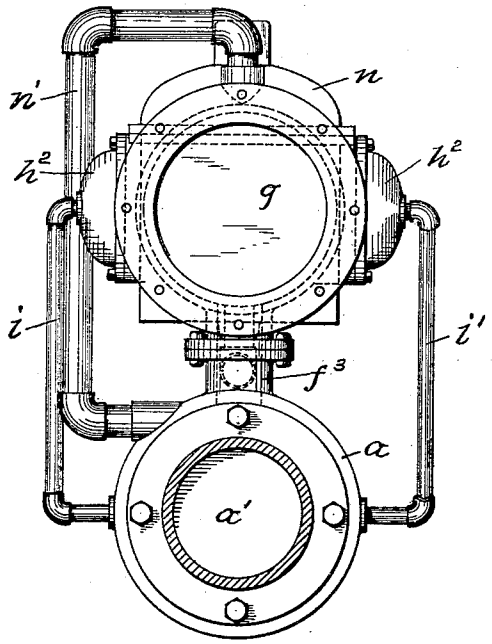


Fig. 4.

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UNITED STATES PATENT OFFICE.

THOMAS B. WYLIE, OF ALLEGHENY, PENNSYLVANIA.

PROPORTIONAL GAS-METER.

SPECIFICATION forming part of Letters Patent No. 638,791, dated December 12, 1899.

Application filed March 21, 1899. Serial No. 709,968. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. WYLIE, a resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Proportional Gas-Meters; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to proportional meters, or, more explicitly, to that class of meters which determine the volume of fluid passing through a conduit or main by passing a portion of the fluid through a tally-meter.

The object of my invention is to cheapen and simplify the construction of the aforementioned meters, as well as to obtain more accurate results than have heretofore been obtainable.

To these ends my invention consists, generally stated, in a proportional meter having a valve for the unmeasured volume of fluid, a valve for the measured volume, a controlling-chamber, two diaphragms in said chamber, one of said diaphragms having the pressure of the fluid-inlet on one side thereof, the other diaphragm having the pressure of the direct-delivery chamber on one side thereof, and connections between said diaphragms, and a valve for controlling the gas to or from said controlling-chamber.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a sectional elevation of my improved meter. Fig. 2 is a plan view showing the controlling-chamber in section. Fig. 3 is a modified form of my invention. Fig. 4 is an end elevation.

Like letters indicate like parts in each view.

In Fig. 1 the letter a designates a suitable shell or casing, and a' a^3 the inlet and outlet pipes for conveying fluid to and from the meter. The fluid-inlet chamber b is separated from the direct-delivery chamber c by the partition b'. The opening b^2 of said partition b' is controlled by the direct-inlet valve d. This direct-inlet valve d is mounted on the stem d', which is suspended from the inner walls of the casing by means of the swinging arms or links d^2 d^3. One of said arms, as d^3, may have a weight d adjustably secured thereto, which gives to the direct-inlet valve a variable resistance to the flow of the fluid. When the valve d is open, the weight will of course exert its greatest force on arm d^3 against the pressure of the fluid passing through said valve. An arm e connects the stem d' with the valve-lever f' of the small proportional valve f, which controls the measured volume of fluid passing to or from the tally-meter. This valve f moves over the opening f^2, which leads into the passage f^3, said passage in turn leading into the controlling-chamber g. Within the controlling-chamber g are the diaphragms h h'. Caps h^2, secured to the casing a, form the diaphragm-chambers h^3 h^4. The diaphragm-chamber h^3 communicates with the fluid-inlet chamber b by means of the pipe i, so that the pressure in the diaphragm-chamber h^3 is always the same as the pressure in the fluid-inlet chamber.

The diaphragm-chamber h^4 communicates with the direct-delivery chamber c by means of the pipe i', so that the pressure in the diaphragm-chamber h^4 is always the same as the pressure in the direct-delivery chamber.

Within the controlling-chamber g is the double rock-arm k, to which the diaphragms h h' are connected by means of the links k' k^2, respectively. A link l' connects an arm k^3 of the rock-arm k to the butterfly-valve l, which controls the opening l^2 leading from the controlling-chamber g to the delivery-chamber m. A pipe m' connects this chamber m with the tally-meter n. A pipe n' leads from the tally-meter to the direct-delivery chamber.

