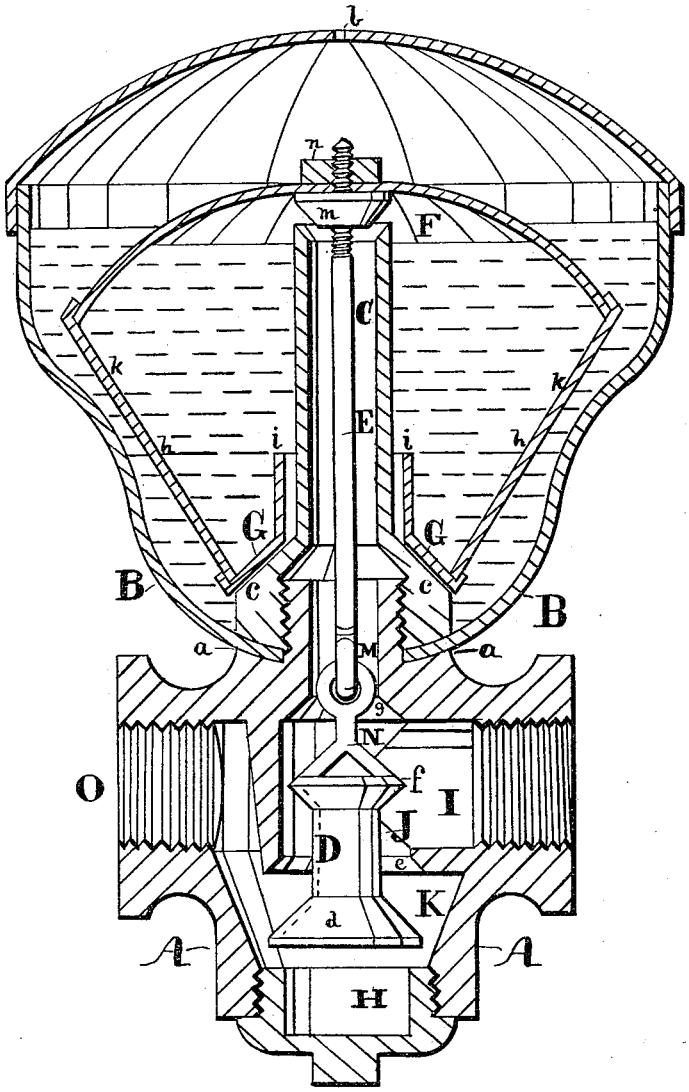
(No Model.)

R. PICKERING.

GAS PRESSURE REGULATOR.

No. 348,338. Patented Aug. 31, 1886.



WITNESSES:

E. Goepfel

J. R. Goodfellow

INVENTOR

Richd Pickering

BY

ATTORNEY

UNITED STATES PATENT OFFICE.

RICHARD PICKERING, OF CLEVELAND, OHIO.

GAS-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 348,338, dated August 31, 1886.

Application filed April 19, 1886. Serial No. 199,405. (No model.)

To all whom it may concern:

Be it known that I, RICHARD PICKERING, a citizen of the United States, residing at Beckwith street, Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improved Gas-Pressure Regulator, or Improvements in Gas-Pressure Regulators, of which the following is a specification.

My invention relates to what are denominated "pressure-regulators," which are especially designed for illuminating-gas, but which may be used for other purposes, for which it may be adapted when an automatic pressure-regulator is required.

The object of this invention is to supply improved regulators that will more effectually regulate the varying pressure of gas to the burners, and to provide against the danger of gas escaping through a diminished liquid-seal, which will indicate, upon lighting a single burner, that the liquid has become low by the streaming up of the light, prevent the gas escaping, and not shut off the gas to the burner-tubes to leave the house in darkness; and it consists in the arrangement and construction of the various parts, passages, and valve-actions, as will be described hereinafter, reference being had to the accompanying drawing, which is a vertical section of the regulator, and is described in the order of its construction.

