No. 654,927. Patented July 31, 1900.

W. T. SUGG.

BURNER FOR INCANDESCENT GAS LIGHTING.

(Application filed Mar. 6, 1900.)

(No Model.)

FIG. 1

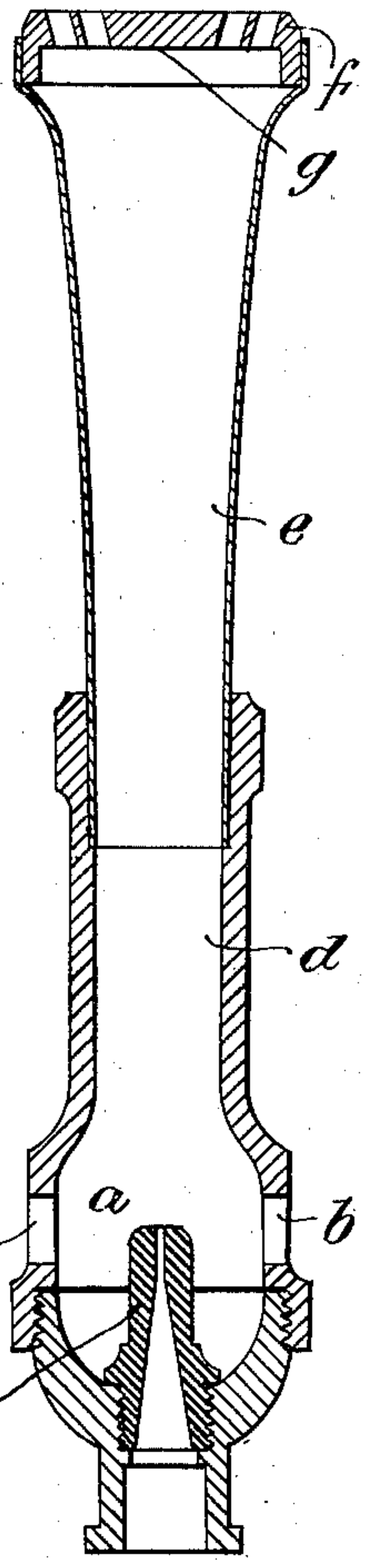


FIG. 2.

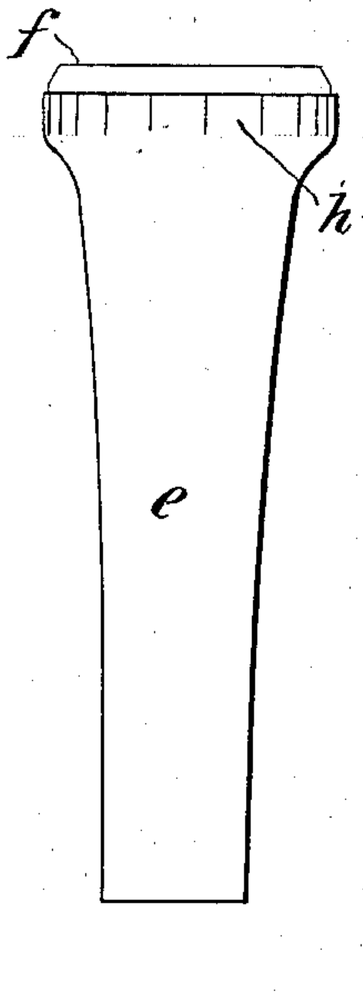


FIG. 4.

