

H. GIROUD.  
Gas-Regulators.

No. 157,280.

Patented Dec. 1, 1874.

Fig. 2.

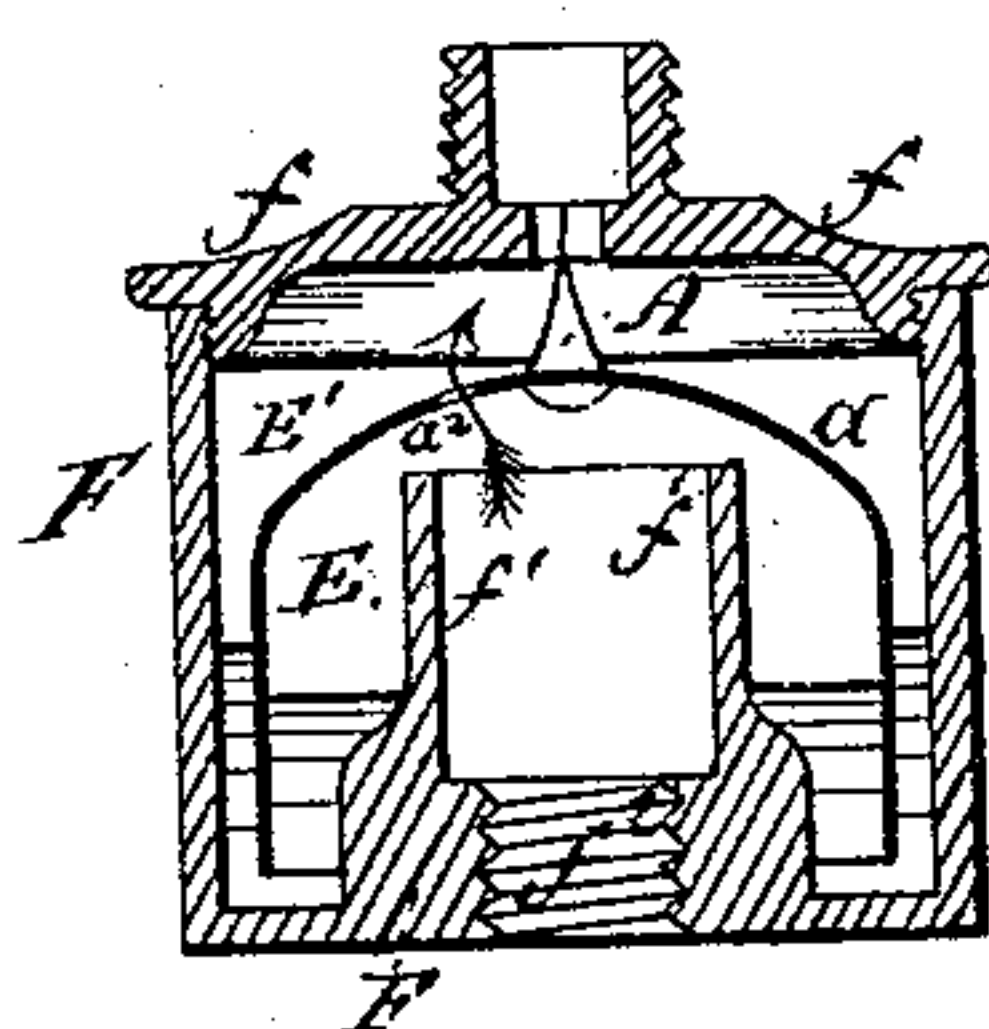


Fig. 3.

