(No Model.)

F. M. MARGACH.

GAS CUT-OFF.

No. 372,036. Patented Oct. 25, 1887.

Fig. 2.

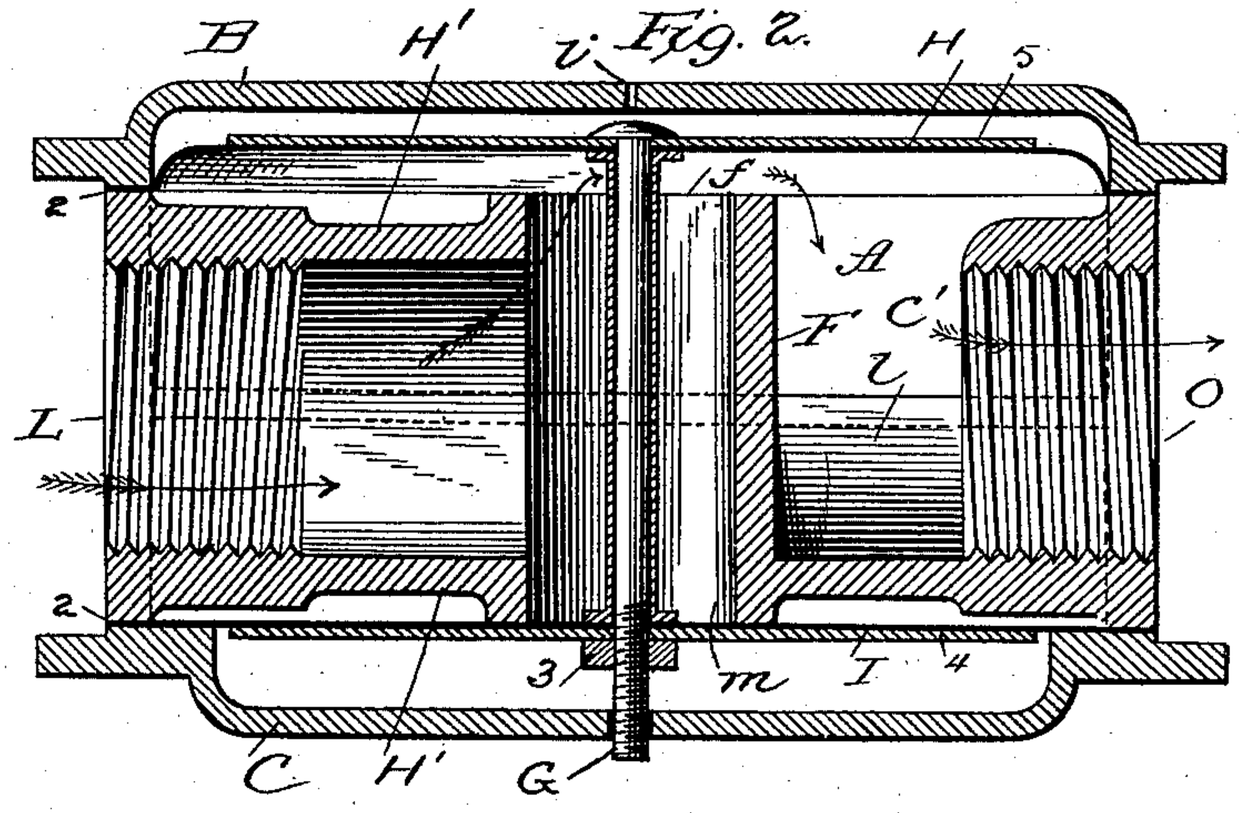


Fig. 3.

