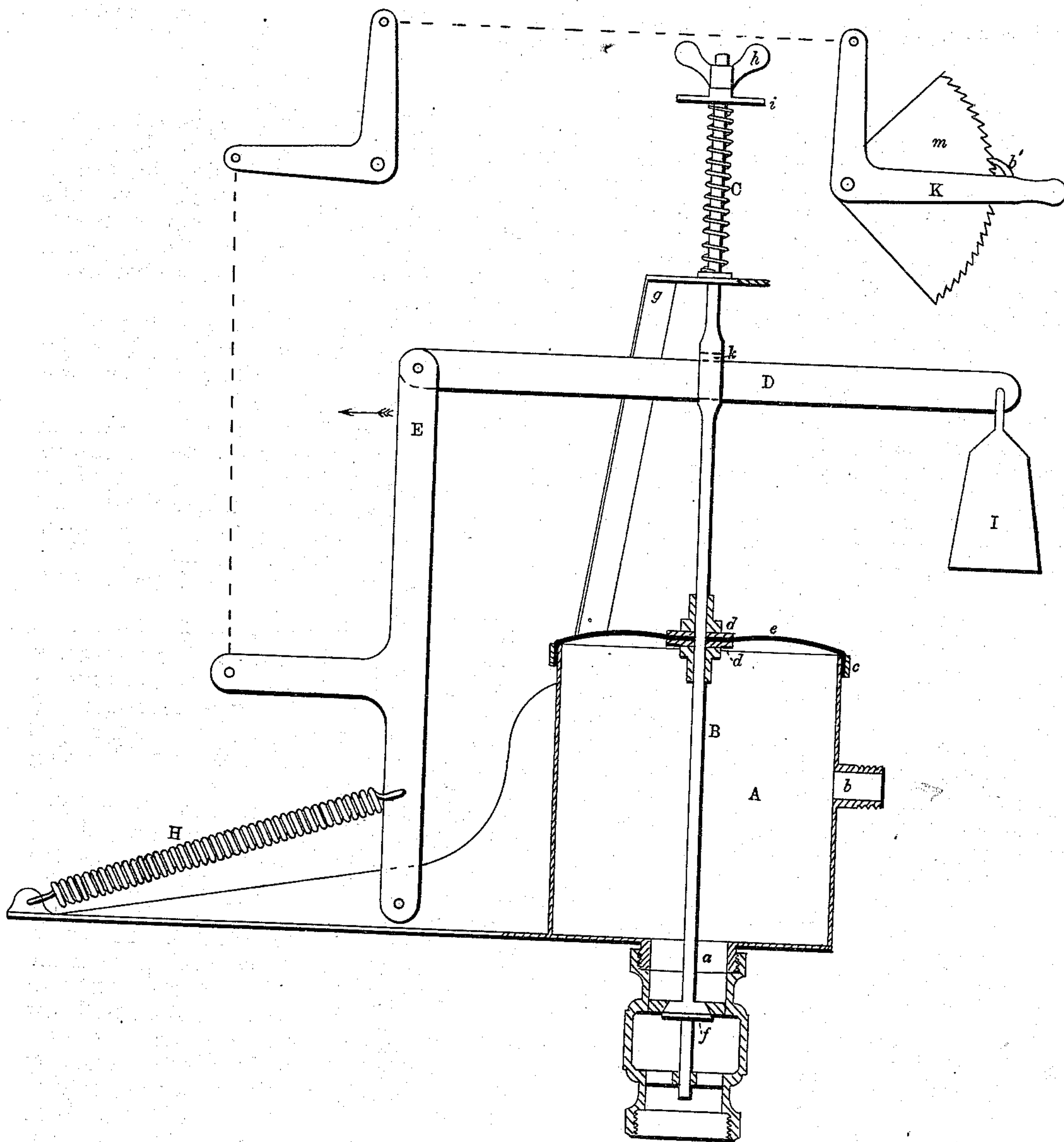


**S. I. CHAPMAN.**  
**Pressure Regulators and Shut Offs for Gases and Fluids.**  
 No. 157,676.      Patented Dec. 15, 1874.



WITNESSES -

*Edwin Howard.*  
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# UNITED STATES PATENT OFFICE

SAMUEL I. CHAPMAN, OF BALTIMORE, MARYLAND.

## IMPROVEMENT IN PRESSURE-REGULATORS AND SHUT-OFFS FOR GASES AND FLUIDS.

Specification forming part of Letters Patent No. **157,676**, dated December 15, 1874; application filed May 20, 1874.