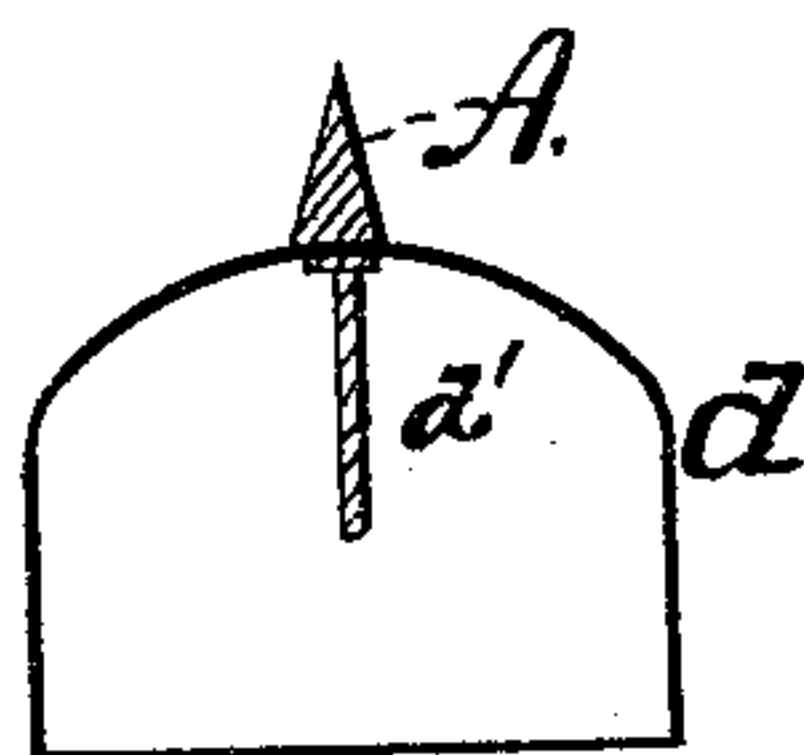


Fig. 1.

