

(No Model.)

J. D. BOWMAN.

PRESSURE REGULATOR FOR GAS CONDUITS.

No. 405,244.

Patented June 18, 1889.

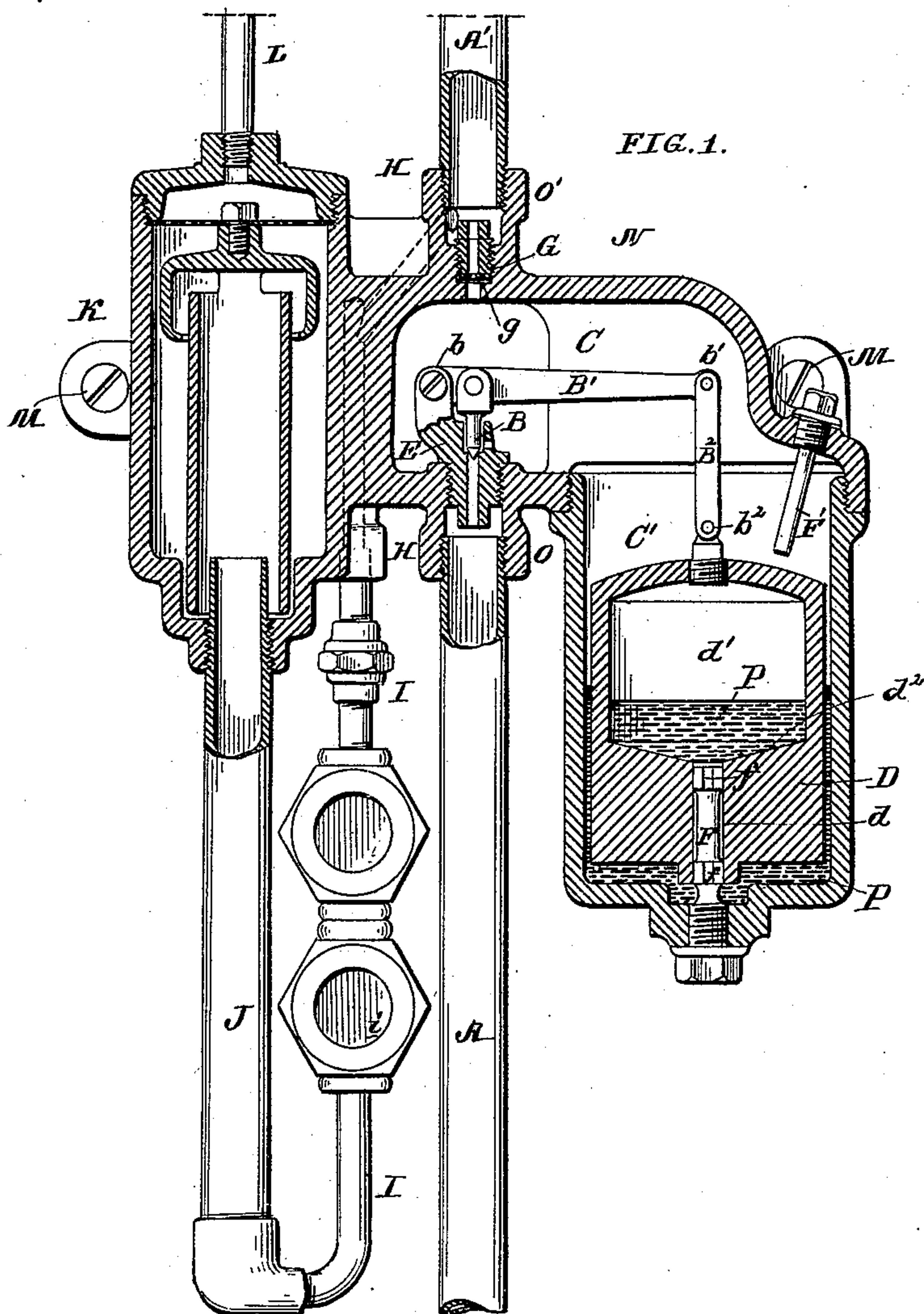
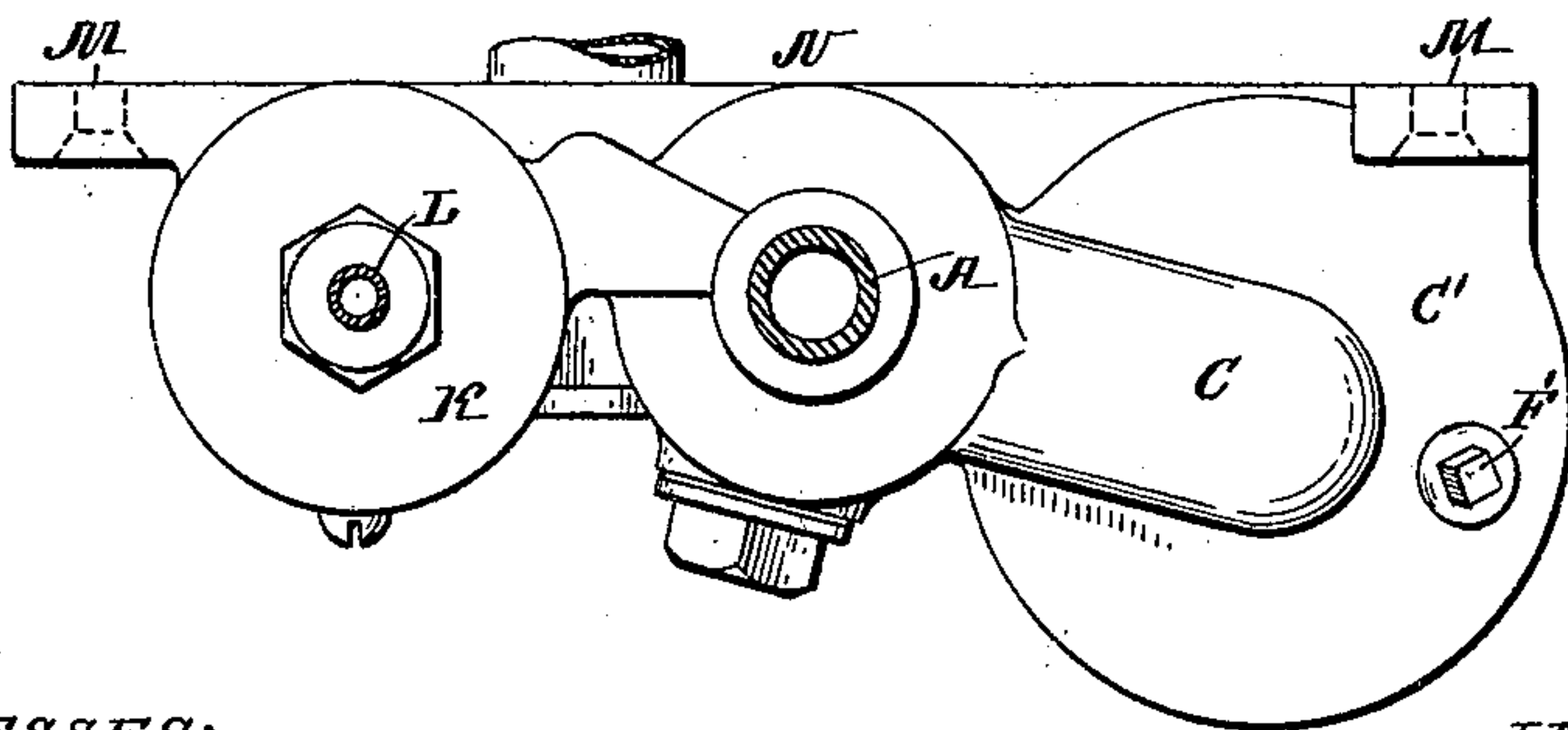