The operation of my improved meter is as follows: The fluid enters the inlet-chamber b by the pipe a' and by its pressure forces open the direct-inlet valve d sufficiently to allow the volume of fluid being delivered to pass. As the valve d opens and the stem d' swings forward the proportional valve f is also opened to allow a proper proportion of the fluid to enter the controlling-chamber g. The object of the diaphragms h h' and the valve l, operated thereby, is to regulate the pressure in chamber g, so that the drop in pressure through valve f will always bear the same ratio to the drop through the valve d. This is accomplished by balancing the forces acting on diaphragms h h'. The areas of diaphragms

h h' being equal, then as the inlet-pressure through pipe i to diaphragm-chamber h^3, acting on diaphragm h, tends to close valve l the result would be a tendency to raise the pressure in the controlling-chamber equal to that in inlet-chamber b. Diaphragm h' would then have this greater pressure acting on it from chamber g or in a direction opposite to that of diaphragm h, so that valve l will be forced into such a position that the pressure acting on diaphragm h will be balanced by the pressure acting on diaphragm h'. As diaphragms h h' have the same pressure or that of the chamber g acting on their inner faces and the pressure of inlet-chamber b on the outer face of diaphragm h and the pressure of delivery-chamber c on the outer face of diaphragm, the controlling-chamber g will have a pressure equal to the pressure of inlet-chamber b less one-half the drop through valve d or equal to the pressure of delivery-chamber c plus one-half of the drop through valve d, the areas of the diaphragms being equal. It is of course to be understood that it is not necessary to have the diaphragms of equal area; but they have been illustrated and described as so for convenience and to simplify the description. Suppose, by way of illustration, that a volume of ten thousand cubic feet of gas per hour are passing through the meter and that the drop through direct-delivery valve d is four ounces. Then if the diaphragms in controlling-chamber A are of equal area the drop through valve f will be two ounces. If tally-meter absorbs one ounce, the valve l will absorb one ounce or a total of two ounces. If tally-meter absorbs two ounces, the valve l will be wide open and will have no absorption. If tally-meter should have no absorption, the valve l must absorb two ounces.

If the amount of absorption by the tally-meter varies, it is evident that a corresponding variation of pressure will occur in the controlling-chamber g, thus changing the position of the diaphragms h h' and the valve l to correspond thereto. By this construction the friction of the tally-meter will not affect the ratio of the volume of fluid passing through the valves d and f.

In Fig. 3 I have illustrated my invention in a different form, the only difference, however, from the form described consisting in reversing the flow of the fluid, so that the fluid passes through the tally-meter before it passes into the controlling-chamber. The former delivery-chamber now becomes the inlet-chamber, and vice versa. A spring o is substituted for the weight d^4. The operation of this form of my invention will be the same as the first-described form, as the fact that the fluid passes through the tally-meter before entering the controlling-chamber does not change the manner of operation or the character of its work.

I do not wish to limit myself to the exact arrangement and construction of parts illustrated and described, as these may be varied without affecting the spirit of my invention.

What I claim is—

1. In a proportional meter a suitable casing having an inlet and outlet, a valve controlling the flow of the unmeasured current of fluid, a valve controlling the measured current, a controlling-chamber between the tally-meter and the last-mentioned valve, and oppositely-acting diaphragms in said chamber adapted to control the drop in pressure through said valve containing the measured current substantially as set forth.

2. In a proportional meter, a suitable casing having an inlet and outlet, a valve controlling the flow of the unmeasured current of fluid, a valve controlling the measured current, a controlling-chamber between the tally-meter and the last-mentioned valve, a valve controlling the pressure in said controlling-chamber, and oppositely-acting diaphragms in said chamber adapted to operate said valve, substantially as set forth.

3. In a proportional meter, a suitable casing having an inlet and outlet, a valve controlling the flow of the unmeasured current of fluid, a valve controlling the measured current, a controlling-chamber between the tally-meter and the last-mentioned valve, a valve controlling communication between said tally-meter and said controlling-chamber, and oppositely-acting diaphragms in said chamber adapted to operate said valve, substantially as set forth.

4. In a proportional meter, a suitable casing having an inlet and outlet, a valve controlling the flow of the unmeasured current of fluid, a valve controlling the measured current, a controlling-chamber between the tally-meter and the last-mentioned valve, a valve controlling communication between said tally-meter and said controlling-chamber, oppositely-acting diaphragms in said chamber, and connections between said diaphragms and said last-mentioned valve, substantially as set forth.

5. In a proportional meter, a suitable casing having an inlet and outlet, a valve controlling the flow of the unmeasured current of fluid, a valve controlling the measured current, a controlling-chamber between the tally-meter and the last-mentioned valve, a valve controlling communication between said tally-meter and said controlling-chamber, diaphragms in said chamber, one of said diaphragms having the pressure of the inlet-chamber on one side thereof, the other diaphragm having the pressure of the delivery-chamber on one side thereof, and connections between said diaphragms and said last-mentioned valve, substantially as set forth.

In testimony whereof I, the said THOMAS B. WYLIE, have hereunto set my hand.

THOMAS B. WYLIE.

Witnesses:
ROBT. D. TOTTEN,
ROBERT C. TOTTEN.