(No Model.)

J. MUSGRAVE.

GAS BURNER FOR HEATING PURPOSES.

No. 260,888. Patented July 11, 1882.

Fig. 1.

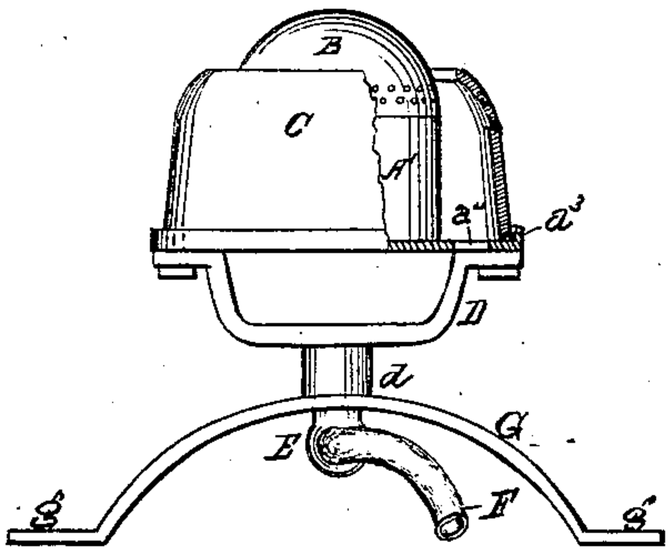


Fig. 2.

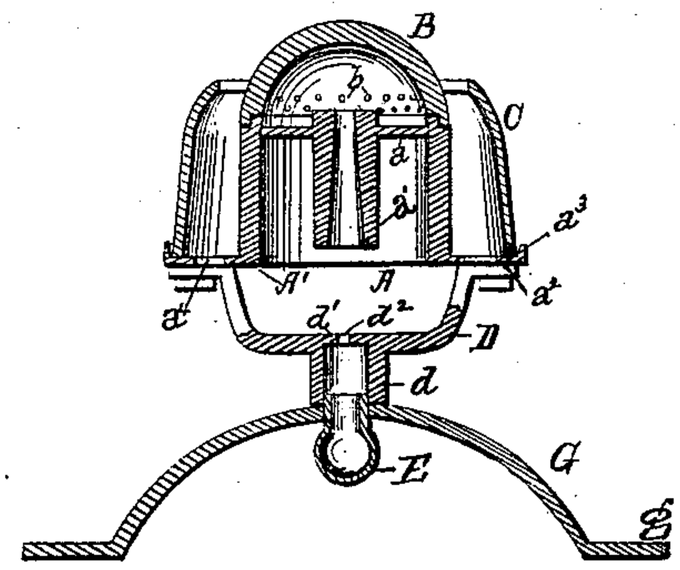


Fig. 3.

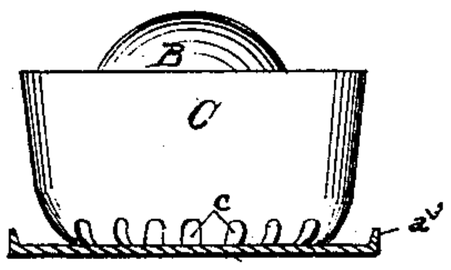


Fig. 4.

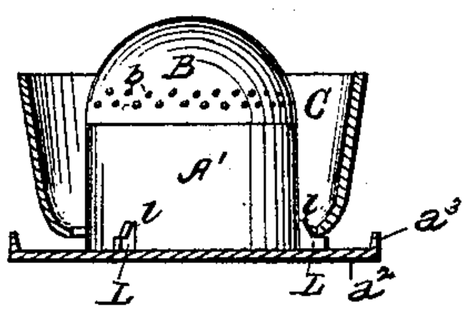


Fig. 5.