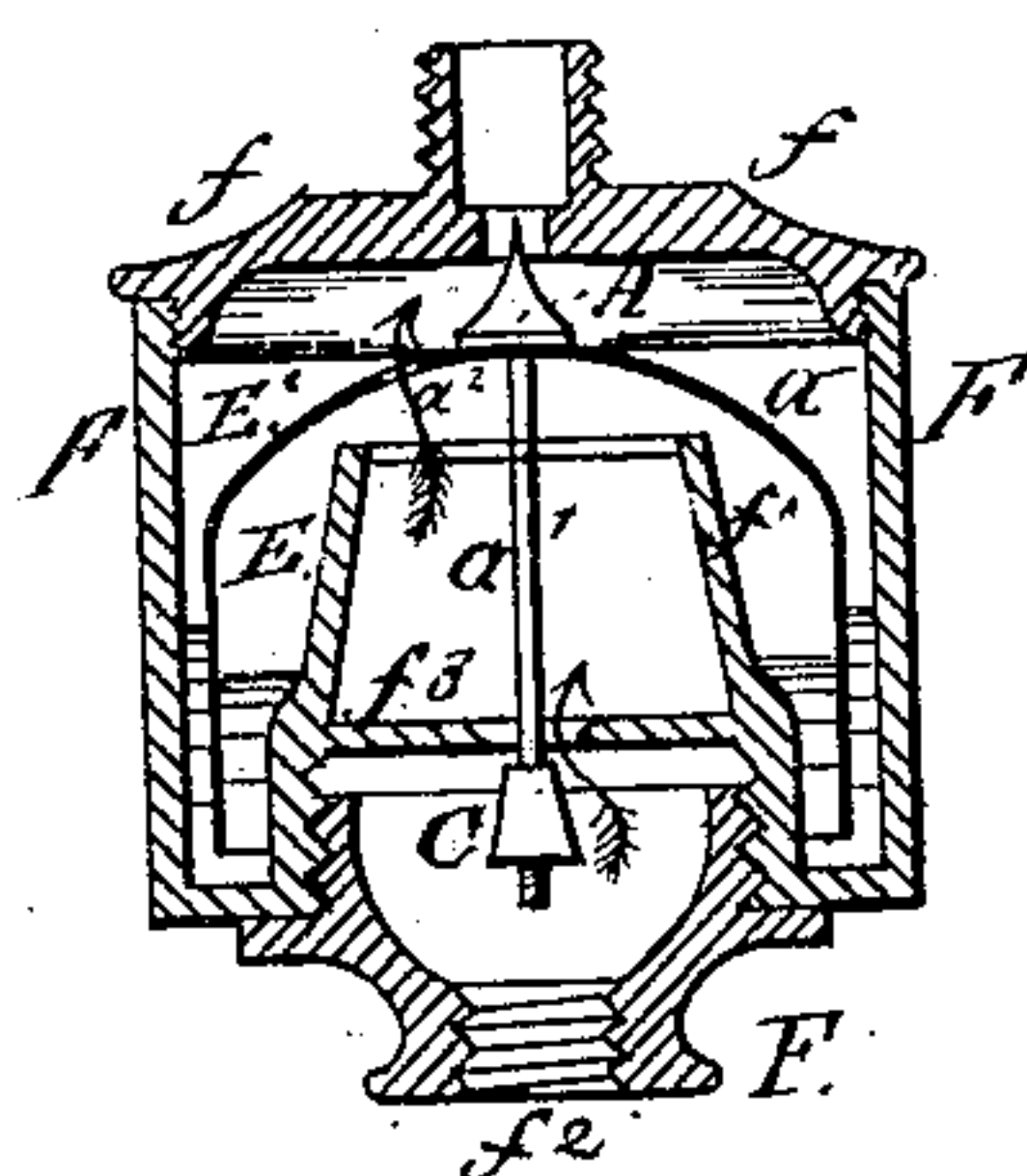
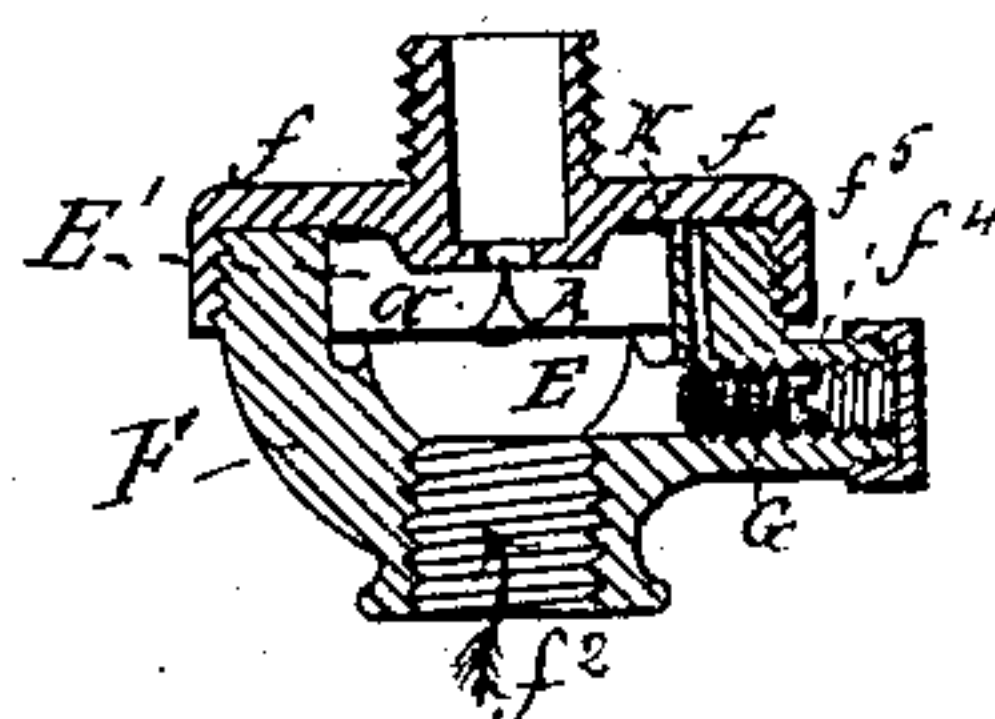


Fig. 4.



