(No Model.)

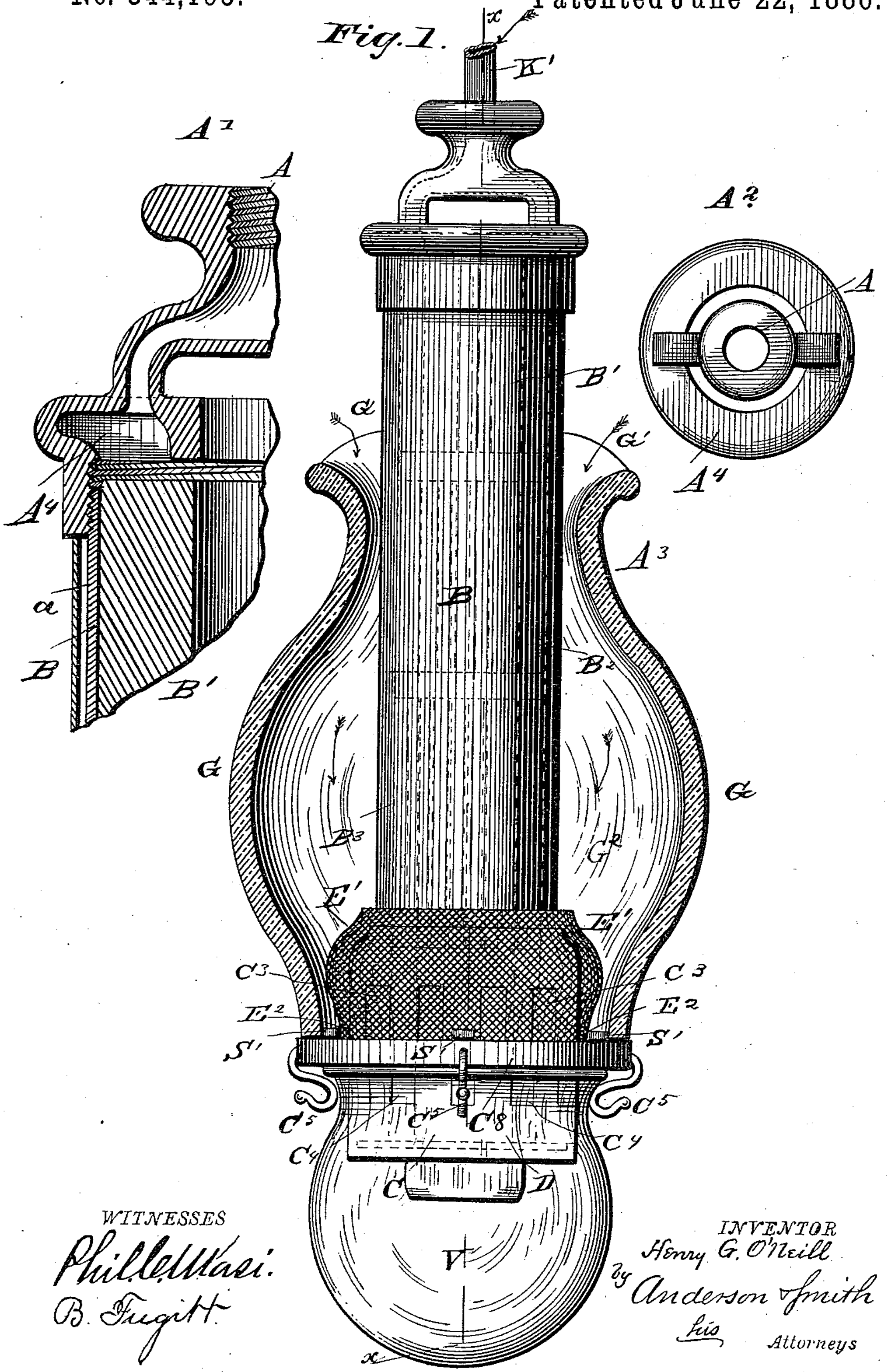
4 Sheets—Sheet 1.

H. G. O'NEILL.

GAS LAMP.

