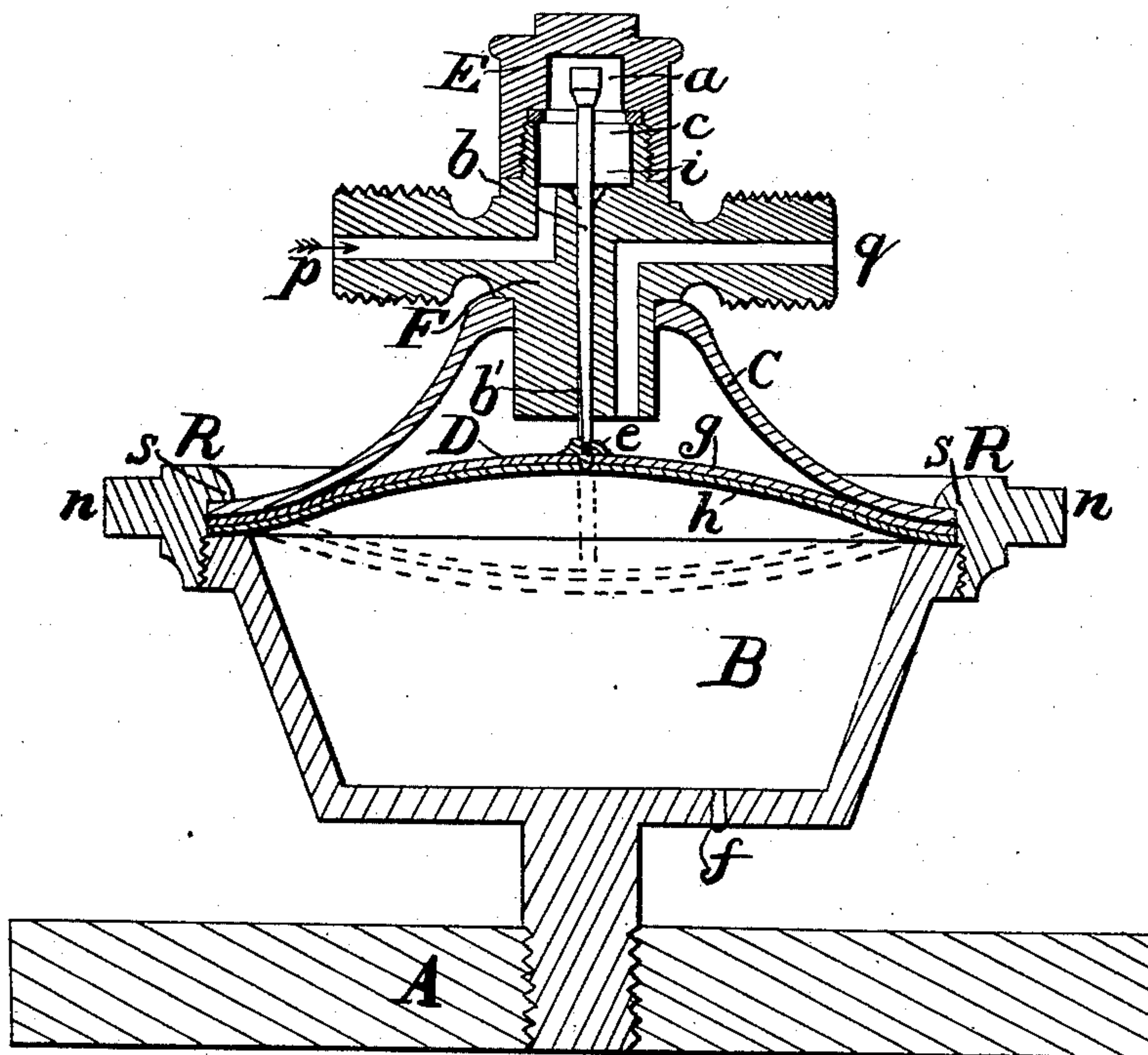


No. 32,670.

PATENTED JUNE 25, 1861.

G. H. SMITH.
PORTABLE GAS REGULATOR.



H. M. Kinross
C. M. Smith } Witnesses.

George Hand Smith

UNITED STATES PATENT OFFICE

GEO. H. SMITH, OF ROCHESTER, NEW YORK, ASSIGNOR TO SILAS O. SMITH, OF ROCHESTER, NEW YORK.

GAS-REGULATOR.

Specification of Letters Patent No. 32,670, dated June 25, 1861.

To all whom it may concern:

Be it known that I, GEORGE HAND SMITH, of Rochester, in the county of Monroe and State of New York, have invented a new and useful Portable Gas-Regulator; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, making a part of the same.

The drawing is a vertical central section showing the internal arrangement of the several parts.