FIG. 2.



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JOHN D. BOWMAN, OF ALTOONA, PENNSYLVANIA.

PRESSURE-REGULATOR FOR GAS-CONDUITS.

SPECIFICATION forming part of Letters Patent No. 405,244, dated June 18, 1889.

Application filed January 12, 1889. Serial No. 296,203. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. BOWMAN, of Altoona, county of Blair, State of Pennsylvania, have invented a new and useful Improved Pressure-Regulator for Gas-Conduits, of which the following is a true and exact description, reference being had to the accompanying drawings which form a part of this specification.

My invention relates to the construction of a device for regulating the pressure and flow of gas in conduits, being especially designed for use in connection with systems of lighting by means of carbureted air, but adapted also for use in any and all gas-conduits.

The novel features of my device are hereinafter clearly pointed out in the claims, and are fully described in connection with the drawings forming part of this specification, and in which—

Figure 1 is a sectional elevation of my device in the form especially designed by me for use on railway-cars and in connection with a system of lighting such cars by carbureted air, and Fig. 2 is a plan view of the said device.

A and A' indicate gas-conduits leading, respectively, to and from the regulating device.

B is the regulating-valve, placed, as is usual with such valves, over a valve-seat at the mouth of the pipe from which the gas is passing.

C is the regulating-valve chamber, C' a chamber connected with valve-chamber C and adapted to contain a certain amount of fluid, preferably mercury.

D is a float, situated in chamber C', having an internal hollow or chamber d', and a passage d, leading from the bottom of said chamber d' downward and opening at the bottom of the float. Where mercury is used in chamber C', the float D is most conveniently made of cast-iron. The float D and valve B must be connected together by some convenient mechanism which will cause the valve to move up or down as the float moves up or down in chamber C'. As shown, this is accomplished by a lever B', to which the valve B is pivoted, and which is pivoted at one end to a lug extending up from a screw-plug E, in which is also formed a seat for the valve

B. This lever B' is pivoted at its other end b' to a link B², which link is pivoted at b² to the float D. This mechanism is well-adapted for the special construction shown in the drawings, but can of course be varied in a great number of ways to suit any other special constructions in which my invention may be embodied.

To keep the float D centered in the float-chamber C', I provide a guide-rod F with wings f, by which it is made to fit quite closely in passage d without interfering with the flow of mercury or other liquid through said passage; and to prevent the float from rising in chamber C' above a determined height, I provide a stop F', which serves this purpose, as is shown in the drawings.

G is a diaphragm interposed in the exit-passage leading from the regulating-valve chamber C, a perforation g of small area being made in this diaphragm.

O and O' are openings or passages formed in the regulating-valve chamber and adapted to receive and couple with the pipes A and A' of the conduit.

H is a passage leading from a point in the exit-pipe above that in which the diaphragm G is secured; I, a pipe connecting at its upper end with passage H and leading downward therefrom; J, a pipe forming, with pipe I, a U-tube, as shown; K, a blow-off chamber situated at the top of pipe J, and L an open pipe leading from the top of the blow-off chamber.

ii are sight-holes connected with pipe I. Preferably I form the regulating-valve chamber C and blow-off chamber K of a single casting, as indicated by the letter N, the passage H being also formed in this casting, as well as the openings O O', to which the conduit-pipes are connected. By attaching the float-chamber C' and the U-tube I J to this casting, as shown, and inserting the operative mechanism, the device is embodied in a very compact and strong form, and can be attached to a wall—such as the side of a car—by screws M M or other devices.

The device is put together as shown in the drawings and already described. Mercury (indicated by the letter P) is placed in the chamber C' in such quantity as will normally

support the float D, and through the connecting mechanism maintain the valve B at a proper height above its seat. When gas is passing into the chamber C through pipe A, it is also of course in communication with the chamber C', and presses on the surface of the mercury surrounding the float D, causing the fluid to pass upward through the passage *d* in the bottom of the float into the enlarged hollow *d'*. As the level of the mercury falls on the outside of the float, the float will fall in the chamber C'. The mercury in passing through the passage *d* spreads out over the bottom of the enlarged hollow *d'*, adding its weight to the normal weight of the float, and of course as the float falls the valve B is drawn down toward its seat, checking and at a proper point cutting off entirely the flow of gas through pipe A. The bottom of the hollow *d'* is preferably formed so as to slope from all sides toward the center, as is indicated at *d''*, the passage *d* leading downward from the lowest point of the bottom. This construction prevents mercury from lodging in the hollow *d'*. The hollow *d'* is of course perfectly closed at all points, except through the passage *d*, and as the air contained in the hollow resists the tendency of the gas to force the mercury up into it the action of the device can be made very delicate and a most perfect regulation of pressure obtained. By using the guide-rod F, passing up from the bottom of chamber C' through passage *d*, the upward and downward motion of the float is not interfered with, but the float is maintained in the center of the chamber C' and prevented from coming in contact with its sides, which of course is highly important. The stop-rod F' prevents the float from rising beyond a determined height, and also of course prevents the valve from rising above its seat beyond a determined maximum. The rod also prevents the float from being thrown upward by sudden jars or shocks.