A represents a four-way coupling having a screw-threaded inlet-opening, I, and outlet-opening O in a horizontal plane. In the lower part is a screw-threaded and shouldered removable cup-piece, H. The upper part is formed with the regulator expansion-passage M, having a beveled valve-stop, *g*, at bottom. In continuation and internally extending down therefrom is the valve chamber or passage J, formed with the inlet I on its side and the valve-stop opening *e* at the bottom, adjoining in continuation a passage, K, leading to the outlet O, that connects with the tube leading to the burners.

Around M on the shoulder *a* is set the cup-shaped casing B, which has a hole in its bottom part and fits over *a* and around M, which is screw-threaded on its outer part.

C is an open regulator-tube and stem-passage, that conducts the pressure to and from the float F. The bottom part *c* is cone-shaped and internally screw-threaded to a shoulder, which joins to the coupling A, gripping the bottom of the casing B between *a* and *c*. The passage M may be made to extend in one piece above the liquid in said float. The shoulder *c* may be a separate piece connected on the outer side of said passage. At the top of casing B is a cover having a central air-hole, *b*.

D is an open tubular double-action valve having a passage through its vertical center and beveled or rounded outward-projecting stop parts *d* and *f*. At the top of D is formed a crutched link or eye, N, which is connected by a hook or link at the lower end of the stem E, and works up and down in the passage M, thus guiding the valve and stem E, the upper end of which is screw-threaded for the nuts *m n*.

Within the casing B is placed the float F, which is concavo-convex in form at the top, and a downward concentrically-sloping side part, *k*, and an upward cone-shaped central bottom part, G, and ending in an upward tubular part, at *i*, forming the annular close-bottomed cup *i* G *h*, this part may be separate from and within the sides of the regulator-float, the sides *k* extending down below the point *h*, the objects of which will be explained hereinafter. The top part of the float is attached to the stem E by means of the nuts *m n*. The cup-piece H screws into the hole at the bottom of the coupling A. Said hole serves for placing the valve D and stem E, and also for removing any accumulation that may lodge there. Inside the casing B is placed a suitable liquid seal, which surrounds below the top of tube C, and filling inside the lower part of float F. The valve D is self-centering, and being linked to the stem E, as before described, it affords a free passage through said valve and regulator-tube C, dispensing with stationary stem-guides. Should the float have a sidewise motion, the link prevents improper action on the valve.

The drawing represents the regulator at low pressure. The top opening of the valve D, at *f*, through which a part of the gas passes, is directly under the regulator expansion-passage, M, which communicates with the outlet O through said opening when said valve is closed, the top of said valve closing the regulator expansion-passage M from the inlet.

The gas enters at I into the valve chamber or passage J, which surrounds the valve D, pressing into the regulator-float F through tube C, and through the center of and around D into the passage K, that connects with the outlet at O, (and not with the regulator-tube, as in other arrangements,) which leads to the burners. By this arrangement direct action is had upon the regulator. Any excess of pressure immediately acts upon and between the liquid and the float, which gradually raises the valve D. The pressure being against the closing motion of said valve prevents to some extent its sudden closing, diminishing the space through which the gas passes at *d e*, and also the space *f g*. The bottom projection, *d*, the stop *g*, of the passage M, which contracts closes against the stop *e*, and port *f* against and closes the area of passage to the outlet O, and also to the regulator-float F. The regulator expansion-passage M C and outlet O being always in open communication (more or less) by means of the valve, the gas in the float must pass through the valve and its chamber from said float to the outlet O, thus regulating the pressure in a second degree, after the first action of the valve, by checking the extra pressure at the float that sustains the valve from passing too freely to the tube leading to the burners.

Regulators heretofore have been so arranged that the pressure first passes through the valve from the inlet to the outlet and the expansion-chamber, which afterward actuates the valve between the inlet and the outlet only, the outlet relieving the expansion-chamber direct, with no valve interposing, and undue pressure after passing the valve is forced upon the burner-tube and regulator-float alike, which actuates and partially closes said valve and checks the full force; but there must be undue pressure in said tube and float to sustain the valve partially closed, the area of passage between the float-chamber and the burner-tube being as large with high pressure as low. In my arrangement the pressure contained in the expansion-chamber passes through the valve to the outlet, and so opens the valve-chamber to the outlet, as required, admitting the inlet-pressure to the expansion-chamber before it passes through the valve, which pressure must pass through said valve arrangement to the outlet only.