The nature of this invention consists in the employment, in portable gas regulators, of a long cylindrical valve, operating in a barrel the bore of which is of a corresponding shape and size therewith, and in which the said valve is moved longitudinally by means of the back pressure of the gas upon a flexible diaphragm to which the valve is attached, and which constitutes the covering of an overcharged cushion of confined air; and also in attaching the valve to the upper or secondary leaf of a double diaphragm, or to a ring or plate of rubber attached to the single diaphragm, so as to avoid the danger of leakage, by perforation of the diaphragm proper, whether used single or double; and its object is to overcome the great difficulty that has been experienced in obtaining a gas regulator that would effect the uniform and continuous discharge of small quantities of gas from highly charged vessels of the same where the flow is very small, and the variation of pressure very great, (as in contradistinction from the great variety of gas regulators for local purposes where the amount of flow is very great and the variation of pressure very slight, as for street gas, &c.) and to provide a portable gas regulator, that shall be capable of standing severe jars, as on a locomotive; and that shall be delicate in action, and durable in construction.

B, is the air chamber.

C, is the cap which covers the flexible diaphragm D, which is composed of two leaves *g*, and *h*, of rubber. The lower, or primary one *h*, is hermetically sealed to the edge of the shell of the air chamber B, by heated shellac, or otherwise. The ring R, is screwed to the chamber B, the flange *s*, firmly clasping the edge of the cap C. The valve barrel F, may be cast with the cap C, or if made separate the joint between them

may be soldered, or otherwise rendered air tight. The top of the valve barrel F, is chambered out, and covered with the screw cap E, the joint being packed with the leather ring *c*. The valve *b*, is made of brass wire, which shall exactly fit the bore through the barrel F, the said bore being slightly enlarged at the top forming a beveled seat *i*, for the head *a*, of the valve to close upon, (when the diaphragm D, is pressed entirely down, as shown by the dotted lines.) The length and diameter of the operating or straight portion of the said wire or cylindrical valve, is made proportionate to the amount of frictional surface required to offer sufficient resistance, to the passage of gas at high pressures. The wire is then placed in the barrel with the upper end projecting into the said enlargement, and type metal is cast around it, thus forming the beveled head *a*, on the valve *b*, which exactly fits the said seat *i*.

The valve *b*, at its lower end, may be filed off on one side so as to leave a wedge shaped, or oblong space *b'*, between the valve and the inner surface of the barrel, the enlarged end of the said space *b'*, being next to the hub *e*, so as to open into the space between the diaphragm D, and cap C, and its point of intersection terminating just below the beveled seat *i*, when the valve is clear up, as shown in the drawing. The lower end of the valve *b*, is "tapped" into the hub *e*, which is rigidly fixed to the leaf *g*, thereby rendering it unnecessary to perforate the under, or primary leaf *h*, or, if desired, there may be a flat rubber ring made on the leaf *h*, to attach the hub *e*, to, and use but one leaf for the diaphragm.

The chamber B, is charged by exhausting the air from between the diaphragm D, and the cap C, admitting air through the aperture *f*, which is "plugged," and sealed over, when the said chamber B, is sufficiently inflated to hold the valve *b*, up as seen in the drawing, thus producing the condensation of air in said chamber B.

The gas enters from the supply gas holder at the inlet *p*, and passing in the direction indicated by the arrows, it escapes at the outlet, *q*, where the gage cock is attached, without operating the valve, when the gage cock is open, but should it be turned off, partially, or, should the flow of gas through the outlet pipe, be rendered less, by a burner

with minute jets, or otherwise, than the flow or amount of gas entering the regulator by the inlet pipe *p*, a reaction or back pressure will be produced upon the diaphragm *D*,
5 pressing it downward, drawing the attached valve *b*, down with it, thereby diminishing the open space *b'*, and increasing the frictional surface for the passage of the gas, between the cylindrical portion of the valve,
10 and the inner surface of the barrel, thus cutting off the flow of gas, at the inlet, proportionate to the escape of gas at the outlet, thus rendering the inlet, by means of the gage cock at the outlet, adjustable. A further
15 action of the back pressure is to depress the valve sufficiently far, at first, that with the gradual decrease of pressure in the gas holder, the open space *b'*, may be proportionately increased, and the frictional surface
20 between the valve and barrel decreased, thereby rendering the amount of escaping gas always constant,—until the pressure in the holder shall equal the back pressure in the regulator, which latter is comparatively
25 slight. Should the pressure upon the dia-

phragm become too great for its strength at any time, it would be forced down, as shown by the dotted lines, and the head *a*, of the valve would be drawn into its seat *i*, entirely cutting off the flow of gas, thus relieving the pressure. 30

What I claim as my invention, and desire to secure by Letters Patent is—

1. The employment, in portable gas regulators, of a long cylindrical valve operating
35 as described, and moved longitudinally, by means of the back pressure of the gas upon an overcharged cushion of confined air, (to the covering of which the valve is connected). 40

2. Attaching the valve to one leaf of a double diaphragm, or, to a ring of rubber attached to the single diaphragm, substantially as, and for the purposes herein set forth.

GEORGE HAND SMITH.

Witnesses:

H. W. DICKINSON,
ED. M. SMITH.