No. 344,195.

Patented June 22, 1886.



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(No Model.) 4 Sheets—Sheet 2.

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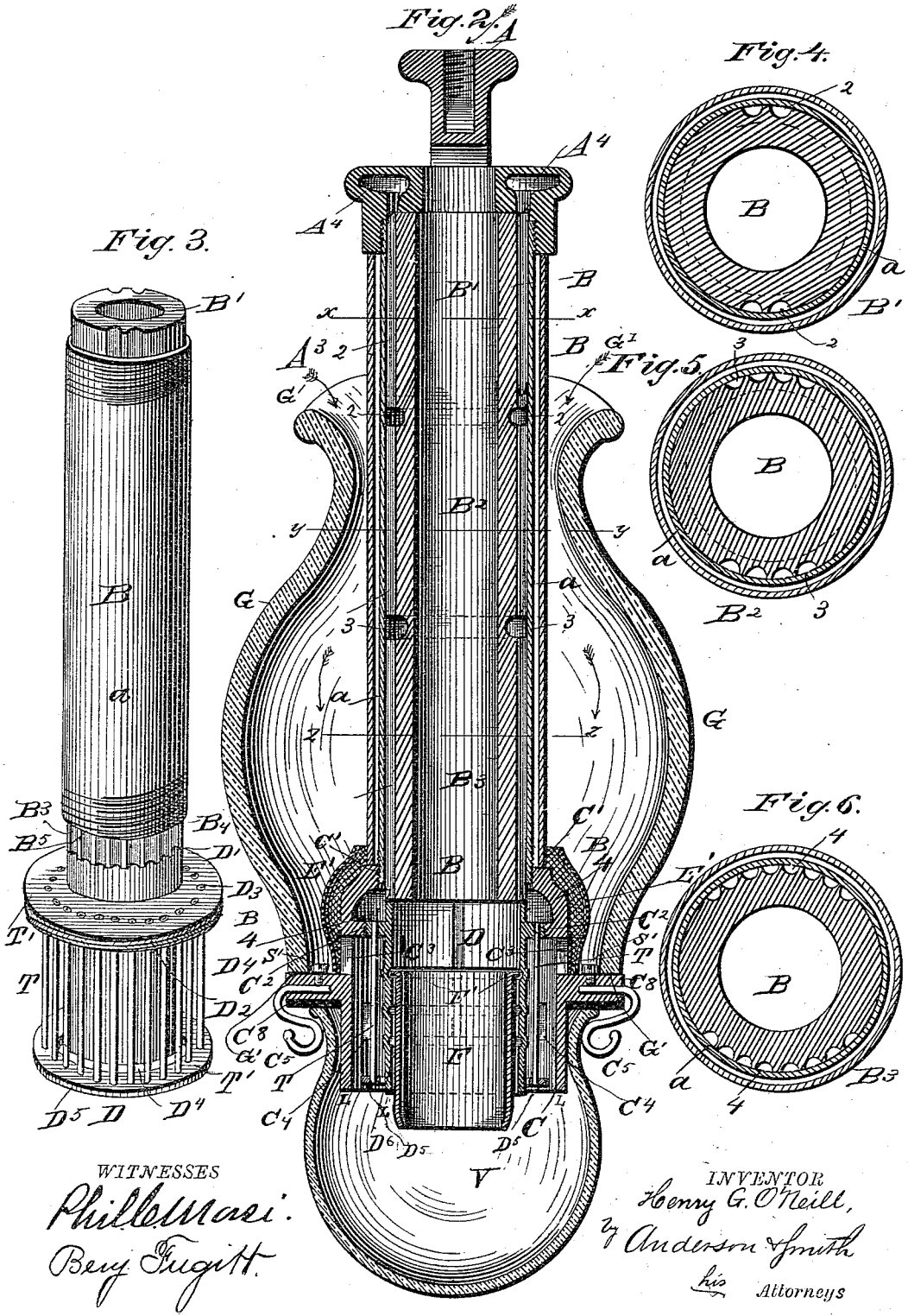

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Fig. 7.