It is claimed that other regulators have a double-action valve; but in reality they are only double shutting with but a single action on the pressure, as far as admitting it to the burner-tubes. There is no action on the pressure as between the float and outlet as there is in my arrangement.

A double-closing tubular valve, acting as described above, can be used in a regulator having a liquid-tank below, as well as those with a tank above, one of which kind I have arranged jointly with this invention, regulating the pressure as described above.

In the bottom of the liquid-chamber B is the cone-base *c*, around the regulator expansion-passage M, upon which sets the cone-shaped annular cup *i* G *h* of the float F, as before described. Should the liquid diminish by evaporation or otherwise the regulator will not act when the top of the liquid is down about the points *i h*. The gas pressing upon the liquid that remains in the annular cup which sets upon the cone-base *c* prevents the gas blowing through the weakened seal. The gas passing through the machine unregulated as it comes from the meter will cause a single burner to stream up, which notice should be regarded. The gas will not be shut off from the burner-tube and leave the house in darkness, but will give notice every time upon lighting the first burner.

The cup *i* G *h* may be separate and within the sides *k* of the regulator-float, as before described, and ride upon the liquid, and when said liquid becomes low the side *h* of a loose cup would bear down upon the sides *k* of the float, the nut *m* fitting on the top of tube C, and so shut off the gas from the seal. When the liquid is high, the top of the side *h* of the loose and separate cup touches the under side of the dome of the regulator-float, which lifts the nut *m* off of tube C, and so opens the regulator-float to the gas, which would act between said regulator and cup-float. A float or floats of this description could be adapted to regulators having a valve arrangement different from mine, and also the linked stem E could be adapted to operate in regulator-tubes of otherwise constructed regulators.

In regulators of the construction shown and described, a solid close valve may be used with one shutting part, *d*. The part *f* may be made to partially close. In this arrangement the flow of gas would be reversed, making O the inlet and I the outlet. It will be observed that the regulator expansion-passage M is open clear through and directly connected with the inner valve passage or chamber, J, of which it is a continuation, also that the float is provided with a seating part or parts. Other equivalent forms of an expansion-chamber with my valve arrangement may be used to suit the purpose for which it may be required. Thus

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

1. In a fluid-pressure regulator, the coupling A, having a main inlet, I, directly intermediate between the regulator-opening M and the valve-outlet-passage opening *e*, a main outlet, O, communicating by a passage, K, through said single opening *e*, with said inlet I and regulator-opening M, the bottom opening in passage K, and the cap or cup for said opening, substantially as described.

2. A fluid-pressure regulator, with inlet, outlet, and expansion passages, a single valve-opening between said inlet and outlet, a second valve-opening in the expansion-passage, and a valve or valves to operate with said openings, substantially as described.

3. In a fluid-pressure regulator, the double-action valve D, working in a surrounding chamber or stop-passage, M *g* J *e*, having an inlet, I, directly connected with an expansion-chamber, F, the movable part of which supports said valve D by a stem, E, said passage J having a single open connection, at *e*, with a passage, K, leading to an outlet, O, said expansion-chamber connecting with the outlet O only through the valve D when said valve has closed the inlet, and through said valve and said single opening *e* when said valve opens said inlet, substantially as described.

4. In a fluid-pressure regulator, a valve and a float stem having a connecting-joint that serves as a radiating and guiding center, adapted to slide up and down in a fluid-pressure passage surrounding said joint, allow the fluid to pass, and guide said valve and float stem, substantially as described.

5. In a fluid-pressure regulator, a float, F, having a close-bottom annular cup, *i* G *h*, with the part G adapted to close upon a seat, *c*, in a liquid-chamber, B, having a vent, *l*, in combination with a coupling having an inlet and outlet, a regulator-valve passage, and a valve connected by a stem with said float, substantially as described.

6. In a fluid-pressure regulator, a double-action tubular valve, D, operating in a regulator-valve-seated passage J, which, together with a main inlet, I, have direct communication with an expansion-chamber, F, said inlet I and chamber F communicating with a main outlet, O, through said valve D, and said passage J, substantially as described.