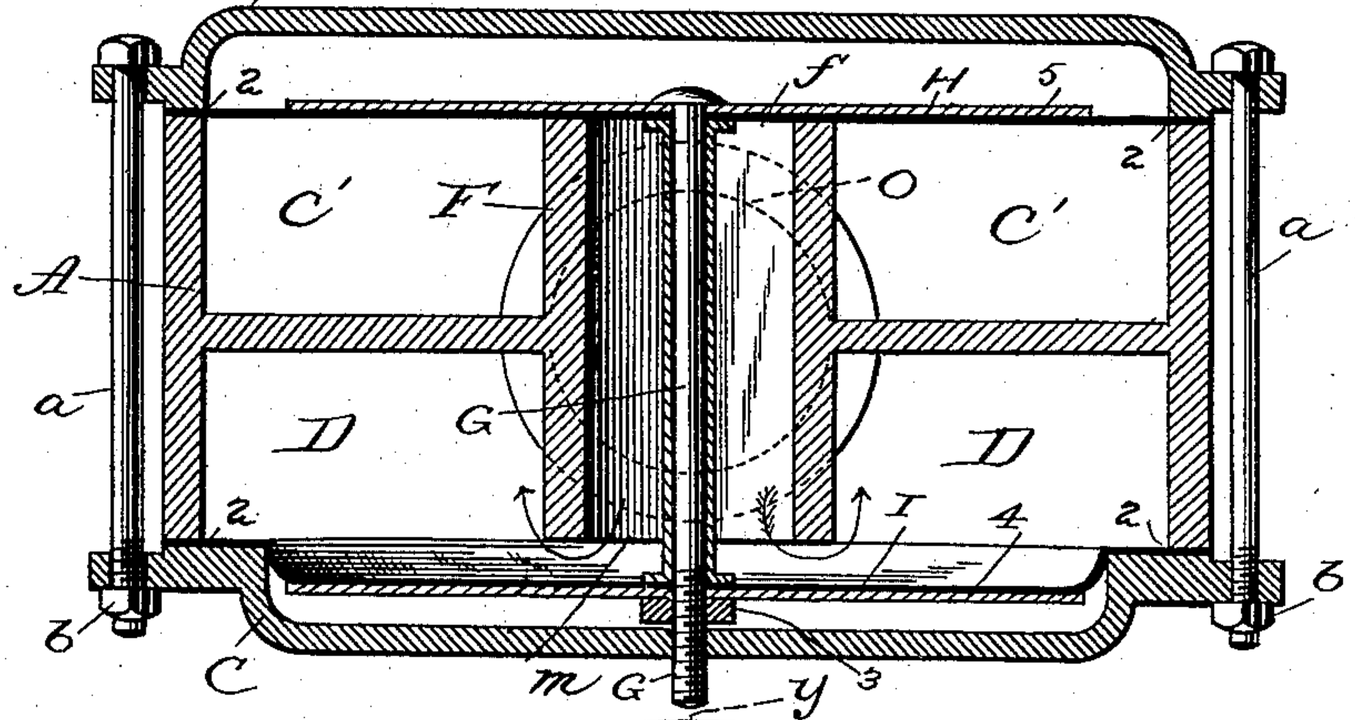
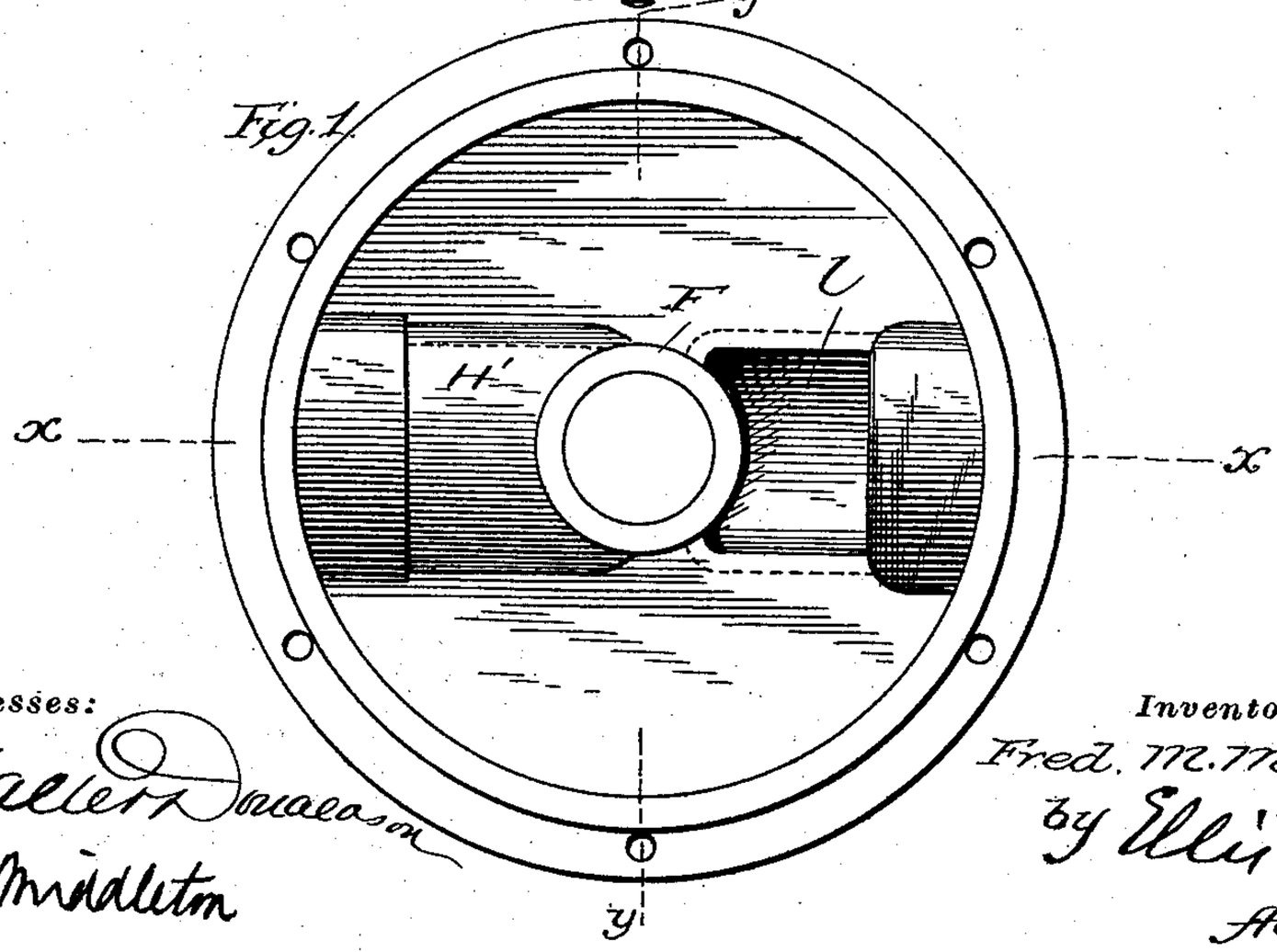


