(No Model.)

T. ROWAN.

GAS LIGHTING APPARATUS.

No. 577,884. Patented Mar. 2, 1897.

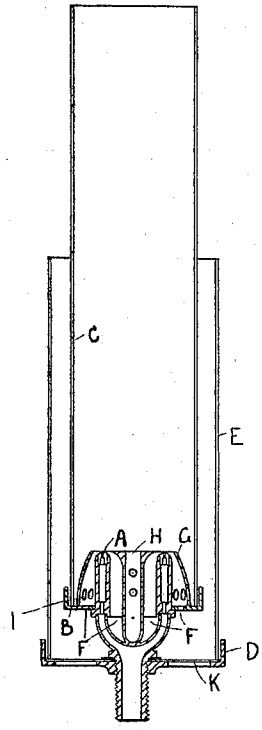

FIG. 1.

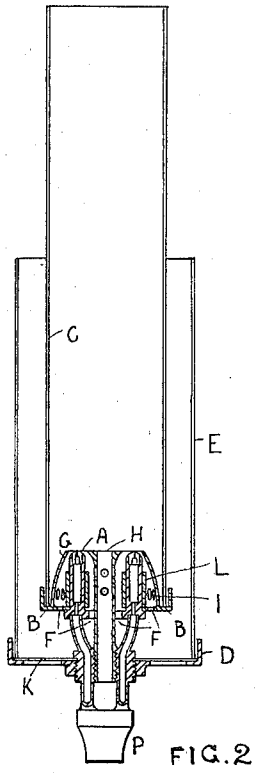

FIG. 2.

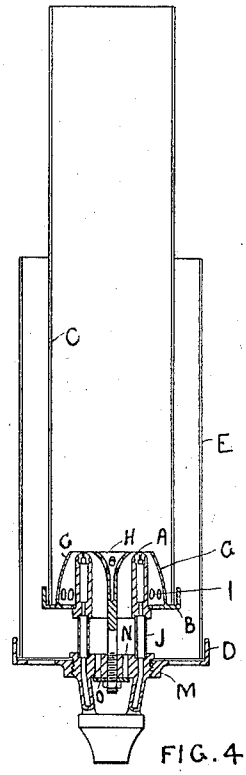

FIG. 4.

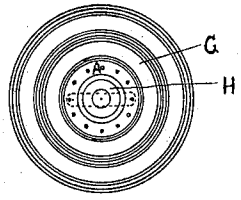

FIG. 3.

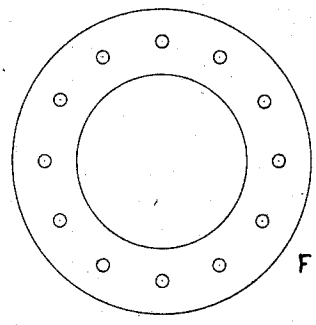

FIG. 6.

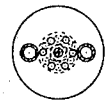

FIG. 5.

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UNITED STATES PATENT OFFICE.

THOMAS ROWAN, OF LONDON, ENGLAND.

GAS-LIGHTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 577,884, dated March 2, 1897.

Application filed December 26, 1895. Serial No. 573,342 (No model.)

To all whom it may concern:

Be it known that I, THOMAS ROWAN, residing at London, England, have invented an Improved Method of Gas-Lighting and in Apparatus Therefor, of which the following is a specification.

My invention relates to gas-lighting, and has for its object the provision of means whereby an Argand burner is adapted to burn ordinary gas, so that a much brighter, whiter, and more vivid light is emitted from a smaller consumption of gas than can at present be realized from any ordinary Argand burner.

My invention consists in the construction and arrangement of parts of such a burner whereby heated air is supplied for the combustion of the gas, (by utilizing the heat itself of the burning gas in a definitely-adjusted quantity by double chimneys,) the gas is prevented from becoming too highly heated before ignition, and the breaking up and attenuation of gas-jets is effected, so that the lighting efficiency of the burner is very largely increased.

