F. Darracott,

Gas Meter.

No. 12,045. Patented Dec. 5, 1854.

Fig. 3.

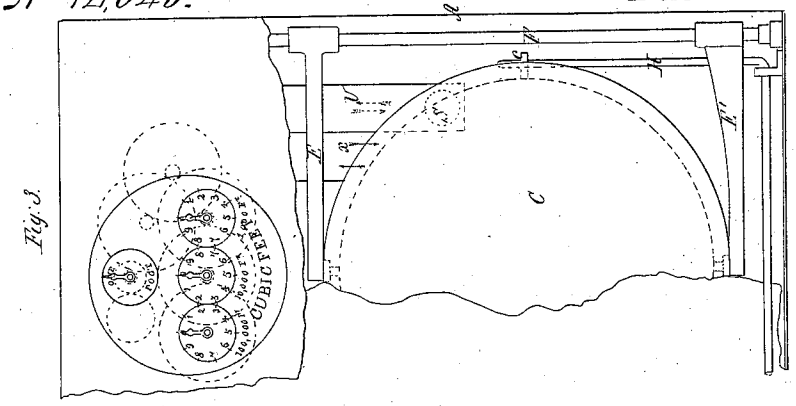


Fig. 2.

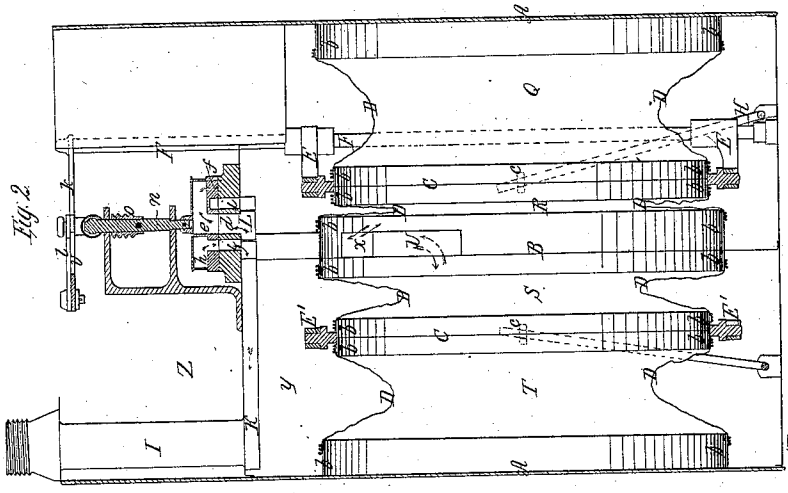


Fig. 7.

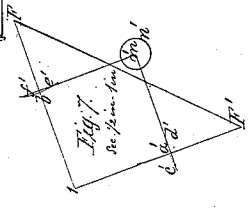


Fig. 1.

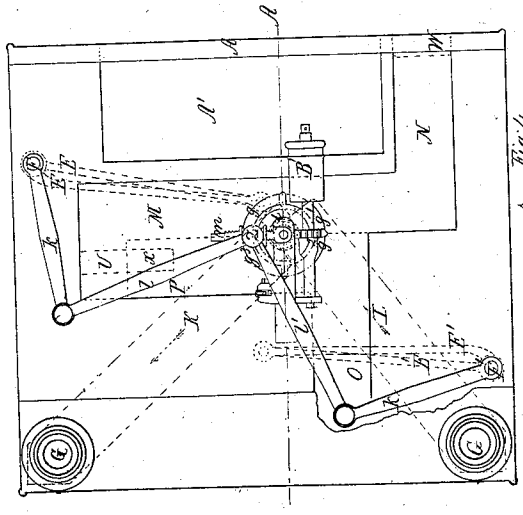


Fig. 4.

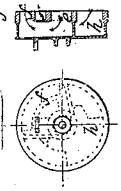


Fig. 5.

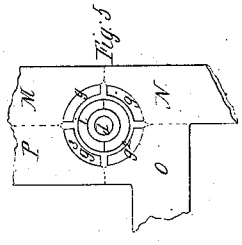
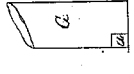


Fig. 6.



UNITED STATES PATENT OFFICE.

FRANKLIN DARRACOTT, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO GEORGE DARRACOTT.

IMPROVEMENT IN DRY GAS-METERS.

Specification forming part of Letters Patent No. **12,045**, dated December 5, 1854.

