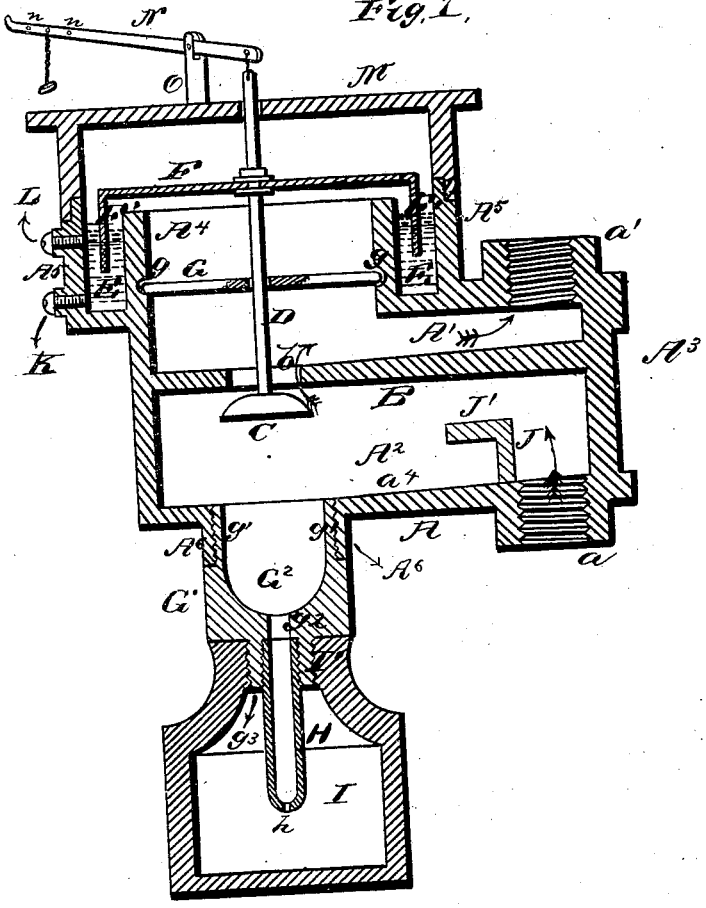
A. W. PORTER & F. M. GRIMES.

Gas-Regulators.

No. 205,678. Patented July 2, 1878.

Fig. 1.



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IMPROVEMENT IN GAS-REGULATORS.

Specification forming part of Letters Patent No. **205,678**, dated July 2, 1878; application filed June 22, 1878.

To all whom it may concern:

Be it known that we, ALONZO W. PORTER and FRANCIS M. GRIMES, of New York, in the county of New York and State of New York, have invented a new and valuable Improvement in Climax-Regulators; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

The figure of the drawing is a representation of a central vertical section of our improved regulator.

This invention relates to the details of mercury-sealed governors for automatically regulating the supply of gas to the distributing-pipes of a building.

The principal objects of said invention are as follows: first, to prevent the overflow of the mercury used as a seal from injuring the meter or gas-generating machine to which the regulator is attached, and to retain and preserve the said mercury, after its overflow, within a detachable trap or receptacle, so that it cannot possibly be spilled; also, in preventing the mercury from evaporating while in use as a seal; also, in protecting the regulator-casing and float from being injured by the mercury; also, in the novel construction and arrangement of the parts, as will be hereinafter more fully set forth.

The above objects are accomplished by means of the devices hereinafter particularly set forth and claimed.

In the accompanying drawing, A designates the main casing of our apparatus. The space within said casing is divided by a horizontal partition, B, cast with said casing, into an upper or float chamber, A^1, and a lower or valve chamber, A^2. The said casing is provided with a lateral extension, A^3, which has a tubular lower extension, *a*. These tubular pieces *a a'* are arranged in a vertical line and internally screw-threaded to receive couplings for an inlet and an outlet pipe respectively. Inlet *a* communicates with valve-chamber A^2, and an outlet, *a'*, communicates with upper or float chamber A^1. Said chambers A^1 A^2 communicate with each other by means of an opening, *b*, through partition B, near the other end thereof. The lower edge of said opening *b* serves as a valve-seat for the convex upper face of a valve, C, which is raised and lowered by means of a vertically-operating valve-rod, D, which works through said opening *b*. The upper part of casing A is in the form of two short concentric upright cylinders, A^4 A^5, having between them an annular space or reservoir, E, containing mercury. Said mercury allows annular flange or downward-turned rim F' of float F (which is carried by valve-rod D) to work up and down in it, and acts as a seal to prevent the escape of gas under said rim from float-chamber A^1. Said float is made of metal, thus securing more stability and durability than when a flexible diaphragm is employed, and must be capable of withstanding the action of mercury without material injury. Practically Russia iron is found to be the best for this purpose. Said float may be attached to said valve-rod in any suitable manner. Said valve-rod D is guided, so that the action of valve C will be perfectly accurate, by means of a centrally-perforated guide-bar, G, the ends of which are rounded, as shown, so that they may be forced into engagement with recesses *g g* on the inside of inner cylinder A^4, forming part of the upper portion of casing A.