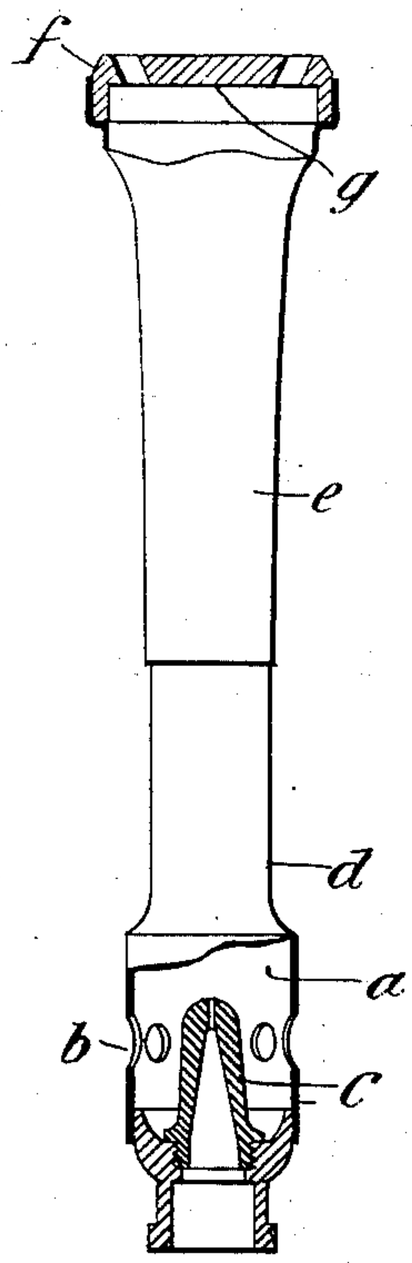


FIG. 3.

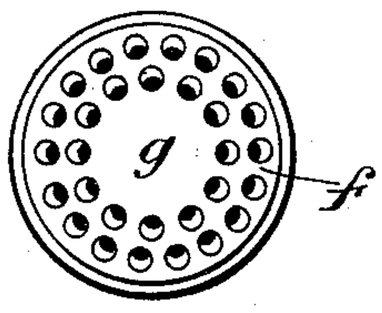
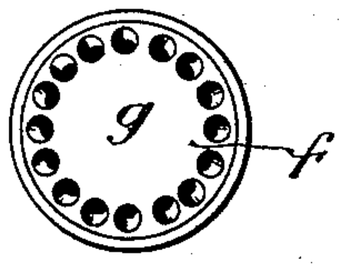


FIG. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM T. SUGG, OF LONDON, ENGLAND.

BURNER FOR INCANDESCENT GAS-LIGHTING.

SPECIFICATION forming part of Letters Patent No. 654,927, dated July 31, 1900.

Application filed March 6, 1900. Serial No. 7,468. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM THOMAS SUGG, of Vincent Works, Regency street, Westminster, London, England, have invented certain new and useful Improvements in Burners for Incandescent Gas-Lighting, of which the following is a specification.

In the accompanying drawings, Figure 1 shows in sectional elevation and in full size a "high-pressure" burner. Fig. 2 is an external view of the burner-tube, and Fig. 3 is a plan view of the burner proper. Fig. 4 is an elevation, partly in section, of a low-pressure burner full size; and Fig. 5 is a plan view of the burner proper.

This invention relates to that class of burner known as "atmospheric" or "Bunsen;" and the invention consists in certain modifications in the construction of the parts of the burner for use in incandescent gas-lighting whereby greatly-improved results are obtained.

The new burner may be employed either as a high-pressure burner or as a low-pressure burner with correspondingly-wonderful results. By "high pressure" I mean where an additional pressure beyond the ordinary pressure in the mains under normal conditions is given to the gas by means of a suitable apparatus, such as a pump, and by "low pressure" I mean the ordinary pressure in the gas-main under normal conditions. In the first case by the use of the new burner burning 10.8 cubic feet of 15.75-candle gas per hour at a pressure of nine or ten inches I obtain a light of an illuminating-power equal to three hundred and fifty candles, or 32.4 candles per foot, while in the second case at the ordinary pressure burning four cubic feet of gas per hour I obtain an illuminating-power of eighty candles. This new technical effect is the result, it is believed, of mixing the air and gas at the point of ignition and not before. This, then, is the leading principle of this invention, the special form of the burner having been devised to carry out this principle. Whether for high or low pressure, the principle is the same, the modifications being rather in degree and necessitated by the increase or decrease in the velocity of the gas under the different conditions.