To all whom it may concern:

Be it known that I, FRANKLIN DARRACOTT, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Dry Gas-Meters, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a plan; Fig. 2, a section upon the line A A of Fig. 1; Fig. 3, a front view, a portion of the case being removed to show the parts within; Figs. 4 and 5, detached views of the valve and its seat, which will be referred to hereinafter; Fig. 6, an elevation of a portion of the inlet-pipe, showing the opening *a*, through which the gas is admitted to the interior of the case which holds the measuring-chambers; Fig. 7, a diagram, to which reference will be made hereinafter.

My invention has for its object the production of a uniform and unvarying stream of gas from the burner without the unsteadiness and jumping of the flame, so often observed where dry or other gas-meters are employed.

The main feature of my invention consists in the use of four or more measuring-chambers, connected together in pairs, the chambers being brought successively into operation by the motion of two diaphragms so arranged that there shall at all times be an unvarying pressure upon the gas beyond the meter, the gas being forced from some one or other of the measuring-chambers every instant that the meter is in operation.

My invention also consists in measuring the gas from the inside only of the chambers, in combination with surrounding the measuring-chambers with gas by opening a communication between it and the inlet-pipe, whereby all pressure is taken off of the membranous substance which unites the disks, and all loss by transmission, as well as the possibility of registering more gas than is actually consumed, is avoided.

My invention also relates to certain details, which will be more particularly referred to hereinafter.

To enable others skilled in the art to make and use my invention, I will proceed to describe the method which I have adopted of carrying it out.

A is the box or case in which the operating parts of the meter are inclosed. It is made perfectly gas-tight and is in constant communication with the interior of the inlet-pipe G through the opening at *a*.

B is a partition or stationary diaphragm, which divides the box A in two.

C C are the movable diaphragms.

b are flanges upon both the movable and stationary diaphragms, to which the flexible substance D is secured. The flanges upon the movable diaphragms are of less diameter than those upon the stationary ones, as seen in the drawings, or vice versa, that the one may shut into the other for the purpose of rendering the full capacity of the chambers more nearly available. The diaphragms C C are supported by arms E E′, secured to the vibrating shafts F F′, which are thus set in motion by the motion of the diaphragms. The latter are also further steadied in their motion by the arms H, which are pivoted to them at the points *c*, Figs. 2 and 3.

G is the inlet-pipe, from which the gas is conveyed by the channel L (shown dotted in red in Fig. 1) to the valve; I, the outlet-pipe, which receives the gas through the passage K. (Shown in dotted blue lines in Fig. 1.)

The valve which I employ and the manner in which it is actuated by the diaphragms will now be described.

Fig. 5 is a plan of the valve-seat, with the passages of communication between the valve and the measuring-chambers. Fig. 4 is a plan of the valve-cover and a section through its center.

The gas from the inlet-pipe G and passage L rises through the center of the valve-seat *d*, Fig. 5, and enters the valve at *e*, Figs. 2 and 4. Thence it passes through the opening *f* down one of the openings *g* of the valve-seat, through the channels M N O P, to the measuring-chambers Q R S T. From these chambers it returns by the same channels, M N O P, up through the openings *g* of the valve seat into the valve-cover at the opening *h*. (Shown in blue in Fig. 4.) Thence the gas passes down through the opening *i* of the valve-seat, which communicates by the outlet-passage K with the pipe I. Suppose the parts to be in such position that the opening *f* of the valve-cover just covers the opening *g* of the valve-seat. The gas

