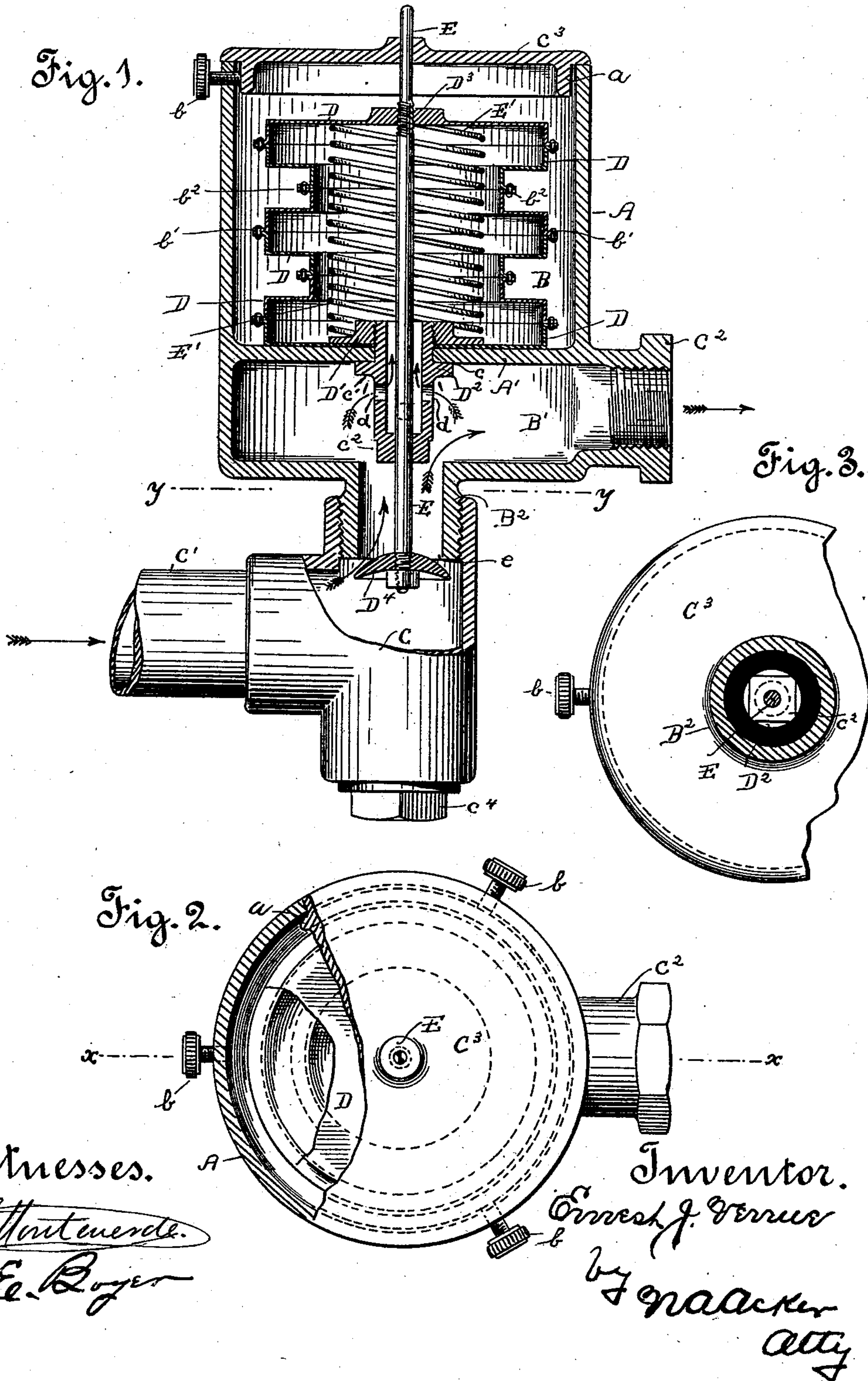


(No Model.)

E. J. VERRUE.  
GAS REGULATOR.

No. 540,603.

Patented June 4, 1895.



Witnesses.

*H. H. Houtenende.*  
*W. E. Boyer*

Inventor.

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att'y



# UNITED STATES PATENT OFFICE.

ERNEST J. VERRUE, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF TWO-THIRDS TO J. D. RICHARDS AND J. V. SHANK, OF SAME PLACE.

## GAS-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 540,603, dated June 4, 1895.

Application filed August 25, 1894. Serial No. 521,329. (No model.)

*To all whom it may concern:*

Be it known that I, ERNEST J. VERRUE, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Gas-Regulators; and I do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

The present invention relates to a new and useful improvement in gas regulators, which consists in the arrangement of parts and details of construction as will be hereinafter more fully set forth in the drawings, described and pointed out in the specification.

My invention has for its object to provide an extremely sensitive regulator for gas, the valve mechanism of which will be operated, in order to seat the inlet valve and check the inflow of gas, by the slightest back pressure of the gas or momentarily with the closing or turning off of the gas burner cock—hence reducing the power necessary to raise or seat the valve of the inlet opening to a minimum.

In order to more thoroughly understand my invention, reference must be had to the accompanying sheet of drawings, wherein—

Figure 1 is a vertical sectional side elevation of the gas-regulator. Fig. 2 is a top plan view of the regulator, the top plate or cover being shown partly broken away; and Fig. 3 is a bottom plan view taken on line *y y*, Fig. 1.