Witnesses

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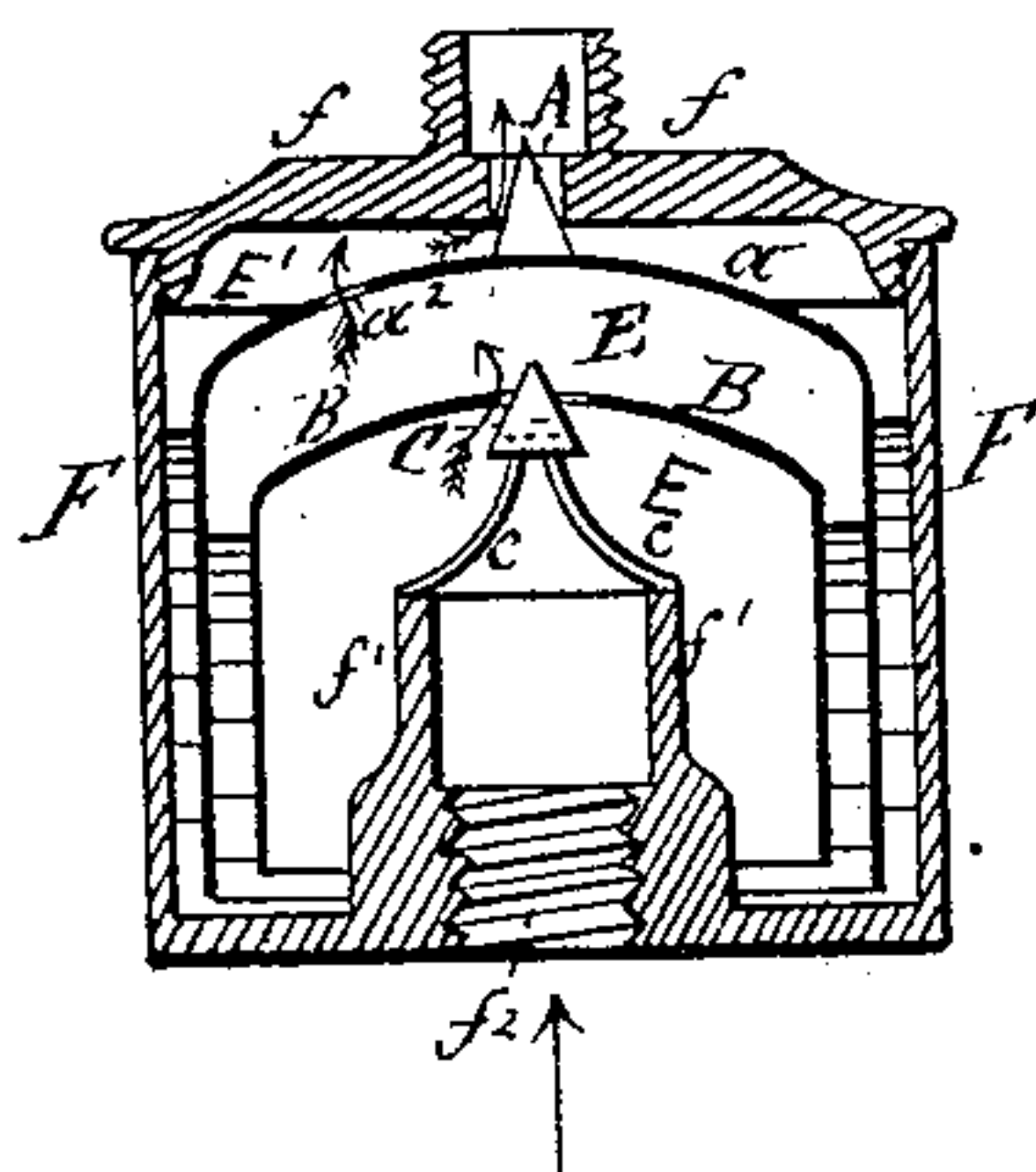


Fig. 3.