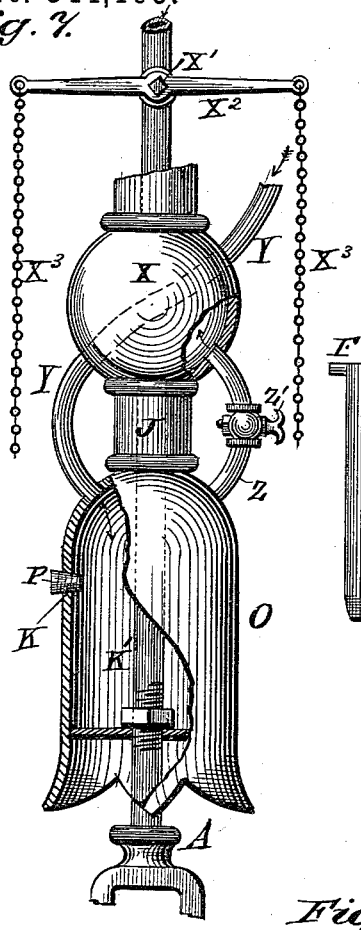


Fig. 12.

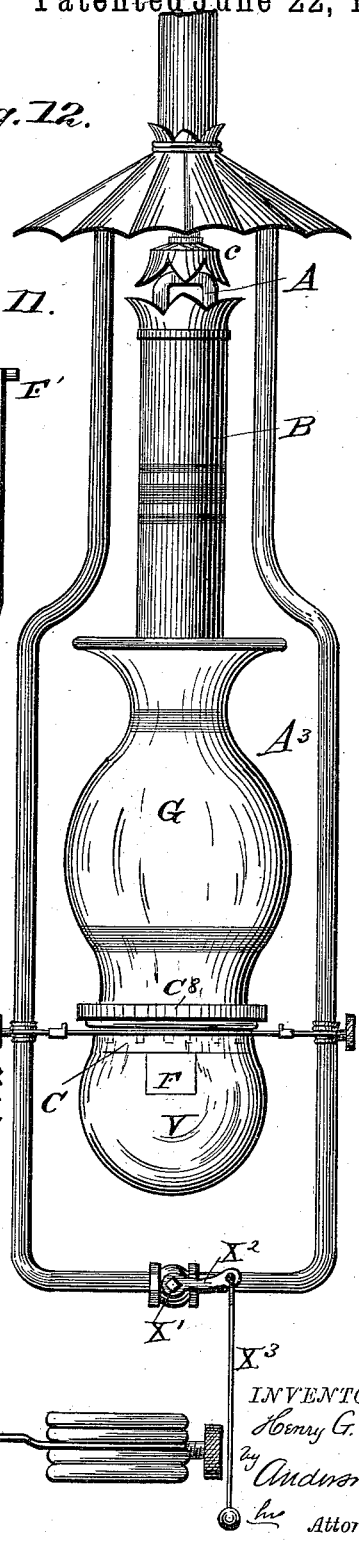


Fig. 11.

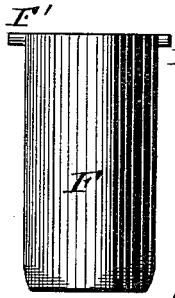
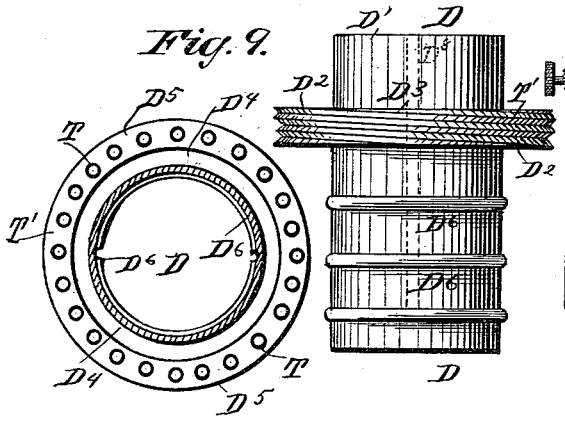


Fig. 10

Fig. 9.



