(No Model.)

J. STUBBE.

GAS REGULATOR.

No. 347,840. Patented Aug. 24, 1886.

Fig. 2.

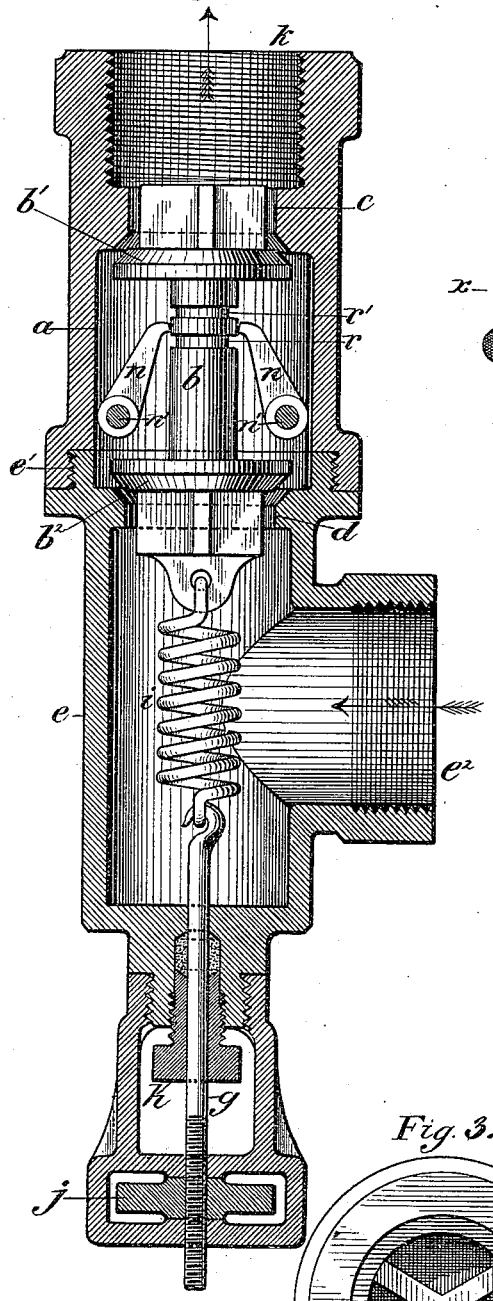


Fig. 1.

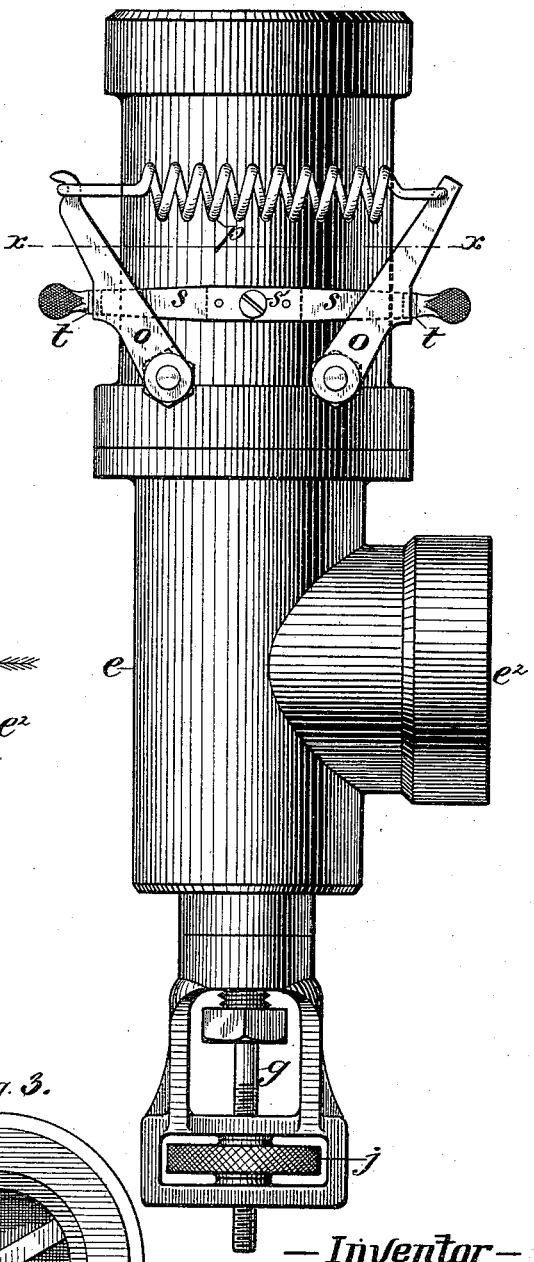
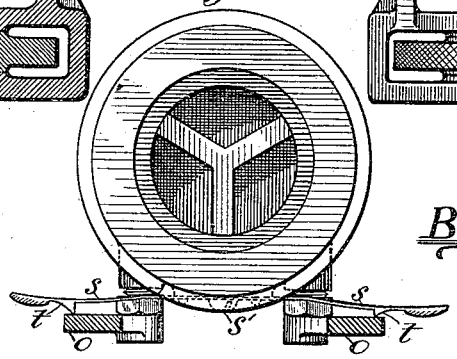