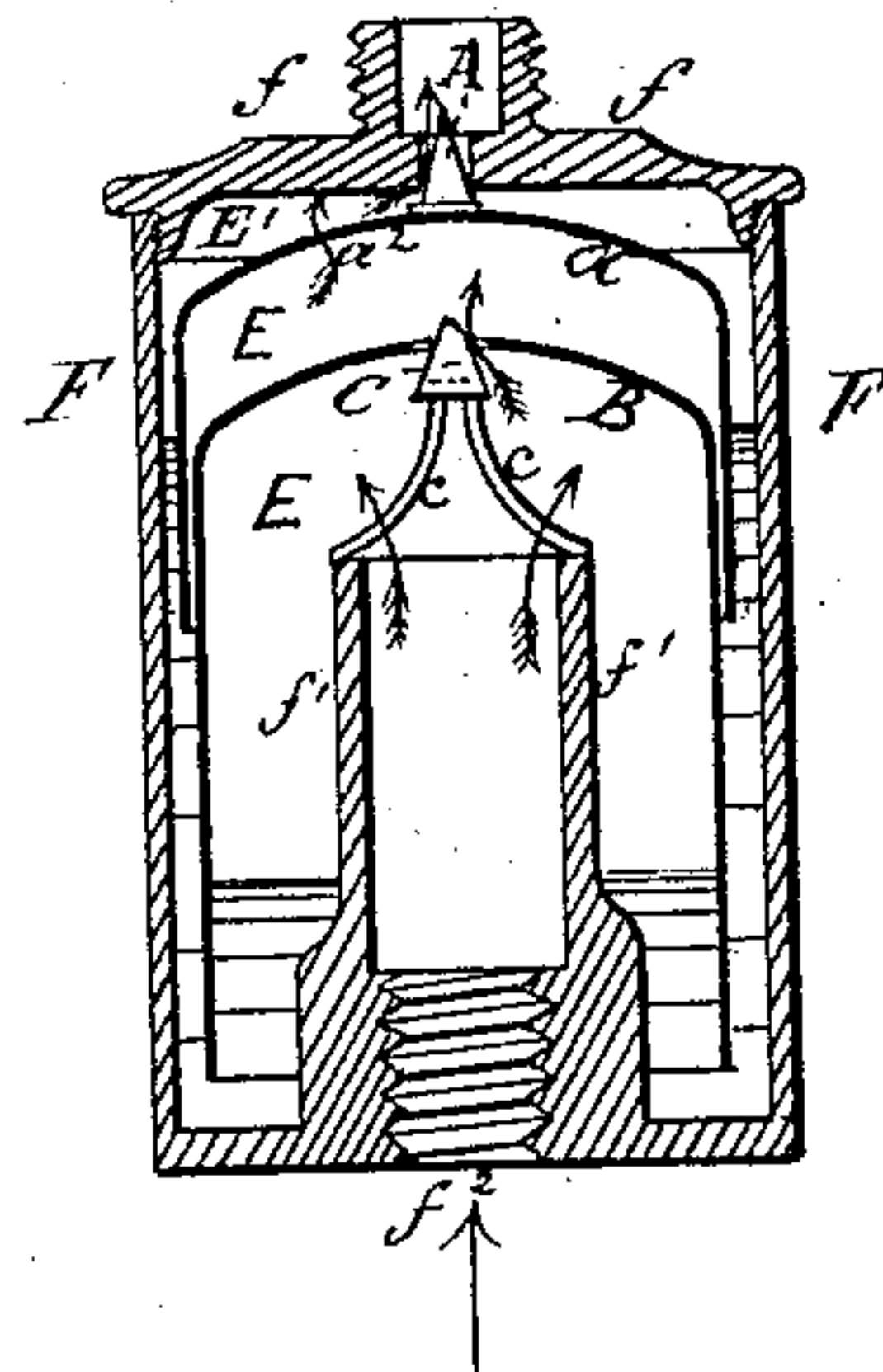


Fig. 2.

