

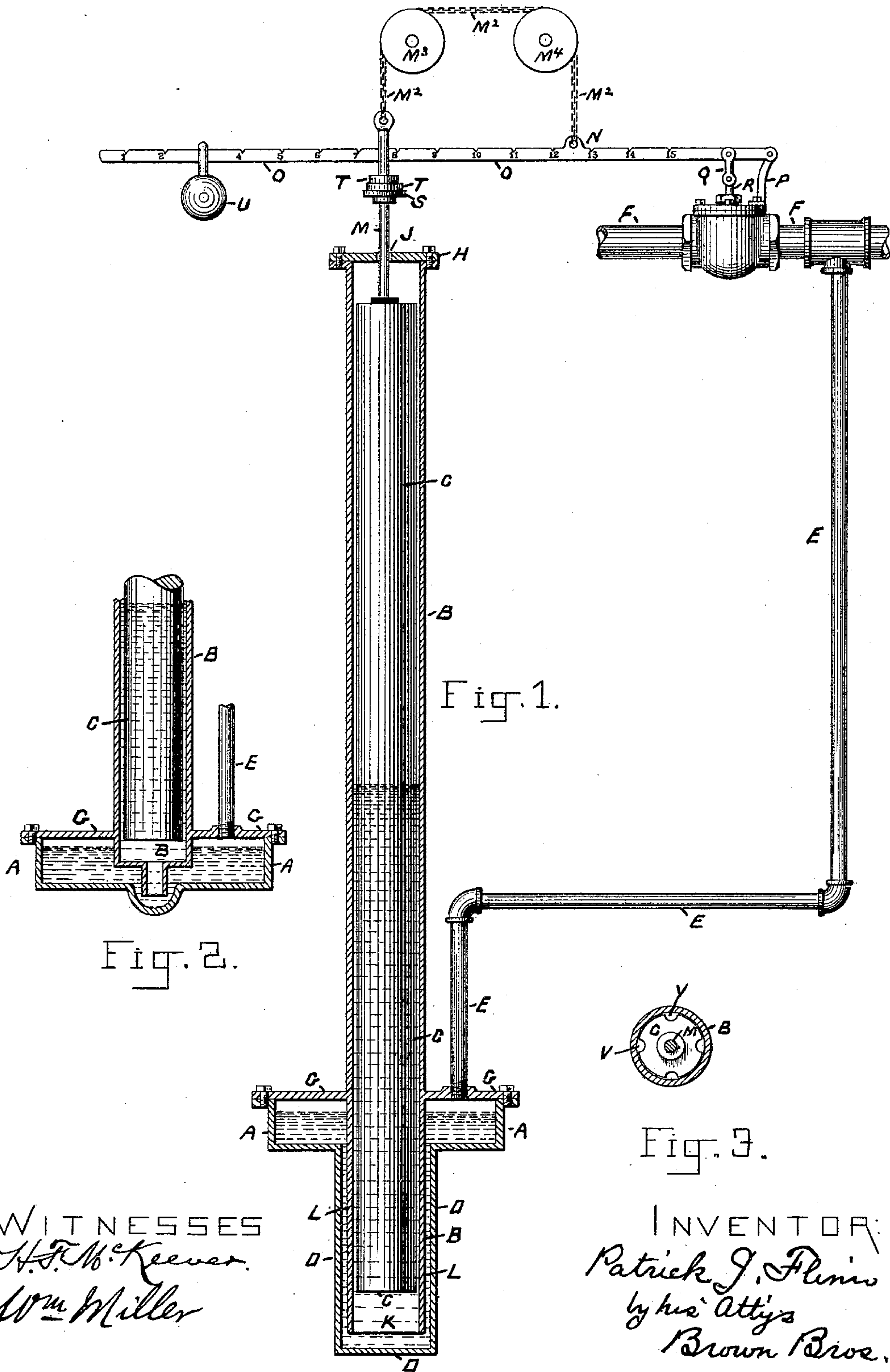
(No Model.)

P. J. FLINN.

PRESSURE AND VACUUM MERCURIAL REGULATOR.

No. 354,119.

