

UNITED STATES PATENT OFFICE.

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CUT-OFF DEVICE FOR GAS.

SPECIFICATION forming part of Letters Patent No. 395,560, dated January 1, 1889.

Application filed May 7, 1888. Serial No. 273,075. (No model.)

To all whom it may concern:

Be it known that I, LOUIS B. FULTON, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Cut-Off Devices for Gas; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in cut-off devices for gas.

The object is to provide a cut-off valve which will invariably close the moment the pressure in the distributing-pipes is removed, and which will remain closed, no matter what the subsequent pressure in the pipes may be, until it is intentionally opened.

A further object is to provide a cut-off mechanism which shall be very simple, effective, and durable, and capable of being managed by the most unskilled person.

With these ends in view my invention consists in certain features of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view of the cut-off mechanism in vertical central section, showing the cut-off valve in side elevation and partly broken away to show its seat, the valve being in full open adjustment; and Fig. 2 is a partial view of the same, showing the valve closed.

A represents the valve-chamber. In the present instance it is shown in globular form, and is provided with a partition, *a*, to which the valve-seat is secured. A gas-supply pipe, B, leading from a suitable supply (not shown) communicates with the valve-chamber on one side of the partition *a*, which is commonly termed the "high-pressure" side, and a pipe, C, leading to the burner (not shown) communicates with the valve-chamber on the other side of the partition *a*, commonly termed the "low-pressure" side. The valve-chamber is provided with a plug or cap, *a'*, at its bottom for gaining access to the valve-seat and for removing sediment from the chamber.

The lower half-section, *d*, of a flat oval diaphragm-chamber, D, is conveniently provided with a screw-threaded neck, *d*², which regis-

ters with a screw-threaded neck or boss, *a*², at the top of the valve-chamber, whereby free communication between the valve-chamber and diaphragm-chamber is established and a gas-tight joint between the valve and diaphragm-chamber secured.

An elastic diaphragm, E, is stretched across the diaphragm-chamber and conveniently secured in place by compressing its edge between the flanges of the upper and lower sections, *d'* and *d*, of the diaphragm-chamber, where they are secured together, as is usual. The diaphragm E completely cuts off the lower portion of the diaphragm-chamber from the upper portion. A thin plate, F, of metal or other suitable material, rests centrally on the diaphragm and has a diameter about one-half that of the diaphragm, more or less.

A connecting-rod, G, leading from the valve to the diaphragm, is provided below the diaphragm with a collar, *g*, either formed integral with the rod or fixed thereto, which is adapted to engage the under side of the diaphragm, and the said rod terminates in a screw-threaded stud, *g'*, which projects through the diaphragm and plate F.

A knob or handle, H, is provided at its base with a screw-threaded socket, *h*, adapted to receive the stud *g'*, and serves when screwed down on the stud to bind the diaphragm snugly between the plate F and collar *g*.

The upper half-section, *d'*, of the diaphragm-chamber is provided with a removable cap, I, preferably screw-threaded, as shown, to register with a screw-threaded opening in the section *d'*, by means of which ready access is obtained to the knob or handle H, for the purpose which will hereinafter appear.

The valve-seat and valve consist, essentially, of an inner and outer shell having the form of frustums of cones, the taper being very slight.

The valve-seat K is conveniently provided with a screw-threaded tap, *k*, by means of which it is screwed into a corresponding threaded opening in the partition *a*. Its top *k'* is completely closed and its side walls are provided with an annular series of openings, *k*², which extend outwardly through the walls proper.

In practice the valve-seat is conveniently

cast with longitudinal ribs k^3 on its interior and with its side walls imperforate, and the series of openings k^3 are then cut out by cutting a continuous groove around the seat the thickness of the wall, which will leave free openings to the interior excepting where the ribs are located.

The valve L is constructed to shut down over the seat K, and its interior face and the exterior face of the valve-seat are so nicely fitted that a perfectly gas-tight closure will be effected when the two surfaces are brought together.

The side wall of the valve L is imperforate, but its top l is provided with openings l' , to prevent the valve from cushioning on its seat when closing, and also to allow the gas which may pass up between the valve and its seat to escape freely.

Because of the slight taper of the valve and its seat there will be no friction to hinder its movement after it has begun to open; but the taper is so slight that no matter how great the gas-pressure may be within the seat it will have no appreciable effect in lifting the valve from its seat when the valve is once closed. Thus the valve possesses the advantages of the piston-valve in its sliding movement, gradually opening the passage for the gas, and yet is free from frictional resistance the moment it is unseated.

The top of the valve is provided with a hub or boss, l^2 , having a threaded socket, l^3 , formed therein, in which the lower end of the connecting-rod G is adapted to be screwed. The screw-threads on the rod G and socket l^3 are intended to be eased a little, so as to allow the valve to center without cramping in case the rod G should not be set up in perfect alignment with the axis of the valve, and a pin, l^4 , is inserted through the wall of the socket to prevent the valve from unscrewing.

The operation is as follows: When the gas in the pipes is under normal pressure, the valve L will be held open by the upward pressure of the gas beneath the diaphragm; but as soon as the pressure is removed, either by the bursting of the diaphragm or by the gas being cut off for repair, or from any other cause whatsoever, the diaphragm will no longer hold the valve suspended, but it will drop onto its seat and effect a complete closure. Furthermore, because of the slight taper of the valve, as hereinbefore set forth, and further because of the location of the diaphragm in communication only with the low-pressure side of the valve-chamber, the valve will not open until it is intentionally lifted from its seat. This is easily and conveniently accomplished by removing the cap I and lifting up on the knob or handle H, when, if the pressure be

on again and the diaphragm intact, the flow of gas will be resumed and the valve held open. This forms a very simple and reliable cut-off, requiring no skill whatever to manage it, and well adapted to general use wherever a cut-off is needed.

In a pending application entitled "pressure-regulators," filed May 3, 1888, Serial No. 272,679, I have shown and claimed in connection with other parts a valve having the same general form as that herein described, but differing therefrom in that it has openings in its side wall corresponding to the openings in the valve-seat.

It is evident that slight changes might be resorted to in the form and arrangement of the several parts without departing from the spirit and scope of my invention; hence I do not wish to limit myself strictly to the construction herein set forth; but,

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

1. The combination, with a hollow valve-seat slightly tapered from its base toward its top and provided with an opening through its side wall, of a tapered valve fitted to shut down over the valve-seat, and means in connection with the gas-pressure for holding the valve normally raised from its seat, whereby the valve is relieved of frictional resistance when raised, but is not subject to any considerable lift from the high-pressure side when seated, substantially as set forth.

2. The combination, with a hollow valve-seat slightly tapered from its base toward its top and provided with an opening through its side wall, of a valve fitted to shut down over the valve-seat, a diaphragm under gas-pressure from beneath it, and a connection between the valve and the diaphragm, whereby the valve is held normally suspended and relieved of frictional resistance, but is not subject to any considerable lift from the high-pressure side when seated, substantially as set forth.

3. The combination, with the slightly-tapered valve-seat provided with an annular series of openings in its side wall, of the valve fitted to shut tightly over the valve-seat and having openings in its top, a diaphragm under pressure, and a connection between the diaphragm and valve, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

LOUIS B. FULTON.

Witnesses:

M. F. CASSIDY,
S. F. KANE.