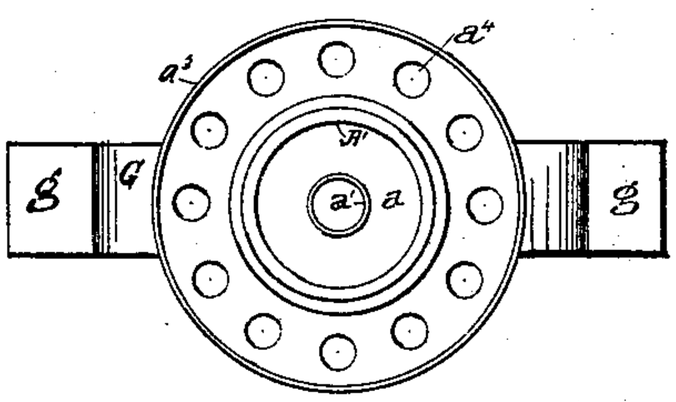
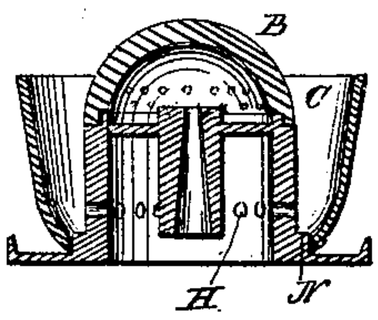


Fig. 6.



Attest:
W. S. Christopher
J. Wm. Strehli.

Inventor:
James Musgrave
per Wm. Hubbell Fisher,
Atty.

UNITED STATES PATENT OFFICE.

JAMES MUSGRAVE, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-HALF TO ALEXANDER REID, OF SAME PLACE.

GAS-BURNER FOR HEATING PURPOSES.

SPECIFICATION forming part of Letters Patent No. 260,888, dated July 11, 1882.

Application filed December 9, 1881. (No model.)

To all whom it may concern:

Be it known that I, JAMES MUSGRAVE, a resident of the city of Cincinnati, county of Hamilton, and State of Ohio, have invented certain new and useful Improvements in Gas-Burners for Heating Purposes, of which the following is a specification.

My invention consists, first, of a burner so constructed as to secure complete combustion of the gas used; and, secondly, of a device for modifying the shape of the flame. The amount of heat developed from a given quantity of gas is proportional to the oxidation of the hydrocarbons of which the gas is composed. The more complete the oxidation the greater the heat developed. To secure this complete combustion the oxygen must be thoroughly mixed with the coal-gas before it reaches the burning-point—that is, the point where combustion is going on. By my device this intimate intermingling of the two gases is accomplished, and a flame of great heat is thereby secured. Furthermore, the complete oxidation of the gases, after being mixed, and while burning, is assisted and the heat increased by an additional supply of air fed to the flame in the manner hereinafter described, and the intensity of the flame is thereby augmented.

In the accompanying drawings, Figure 1 represents a side view of my device, the flame-regulator being partially broken away to show parts beneath. Fig. 2 is a central section of the same. Fig. 3 shows the flame-regulator in modified form, reversed. Fig. 4 shows the flame-regulator as represented in Figs. 1 and 2, reversed. Fig. 5 is a top view of the burner, the flame-regulator and burner-cap being removed. Fig. 6 shows a modification of the burner.

The cone A consists of a cylinder, A′, across the top of which a diaphragm, *a*, extends. Through the center of this diaphragm a vertical cone, *a′*, passes, extending slightly above the diaphragm *a* and reaching nearly to the bottom of the cylinder A′. While this relation of the ends of cone *a′* to the diaphragm *a* and lower edge of cylinder A′ is the preferable one, it is not essential, as the cone *a′* may be made flush with the diaphragm *a*, and extends below the edge of cylinder A′.

To the top of the cylinder A′ is connected in any suitable manner a cap, preferably hemispherical in form. In the present instance the top of cylinder A′ is rabbeted, as shown in Fig. 2, for the purpose of securely holding in place the similarly-rabbeted hemispherical cap B. Cap B is provided with openings *b*, preferably arranged in a zone about it, through which the mingled air and gas escape.

Extending outwardly from the bottom of cylinder A′ is a flange, a^2, provided on its outer edge with an upwardly-extending secondary flange, a^3. The flange a^2 is perforated with openings a^4, as shown in Fig. 5. The flame regulator or cup C rests on the flange a^2, and when in the position shown in Figs. 1 and 2 incloses the openings a^4. It is held in position by the flange a^3. As the cup C extends upwardly it tapers slightly toward its center, being somewhat more constricted near the top. The top of the cup C usually (as in the present instance) reaches somewhat higher than the zone of the flame-openings *b*. The cone A is preferably supported, as shown in Figs. 1 and 2, by a yoke, D, from the under side of which (or of a suitable support) a hollow stem, *d*, extends. Across the top of this stem is a diaphragm, *d′*, perforated in the center by a small opening, d^2. Into the stem D is screwed a hose-connection, E, to which is attached a hose, F. The whole is preferably supported by an arch, G, provided with feet *g*. This latter arrangement makes the burner portable—in fact, makes it a hand gas heater or stove.