Patented Dec. 14, 1886.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

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## PRESSURE AND VACUUM MERCURIAL REGULATOR.

SPECIFICATION forming part of Letters Patent No. 354,119, dated December 14, 1886.

Application filed April 17, 1886. Serial No. 199,244. (No model.)

*To all whom it may concern:*

Be it known that I, PATRICK J. FLINN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and  
5 useful Improvements in Pressure and Vacuum Mercurial Regulators, of which the following is a full, clear, and exact description.

This invention relates to that class of mercurial regulators for pressures and vacuums of  
10 steam, air, and other fluids employing a mercurial reservoir connected with the fluid the pressure of which is to be regulated, a float-chamber connected with said reservoir and in communication therewith, and a float in said  
15 chamber, and which is connected with the valve or other mechanism to be operated from the vertical movement of the float in its float-chamber, from the rise and fall of the mercury therein. Under this invention the mer-  
20 cury-reservoir, which contains the mercury and is closed on all sides, and at its upper portion is in communication with the pressure which is to be regulated, and the float-chamber, in communication with the mercury-reservoir  
25 and which contains the float, at its upper end connected to the valve or other part to be operated from its vertical movement from the rise and fall of the mercury, are combined, arranged, and connected, and in a manner for  
30 the float to have a vertical movement through and below the top and within the body of the mercury-reservoir, separated, however, laterally from the mercury therein by the walls of the float-chamber, and open at its lower end to  
35 the upward movement of the mercury through it, all substantially as hereinafter described. Again, under this invention, the float of the float-chamber of the class of mercurial regulating apparatuses to which this invention re-  
40 lates is adapted, substantially as hereinafter described, to be regulated or adjusted in weight.

In the accompanying drawings, forming a part of this specification, Figure 1 is a central  
45 vertical section of the present improved construction and combination of mercury-reservoir and float-chamber and an elevation of the float and of the weighting of the same and of the connection between the float and a valve  
50 to be operated by its vertical movement, and also of the pipe connecting mercury-reservoir

with the steam or other fluid the pressure of which is to be regulated. Figs. 2 and 3 are sectional views in detail, hereinafter explained.

In the drawings, A represents the mercury-  
55 reservoir, B the float-chamber, and C the float of the apparatus of this invention.

D is a central downwardly-extending well in continuation of the mercury-reservoir, and this well D and mercury-reservoir are closed  
60 on all sides. The reservoir, at its upper portion and through a pipe, E, is connected to a pipe, F, at one side of a valve (not shown) located in said pipe F, and this pipe F at the  
65 other side of its valve is in any suitable manner connected with a supply for steam, air, water, or other fluid which is to pass through its valve and be serviceably used on the opposite side thereof, but at a pressure reduced  
70 from that of its supply. The reduced pressure and mercury-reservoir connecting-pipe E, opening to the upper portion of the reservoir, as above stated, makes communication with  
75 its chamber above the level of its contained mercury, the mercury being shown by broken horizontal lines.

The float-chamber B is a tube, and as shown, Fig. 1, it leads from near the bottom of the well of the reservoir upward through said well  
80 and through the closed top G of the reservoir to and above the outside thereof, terminating at any suitable height above the reservoir, and at its upper and so terminating end it is closed by a cap-plate, H, having an opening,  
85 J, through its center. The lower end, K, of this float-chamber B opens to the well D of the reservoir, and the float-chamber for the whole depth of the well has an open space, L, around it for the passage of the mercury of  
90 the reservoir down and through said space and thence into the float-chamber at its lower and open end to and around the float located in said float-chamber. The float is cylindrical  
95 and of a size to fit within the float-chamber, so that the mercury can flow around it, and of a length as to the length of the float-chamber for the desired movement thereof vertically.  
This float is suitable to float in mercury, and provided its length, as compared with the  
100 length of its float-chamber and a chamber closed at its upper end, is suitable, the movements of the float within its chamber and



from the rise and fall of the mercury in the mercury-reservoir plainly is upward and downward and in a direction across the depth of the mercury-reservoir and the horizontal plane of its closed top; and in such movement it is separated laterally from the mercury within the mercury-reservoir and its well by the walls of the float-chamber, the mercury being only allowed to enter the float-chamber at its lower and open end.

