(No Model.) 2 Sheets—Sheet 1.

C. A. DALLY & H. K. RICHARDSON

AUTOMATIC CUT-OFF AND GAS REGULATOR.

No. 405,830. Patented June 25, 1889.

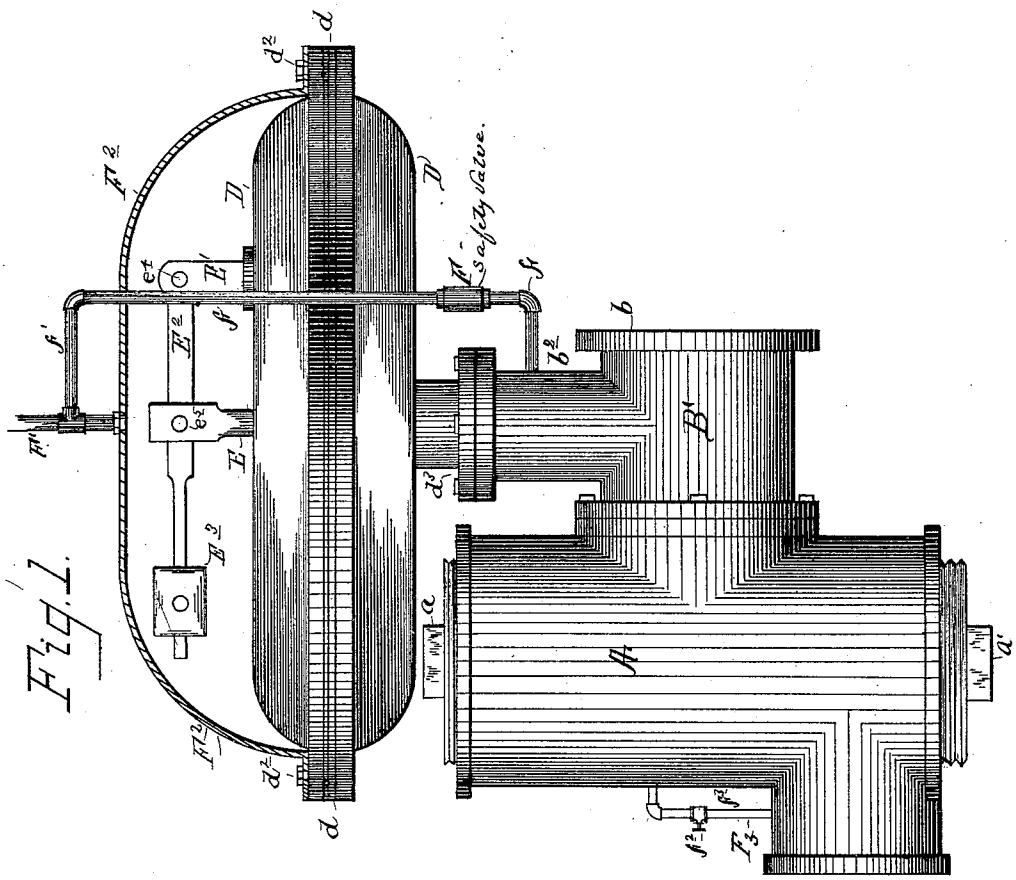


Fig. 1.

Witnesses:

Geo. H. Harvey

Geo. T. Schnorr

Inventor.

Charles A. Dally

Harry K. Richardson

by J. H. Stevenson

Atty.