The U-tube IJ is filled with mercury, and, in connection with the diaphragm G, serves the purpose of an indicator to show the rate at which gas is flowing through the exit-pipe A', the gas passing from the regulating-valve chamber C through the perforated diaphragm G, and by means of the passage H acting on the face of the mercury in the top of tube I, pressing it downward in said tube and upward in the other leg J of the U-tube, the level of the mercury being visible within the necessary limits through sight-holes *i i*. Where the pressure exceeds that at which the mercury in the U-tube IJ will be entirely pressed out of the tube I, the gas escapes into pipe J, bubbling through the mercury therein and escaping into the blow-off chamber K, which is arranged to prevent mercury from being lost, the gas or air escaping from the top of the blow-off chamber through pipe L to the atmosphere without admixture with the mercury.

The indicating device here shown and

above briefly described forms no part of my present invention, but is the subject-matter of another application filed by me December 13, 1888, in the United States Patent Office, said application having received the Serial No. 293,421, and the blow-off illustrated is also the subject of another application filed in the United States Patent Office November 6, 1888, and bearing the Serial No. 290,076.

So far as these devices are concerned, the only feature of novelty for which I seek protection by this application is the special construction illustrated, by which the regulating-valve chamber and blow-off chamber are formed of the same casting in which provision is made for the attachment of the other parts of the apparatus, as hereinbefore described.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A pressure-regulator for gas-conduits, consisting of a regulating-valve interposed in the conduit, in combination with a chamber C', closed to the air and connected with the gas-conduit only and adapted to contain fluid, a float D, situated in said chamber, having a hollow *d'* in it closed to the air, and an open passage *d*, leading downward from said hollow into chamber C', and mechanism connecting the valve and float, substantially as specified, and so as to move the valve to or from its seat as the float falls or rises.

2. A pressure-regulator for gas-conduits, consisting of a regulating-valve interposed in the conduit, in combination with a chamber C', closed to the air and connected with the gas-conduit only and adapted to contain fluid, a float D, situated in said chamber, having a hollow *d'* in it closed to the air, and an open passage *d*, leading downward from said hollow into chamber C', a guide F, to maintain the float in the center of the chamber, and mechanism connecting the valve and float, substantially as specified, and so as to move the valve to or from its seat as the float falls or rises.

3. A pressure-regulator for gas-conduits, consisting of a regulating-valve interposed in the conduit, in combination with a chamber C', closed to the air and connected with the gas-conduit only and adapted to contain fluid, a float D, situated in said chamber, having a hollow *d'* in it closed to the air, and an open passage *d*, leading downward from said hollow into chamber C', an adjustable stop F', arranged to prevent the float from rising above a determined point in the chamber, and mechanism connecting the valve and float, substantially as specified, and so as to move the valve to or from its seat as the float falls or rises.

4. A pressure-regulator for gas-conduits, consisting of a regulating-valve interposed in the conduit, in combination with a chamber C', closed to the air and connected with the gas-conduit only and adapted to contain fluid,

a float D, situated in said chamber, having a hollow d' in it closed to the air and with sloping bottom d^2 , and an open passage d , leading downward from the lowest point of bottom d^2 into chamber C', and mechanism connecting the valve and float, substantially as specified, and so as to move the valve to or from its seat as the float falls or rises.

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10 5. The casting N, containing valve-chamber C, blow-off chamber K, openings O O' for conduit-connections, and passage H, in com-

bination with float-chamber C', U-pipe J I, connecting passage H with the blow-off chamber, float D, valve B, mechanism connecting said valve and float, as specified, and diaphragm G, secured in opening O' below the mouth of passage H, all substantially as and for the purpose specified.

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Witnesses:

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