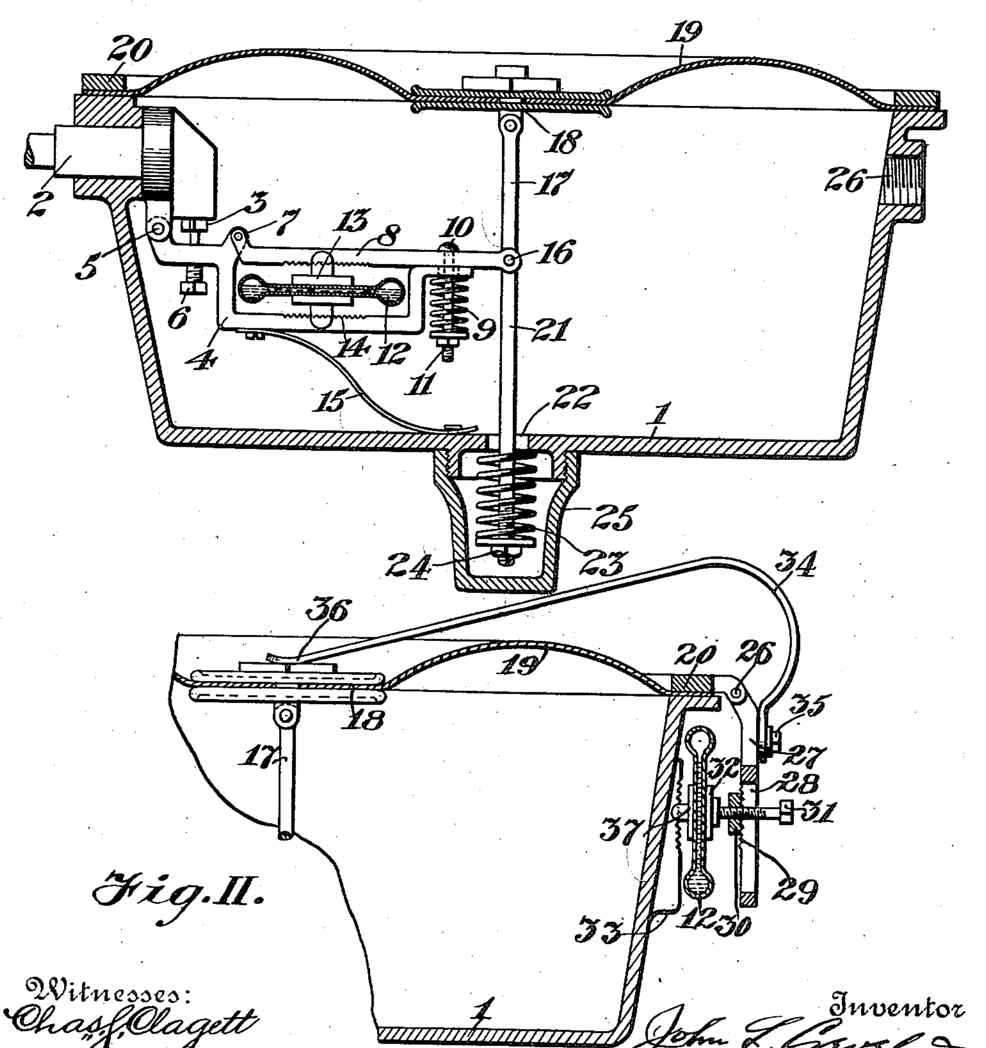
J. L. CREVELING.

PRESSURE REGULATOR.

APPLICATION FILED APR. 1, 1908.

1,045,375. Patented Nov. 26, 1912.



Witnesses:
Chas. J. Clagett
[illegible]

Inventor
John L. Creveling

UNITED STATES PATENT OFFICE.

JOHN L. CREVELING, OF NEW YORK, N. Y., ASSIGNOR TO THE SAFETY CAR HEATING & LIGHTING COMPANY, A CORPORATION OF NEW JERSEY.

PRESSURE-REGULATOR.

1,045,375. Specification of Letters Patent. Patented Nov. 26, 1912.

Application filed April 1, 1908. Serial No. 424,673.