I have found by exhaustive experiments that the efficiency of coal-gas as an illuminating agent when burned in a regenerative Argand burner depends, first, upon the temperature of the air mixed with the gas to produce combustion; second, upon the volume of heated air that is allowed to pass through the device in proximity to the flame; third, upon the maintaining of the gas itself at a sufficiently low temperature before ignition to prevent the decomposition of the hydrocarbon before ignition and the too-rapid combustion of the carbon during burning, and, lastly, upon the breaking up or attenuation of the gas-flame, so as to present a gas-jet of large surface and small volume in the manner hereinafter more fully described.

In order that my invention may be the better understood, I will now proceed to describe the same in relation to the accompanying drawings hereunto annexed, reference being had to the letters marked thereon.

Like letters refer to like parts in the various figures.

Figure 1 is a sectional view of a burner constructed according to my invention. Fig. 2 is a view of a modified construction of the same. Fig. 3 is a plan of Fig. 1. Fig. 4 is a view of burner with adjustable central air-passage. Fig. 5 is a sectional plan of the same. Fig. 6 is an enlarged plan of the gas-orifices of the burner, showing their disposition around the ring.

To carry my invention into effect, I arrange upon the burner A a gallery B, carrying an inner chimney C, and a second gallery D, carrying an outer chimney E, so that an annular space exists between the two chimneys, which communicates at its upper end with the external atmosphere and at its lower end with the air-passage F, leading to the spaces around and within the burner A. The bottom of the gallery D is closed by a mica or other diaphragm K.

In order to break up or attenuate the flame, I arrange the orifices for the gas in the burner-ring at a greater distance from one another than in ordinary Argand burners. This is shown in Fig. 6 of the drawings, which is intended to represent, on an enlarged scale, a ring-burner of one-inch diameter having twelve holes. An ordinary Argand burner would have thirty-six holes of the same diameter arranged around a circle of the same diameter and would give a lighting efficiency of about two to three candle power per cubic foot of gas burned per hour, whereas with my burner having only one-third of the area of gas-issue orifice I obtain six and one-half to seven candle power per cubic foot per hour. In other words, with an ordinary Argand burner having a ring one inch diameter and thirty-six gas-orifices, with a single chimney, when burning five cubic feet per hour of sixteen-candle-power gas a light of about twelve candles is obtained.

When burning five cubic feet of similar gas per hour in one of my one-inch ring-burners with twelve gas-orifices of the same diameter as the ordinary burner, but with the double chimney of the proportions hereinafter described, I obtain a lighting effect of thirty-five candles.

The attenuation of the flame is produced by the careful adjustment of the draft in the siphon-chimneys and the high temperature of the air supplied, so that the flame, broken up by the burner, is attenuated, giving extended surface with small thickness or volume of jet.

I arrange a cone G of such a shape as to

cause the current of heated air to intermix with the issuing gas. I also use a central tube-spreader H, having a similar object with regard to the inside surface of the flame. In this way I feed directly to the flame an amount of heated air in such a way as will produce a very high incandescent effect upon the carbon particles of the flame. Too little air would produce a smoky flame, and too much air would cause the carbon to be consumed too readily to allow of it being in an incandescent state sufficiently long to produce a flame of high luminosity.

With an Argand burner having a ring of one-inch diameter made according to my invention, with twelve holes each of one twenty-fourth of an inch diameter, I find that I obtain the highest luminous efficiency when the inner chimney is two inches outside diameter and nine inches long and the outer chimney is two and one-half inches inside diameter and six inches long. The top of the outer chimney is arranged four inches below the top of the inner chimney. The area of the air-channels through the center of the burner, through the holes I, and up the cone G for the supply of air to the flame is 1.166 of a square inch. Such a burner will give with sixteen-candle-power gas seven candles per cubic foot of gas burned per hour.