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(No Model.) 4 Sheets—Sheet 4.

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Fig. 15.

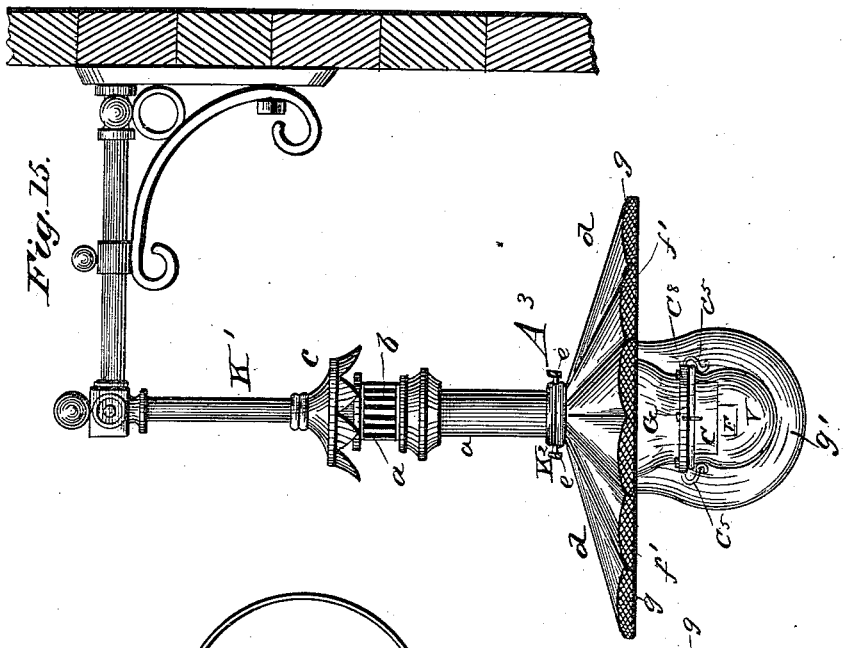


Fig. 13.

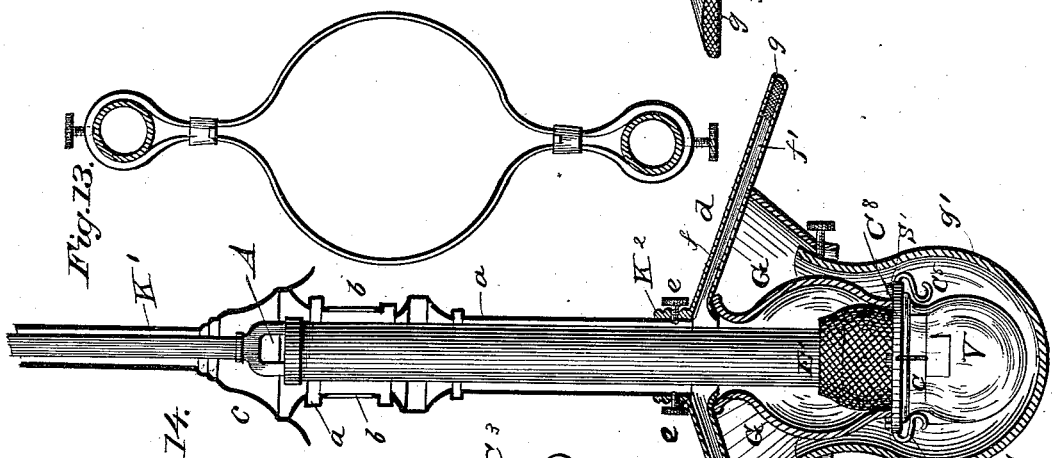
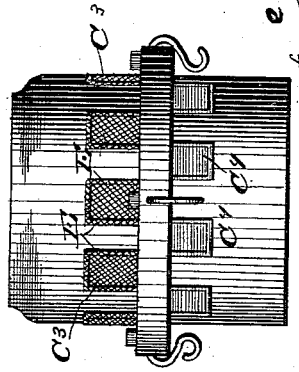


Fig. 14.

Fig. 8.