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN STUBBE, OF PITTSBURG, PA., ASSIGNOR OF TWO-THIRDS TO GEORGE T. OLIVER AND CADWALLADER EVANS, BOTH OF SAME PLACE.

GAS-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 347,840, dated August 24, 1886.

Application filed May 7, 1886. Serial No. 201,430. (No model.)

To all whom it may concern:

Be it known that I, JOHN STUBBE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Gas-Regulators; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side view of the regulator-valve. Fig. 2 is a vertical axial section thereof. Fig. 3 is a horizontal section on the line *x x* of Fig. 1.

Like letters of reference indicate like parts in each.

The object of my invention is to provide an automatically-acting regulator for gas-lines, which will be quick and certain in its action, and which maintains a uniform pressure of gas at the point of supply.

In the drawings, *a* is the valve-chamber containing the regulating-valve *b*, which is a double-faced valve adapted to seat in one direction over a port, *c*, at one end of the chamber and in the other direction against a port, *d*, at the opposite side of the chamber. The port *d* is a tapering hole made in the end of a shell, *e*, which is screwed to the valve-chamber, as at *e'*, and affords communication between the valve-chamber and the gas supply pipe, which is screwed into a port, e^2, at the side of the shell.

g is a rod, which extends through a stuffing-box, *h*, into the shell *e*, where it is connected by a coiled spring, *i*, to the end of the valve *b*. A nut, *j*, working on a screw-thread on the rod *g*, outside of the shell *e*, enables the tension of the spring *i* to be adjusted to any degree desired. A pipe leads from the forward end *k* of the valve-chamber to convey gas to the place of use after its pressure has been regulated by the valve.

The faces *b'* and b^2 of the valve *b* seat in opposite directions against their ports *c* and *d*, the length of the valve being such relatively to the distance between the ports that when one port is closed the other shall be open, and vice versa, and that if the valve be kept midway between the ports, as shown in Fig. 1, both shall be open.

When gas is turned on to flow through the service-pipe and into the shell *e* through the port e^2, its pressure on the under side of the face b^2 of the valve will tend to unseat it and to afford a passage for it through the valve-chamber. To set the valve in condition for operation, the tension of the spring *i* is adjusted by means of the nut *j*, so that the force exerted by it on the valve, when the latter is midway between its seats *c* and *d*, shall counterbalance the force of the gas on the under sides of the faces *b' b²* when the gas is at the mean pressure in the supply-pipe. When the spring is thus adjusted, it is clear that the valve will be kept in this intermediate position so long as the pressure of gas flowing through the valve is constant; but if the pressure should increase the consequent upward movement of the valve would cause it to approach the seat *c*, and to correspondingly cut off the supply delivered to the burners, and if the flow should diminish, the spring *i* pulling on the valve would draw it against the port *d*, and would close the port, either partially or entirely, according to the degree of diminution of the pressure. The valve is extremely sensitive, and preserves a steady gas-flow of uniform pressure. It is, therefore, of great use on the supply-pipes of illuminating-burners, and after a series of experiments I have found that the steadiness of flame which its use affords enables natural gas to be burned as an illuminant with very good results.

This regulator is best used in connection with another regulator, which may be less sensitive in its action, connected with the supply-pipe, so that it shall reduce the average pressure of gas which passes through my regulating-valve.