It will be noticed from the drawings that the arrangement of the pipes or channels J, by which the gas is led up to the burner within the hot-air space, is such that the gas traveling therethrough at a considerable velocity does not become very highly heated; further, that the temperature of the burner is kept low by the transmission of heat from the burner by conduction down the pipes into the fitting that supports the burner, and is dissipated by radiation to the surrounding atmosphere.

When desirable, I arrange non-conducting packing L, such as asbestos, upon the outside or inside of the burner, or upon both outside and inside of the same when necessary, as shown in Fig. 2, to prevent the absorption of heat by the burner from the heated air.

In Fig. 4 I show a modification in the construction of the burner whereby the lighting efficiency of the burner is further increased, which consists in the provision of means whereby a current of cold air is led up around the gas-supply channels, so as to extract the heat therefrom, and then passes on to mix with the gas to support combustion. In this way the flame is protected from loss of heat by outward radiation by the envelops of heated air in the chimneys, but at the same time the carbon particles of the flame are kept at a sufficiently low temperature to give high incandescence and at the same time the too ready combustion of the carbon is prevented, thus giving the flame intensity. By reference to Fig. 4 it will be seen that the central spreader H is mounted onto the supporting-boss M, and air-orifices N are arranged through the said boss, so that the cold air passes to the central air-passages, from which it issues and mixes with the flame. I may fit an adjustable shutter O to these orifices, such as a disk having apertures therethrough, adapted to revolve and eclipse more or less the holes in the boss M, in order to regulate the amount of cold air admitted to the burner. When the area of the orifices has been determined for highest efficiency, I may make them the exact size without means of adjustment.

In the burner shown in Fig. 2 the central air-inlet is formed by an open-ended central tube, which feeds air heated by contact with the metal of the central airway to the interior of the flame, having the same effect in producing a flame of high incandescence as the means hereinbefore described.

The proportions of chimneys and airways that I have found by exhaustive experiment to give a volume of air of such a character as to maintain the carbon particles of the flame in a high state of incandescence through a considerable interval of time and at the same time to insure their ultimate combustion would, if altered in proportionate effect relatively to one another, reduce the efficiency of the burner. If the gas were allowed to be heated to a high temperature, as well as the air, it would be expanded in volume and the carbon particles would too readily combine with the oxygen of the air and be too quickly consumed.

In order to maintain the pressure of gas at the burner constant, I fit a governing device P, of any known form, as I find the difference of from an eighth to a quarter of a cubic foot of gas per hour makes a considerable difference to the luminosity of my adjusted and controlled flame. I may also use telescopic extensions to the inner and outer chimneys to adjust the burner for dealing with different quantities or qualities of gas.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The method of burning coal-gas consisting in feeding the gas to the burner at a low temperature and over a large area or surface, the gas at the burning-point being maintained at a minimum volume and supplying to the said gas a minimum amount of air at a high temperature, substantially as described, to produce complete combustion and high incandescence and luminating.

2. In combination in an Argand gas-burner, the burner proper having gas-jet openings spaced about five diameters apart to distribute a minimum volume of gas over a maximum surface or area, a double chimney communicating with the burner and adapted to conduct highly-heated air thereto in a minimum quantity and means for supplying cold air to the burner comprising a central air-

passage up the burner to prevent the gas from being too highly heated before issuing from the burner, substantially as described.

3. In combination in an Argand burner, the burner proper having gas-jet openings spaced about five diameters apart to distribute a minimum volume of gas over a maximum surface or area, a double chimney communicating with the burner and adapted to conduct highly-heated air thereto in a minimum quantity, means for supplying cold air to the burner comprising a central air-passage up the burner to prevent the gas from being too highly heated before issuing from the burner, and the cone G about the burner forming the means for leading the hot air from the double chimney to the burning-point, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS ROWAN.

Witnesses:
REGINALD W. JAMES,
RICHARD A. HOFFMANN.