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UNITED STATES PATENT OFFICE.

HENRY G. O'NEILL, OF CINCINNATI, OHIO, ASSIGNOR TO THE PLATINUM LIGHT COMPANY, OF SAME PLACE.

GAS-LAMP.

SPECIFICATION forming part of Letters Patent No. 344,195, dated June 22, 1886.

Application filed March 29, 1886. Serial No. 196,975. (No model.)

To all whom it may concern:

Be it known that I, HENRY G. O'NEILL, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Lamps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation, partly in section, of my lamp. Fig. 2 is a vertical section of same. Fig. 3 is a perspective view of the inner part of the burner, its jet-tubes, draft-chimney, and the tube surrounding the same. Figs. 4, 5, and 6 are horizontal sections of the tubular portion of the burner, taken on the lines *x x*, *y y*, and *z z* of Fig. 1. Fig. 7 is a side elevation, partly in section, of the vaporizing attachment. Figs. 8, 9, 10, and 11 are detail views. Fig. 12 is a modification. Fig. 13 is a plan view, partly in section, of the spring-holder. Fig. 14 is a sectional elevation of outside lamp, and Fig. 15 is a side elevation of same.

This invention relates to improvements in gas and oil burning apparatus, and is especially adapted to utilize the varying qualities of gas, from whatever source, from the rich seventy-candle-power oil-gas, to the poorest qualities of carbureted or sulphureted hydrogen or natural gas. It is also well adapted to utilize every grade of petroleum, crude or refined, for the purpose of illumination.

The object of the invention is to produce a pure, white, smokeless, and economical light, that will cast no shadow from the lamp apparatus outward or downward, and very little above a light of universal adaptation, save and except for submarine uses.

In carrying out this invention I have constructed a lamp which is designed to operate the gas or vapor employed therein by successive expansions and attenuations at regular and necessary pressure, so that it is discharged for burning in a minute state of atomic separation or subdivision between two heated streams of atmospheric oxygen around a suitable deflector adapted to convert into secondary light the direct heat resulting from the combustion of the gas and air, the waste heat of the products of combustion being utilized for the regenerative function of the lamp.

The mode in which the principle indicated is carried out is designed to multiply the volume of gas according to the law governing the expansion of gaseous bodies, and thus from actual increase in bulk to obtain greater service and consequent economy; to heat and reheat the gas in expanded form—that is to say, in attenuated condition, or minute state of atomic subdivision or separation—by contact with extended heated surfaces provided by the series of expansion and equalizing chambers, so that every particle of carbon becomes equally and thoroughly heated throughout the volume of gas as it descends to the burner, and to increase the temperature of the gas and its attenuation to such a degree that as soon as it comes in contact with the heated air at the point of combustion it is at once rendered incandescent, each particle of carbon glowing with a white light. It is also designed to utilize all the carbon of the gas by the conditions hereinbefore explained, and by the regularity of pressure effected by the equalizing-chambers, which prevent waste of gas and smoke, and obviate the necessity of a governor, and, finally, by this lamp not only is the candle-power of the carbon increased, but also the temperature of the flame is raised, and this increase of flame temperature is converted into a secondary source of light by the incandescent deflector, around which the flame burns. No matter what the nature or quality of the gas consumed may be, the light produced therefrom by this lamp is always good, although varying in candle-power, as the gas is rich in carbon. The lamp does not become blocked up or clogged in its chambers or tubes; and whether gas is burned therein or oil, or gas and oil combined, or gas enriched by any solid or liquid hydrocarbon, the same process is involved, except that the oil or solid hydrocarbon should first be converted into vapor in a cylindrical or other proper attachment to the lamp.

In the accompanying drawings, the letter A designates the main supply to the lamp, whereby the gas or vapor is conveyed to the first or upper chamber, A^4.

B is the upper portion of the lamp, which may be of elongated cylindrical form, centrally open from bottom to top, and having its exterior channeled longitudinally and chambered circumferentially, for the purposes hereinafter referred to. This hollow cylinder may be of cast-iron, its height being about six times its diameter, and the thickness of its wall sufficient to carry heat upward from the burner to the chambers.