To all whom it may concern:

Be it known that I, JOHN L. CREVELING, of New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Pressure-Regulators, of which the following is a complete specification, reference being had to the accompanying drawings.

My invention pertains to that class of devices known as pressure regulators, usually adapted to be used in connection with a source of fluid under pressure and intended to regulate the flow of the said fluid in such manner as to produce a substantially constant outlet pressure regardless of the pressure upon the inlet, within reasonable limits.

My invention has for its particular object to produce a regulator which under fixed conditions will deliver a substantially constant pressure from its outlet regardless of the inlet pressure within the limits of its design, and upon changes in temperature correspondingly change the outlet pressure in such manner as may be desired and predetermined.

In the drawing, Figure I represents a sectional view of one form of regulator embodying my invention. Fig. II represents a partial section of a regulator embodying my invention in a modified form.

Like numbers in both figures are used to indicate corresponding parts.

Referring to Fig. I, (1) indicates a body or shell portion of a regulator which in its general construction might be said to be of the well known "Pintsch" type, and having a pressure inlet connection as indicated by (2) through which the flow of gas is governed as by valve (3).

(4) is a lever pivoted at (5) and operating the valve (3) by its communication through the adjusting screw (6). The lever (4) is provided with the hinge (7) carrying the lever (8) while (9) is a compression spring tending to press levers (4) and (8) together in the position shown in the drawing through the instrumentality of screw (10), and adjusting nut (11).

(12) represents a section of what is technically known as an expansion disk such as usually formed of a circular shell of light metal partly filled with some volatile fluid.

The members (13) are fastened upon opposite sides or diaphragms of the expansion disk (12) and engage the levers (4) and (8) in such manner that when pressed apart as by expansion of the fluid within the disk they separate the levers (4) and (8) against the action of spring (9). The levers (4) and (8) are notched in a manner similar to a scale beam as indicated at (14), and these notches engaging the members (13) hold the expansion disk properly in place and also permit the adjustment of the same.

(15) is a leaf spring normally tending to pull down the lever (4) in such manner as to cause the valve (3) to open.

The lever (8) is provided at its outer end with the hinge (16) engaging the link (17) to which are attached the members (18) carrying diaphragm (19) which is held in place so as to make a gas tight joint as by an annular ring (20). The hinge (16) also carries the depending member (21) which passes through the body of the regulator as through aperture (22) and a downward pressure is exerted upon the hinge (16) by a compression spring (23) while adjustment of such pressure may be accomplished by adjustment of nut (24). The cap (25) prevents escape of fluid from the interior of the regulator to the atmosphere.

(26) indicates the usual outlet from which uniform pressure is to be had.

In Fig. II. the expansion disk (12) is shown external to the regulator and the ring (20) is shown as provided with a hinge (26) carrying a lever (27) which is provided with a slotted portion (28) one face of which is notched as indicated at (29). This face bears against a notched nut (30) carrying screw (31) which is attached to member (32) in such a manner that it may revolve therein without rotating the disk (12). A fin (33) engages the member (37) attached to the opposite side of the disk (12). A heavy leaf spring (34) is attached to the lever (27) as by means of screw (35) in such manner as normally to press upon top of the member (18) as indicated at (36).