Fig. 1.



Witnesses:
Walter Donaldson
F. L. Middleton

Inventor:
Fred. M. Margach,
by Ellis Spear
Atty.

UNITED STATES PATENT OFFICE.

FRED M. MARGACH, OF MEADVILLE, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO FRANK ROUECHE, OF SAME PLACE.

GAS CUT-OFF.

SPECIFICATION forming part of Letters Patent No. 372,036, dated October 25, 1887.

Application filed December 27, 1886. Serial No. 222,598. (No model.)

To all whom it may concern:

Be it known that I, FRED M. MARGACH, of Meadville, in the county of Crawford and State of Pennsylvania, have invented a new and useful Improvement in Gas Cut-Offs, and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention is an improvement in that class of devices designed to automatically shut off gas from the service-pipes of buildings.

The extensive use of natural gas has developed the necessity for a thoroughly reliable and automatic apparatus of this kind. The supply of this natural product being so great and the cost to the consumer being so small, it is much used as a heating agent, and consequently the burning is kept up continuously for a long period. When, therefore, the supply to the service-pipe is shut off for the purpose of allowing repairs to be made to the main, or for any other cause, it frequently happens that the burners connected to the service-pipes are left unclosed by reason of the absence or negligence of the consumer, and upon the flow being re-established free egress of the gas is permitted to the building, and thus the possibility of severe and destructive explosions ensues, the gas being of a highly-explosive nature.