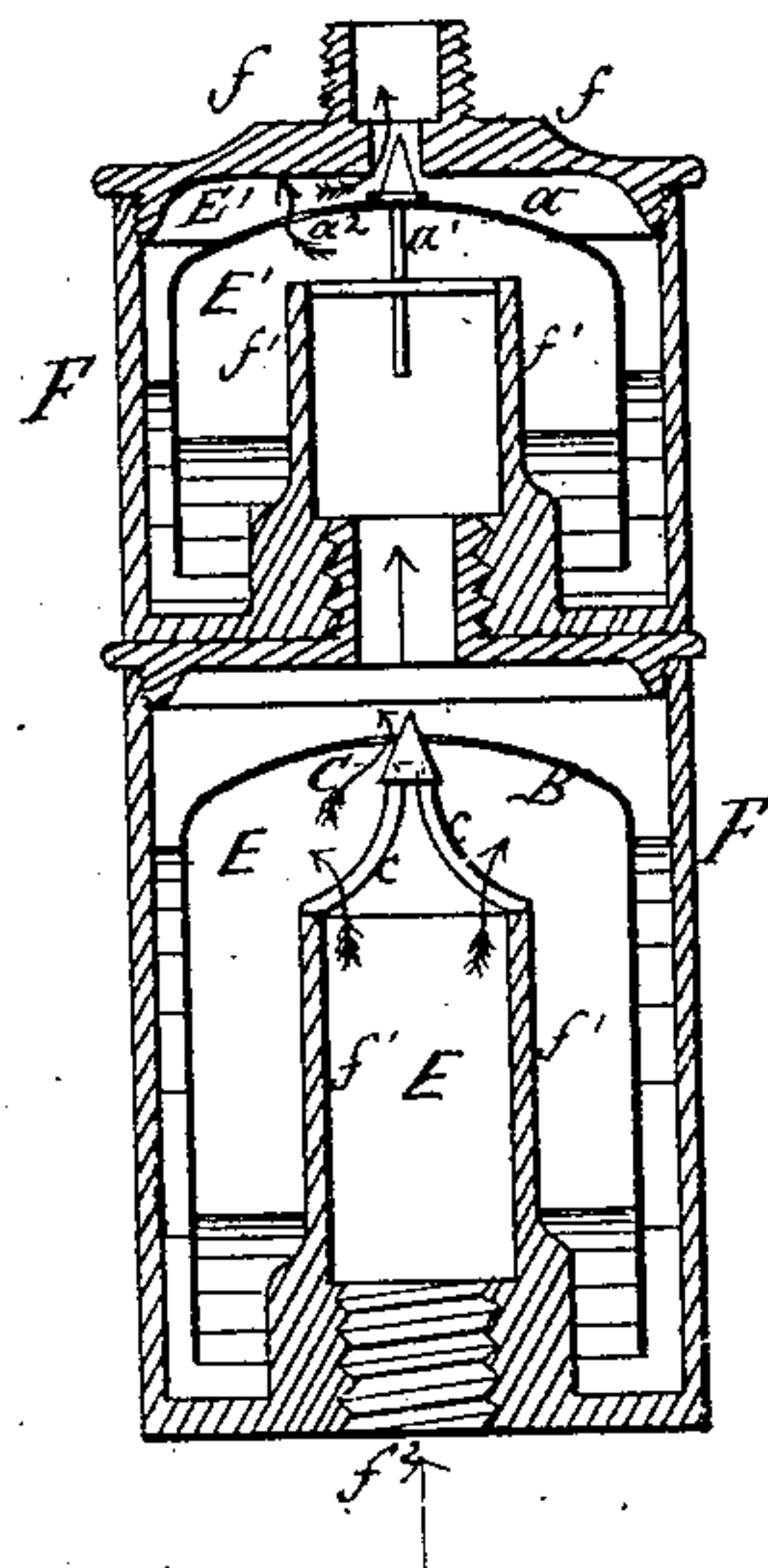
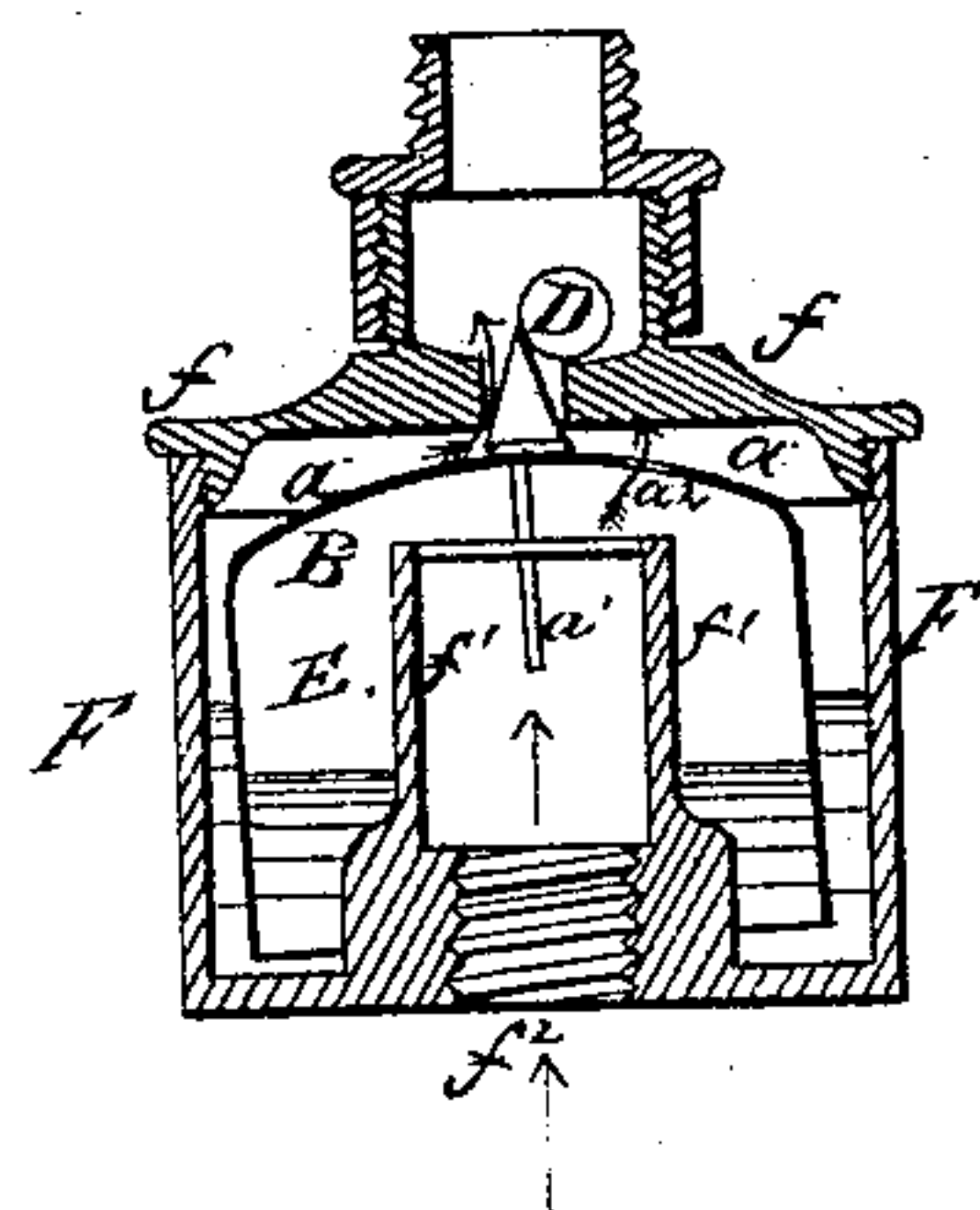