M is a stem extending from the upper end of the float through the central opening, J, of the top of the float-chamber.

M<sup>2</sup> is a chain connected to upper end of float-stem M and passing upward therefrom over a vertical pulley-wheel, M<sup>3</sup>, and thence over another vertical pulley-wheel, M<sup>4</sup>, in the same horizontal plane down and connected at N to a horizontal lever, O, fulcrumed at one end to a stationary post, P, and between such fulcrum and the chain-connection at N connected by a link, Q, to a stem, R, of the valve (not shown) heretofore referred to. The float rod or stem M is provided with a shoulder, S, as a rest and support for the attachable and removable weight-blocks T T to weight the float, and the lever to which the float is connected, as has been described, has a weight, U, suspended from it, and said lever is graduated and marked along its length as guides to the location of said weight thereon for a balance to the weight of the float, and thereby, with a proper adjustment of the weight-blocks, to enable the float to be adjusted as to its weight, as may be required for it in its operation to maintain the pressure desired of steam, &c., in the pipe F at the reduced-pressure side of the valve of said pipe.

In the operation of the apparatus described the float rises and falls with the rise and fall of the pressure with which the mercury-reservoir is connected—as, for instance, with the rise and fall of the pressure at the reduced-pressure side of the valve (not shown) in the pipe F—and in its so rise and fall, through the connecting mechanism between it and the valve-stem, as described, said valve is operated—closed on the rise and opened on the fall of the float—and thus the pressure on the reduced side of the valve is regulated as desired.

With the float-chamber and mercury-reservoir relatively arranged, and for a vertical movement of the float across the depth of the mercury-reservoir, as described, and a proper adjustment of the weight of the float made, the apparatus described is made capable of regulating pressures of varying amounts, which, as is plain, makes the apparatus most advantageous and serviceable for practical application.

Although the application of this invention has been particularly shown and described for operating and closing a reducing-valve, as the pressure lowers and rises at the low-pressure side of said valve, the same apparatus, and

without substantial or material changes in the construction, arrangement, and operation of its parts, may be employed for other purposes—as, for instance, for valves in apparatuses of various kinds using steam, air, gas, and other fluids. As illustrations of some of its uses above referred to may be mentioned dampers of furnaces to steam and other boilers, valves of steam, hot-water and hot-air heating and drying apparatuses, feed-valves for regulating pressure of steam, water, or gas, and the vacuum in a vacuum-pan or in the condenser of a steam-engine.

In Fig. 2 a modification is shown, consisting, in substance, in terminating the float-chamber within the body of the mercury-reservoir, in lieu of extending it entirely through the depth of the reservoir and into a well leading from the bottom thereof. In addition to this, the area of the end of the float-chamber communicating with the mercury-reservoir is reduced and continued in a central-nipple passage dipping into the depression of the bottom of the reservoir.

In Fig. 3 the float is shown as having vertical corrugations V for the upward flow of the mercury between the float and its float-chamber. The corrugations allow the float to be fitted more closely to the float-chamber, affording at the same time the necessary mercury communication along the side of the float, and reducing the quantity of mercury necessary. The vertical corrugations may be on the inner wall of the float-chamber, in lieu of on the float, or on both.

The modifications described in no material respect affect the operation of the apparatus, the apparatus being the same in the principles of the construction, arrangement, and operation of its part.

Having thus described my invention, I claim—

1. In a mercurial pressure-regulator, in combination, a mercury-reservoir, A, a float-chamber, B, entering and crossing the depth of the mercury-reservoir, and closed laterally but open vertically to the mercury in said reservoir, and a float located in said float-chamber, the float and mercury-reservoir being separately connected, substantially as described, for the purpose specified.

2. In a mercurial pressure-regulator, in combination, a mercury-reservoir, A, connected with the pressure to be regulated, a float-chamber, B, in communication with mercury-reservoir A, a float, C, located in float-chamber B, and connected and separately weighted, substantially as described, for the purpose specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

PATRICK J. FLINN.

Witnesses:

ALBERT W. BROWN,  
KATE E. BELLWS.