The upper chamber, A^4, is usually made in an independent part, which is attached to the cylinder B. This is the first distributing and equalizing chamber. Below it are the longitudinal heating and expansion passages B′, which extend to and open into the second distributing and equalizing chamber, 2. From this chamber downward the third series of heating and expanding channels or passages, B^2, extend, terminating below in the third distribution and equalization chamber, 3, which extends circumferentially. The longitudinal heating-chambers of this series are more in number than those of the preceding series, in order to accommodate the gas or vapor in its expanded form, and to reheat it for further expansion, and the equalization-chamber is greater than that of the preceding series, for similar reasons. Usually, for large lamps I prefer to employ in the lower series a number of heating and expansion channels which is double that of the series preceding. Each succeeding series of heating and expansion passages is made larger or greater in number, according to the construction, to accommodate the volume of attenuated gas as increased by the successive expansions. The last series of heating and expansion passages, B^3, extend downward from the preceding equalization-chamber, and are arranged around the cylinder, terminating below in the last equalizing-chamber, 4, which discharges through tubes to the burner. The series of reheating and equalizing chambers may be increased sometimes, or may be lessened, provided the conditions are maintained whereby the gas or vapor passing is heated and expanded regularly under pressure in the manner indicated.

In order to close the chamber above referred to, the cylinder is provided with a jacket, *a*, of copper or other metal, which is fastened thereto; or the chambers in the wall of the cylinder may be made by boring and casting. The object is to provide the longitudinal and circumferential gas-tight chambers. The outer jacket may be made of ornamental form exteriorly, or it may be incased in an outer covering of porcelain, glass, or other material. The lower end of the cylinder B is connected to that part of the lamp constituting the burner portion usually by threads; and to the lower portion of the jacket *a* is connected the part C of the lamp, and in this manner may be formed the last equalization-chamber, hereinbefore referred to. At the point D^3 in the lower portion of the burner D, in the projecting flange around the outer circumference of the part D^4, are inserted tubes T, of copper or other suitable metal, which pass through one or more supporting annular plates or rings, and usually terminate in a burner-ring, D^5, which is between the burner-lips L L, annular interspaces being left between the lips and the burner-ring or the mouths of the burner-tubes on each side, as indicated, for the passage of air.

D^2 designates the lower portion of the burner D, arranged with the necessary tubes in proper position and connected with the cylinder B, as above stated.

Around the outer circumference of the burner is a peripheral band or flange, C^8, forming a bearing on its upper side for the shell G of the air-chamber G^2, and also forming, in connection with suitable packing, a bearing on its under surface for the globe V, which must be air-tight. This is usually accomplished by using a packing or gasket of asbestus on the flange C^8 and providing suitable fastenings on the globe. Those which I prefer are spring-fastenings made of phosphor-bronze, which will stand the high temperature of the parts.

Through the burner-shell to the chamber of the burner surrounding the tubes thereof are made air-passages C^3, which are covered with a metallic gauze, E′, or perforated coverings, which allow the air to pass through from the outer air-chamber and heat it at the same time thoroughly, while preventing its inrush in gusts. The gauze steadies and equalizes the draft of air to the burner, and at the same time raises its temperature to a high degree.

I sometimes form in the burner-shell windows, as at C^4, these being closed with mica or glass, and serving to permit the upward passage of the light from the flame, and thereby reducing the shadow above the lamp in a material degree.

F represents a refractory deflector, which is usually made adjustable upward and downward within the cylinder D, comprising the lower portion of the burner. This cylinder is provided with adjusting devices for the purposes in view. Usually I employ the series of circumferential grooves D^6, in connection with communicating longitudinal grooves D^8, these grooves corresponding to the lugs or projections F′ of the deflector. This deflector, or that portion of the same which comes in immediate contact with the flame, should be of some durable substance capable of being rendered incandescent by heat, and should be upon some non-conducting base, so that the direct heat, instead of being conveyed to the body of the burner, may be utilized and converted into a secondary source of light, whereby it is designed to fill, intensify, and round out the direct light of the flame itself. I prefer in practice to use a base of asbestus, mica, or asbestus and mica combined, covered with platinum in foil, gauze, or fine-wire form, or with a solution of the nitro-muriate or chloride of platinum; or I may employ steatite, lava, talc, or soapstone, likewise coated.