As the gas passes into upper chamber A^1 it presses against the bottom of float F and raises the same, closing valve C, so as to cut off the further influx of gas through opening *b* to said upper chamber. As soon, however, as any of the gas is drawn off from said upper chamber by turning on the cock of one or more burners in the building the upward pressure against said float is lessened, and the weight of the same causes it to fall, once more opening valve C. The distance to which said valve is depressed depends upon the amount of gas drawn off to feed the burners—that is, approximately upon the number of burners lighted. Just as much gas as is required for that purpose will be furnished, and no more; nor will this automatic regulation be disturbed by any irregularity in the supply of gas to the governor.

If the supply be accelerated, the increase in the rapidity of its flow through opening *b* will be neutralized by the increased pressure

against float F, and consequent partial closing of said opening.

A slackening of the supply by the reverse action of that above described allows the valve C to fall, thus opening the way for a freer flow of gas into the said upper chamber. The supply depends solely upon the consumption.

Directly under opening *b* a tubular internally screw-threaded coupling, A^6, is formed on the bottom of casing A. To this coupling is attached a block, G^1, by means of a screw-threaded upper extension, g^1. In the upper part of said block is a pocket, G^2, the bottom of which is connected, by a small passage, g^2, with a detachable tube, H, the lower end of which is closed, except a small perforation or perforations, *h*. This tube extends down within a mercury trap or receptacle, I, the internally screw-threaded neck I^1 of which embraces a screw-threaded tubular downward extension, g^3, of block G^1, which tubular extension incloses the upper end of tube H.

When the mercury is caused (by accident in the process of filling or by any sudden jar) to flow over the top of inner cylinder A^4, it falls first upon the inclined upper face of partition B, which conveys it to opening *b*, thence it falls upon the convex top of valve C, whence it passes to the inclined floor a^4 of lower chamber A^2, whereby it is conveyed to pocket G^2. From said pocket it flows or drips through passage g^2, pendent tube H, and perforation *h* into receptacle I.

Block G^1 may be readily separated from casing A; but whether thus separated or left still connected, the mercury in trap or receptacle I cannot possibly escape.

Mercury trap or receptacle I may be readily detached from block G^1 to allow the removal of the mercury.

The above-described devices for directing the flow of the mercury, and, so to speak, bottling the same, are of very great importance. Heretofore the inlet-pipes of gas-governors have been arranged, like said reservoir I, below, or nearly below, the space through which the mercury in overflowing must fall, and in consequence the gas machine or meter is frequently injured thereby. Indeed, some forms of governor have been partly excluded from use by reason of their special liability to damage from this cause. All of these annoyances and losses are entirely obviated by this part of my invention.

To prevent any of the mercury from spattering from the convex top of valve C into inlet *a* as it falls, I form on inclined floor a^4 a guard or shield, J, having a horizontal inwardly-extending top flange, J′. This guard arrests all the spattering mercury thrown toward said inlet and effectually protects the latter.

Flange J′ prevent the mercury from flowing into said inlet when the governor is tipped sidewise toward guard J, and prevents the water of condensation from flowing into the inlet-pipe; but when the water rises above the top it will escape out of said inlet-passage, so as not to close valve-opening.

Said mercury may be drawn off from annular receptacle E by withdrawing a screw-plug, K, from an opening in outer cylinder A^5 of casing A, which opening communicates with said receptacle at the bottom thereof. A similar screw-plug, L, closes a similar opening, arranged above the first at the highest line to which it is designed that the mercury in said receptacle shall attain.