One of the chief uses of the regulator is that it automatically regulates the flow of gas, so that whether one or many burners be used the jets from the burners shall be constant. Thus suppose there be a large number of burners open, the escape of the gas after it has passed the regulating-valve being so much the more rapid, the back-pressure on the valve-faces will be small relatively to the forward pressure, and the gas will therefore exert its force to draw the valve-face b^2 away from its

seat to open the valve and to permit a sufficent amount of gas to pass through the valve to supply the large number of burners, and if a number of the burners be cut off the diminished area of escape-passage for the gas will increase the back-pressure on the valve, and acting in conjunction with the spring *i* will force the valve-face b^2 toward its seat, to cut off the gas supply until the pressure in the supply-pipe forward of the valve shall be cut down to a point at which, together with the tension of the spring *i*, it shall equal the forward pressure of the gas. In this way the size and force of each burning jet will be constant, whether it be the only open jet or one among many. The regulator is thus a protection not only against surges of the gas, but also serves to regulate the supply to the amount used. When all the burners are shut, the gas forward of the valve increasing in density until it equals the pressure in the rear, the spring *i* will close the valve entirely.

As I have shown and described my apparatus, the valve is closed upon the extraordinary increase or cessation of gas flow. It is therefore desirable to use in connection with it a safety-locking device for preventing the valve from subsequently opening of itself. I have illustrated such apparatus in the drawings, and I will now describe it.

Pivoted within the valve-chamber are fingers or dogs *n*, whose shafts *n'* extend through the shell of the valve to the outside, where they have radially-projecting lever-arms *o*, whose ends are connected by a coiled spring, *p*, which tends to draw the levers *o* and the fingers *n* together. As actuated by this spring, the ends of the fingers *n* bear upon the opposite sides of the neck connecting the valve-faces b' and b^2, on which neck are two grooves or notches, *r r'*, which are so spaced that when the valve is seated against the port *c* the notch *r* shall be in opposition to the ends of the fingers *n*, which will then spring into these notches to confine or lock the valve, and when the valve is seated against port *d* the notch *r'* shall receive the ends of the fingers. When the valve is unseated and the gas flowing, the fingers *n* rest on the part of the valve-neck between the notches, allowing the valve to work freely; but as soon as the valve is seated, either in one direction or the other, the fingers *n* will immediately lock and hold the valve closed until the fingers are released by operation of the levers *o* on the outside of the valve-shell. The spring *p* is shown hooked to one of the levers *o*, the purpose of which arrangement is that the spring may be disengaged and the automatic locking device disused whenever this is desirable. The use of the two fingers *n* is important, because, bearing as they do against opposite sides of the neck, they resist each other and lock the valve much more firmly than if one finger were used separately.

As a further protection against accidental disengagement of the fingers, I employ the spring-catches shown in Figs. 1 and 3. A leaf-spring, *s*, is fastened at its middle, *s'*, to the valve-shell and projects on both sides. The outer sides of the arms of this spring are provided with hooks or lugs *t*, the tension of the spring being such as to keep these lugs pressing against the inner sides of the levers *o*. When these levers are moved together by the spring *p* to engage the fingers *n* with the valve, they will move past the hooks *t*, and the spring then projecting, these hooks will cause them to engage the sides of the levers *o* and to lock them securely. The fingers *n* cannot then be disengaged from the valve until the spring *s* is pushed back to disengage the hooks *t*.

I claim—

1. The combination of a valve chamber having opposite ports for the passage of gas, which flows directly through both ports, and a double-faced regulating-valve arranged between the ports and actuated by the gas-flow, variation in which causes the approach of one of the valve-faces to its port and the recession of the other valve face from its port, substantially as and for the purposes described.

2. The combination of a valve-chamber having opposite ports for the passage of gas, which flows directly through both ports, and a double-faced valve moving in the direction of the gas-flow on the increase thereof, and so arranged and actuated relatively to its ports that an increase of gas-pressure shall cause the approach of one of the valve-faces to its ports to contract the opening thereof, and shall simultaneously cause the recession of the other valve-face from its port to increase the opening thereof, and that a diminution of gas-flow shall cause a reverse movement of the valve-faces to correspondingly open one port and contract the other, substantially as and for the purposes described.

3. As an automatic locking device for regulator-valves, the combination of the valve and locking-fingers bearing against opposite sides of the valve or its stem and arranged to engage a notch therein, substantially as and for the purposes described.

4. The combination, with the double-faced valve *b*, arranged to seat in opposite directions against its ports *c d*, and having the two notches *r r'*, of a locking-finger bearing against the valve and arranged to engage the notch *r* when the valve is seated against one port, and to engage the notch *r'* when the valve seats against the other port, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 28th day of April, A. D. 1886.

JOHN STUBBE.

Witnesses:
W. B. CORWIN,
THOMAS W. BAKEWELL.