Fig. 4.



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# UNITED STATES PATENT OFFICE.

HENRI GIROUD, OF PARIS, FRANCE.

## IMPROVEMENT IN GAS-REGULATORS.

Specification forming part of Letters Patent No. 157,280, dated December 1, 1874; application filed February 28, 1873.

*To all whom it may concern:*

Be it known that I, HENRI GIROUD, of the city of Paris, in the Department of the Seine and Republic of France, have invented certain Improvements in Rheometric Regulators, applicable to a single gas-burner, of which the following is a specification:

My invention relates, first, to a regulator for single burners, by means of which the quantity of gas delivered to such burner is at all times the same, no matter what the initial pressure of the gas or the diameter of the burner-orifice may be; and, secondly, to a slight modification of the apparatus, by means of which it becomes an auto-extinguisher.

The principles upon which the apparatus is constructed are the same as those of my gas-regulators fully set forth in my specification filed November 20, 1871.

In the accompanying drawings, Figure 1, Sheet 1, is a vertical transverse section of a rheometric regulator embodying my invention. Fig. 2, Sheet 1, is a similar view of a rheometer having no separate cone-valve beneath the float, the bell having the cone affixed on top. Fig. 3, Sheet 1, is an elevation of the bell and cone partially in section. Fig. 4, Sheet 1, is a vertical transverse section of a day rheometer. Fig. 1, Sheet 2, is a vertical transverse section of a rheometer, the valve being independent of the rheometric cap, and inclosed in a single basin. Fig. 2, Sheet 2, is a similar view, the rheometric cap and valve being inclosed in two separate basins. Fig. 3, Sheet 2, is a vertical transverse section of a rheometer, the valve being dependent upon the cap and placed beneath the same in a single basin. Fig. 4, Sheet 2, is a similar view, with the valve placed above the rheometric cap.

From what has been said in my former specification upon the regulators of a fluid current, it is necessary for the emission of a constant and unvariable volume that the movable parts suspended over such current should be of a weight determined *a priori*, and that such movable parts should exert their pressure upon an orifice or orifices, also unvariable, the diameter of which has been established *a priori*—that is to say, the weight of the movable parts and the rheometric orifice or orifices are regulated according to the quantity of gas

to be delivered by the apparatus. The movable parts may be made of copper or aluminum, or they may be tinned or covered with zinc, nickel, or platinum by means of the galvanoplastic process.