The operation of my improved regulator is substantially as follows: Referring particularly to Fig. I., it will be obvious that if there be no back pressure in the interior of the chamber (1) the diaphragm (19) will fall and the end (16) of the lever (8) will drop to a lower position than indicated in the drawing. It will also be obvious that such movement will cause the valve (3) to open. Now if a source of fluid under pressure be connected with the inlet (2) the fluid will flow through valve mechanism (3) into the chamber formed by (1) and diaphragm (19), and if the outlet be so constricted as to cause back pressure the lever (8) will be raised against the action of the spring (23). Raising the lever (8) will also raise the lever (4) and thus crowd the valve (3) against its seat in such a manner as to cut down incoming fluid and thus prevent an increase of the pressure above the point at which this will take place as is determined by the adjustment of the spring (23). It is obvious that the more the spring (23) has to be compressed by the action of the gas upon the under side of the diaphragm the greater will be the pressure delivered by the regulator. Now with the regulator working and maintaining constant pressure as outlined above if we consider the temperature of the atmosphere surrounding the regulator to be increased in such manner that the increase will cause the expansion disk (12) to expand and separate the outer ends of the levers (4) and (8) against the action of the spring (9) this will cause the valve (3) to open wider which in turn will require the lever (8) to be lifted to a higher position to close the valve and thus necessitate a further compression of the spring (23) and a higher pressure within the regulator corresponding to the increase in temperature above mentioned. So long as the temperature remains constant the levers (4) and (8) will serve the purpose of a simple lever, but upon changes in temperature the above outlined action or the reverse thereof will take place. If, however, the temperature falls and the member (12) contracts while the pressure within the regulator is that caused by a higher temperature the diaphragm (19) will not be forced downwardly against the higher pressure and thus cause the extra force to be exerted upon valve (3) but the spring (9) will allow the levers (4) and (8) to remain separated until a portion of the gas is used from the interior of the regulator and the pressure brought down to the proper pressure to correspond with the temperature at that time, when the relative relations between the two levers will be as determined by the disk (12) and spring (9). It is obvious that the position of the members (13) along the levers (4) and (8) will determine within limits the amount of compression given to spring (23) for various degrees of expansion of the member (12) owing to the change of leverage.

In the regulator shown in Fig. II. movements of the diaphragm (19) will perform the functions in regulation as described above and it is obvious that the greater pressure exerted upon the top of the diaphragm the greater will be the outlet pressure of the regulator. In the type indicated in this figure it will be obvious that expansion of the member (12) corresponding to an increase in temperature will move the lever (27) in such a way as to cause the spring (34) to increase the downward pressure upon the top of the diaphragm (19) also that the variation of such pressure by disk (12) may be adjusted within certain limits by changing the relative vertical position of the said disk and by changing the adjustment of screw (31) in a well known manner.

I do not wish in any way to limit myself to the specific construction or detail shown in the accompanying drawings, which merely show certain forms of apparatus embodying my invention. It is plain that wide variations may be made in the details of construction without departing from the spirit of my invention as is set forth in the following claims.

I claim:

1. In combination, in a fluid pressure regulator having a valve governing the passage of fluid therethrough; means for maintaining a predetermined pressure on the outlet side of said valve throughout changes in the pressure on the inlet side of said valve; and means, for automatically determining the outlet pressure to be maintained dependent upon changes in temperature, comprising a thermal expansion member, and yielding means operatively connecting the same with said valve.

2. In a fluid pressure regulator having an inlet portion and an outlet portion; means for automatically maintaining the outlet pressure substantially constant throughout changes of pressure in the inlet portion; and means, for automatically causing the outlet pressure to be maintained to vary upon changes in temperature, comprising a thermal expansion member and mechanical means operatively connecting said expansion member with the first mentioned means.

3. In a fluid pressure regulator, means for maintaining a predetermined outlet pressure throughout changes in the inlet pressure; combined with means, for automatically governing the outlet pressure to be maintained, depending upon changes in temperature of the fluid governed by said regulator, comprising an expansion member in operative relation to said fluid; and means whereby the expansion of said member acts to vary the pressure to be maintained.

4. In a pressure regulator, the combination with a valve, the position of which determines the pressure delivered by the said regulator; means whereby the pressure delivered operates said valve; and yielding means affecting the operation of said valve and directly affected by temperature

changes, whereby changes in temperature of the fluid delivered alter the operation of said valve.

5. In a fluid pressure regulator, a movable wall or diaphragm, against which the outlet pressure delivered by said regulator acts; resilient means opposing the action of the outlet pressure against said wall or diaphragm; means whereby the position of said diaphragm governs the resistance, caused by said regulator, to the flow of fluid therethrough; and means whereby changes in temperature affect the position of said diaphragm with reference to said valve.

6. A pressure regulator comprehending a valve governing the flow of fluid therethrough; means for operating said valve to cause the same to deliver a substantially constant outlet pressure, comprising a movable diaphragm exposed to the outlet pressure; yielding means tending to move the same in a direction opposed to the outlet pressure; and a thermal expansion member operatively connected with said yielding means, whereby expansion of said member varies the yielding means to vary the outlet pressure.

JOHN L. CREVELING.

Witnesses:
G. R. JEWETT,
C. J. STOCKLEY.