N. PETERS. Photo-Lithographer, Washington, D. C.

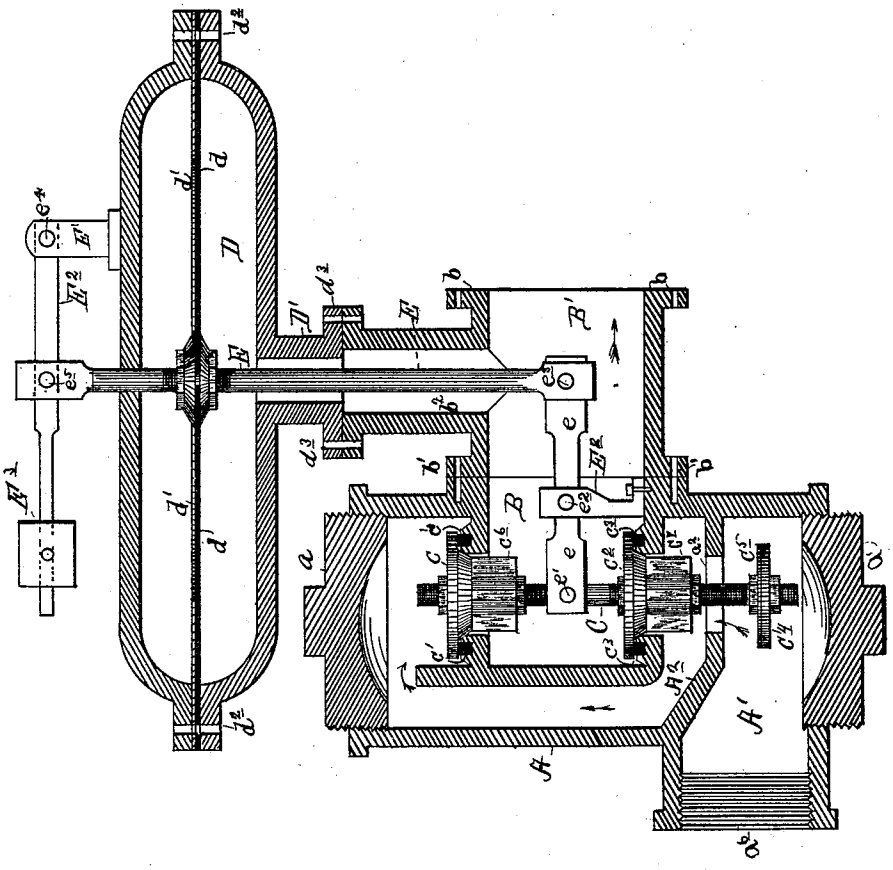
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Fig. 2.



Witnesses:
Geo. H. Harvey
Geo. F. Dickson

Inventor.
Charles A. Dally
Harry K. Richardson
by J. H. Stevenson
Atty.

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

CHARLES A. DALLY AND HARRY K. RICHARDSON, OF PITTSBURG, PENNSYLVANIA.

AUTOMATIC CUT-OFF AND GAS-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 405,830, dated June 25, 1889.

Application filed October 8, 1888. Serial No. 287,577. (No model.)

To all whom it may concern:

Be it known that we, CHARLES A. DALLY and HARRY K. RICHARDSON, of Pittsburg, Pennsylvania, have invented a new and useful Improvement in Automatic Cut-Offs and Gas-Regulators, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

Similar letters of reference indicate corresponding parts.

Our invention relates to improvements in an automatic gas cut-off and regulator, which we will fully describe hereinafter.

In the drawings accompanying this specification, Figure 1 is a side view of one of our valves or regulators, and Fig. 2 is a sectional view of the same.

A is the principal chamber of our gas-regulator, which we call the "high-pressure" chamber. This chamber is separated from the inlet-chamber A′ by a wall A^2, in which is an opening a^2. Through this opening a^2 the gas passes into the chamber A.

a is a plug at the top of the chamber A, and a' is a plug at the bottom of the chamber A′. These plugs are screwed into their several places.

Inside the chamber A is an inner chamber B, in the walls of which are two valve-seats—one at the top and one at the bottom—in which are placed the valves c and c^2, respectively. These valves are fixed to the shaft C, as will be seen in Fig. 2. c' c' and c^3 c^3 are gum packings to insure tightness of the valve-seat. These valves c and c^2 are seated from above, and are operated at one and the same time either in opening or closing of the same. They (valves c and c^2) by their operation constitute chamber B a low-pressure chamber, the high pressure being from within chamber A. The chamber B is extended by the addition of the chamber B′, and the two are held together by a flange attachment b' b', and to the port B′ the service-pipes are attached, preferably by flange b b.

c^4 is a valve at the lower end of the shaft C.

c^5 is a gum disk fixed to the valve c^4.