*To all whom it may concern:*

Be it known that I, SAMUEL I. CHAPMAN, of the city of Baltimore and State of Maryland, have invented certain new and useful Improvements in Pressure-Regulators and Shut-Offs for Gases and Fluids, of which the following is a specification; and I do hereby declare that in the same is contained a full, clear, and exact description of my said invention, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

My invention relates to means hereinafter described by which fluids or gases flowing into a reservoir at a certain pressure can be maintained therein and drawn therefrom at any tension below the initial pressure, and sustained uniformly at the reduced tension, without reference to the amount or pressure of gas or fluid withdrawn or supplied; and, further, to certain mechanical devices, hereinafter described, designed to allow the said reduced pressure to be varied—that is, uniformly increased or diminished—without affecting the regularity of its flow, the compensating mechanism operating to prevent fluctuation of pressure in the eduction-pipe or the reservoir as well after as before the regular increase or decrease in tension of the fluids or gases supplied or withdrawn.

In the description of my invention which follows, due reference must be had to the accompanying drawing forming a part of this specification, and which is a view of my improved regulator and shut-off, partly in section.

A is a reservoir, provided with induction and eduction pipes, represented, respectively, by *a* and *b*. The top of the reservoir is formed of a flexible diaphragm, *e*, of some material impervious to the gases or fluids used, and fastened to the reservoir by means of the hoop *c*, or other suitable device. B is a valve-stem, passing through the diaphragm, to which it is fastened by means of the disks *d*. The lower end of the stem is connected to a valve, *f*, which opens downward in the induction-pipe *a*. The upper end of this valve-stem passes through a guide, *g*, and is provided with the spring C and adjusting and lock nuts *h* and *i*, the tendency of which spring is

to counteract the weight upon the valve *f* and close it. The valve-stem has a slot, represented by *k*, through which slot the lever D traverses. E is a support, which serves as a fulcrum for the lever D. The support is connected, by means of wires and bell-cranks, to any point at which it may be desirable to control or shut off the supply.

In the description of the operation of my invention which follows, parts thereof not yet alluded to will be described, and their uses set forth.

Supposing the induction-pipe *a* beneath the valve *f* to be subjected to a certain pressure, and it is desired to have a uniform flow from the reservoir at a reduced pressure, the fulcrum of D is moved in the direction of the arrow by means of the handle K, which is held at the required point by means of the pawl *l'* and toothed quadrant *m*.

It will be observed that, as the fulcrum is moved in the direction indicated, the pressure occasioned by the weight I upon the valve is reduced by reason of the altered leverage, and the valve is partially closed by the spring C and the pressure of the gas or fluid acting upon the diaphragm.

The flow through the eduction-pipe *b* is rendered automatically uniform at the reduced pressure in the following manner: A sudden interruption in the eduction-pipe *b*, caused by the partial closing of the discharge, operates to increase the pressure within the reservoir, which increased pressure, operating under the diaphragm, slightly closes the valve until an equilibrium is established. An increased flow through the eduction-pipe operates in exactly a reverse manner, the valve being opened by means of the weight I, the pressure beneath the diaphragm failing to sustain it. The force exerted by the spring C may be so regulated, by means of the nuts *h* and *i*, as to give the valve *f* no appreciable weight. Any pressure in the eduction-pipe less than the initial pressure can be obtained through the medium of the handle K and its accompanying devices, and, when once fixed, automatically retained thereat independently of the draft upon the reservoir or the pressure of the supply. By moving the lever D in the direction of the arrow, the extreme distance, or until the weight I



comes nearly in contact with the valve-stem, the pressure upon the valve is overbalanced by the spring C, and the valve is entirely closed, thus shutting off all connection between the reservoir and the source of supply.

I am aware that a reservoir having a diaphragm connected with a valve and operated by a weighted lever to control and regulate the pressure of gas has heretofore been used; and therefore I do not claim, broadly, a diaphragm connected with a valve and operated by a lever adapted to exert a varying pressure; but

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

1. The combination of the reservoir A, having the diaphragm *e* and induction and education pipes, as specified, with the stem and valve B *f*, weighted lever D, and connecting-support E, the support E having a fixed fulcrum in the reservoir-stand, and the lever D a variable fulcrum in E, and sliding through said vertical stem B, substantially as set forth.

2. The spring C, capable of being made to exert a required pressure upon the valve *f*, in combination with said valve *f*, its stem B and weighted lever D having a variable fulcrum in E, relatively arranged and operating with the reservoir A and its diaphragm-cover *e*, substantially as and for the purposes specified.

3. The bell-cranks and lever K with their connecting-wires, as shown, in combination with the support E, spring H, weighted sliding lever D, stem and valve B *f*, support *g*, and spring C, all relatively arranged and operating with the reservoir and its diaphragm-cover, substantially as and for the purposes specified.

In testimony whereof I have hereunto subscribed my name this 2d day of May, in the year of our Lord 1874.

SAMUEL I. CHAPMAN.

Witnesses:

THOMAS W. DEMPSTER,  
PHILIP JORDAN.