from the inlet-passage L, as it passes through the center opening, *d*, of the valve-seat, Fig. 2, down through the opening *f* in the valve-cover, enters the opening *g* of the valve-seat and passes by the channel M and vertical passage U to the chamber S. (Shown partially expanded by the pressure of the gas in Fig. 2.) At the same moment the opening *h* of the valve covers the opening g^2, which communicates through the passage O with the measuring-chamber T, which is thus brought into connection with the outlet-pipe I through the opening *i* in the valve-seat and the passage K, and this chamber is thus emptied at the same time that the chamber S is being filled. It will be observed that at the same time that the gas within the chamber S exerts a pressure upon the movable diaphragm C, and consequently upon the gas within the chamber T, there is an equal pressure from the gas within the case which holds the measuring-chambers upon the leather or other substance which forms the flexible sides of the chambers, and consequently there is no loss of gas by transmission through the leather and no registry of gas not actually consumed. While the chamber S continues to fill and the chamber T to empty itself, the valve in its rotation brings the inlet-opening *f* over the opening *g'* of the valve-seat, through which the gas passes by the channel N and vertical pipe W into the measuring-chamber Q, which now commences to expand. The chamber R being at the same time brought into communication with the outlet-pipe I through the channel P and the vertical pipe X, both the chambers S and Q continue to expand, while R and T continue to collapse, until by the rotation of the valve the opening *f* has passed from off the opening *g* and now covers exclusively the opening *g'*. The next instant it commences to cover the opening g^2 in the valve-seat, while the opening *h* at the same time falls over *g* of the valve-seat and the gas begins to pour through the pipe O into the chamber T and from the pipe M out of the chamber S. The measuring-chambers are thus brought successively into operation, and at no instant is there a cessation or any interruption of the pressure within the outlet, which is at all times equal, or very nearly so, to that within the inlet-pipe, a difference only of pressure being produced by the friction of the moving parts; and it will be observed that as the opening *f* passes from off one opening, *g*, in the valve-seat it enters immediately upon another, so that as the passage through one of these openings diminishes that through the other increases, and there is consequently at all times a way for the gas open through the valve equal to the size of the opening *g*. There can therefore be none of that flickering of the flame which is so often experienced where dry gas-meters of the ordinary construction are used.

I will now describe the manner in which the valve and index are actuated by the motion of the diaphragms. These latter, as before explained, are pivoted or hinged to the arms E E', secured to the vertical rods F F', to which a vibratory motion is thus communicated by the motion of the diaphragms.

k k', Figs. 1 and 2, are arms secured to the rods F F' and connected by means of the links *l l'* to a crank-pin upon an arm, *m*, secured to the top of the valve-stem *n*.

o is a worm upon the valve-stem, which engages with a gear, *p*, upon the shaft *q* of the first index-hand. This shaft passes through a stuffing-box at B', by which the gas within the chamber Z is prevented from coming in contact with the mechanism of the counter. There being a free communication between the chambers Y and Z, the rods F F' require no packing, and as there is thus an equal pressure upon all sides of the valve there is no tendency to leakage at this point.

From the connections above explained it is evident that from the vibratory motion of the diaphragms and of the rods F F' a rotary motion is communicated to the valve, and to this end it is evident that the length of the arms *k k'* must bear the same relation to that of the arms E E' that the throw of the diaphragms does to the throw of the crank-pin *t*. Suppose the throw of the diaphragms be one and one-half inch and the throw of the crank upon the valve-stem to be taken at one inch. Then the length of the arm *k* will be two-thirds that of the arm E, and it now only remains to find the center of the valve. In the diagram, Fig. 7, let F F' represent the position of the rods F F'. Construct an isosceles right-angle triangle on F F', making F F' the hypoteneuse. Lay off on the lines F 1 and F' 1 the distances F *a'* and F' *b'*, equal to the length of the arms *k k'*, and sweep the arcs with these distances as radius. Then lay off at equal distances upon each side of the lines F 1 and F' 1 the points *c' d'* and *e' f'*, so that the distance between these points shall be equal to the throw of the arms *k k'*. Prolong the lines *d' c'* and *e' f'* until they meet in *m'*, and this is the center of the valve, the circle *n'* representing the path of the crank.

By opening a communication between the chambers Y and Z and permitting the gas to pervade these compartments of the meter, the necessity of packing the rods F F' at any point is avoided, and I am enabled to make use of a lighter valve than would otherwise be required.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The use of measuring-chambers arranged in pairs, as described, and similarly inclosed by means of the flexible leather secured to the stationary and movable diaphragms, the latter being placed between the chambers and forming one side of each of them and connected to the parts which they are to actuate by means of attachments to their peripheries, as set forth.

2. I do not claim the method herein employed of giving motion to the valve, nor the system of arms, levers, &c., by which it is rotated, nor any arrangement or combination of

such devices for effecting this purpose; but I do claim, in combination with the measuring-chambers of a dry gas-meter, the within-described rotating valve, with its inlet and outlet-passages, constructed and operating in the manner herein set forth.

3. Opening a communication between the space which surrounds the measuring-chambers and the inlet-pipe when the registering takes place only from the gas within the chambers, whereby an equal and uniform pressure exists at all times upon both sides of the leather which unites the diaphragms, and all loss of gas by transmission through its pores is avoided.

FRANKLIN DARRACOTT.

Witnesses:
EDWARD G. LYNES,
WILLIAM REED.