This upper opening serves a double function. It affords, when uncovered, a certain indication when the mercury in receptacle E has attained a sufficient height. It also allows, without disturbing the mercury, the easy drawing off of a layer of glycerine, which covers the surface of said mercury and protects the same from the air. Heretofore much inconvenience has been occasioned by the insensible evaporation of mercury used as gas-seals, producing vapors injurious to health and involving a constant loss of valuable material. My invention effectually stops this vaporization, producing a double seal—that is, the mercury seals the gas and the glycerine seals the mercury. The glycerine is itself absolutely non-volatile, and, moreover, affords a good lubricant for the parts of the governor that come in contact therewith. In case it becomes foul it can easily be withdrawn, as stated.

The mercury and glycerine are inserted by removing a top or cap, M, which sits upon outer cylinder A^5 at the top of casing A. This cap is secured to said casing by ordinary bolts, or in any other suitable manner.

Valve-rod D passes up through the middle of it, and the upper end of said valve-rod is suspended from the short arm of a counterbalance-lever, N, of the first kind, which is pivoted to a standard, O, on the top of said cap M. The long arm of said lever is provided with a series of perforations, *n*, for the attachment of a weight, that may be shifted from one hole to another to regulate the leverage and consequent counterbalancing power of the device.

The object of the latter is as follows: Float F, in order to resist injury from the mercury, must be made of Russia iron. This iron cannot be rolled thin enough to make said float sufficiently light to be properly responsive in a strictly competitive test to the upward pressure of the gas.

The above-described counterbalancing lever and weight in effect reduces the gravity of said float to any required extent, thus making it more or less readily responsive, as desired.

My casing is preferably constructed by casting; but the annular space E is turned out of the same by cutting-tools, so as to leave a surface which will be less liable to injury by the mercury, as it is more readily coated with bees-wax. All parts of the inside of the casing A which come into contact with the quicksilver or glycerine are coated with bees-wax,

and the float E and inside of cap M are similarly treated. This will effectually protect them from injury by mercurial action. Paraffine or stearine may be substituted for bees-wax.

The simplicity of the above-described devices, and especially of the main casting A B, is a very valuable feature of our invention. We employ but one internal partition, and have no parts which are difficult to cast.

In casting more complicated ones there are many failures, which have to be thrown away, involving a great waste of material, while even the ones which are fit for use contain much more material than is necessary. A governor-casing cannot well be more simple than the one shown in the present case, and this simplicity saves a great deal of work in finishing the valve-seat.

It is noticeable that all the surfaces on which the overflowing mercury is liable to lodge are inclined planes, conducting said mercury to the trap or receptacle I. The block G serves a double function, holding said receptacle to casing A, and also stopping the opening through which the valve is inserted.

We do not desire to confine ourselves in all particulars to the precise construction and arrangement shown, as many parts of this apparatus may be considerably modified without departing from the spirit of our invention.

What we claim as new, and desire to secure by Letters Patent, is—

1. An automatic mercury-sealed gas governor or regulator having a detachable mercury trap, I, and pendent tube H, arranged directly under the mercury-seal to catch the mercury in case of overflow, and secure the same therein, for the purpose hereinbefore described.

2. The combination of mercury trap or receptacle I with tube H, closed at its lower end, except perforation *h*, and block G^1, having pocket G^2, substantially as and for the purpose set forth.

3. In a gas-governor, horizontal partition B, arranged below the mercury-seal and inclined on its surface, so as to conduct the spilled mercury to opening *b* thereof, and the mercury-trap I, arranged substantially as and for the purpose set forth.

4. In a gas-governor, a guard for preventing mercury from spattering into the inlet-tube, substantially as and for the purpose set forth.

5. The method of protecting a mercurial gas-seal from contact with the air, consisting in providing a superposed layer of glycerine, substantially as and for the purpose set forth.

6. A casing consisting of casing A, extension A^3 a^1 a^2, vertical cylinders A^4 A^5, partition B, inlet-guard J, and coupling A^6, substantially as and for the purpose set forth.

7. The method of protecting the casing and float of a gas-regulator from injury by mercury or glycerine, consisting in coating the exposed surface with bees-wax or its equivalent, substantially as and for the purpose set forth.

In testimony that we claim the above we have hereunto subscribed our names in the presence of two witnesses.

ALONZO W. PORTER.
FRANCIS M. GRIMES.

Witnesses:
GEO. A. HAMMOCK,
CHAS. P. FELDHAUS.