In the drawings the letter A indicates the outer casing of the regulator, which is divided by a partition A' into an upper and lower chamber B, B'. The lower chamber constitutes the gas receiving chamber and terminates in a screw threaded extension B<sup>2</sup>, to which is secured the elbow C, to which elbow or joint the gas inlet pipe C' is connected. From this chamber B' laterally projects the screw threaded extension C<sup>2</sup>, to which is connected the house supply pipe. Not shown. In the present case I have shown the screw threaded extension B<sup>2</sup>, C<sup>2</sup>, as being made or cast integral with the outer casing A, although it is obvious that the same may be made independent thereof.

The outer casing is provided with a remov-

able cover or top C<sup>3</sup>, which is provided with an annular depending flange *a* which fits within the wall of the said casing, as shown in Fig. 1, and the cover or top is held in place by means of the set screws *b*, which pass through the wall of the outer casing and engage the depending flange of the cover or top. By means of these set screws the cover or top is held firmly in place and prevented from vibrating by the action of the flexible bellows fitted within the upper chamber of the casing, as hereinafter described.

Within the upper chamber B, I locate what I term the inflatable or expansionable gas bellows, which is composed of a series of thin metallic disks D, the flanges *b*<sup>2</sup>, *b*' of each disk being secured to the flanges of the next disk. When thus united the disks form a flexible bellows, which is expanded or contracted as the pressure of the gas therein is increased or decreased. To the upper face of the lower disk is secured the screw threaded collar D'. See Fig. 1. Within this collar fits the screw threaded end of the hollow shell D<sup>2</sup>, which is held retained within the chamber B', the upper end passing through the central opening *c* cut within the partition A'. This sleeve is provided with an annular collar or shoulder *c*' which abuts against the under face of the diaphragm, when the sleeve is secured in position shown in Fig. 1. The lower end of the hollow sleeve terminates in a square head *c*<sup>2</sup>, by means of which the end of the shell may be engaged by a tool in order to screw the upper end into the screw threaded collar D'. This shell is fitted within the chamber B' by being inserted through the elbow C, the plug *c*<sup>4</sup> being removed for this purpose. Through the hollow shell D<sup>2</sup> I cut a series of openings *d*, which admit the gas into the flexible metallic bellows, as shown by arrows 1.

Through the hollow shell and bellows extends the valve stem E, the upper portion of which is partially screw threaded so as to engage the threads of the collar D<sup>3</sup> secured to the face of the upper disk of the bellows, the end thereof extending through the top plate or cover C<sup>3</sup>. The lower end of the valve stem extends below the screw threaded end of the outer casing and has secured thereon the



valve D<sup>4</sup>. The valve stem being secured to the collar D<sup>3</sup> is raised or lowered with the movement of the flexible bellows.

In order to impart extreme sensibility to the gas regulator I place within the flexible bellows the spiral spring E', which surrounds the valve stem and bears against the under face of the upper disk of the bellows and against the collar D' secured to the lower disk of the bellows, the resiliency of the spring serving to compensate for the weight of the disks, thus making the bellows, so to speak, counterpoised, whereby the same may be raised or lowered by the slightest increase or decrease in the pressure of the gas. With the movement of the bellows the valve D<sup>4</sup>, through the medium of the valve stem, is raised or lowered in order to close or open the gas inlet so as to regulate the inflow of the gas into the chamber B'. When the bellows has been expanded its full distance the valve D<sup>4</sup> will completely close the opening e, thus shutting off the inflow of gas. As the gas cock, not shown, is opened in order to cause a flow of gas from within the chamber B' to the house supply pipe, the pressure upon the bellows is released, when the resilience of the spring E' will cause the bellows to descend so as to open the valve or unseat the same. The valve stem passing through the top plate or cover C<sup>3</sup> and hollow shell D<sup>2</sup>, is held rigid in place, that is prevented from lateral movement. Consequently the flexible bellows is maintained steady. By means of the spring secured within the bellows the weight thereof is so evenly balanced that it acts in the same manner as a float would, that is to say, it will be affected by the slightest variation in the

pressure of the gas. As the gas is turned off within the house the back pressure forces the gas through the perforations within the hollow shell into the flexible bellows and raises the same upward, which bellows carrying the valve stem therewith causes the valve to seat itself and close the gas inlet to the gas chamber.

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

The gas-regulator herein described, comprising an outer casing provided with a cover and formed with a partition dividing it into a lower gas-chamber and an upper regulator-chamber, and formed with a projecting inlet-pipe, constituting a valve-seat at its lower end, and an exit-pipe, a hollow-shell projected vertically through, and secured in, the partition between the chambers and having a closed lower end and gas-ports in its sides, an expansible gas-bellows in the upper chamber composed of a series of thin metallic disks provided with flanges at their meeting points, fastenings through the flanges, an expansible spiral spring arranged within the bellows, a valve-rod secured in the top disk of the bellows and projected through the chamber, the gas-bellows and the hollow-shell, and a valve on the lower end of the valve-rod to close and open the gas-ingress to the regulator, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

ERNEST J. VERRUE.

Witnesses:

N. A. ACKER,  
LEE D. CRAIG.