D is a diaphragm-chamber secured to the chamber B′ by means of the flanged tube D′, the flange of the same d^3 being secured to the tube E at its upper end, as seen in Fig. 2 at d^3. This diaphragm-chamber D is in two sections, which are fastened together by bolts, as seen at d^3, Fig. 2. Between these two sections of the chamber D we place a flexible diaphragm d d, and on the upper side thereof we fasten the metallic disk d' for a well-known purpose.

E is the operating valve-rod, and at its upper end is secured to the lever E^2 by a bolt at e^5. This rod E extends from above the chamber D to within the chamber B′, and is rigidly fixed to the diaphragm d. At the lower end of the rod E an attachment is made to the lever e by bolt e^3.

E′ is a fulcrum, and E^3 a weight.

E^2 is a fulcrum for the lever e, and is fixed thereto by the bolt e^3, while e' secures the lever e to the shaft C.

F represents a weighted safety-valve to the escape-pipe f f'. F′ is another escape-pipe secured to the hood F^2 at the top thereof. These two escape-pipes unite near the top of the hood F^2, as seen in Fig. 1. In case any gas should escape within the chamber formed by the hood F^2, it may pass harmlessly off through the escape-pipe F′, and in case of an over gas-pressure in the chambers B′ and E gas may be conveyed off through pipes f f' to the pipe F′, and from thence into open air.

By reference to Fig. 2 it will be readily seen that by our system of valves and their operating mechanism a sure cut-off will be automatically secured when the gas-pressure falls below the minimum in the chamber D. This is effected by a lowering of the diaphragm d, thus carrying down the lever e at one end and raising it at the other end, where it is secured to the shaft C. This movement carries up the valve c^4 so as to shut tight the opening a^2, thus preventing any further flow of gas into the chamber above, and the gas-pressure against the valve c^4 will hold it up, or it will be held up by means of the weight on the lever e. When the weight E^3 on the lever E^2 is properly adjusted so as to produce the desired effect in relation to the gas-pressure, there will be a complete regulation of

gas-pressure thereafter. This will be apparent to those who understand this branch of mechanics on a close inspection of Fig. 2. By using the two valves c and c^2 the high pressure downward on the upper one c and upward on the other one c^2 it will be seen that an equal pressure either way will be maintained no matter how high the pressure may be of the gas through the opening a^2. This is one of the main features of our invention to which special attention is called. By removing the plugs a' and a access can be had to regulate or repair the valves c, c^2, and c^5, and for any other necessary purpose. As the ports c^6 and c^7 are wing-shaped, the gas will readily pass the same from the chambers A′ and A into the chamber B.

After there has been a complete cut off of gas by closing valve c^4 and it is desired to again start the flow of the same into chamber A, some difficulty may at times be experienced by reason of a very high pressure on valve c^4, so that some considerable difficulty may be experienced in opening the latter-named valve. We obviate this difficulty by means of conveying a flow of the gas out of the chamber A′ and into chamber A by means of the pipe F^3, regulated by the cock f^2. In this way a balance-pressure will be effected, as the valves c and c^2 will be open through to chambers B B and D to the diaphragm d.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

In an automatic pressure-regulator and cut-off, the combination of the isolated high and low pressure chambers, a vertically-movable valve-stem operating in the low-pressure chamber and having the valves c c^2, adapted to open and close the ports between said chambers, an outlet-chamber communicating with the low-pressure chamber, a diaphragm-chamber communicating with the exit-chamber, a diaphragm, connections intermediate of the valve-rod and diaphragm, a hood F^2, fixed to the diaphragm-chamber, an escape-pipe F′, leading from said hood, and a pipe f, communicating with the outlet-chamber and the escape-pipe and having an automatic valve F, substantially as described.

In testimony that we claim the foregoing as our invention we hereto set our hands in the presence of two witnesses.

CHAS. A. DALLY.
HARRY K. RICHARDSON.

Witnesses:
JOHN H. CRATTY,
ARTHUR L. BRYANT.