It is the object of my invention to provide such a device as will insure the full operation of the parts whether the pressure to which they are subjected be great or small, the said operating parts thus possessing the characteristic feature of freedom from friction and from the use of weighty and slow-working metal valves. I also aim to combine the operating parts so that when the pressure of gas is on and the passage closed the action of the gas will operate to effect a closer union between the closing medium and its seat.

My invention consists, broadly, in the combination of a chamber provided with suitable inlet and outlet ports, a diaphragm situated within said chamber and arranged to be held in suspension from its seat by the pressure of gas and to fall freely by gravity directly upon its seat to close the inlet-opening when the said pressure ceases, and of means to be acted upon when the flow is re-established, whereby the diaphragm is held firmly to its seat until operated by hand.

My invention consists, further, in employing in connection with said freely-moving diaphragm a supplemental diaphragm arranged in a compartment of the main chamber and adapted to open the port of said compartment for the free admission of the gas at the same time the main diaphragm falls upon its seat, whereby, when the flow of gas is re-established, the compartment will be filled and the supplemental valve fully acted upon to draw the main valve firmly to its seat, each of said diaphragms acting directly upon the part adjacent thereto. Further, in such an arrangement whereby, when the device is closed, the main or closing diaphragm will present less surface to the action of the gas than the supplemental diaphragm, and, when in an open position, will present a larger area to said action.

Further, the invention consists in a special construction whereby the parts may be properly set by hand for the passage of the gas, and in various details of construction and arrangement by which the objects referred to above are carried out in an efficient and simple manner.

In the accompanying drawings, Figure 1 is a plan view with the top plate removed. Fig. 2 is a vertical section on line *x x* of Fig. 1, the parts being in position to permit the passage of the fluid. Fig. 3 is a vertical section on line *y y* of Fig. 1, the parts being in closed position.

In the drawings, A represents the chamber, composed of the central shell and the top and bottom plates, B C, the connection between the parts being formed by the rods *a* and nuts *b*, threaded upon the ends thereof. The inlet and outlet openings L and O are preferably situated directly opposite each other. The section of pipe H′ through which the inlet is formed projects inwardly and is provided with a transversely-extending portion, (marked F.) This section F of the pipe is positioned about centrally of the chamber and stands with its axis in a vertical line. It is open at each end, and thus the inlet is in direct communication with both the upper and lower portions of the

main chamber. A horizontal partition is formed within the chamber, separating it into the compartments C′ and D, the former being at the top of the chamber and the latter at the bottom. The upper compartment has free communication with the inlet through the opening *f*, and also with the outlet, the partition being depressed, as shown at 1, to effect the latter result. The lower compartment, however, is entirely closed upon its sides and has communication only with the inlet through the opening *m*.

It will thus be seen that the gas entering from the inlet will, in order to find an exit, pass through the port *f* into the compartment C′ and through the port O, while that which at any time passes into the lower compartment will find no outlet, but will fill said space and be confined by the walls thereof.

Within each of the compartments a freely-moving diaphragm is arranged, being supported by the clamping of its edge between the central shell and the adjoining top or bottom plate. The points of support (marked 2) are in the same horizontal line with the ports of the central pipe, F, and the relative arrangement of the diaphragm to the ports is such that when either of them is in its normal position it will extend across the corresponding port and close the same against the passage of the gas. A bolt, G, connects the two diaphragms H I, so that they will move in unison. Their distance apart is somewhat greater than the distance between the ports *f m*, and it will thus be seen that when either diaphragm is upon its seat and the corresponding opening closed the other diaphragm will be in position to allow the free passage of the gas.

A tube of any suitable material surrounds the bolt, and the upper diaphragm is clamped between the head of said bolt and a flange formed upon the tube. The securing of the lower diaphragm is effected by means of the nut 3 and a flange on the lower end of the tubing. The diaphragm may be of pure rubber or like flexible material, and to give uniformity and stability to the surface of the material metal plates are secured to the outer surfaces thereof, as shown at 4 5. The seats at *f* and *m* are provided with rubber rings, upon which the diaphragms bear.