7. In a fluid-pressure regulator, a tubular valve, D, arranged to interpose and communicate between the outlet and a regulator-passage and the inlet, and also between the inlet and the outlet and the regulator-passage of a chambered coupling communicating with an expansion-chamber, so as to open and regulate the inlet-pressure to the outlet by relieving the pressure contained in said expansion-chamber through said valve to the outlet, and also by said valve intermediating between the outlet and said expansion-chamber, the inlet, expansion-chamber, and the outlet, substantially as described.

8. In a fluid-pressure regulator, the coupling A, having inlet and outlet in a horizontal plane, which, together with the other passages, concentrate downward to a bottom opening that holds, and is closed by, a cup, H, and serving for the purposes set forth, in combination with a float, F, having the part G, and supporting a regulator-valve by a stem through a central tube, C, having a seat, *c*, as set forth, said float acting in liquid contained within an outer casing supported by said coupling, substantially as described.

9. In a fluid-pressure regulator, the coupling A, casing B, tube C, link-valve D, link-stem E, and float F, said coupling having a bottom cup, H, and an inlet, I, direct to said float, the pressure being first on the float side of the valve in J C, and, second, on the outlet K O, substantially as described.

10. In a fluid-pressure regulator, a float expansion-chamber, F, adjustably attached to a stem, E, by nuts *m n*, said nut *m* serving as a closing-seat for the top of tube C, a loose annular float-cup, *i* G *h*, within the sides *k* of the float F, and a casing, B, having a vent, *b*, adapted to contain a suitable liquid for said floats, in combination with a coupling having inlet and outlet passages with a valve-chamber and a valve therefor connected to said float, substantially as described.

11. In a fluid-pressure regulator, a regulator-tube, C, having a screw-threaded and shouldered base, *c*, adapted to join to a coupling, A, and grip a casing, B, between said shouldered base *c* and the shoulder *a* of the coupling A, substantially as described.

12. In a fluid-pressure regulator, a coupling, A, with inlet and outlet in a horizontal plane, and having a bottom opening and a cup, H, for said opening, a shoulder, *a*, and a screw-threaded regulator-opening, M, in combination with a screw-threaded and shouldered regulator-tube C, adapted to support and grip a casing, B, between said shoulders, substantially as described.

13. In a fluid-pressure regulator, a coupling, A, with inlet and outlet passages, a regulator-valve guide-passage, M, adapted to guide a flexible top joint, N, of a suspending valve, D, flexibly connected to a stem, E, of a float expansion-chamber, F, substantially as described.

14. In a fluid-pressure regulator, a regulator-tube, C, having a cone-base, *c*, in a liquid-chamber, B, substantially as described.

15. In a fluid-pressure regulator, a float, F, with an annular close bottom cup, *i* G *h*, and stem E, flexibly connected to a valve, D, as set forth, and substantially as described.

16. In a fluid-pressure regulator, the valve D, formed with top and bottom outward projecting seats or surfaces with a tubular central passage, substantially as described.

17. In a fluid-pressure regulator, a regulator expansion passage (extending above the liquid in an expansion-chamber) having a seat-face at the upper and lower openings of said passage, for the purposes set forth, and substantially as described.

18. In a fluid-pressure regulator, a float with a closing part or seat in liquid, and a corresponding seat therefor in a casing containing said liquid and said float, substantially as described.

19. In a fluid-pressure regulator, a float with differential closing-seat surfaces G *m*, and corresponding seats therefor, substantially as described.

RICHD. PICKERING.

Witnesses:
EARNEST SIEVERT,
E. GOUPTEL.

Corrections in Letters Patent No. 348,338.

It is hereby certified that in Letters Patent No. 348,338, granted August 31, 1886, upon the application of Richard Pickering, of Cleveland, Ohio, for an improvement in "Gas-Pressure Regulators," errors appear in the printed specification requiring correction, as follows: On page 2, lines 17 and 18 were transposed by the printer, line 18 should be read as line 17, and line 17 as line 18, and the word "port" in line 18 should read *part;* and that the Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 28th day of September, A. D. 1886.

[SEAL.]

H. L. MULDROW,
Acting Secretary of the Interior.

Countersigned:

R. B. VANCE,
Acting Commissioner of Patents.