The globe V requires to be carefully annealed, and should be of clear glass.

When the lamp is to be used out of doors, an ornamented canopy is employed above to keep off the rain; and usually I provide, in connection with the supply-pipe, a gas-cock, X′, with by-pass, which is controlled by a lever and chains or otherwise, the object being to facilitate lighting the lamp without removing the globe, if it should be preferred.

In Fig. 12 I have illustrated another arrangement of the by-pass cock, and in Fig. 13 another device for holding the globe in position, the same being a sliding or adjustable spring-holder operating in connection with arms of the lamp-frame.

For outdoor-lamps I usually provide a storm-protector and ventilator with canopy to keep out rain or snow, and to prevent the wind from rushing down the updraft or central passage of the cylinder B. At the part K^2 a flange or collar is provided, to which is attached the protector *d*, which is usually double-walled, its under surface serving as a reflector, its upper wall as a water-shed, and interspaces between the two as an air-passage, where the air is taken into the lamp and warmed as it passes to the air-heating chamber. The mouth or mouths of these air-passages are guarded with wire-gauze, to assist in heating the air, to regulate its admission, and prevent gusts, and I usually employ in outdoor lamps two globes—an outer or protective globe, *g′*, in addition to the inner or main globe, V. The outer or protective globe may be attached to the reflector, or to a descending skirt of the reflector, as shown, so that wind will not enter the outer globe.

K indicates a vaporizing-chamber in which is placed the hydrocarbon. This chamber communicates with the vapor-chamber X above it by the pipe Z.

Y is an oil-supply, which may sometimes be employed for the vaporizing attachment.

The vaporizing attachment may be applied above the cylinder B on the supply-pipe, and the heat of the cylinder utilized to vaporize the oil or solid hydrocarbon placed therein, and when advisable desulphurizing and purifying substances may be used in such chamber, and the gas may be passed through the same, and when the lamp is to be used with gases which have much sulphur in their compositions it is designed to coat the gas-passages of the lamp with enamel or iridium, or other substance which is not liable to be corroded by the action of the sulphur or other impurity. The hydrocarbon vaporized by the heat of the pipe and burner-tube and mixed with gas in the chamber X, or alone, descends through the pipe A through the passages and chambers of the burner. The principles herein described may also be used for purposes of heating and ventilating.

The deflector may be adjusted to present more or less surface below the burner-lips, also, by means of a threaded feed in the interior wall of the burner. This adjustment of the deflector is sometimes important, on account of the varying specific gravities of the different grades of gas or vapor in use, presenting, according to circumstances, varying areas of flame to obviate the loss of gas in smoke, and to secure the maximum illuminating-power.

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

1. In a lamp, the combination, with a central metallic tubular draft-chimney and an exterior air-chamber around the same, of an annular burner directed downward below the same, having annular air-outlets interior and exterior to the annular gas or vapor outlet or outlets, series of longitudinal gas-heating and expansive passages one above another alternating with series of transverse distributing and equalizing chambers, said passages and chambers being located between the escape-flue and the passage for the incoming air, whereby the gas or vapors are delivered to the burner, a refractory deflector adapted to be brought to incandescence by the temperature of the flame, and an air-tight globe inclosing the burner below, substantially as specified.

2. In an incandescent lamp, the body of the incandescent consisting of a refractory base coated with platinum or platinum salt, substantially as specified.

3. In an incandescent lamp, the body of the incandescent of soapstone coated with platinum, substantially as specified.

4. The combination, with an incandescing lamp having gas-heating chambers and air-heating chamber delivering to the burner at its lower end, of the vaporizing attachment above adapted to be operated by the conveyed heat from the flame below, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY G. O'NEILL.

Witnesses:
THEO. MUNGEN,
PHILIP C. MASI.