(No Model.)

O. M. SMITH.

GAS BURNER.

No. 322,399. Patented July 14, 1885.

Fig. 1

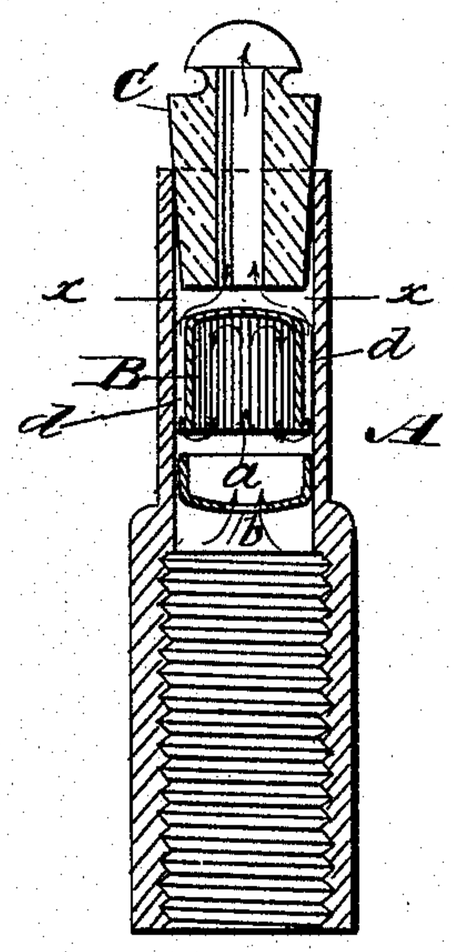


Fig. 3.

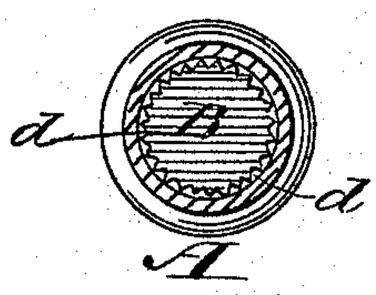


Fig. 4.

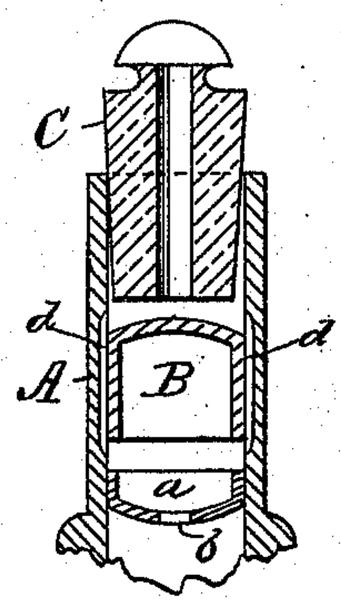


Fig. 2.

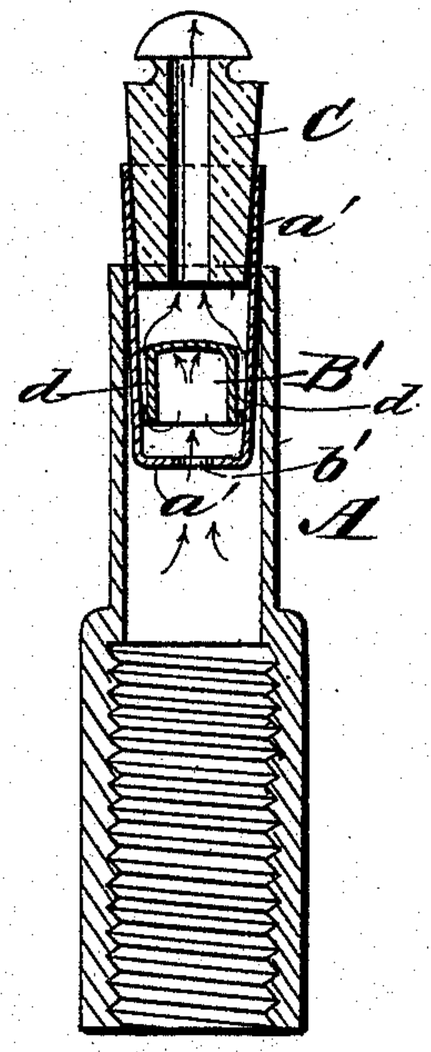
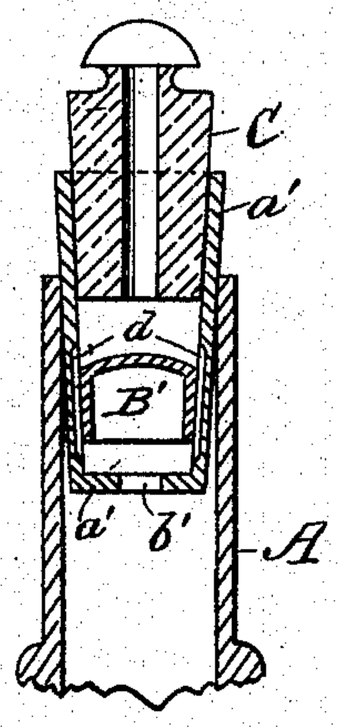