The operation of the burner is substantially as follows: The gas, entering through the hose F, passes up through the attachment E and stem *d*, escaping with considerable force through the narrow opening d^2 and rushing up through the cone *a′* into the cavity of the cap B, from which it escapes through the openings *b*, where it is ignited. The gas, rapidly escaping through the narrow opening d^2, produces a current of air, by which it is accompanied through the cone *a′*. In the cone *a′* and the cavity or chamber above the air and gas are thoroughly mixed, forming a gas in whose combustion the original coal-gas is completely oxidized with the advantages previously set forth. To still further insure an

efficient supply of oxygen, the cup C and openings a^4 are provided. Any additional air which may be needed or can be used in burning the gas will rise through the openings a^4 and be directed by the cup C into the flame. The cup C has, moreover, another function. In the position of the cup C shown in Fig. 2 it is evident that the flame formed at the openings *b* would be deflected by it upwardly into a conical or cylindrical flame—such as is seen in an ordinary Argand burner—thus condensing and limiting the heat to a comparatively small area. This limitation of the flame-area is not always desired, and when a more diffuse flame is required the cup C is to be reversed, as in Fig. 4. In this position it is evident that the flame does not strike the cup C so soon, and will consequently be more diffused. When the cup C is reversed I have several means by which air is admitted between the cup C and cylinder A′.

In Fig. 4 are shown lugs L, each provided with a shoulder, *l*. These lugs are preferably three in number, and project from the cylinder A′ at points on its circumference equidistant from each other. In this arrangement the cup C is elevated on the lugs L, allowing air to enter beneath it, and is at the same time held firmly in position by shoulders *l*, its inner edge being in such relation with them as is shown on the right-hand side of Fig. 4. The cup C is held in this one position for the purpose of keeping its upper (now the lower) edge everywhere equally distant from cap B to thus secure a uniform draft everywhere around the cylinder and a regular symmetrical flame. If the cup were allowed to rest loosely on the flange a^2, one part of it would sometimes be nearer to cap B than another, and thus produce an irregular flame. In Fig. 6 the cup C is seen held in position by the shoulders N, and the air is admitted between the cup and cylinder through the openings H. In Fig. 3 the edge of the cup C is shown provided with openings, usually notches *c*, as shown, for the purpose of admitting air. In this form it is retained in position by shoulders, such as N. (Shown in Fig. 6.)

The advantages of my invention arise from the complete combustion of gas which it effects, thereby enabling one to obtain a greater amount of heat from a given quantity of gas than can be obtained in any other way, and at the same time economizing by requiring less gas to produce the same quantity of heat which other burners will produce.

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

1. A gas-burner provided with flange a^2 and cap B, having perforations *b*, in combination with the reversible flame-regulator C, one end of which rests on the flange a^2, the other end extending above the openings *b* and so formed that the flame from the openings *b* will strike against said flame-regulator, substantially as and for the purposes specified.

2. The combination of cap B, provided with openings *b*, cylinder A′, cone *a′*, diaphragm *a*, yoke D, and stem *d*, provided with contracted orifice d^2, substantially as and for the purposes specified.

3. The combination of cap B, provided with openings *b*, cylinder A′, diaphragm *a*, cone *a′*, flange a^2, provided with openings a^4, cup C, yoke D, stem *d*, and orifice d^2, substantially as and for the purposes specified.

4. The combination of cap B, provided with openings *b*, cylinder A′, diaphragm *a*, cone *a′*, flange a^2, provided with orifices a^4, cup C, yoke D, stem *d*, provided with contracted orifice d^2, lugs L, and shoulders *l*, substantially as and for the purposes specified.

5. The combination of the cylinder A′, cap B, provided with opening *b*, diaphragm *a*, cone *a′*, flange a^2, and cup C, and provisions for introducing the external air into the space between the cylinder A′ and the cup, substantially as and for the purposes specified.

JAMES MUSGRAVE.

Witnesses:
JOHN J. MOLLOY,
E. R. HILL.