In the drawings, F is the casing, formed in three parts, of which *f* is the cover carrying a threaded pipe for the reception of the burner; *f*<sup>1</sup> the annular partitions; and *f*<sup>2</sup> the threaded piece, by means of which it is screwed to the supply-pipe, bracket, or branch. The annular partitions *f*<sup>1</sup> and the rheometric cap *a* and receiver B subdivide the interior of the casing into two compartments or chambers E E'. The chamber E' is partially filled with water, mercury, or glycerine—the latter preferred, on account of its non-freezing and non-evaporating qualities. *a* is the cap or bell, having affixed to its center a rod, *a*<sup>1</sup>, to the upper end of which, and above the bell, a conical needle, A, is screwed, and at the lower end the rod carries a cylindro-conical valve, G, the seat of which is in the aperture formed by the ring *f*<sup>3</sup>. The weight of this cap or bell, the rod, conical needle, and valve is predetermined, and the cap or bell is also provided with a fixed orifice, *a*<sup>2</sup>, called the rheometric orifice. The cap or bell *a* is partially submerged in the bath of glycerine in the chamber E'.

The gas enters through *f*<sup>2</sup>, passes around the conical valve into the chamber E, and, so long as the pressure is not sufficient to uplift the cap or bell with its conical needle, rod, and valve, the gas will flow through the aperture *a*<sup>2</sup>, into the chamber E', and thence to the atmosphere through the burner under a varying pressure, and consequently in varying volume, this pressure being equal to the difference of the pressure above the cap or bell and the pressure below the cap or bell. The pressure above the cap or bell will always tend to depress the latter—that is, keep the valve open and allow the gas to flow freely under the cap or bell *a*. The pressure under such cap or bell *a* will lift the same, and from that moment the volume delivered by the orifice *a*<sup>2</sup> will be constant.

According to the second part of my invention, Sheet 2 of the drawings, the receiver is of a weight such as to equilibrate the day-pressure, and, under such pressure, falls back



upon the cone C, supported by the arms c, and closes the opening formed in the receiver B, in such manner as to allow a small quantity of gas to escape through it, and thereby keep the merest glimmer at the burner. When the initial pressure exceeds the day pressure the receiver B is uplifted, and the gas precipitates itself under the rheometric cap to set it in operation. The receiver B, were it not for the pressure established above it, would press against the rheometric cap a, but it is retained by this pressure, and takes upon the cone such a position as to allow the volume of gas fixed by the rheometric cap a to flow through the valve-opening, whatever may be the differential pressure which upholds the receiver B.

Fig. 2, Sheet 2, shows the movable parts inclosed in two separate chambers, the upper one containing the rheometric cap a, and the lower one the receiver B. In Fig. 3, Sheet 2, the rheometric cap a and receiver B are united and immersed in the casing. The total weight of the cap and receiver have to be taken into consideration, as the latter no longer fulfils any rheometric action, as in Figs. 1 and 2, Sheet 2. Lastly, in Fig. 4, Sheet 2, the receiver-valve is dispensed with, and a simple ball-valve is used, which rests upon an incline, and closes the orifice leading to the burner, while the rheometric cap rests at the bottom of the casing so soon as the pressure is reduced to a day pressure. The ball will be removed by the conical needle when this pressure increases by night.

The outflow of the gas taking place under a differential pressure, and this differential pressure changing with the weight of the cap,

the diameter remaining the same, I utilize this peculiarity to construct rheometers working only under night pressure of the gas, which is always stronger than the day pressure. For this purpose, it is only necessary to give the cap or bell a sufficient weight to equilibrate the day pressure, and add to the apparatus a valve which closes under the pressure and opens directly it is exceeded, subject to the condition of not rendering the valve tight. I can then, in the morning, lower all the public lamps to a mere glimmer by a simple change of pressure, without interfering with the supply to consumers, while in the evening I may, in a moment, set all the lamps fully alight without the intervention of lamp-lighters.

These effects may even be made partial or successive in a same district.

I claim as my invention—

1. The combination of the casing F, the chamber E' of which is partially filled with glycerine, the cap or bell having a rheometric orifice,  $a^2$ , conical needle or solid cone A, conical valve C, and a gas-burner, substantially as set forth, and for the purposes specified.

2. The combination of the rheometric cap or bell a, having orifice  $a^2$ , conical needle or solid cone A, with the receiver cap or bell B, the solid cone C, and casing F, having compartment E partially filled with glycerine, all arranged to operate substantially as shown and specified.

H. GIROUD.

Witnesses:

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LOUIS ROBIN.