Fig. 5.



WITNESSES:

Francis McArdle.

C. Sedgwick

INVENTOR:

O. M. Smith

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ORREN M. SMITH, OF PHILADELPHIA, PENNSYLVANIA.

GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 322,399, dated July 14, 1885.

Application filed September 25, 1883. (No model.)

To all whom it may concern:

Be it known that I, ORREN MARK SMITH, of Philadelphia, in the county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Self-Regulating Gas-Burners, of which the following is a full, clear, and exact description.

The object of my invention is to prevent hissing or blowing of gas from a burner, and to secure an even flow with diminished pressure, which shall automatically regulate itself within the varying pressures usually met with in practice. It is well known that when illuminating-gas passes at a high velocity through the tip of a burner it sets up blowing currents which act like an ordinary blow-pipe to convert the burner practically into a Bunsen burner, drawing into itself large quantities of oxygen, so as to greatly diminish the light, and greatly increase the heat of the flame. This is irrespective of the size of the delivery-orifice, as any burner which blows, or hisses, or gives evidence of excessive currents by streamers thrown out in the flame, will lose in illuminating-power in the same manner. To avoid this and secure a steady, even, and somewhat slow current has been much sought for by inventors, and many expensive and complicated forms of apparatus have been devised for the purpose. In my invention, however, I use the counter-currents of gas, which I introduce into my burner, to mutually react upon, resist, and retard the flow of each other, by their direct interaction in directions determined by the construction of the parts of which my burner is composed. I permanently fix, directly across the inside of the pillar of the burner, and above the screw-socket thereof, a diaphragm which completely closes the channel in the pillar, and is perforated at the center with a small hole through which the gas passes directly upward in a swift current, but not guided, except by the hole itself through which it passes. Above this diaphragm some distance, as shown in the drawings, I also fix permanently a deep cup, having approximately parallel sides, said cup having a narrow slot or channel all around between its periphery and the pillar, or a series of fluted channels, through which the retarded currents of gas may slowly ascend to the flame-tip. The current of gas, passing up swiftly through the hole in the diaphragm, is directed into the hollow of the cup, and by its elasticity immediately rebounds. The only outlet being the narrow slot around the cup, the current of gas instantly recoils from the top of the cup, and travels downward alongside and around the central column of ascending gas, with which it is kept in close contact by the vertical sides of the inverted cup. These two currents act by friction and impact upon each other, and as the friction-surface of the descending current is much greater than that of the central ascending current it exercises a strong pull upon it, and retards the same precisely in proportion to the velocity of the inflow—that is to say, a high velocity of the upward current is met and neutralized, to a great extent, by an equally-swift current descending in the confined space surrounding it, so that the flow, within the limits usually met with, is always brought down to practically the same velocity. The gas, thus retarded in its descent, rises by its lightness and overflows up through the narrow circular slot *d*, or the vertical corrugated channels surrounding the cup, and is filtered thereby, and its distribution still further equalized. The pressure in the upper part of the gas-burner, above the inverted cup, is found to be much less than that in the burner below the diaphragm-plate, and the pressure in the upper part, regardless of the varying pressure of the gas below the diaphragm, is nearly constant. If the cup B, instead of being inverted, be placed in the pillar open end up, it will be found that no retardation occurs, except what is observed when an ordinary wire-gauze is interposed, and that the burner will hiss and blow just like a common gas-burner, showing that the retardation is due to the causes above explained.