The high-pressure gas is used for public lighting—such as railway-stations, churches, and other places where, say, a water-propelled gas-pump may conveniently be employed—while the low pressure is chiefly used for ordinary domestic purposes, where the use of such forcing apparatus would not be convenient and where a very high illuminating-power is not necessary; but it can of course be used for public lighting, if desired.

a is a chamber of any suitable construction, in the walls of which are six holes *b* for the inlet of air, the aggregate area of which will be 340.5 millimeters square. In the bottom of this chamber is inserted a steatite gas-nozzle *c*, of such a length that the tip shall be level with a line corresponding to the horizontal axis of the holes *b* for the high pressure, but in the low pressure it will be about level with the top of the holes, or it may be slightly above. This nozzle *c* is coned internally and is provided with a parallel-walled outlet-passage at the apex of the cone of 1.15 millimeters in diameter and four millimeters long for the high-pressure burner. For the low-pressure burner the diameter will be 0.9 millimeter. I suggest steatite for this purpose, because the outlet-passage must be perfectly smooth, presenting no bur, as in metal, which causes a hissing of the issuing gas; but of course any other material in which the same conditions will be obtained may be used.

The chamber *a* has a tubular extension *d*, to which the burner-tube *e* is closely fitted. This tube *e* is trumpet-mouthed, as shown, and carries in the mouth the burner proper, *f*. This burner *f* consists of a flanged disk of steatite, and for the high-pressure burner it contains two rows of holes the axes of which are inclined outwardly in an upward direction at an angle of fifteen degrees from the vertical. In the first or outer row (which is as near the edge of the disk as possible) are eighteen holes, and in the second and inner row are twelve holes. The diameter of each hole is 2.75 millimeters, and the total area of all the holes is one hundred and eighty millimeters square. For the low-pressure burner only one row of sixteen holes each of three millimeters in diameter is used, the axes of the holes being at an angle of twenty-five degrees from the vertical. I may, however, use two rows of finer holes, provided the angle of

their axes is the same. In each case a solid portion *g* is left immediately over the outlet of the gas-nozzle *c*.

For the high-pressure burner the distance from the nozzle *c* to the under side of the burner *f* is about five and one-fourth inches, while in the low-pressure burner the distance is about four and one-eighth inches, the extra length in the high-pressure being required in view of the increased velocity at which the gas is passing out of the nozzle and the increased volume of the gas in order to draw in the requisite quantity of air to produce a proper mixture of air and gas and also to give the requisite velocity to the air.

The flange of the burner *f* is held securely in the bell-mouth of the burner-tube *e* by means of spring-tongues *h*, formed by cutting nicks in the edge of the bell, (see Fig. 2,) and this is necessitated by the nature of the material used, which having somewhat of a brittle character would crack and break unless provision were made for its expansion under the heat evolved. The spring-tongues constitute such provision, and as the burner cools (when the gas is turned off) and shrinks the spring-tongues close in upon the burner and so hold it firmly at all times.

The action of the burner is as follows: The gas issuing from the nozzle *c* forms a column of gas, which having a clear and uninterrupted flow strikes against the solid part *g* of the burner proper, *f*. As the gas rises, and according to its velocity, it draws in through the holes *b* the air, which forms a tube or sleeve of air around the column of gas, but does not mix therewith. The air thus attains a velocity equal or nearly equal to that of the gas. When the gas strikes the solid part *g* of the burner *f*, its velocity is arrested and it is caused to spread. It is thus thrown outward into contact with the upwardly-rushing current of air and is carried with it through the holes in the burner. The gas and air which have become heated by contact with the burner thus practically mix at the point of ignition, and the flame, which by reason of the inclined axes of the holes is thrown outward onto the mantle, produces an intense soft white light of the illuminating-power above mentioned.

Although I prefer to use the high and low pressure burners for the respective services, still either burner may be used for the other service and improved results over anything which has gone before will ensue; but to get the best results the burner described for the respective service should be employed.

I claim—

A burner for incandescent gas-lighting embodying in combination a circular chamber having air-inlets in its walls and having an upward tubular extension, an upwardly-enlarged trumpet-mouthed burner-tube attached to said extension, a gas-nozzle within said chamber, and an internally and externally flat burner-disk which is inserted closely within the mouth of the burner-tube and which has a solid center surrounded by holes which have an outward inclination in an upward direction, substantially as herein described.

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Witnesses:
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