It will be observed that the surface of the lower diaphragm that is exposed to the action of the gas is smaller in area than the corresponding surface of the upper diaphragm, and the purpose of this will be made clear hereinafter. The bolt G is made of sufficient weight to cause the parts to fall freely by gravity when the pressure of gas is removed and the end of said bolt protrudes through the bottom of the chamber for the purpose of allowing the ports to be set to proper position by hand. The diaphragms, being formed of thin flexible material, offer slight resistance to the pressure of the gas, and the manner of supporting merely by the edges practically places the closing part of said diaphragm in suspension and permits free movement thereof.

Supposing the diaphragms to be in the position shown in Fig. 1—that is, the upper one away from its end of pipe F, while the lower one is upon its seat and closing the inlet *m*—gas entering at L passes through the inlet pipe and port *f* into the compartment C′, where it acts upon the diaphragm H and keeps it away from its seat, the same action tending to draw the lower diaphragm closer upon its end of the pipe, and thus prevent the escape of any gas into the lower compartment. From the compartment C′ the gas flows through the outlet into the service-pipe of the building. If, now, from any cause whatever, the pressure of gas ceases, the weight of the movable parts will cause them to fall and assume the position represented in Fig. 3, with the inlet *f* closed and the inlet *m* open. Upon the re-establishment of the flow the gas will pass directly through the opening *m* and fill the compartment D. The diaphragm I contained therein being thus acted upon will draw the upper diaphragm hard upon its seat, and by reason of the exposed surface of said diaphram being much smaller than that of the lower diapragm upon which the gas is acting there will be no liability of upward movement of the parts.

When it is desired to set the device for the passage of the gas, it is only necessary to press the protruding end of the bolt G upward, which will cause the entire surface of the upper diaphragm to be exposed to the action of the gas, and as this surface is greater in comparison with that of the lower diaphragm the parts will remain in their upward position.

A vent, *v*, is provided in the top plate for the escape of any air above the diaphragm.

I am aware that diaphragms have been heretofore employed in separate compartments of the main chamber, each being connected to an intermediate valve, so as to control the action of the said valve, and I therefore do not claim this construction. My invention is essentially different from this, inasmuch as the intermediate valve is dispensed with and the diaphragm itself is utilized to perform this function, acting directly upon the inlet-port and being held in suspension, so as to be sensitive to the slightest variation in the pressure.

I claim as my invention—

1. In a gas cut-off, and in combination, the main chamber, the outlet-port, the inlet-port *f*, the diaphragm H, arranged above said port to act directly thereon when the pressure of gas ceases, the compartment of the main chamber having the port *m* communicating with the port L, and a diaphragm connected to the first diaphragm and arranged within said compartment to open the port *m* when the inlet-closing diaphragm falls upon its seat, substantially as described.

2. In a gas cut-off, and in combination, the main chamber having the inlet-opening *f* and

outlet-port O, the diaphragm H, arranged above said inlet-port and supported at its edges to be held in suspension by the pressure of gas and to fall freely by gravity directly upon the port *f* when said pressure ceases, and means for holding said diaphragm to its seat after it has fallen, substantially as described.

3. In a gas cut-off, and in combination, the main chamber having the inlet and outlet ports, the section F of pipe, having the ports *f* and *m*, the compartment D, the diaphragms H and I, placed at a distance apart greater than the distance between the ports *f* and *m* and arranged to act directly upon said ports, and the connection G, all substantially as described.

4. In a gas cut-off, and in combination, the main chamber, the section F of pipe, having the ports *f* and *m*, the compartments D, the diaphragms I and H, supported by clamping their edges in the same horizontal plane with said ports, and the connection G between the two diaphragms holding their centers at a distance apart greater than the distance between the ports *f* and *m*, substantially as described.

5. In a gas cut-off, and in combination, the chamber, the section of pipe, F, having ports *f* and *m*, the diaphragms, and the connection between the same, consisting of the headed bolt G, the tube surrounding the same having flanges at top and bottom, and the nut threaded upon the bolt, all substantially as described.

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

FRED M. MARGACH.

Witnesses:

EDWARD G. ROST,

THEO. SCHEFFLER.