My invention consists in the improved construction of the parts required to effect these functions, as will be hereinafter described.

The accompanying drawings form a part of this specification, and represent what I consider the best means of practically carrying out my invention.

Figures 1 and 2 are sectional elevations of

my improvement. Fig. 3 is a cross-sectional plan view of Fig. 1 on line *x x*. Figs. 4 and 5 are modifications with portions broken away.

Similar letters of reference indicate like parts in all the figures.

Fig. 1 represents the construction of my improvement as applied to and forming a special and complete burner, whose interior parts may in some cases be applied to and inserted in an old pillar-nipple. Fig. 2 represents my improvement as adapted to receive a lava or other gas-burner tip, and therewith be itself in turn received and fitted into any old pillar, thus saving the cost of a new or special pillar, such as ordinarily and specially used in Fig. 1.

In Fig. 1 I use a pillar, A, preferably made in the ordinary form, and fasten into the upper part below the lava lip C a somewhat elongated inverted cup or closed top tube, B, whose sides are substantially vertical and preferably corrugated or grooved, as shown at *d*, Figs. 1 and 3, and which is a snug fit in A; and at a suitable distance below the cup B, I fasten or set in firmly an orificed diaphragm, *a*, having a central orifice, *b*, through which the gas enters, and naturally impinging against the top of corrugated or grooved tube B, counter-currents are set up, as shown by the arrows, and escape to the space *x*, leading to the tip C through the grooves in B, forming channels between B and A, as shown more clearly in Fig. 3, where A is the pillar, B the corrugated tube, and *d* the grooves. The grooves may be also formed in the pillar A and the cup B be smooth, or both A and B be grooved. I also sometimes make the circumferential slot *d* around the inverted cup B without corrugations; but for convenience in setting the cup, and in order to filter and distribute the gas, I prefer to groove only the exterior of B.

In Fig. 2 I show the same arrangement of the grooved cup B′, in combination with a taper tube, *a′*, which is the diaphragm cup *a* of Fig. 1, here extended upward to take the place of the upper part of pillar A in holding the tip C, as in Fig. 1, this taper tube *a′* being capable of insertion in and combination with any old pillar-nipple, (represented by A, Fig. 2.)

In Fig. 2 the gas enters *a′* at the hole *b′*, strikes the closed top of B′, as in Fig. 1, and passes, as shown by the arrows, through the grooves in the exterior of B′, between B′ and *a′*, and thence to the tip C.

In the same manner as with Fig. 1, the corrugations or grooves in the cup B′ may be transferred to or made in tube *a′*; or both B′ and *a′* may be grooved.

My invention prevents the gas from hissing or blowing, its velocity being arrested by the friction and resistance of the mutually-interacting currents, from the hole in the diaphragm upward, and from the top of the cup downward, and afterward by its passage along the minute and elongated tubes formed by the corrugations or grooves in the exterior of B′, whereby the greater the pressure the greater the resistance, in this particular gaining an advantage over burners in which merely a piece of wire-gauze is employed to distribute the gas.

I am aware that gas-burners consisting of an expanded or bell-shaped chamber provided with internal cups, deflectors, and other retarding devices, not adapted to operate upon the principles herein set forth, have been known heretofore; and I do not broadly claim cups, deflectors, or other retarding devices, in combination with a gas-burner, but limit my invention to the devices constructed substantially as and adapted to operate in the manner herein described and claimed.

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

A gas-burner consisting of an outer shell having inlet and outlet openings at opposite ends, and provided with a flat centrally-perforated diaphragm to direct the current upward, and an inverted mixing-cup permanently fixed above the same, together with the exit slots or corrugations *d*, substantially as described.

Witnesses: ORREN M. SMITH.
WM. B. HILT,
FRANCIS BROADBENT.