(No Model.) 2 Sheets—Sheet 1.

D. W. SUGG.

INVERTED GAS LAMP.

No. 407,622. Patented July 23, 1889.

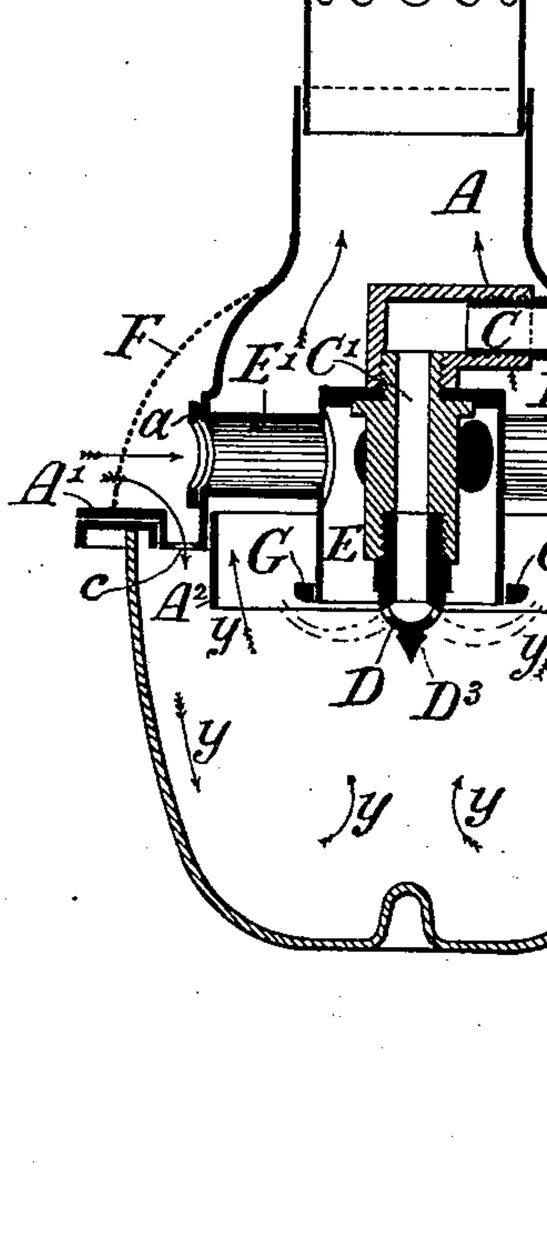

Fig. 2.

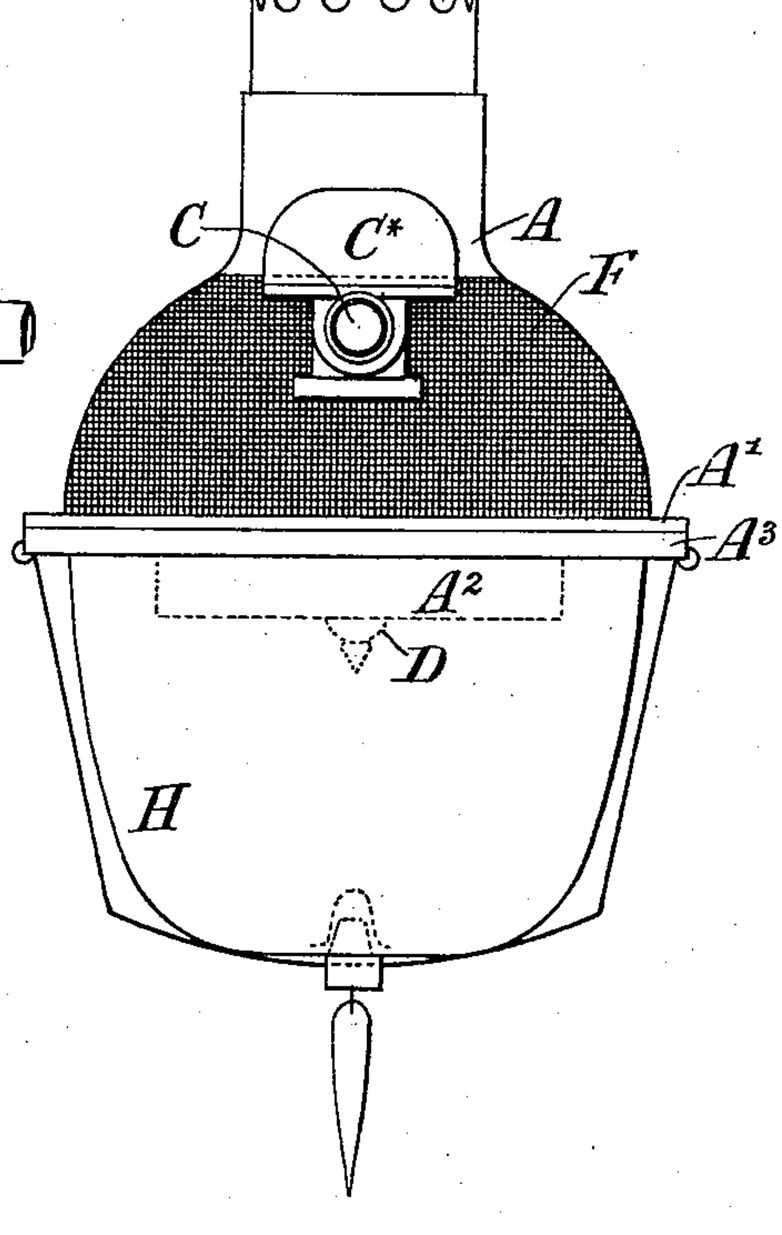

Fig. 1.

Witnesses:
C. Sundgren
Emil Herter.

Inventor:
David W. Sugg
by his Attorneys
Brown & Hall

(No Model.) 2 Sheets—Sheet 2.

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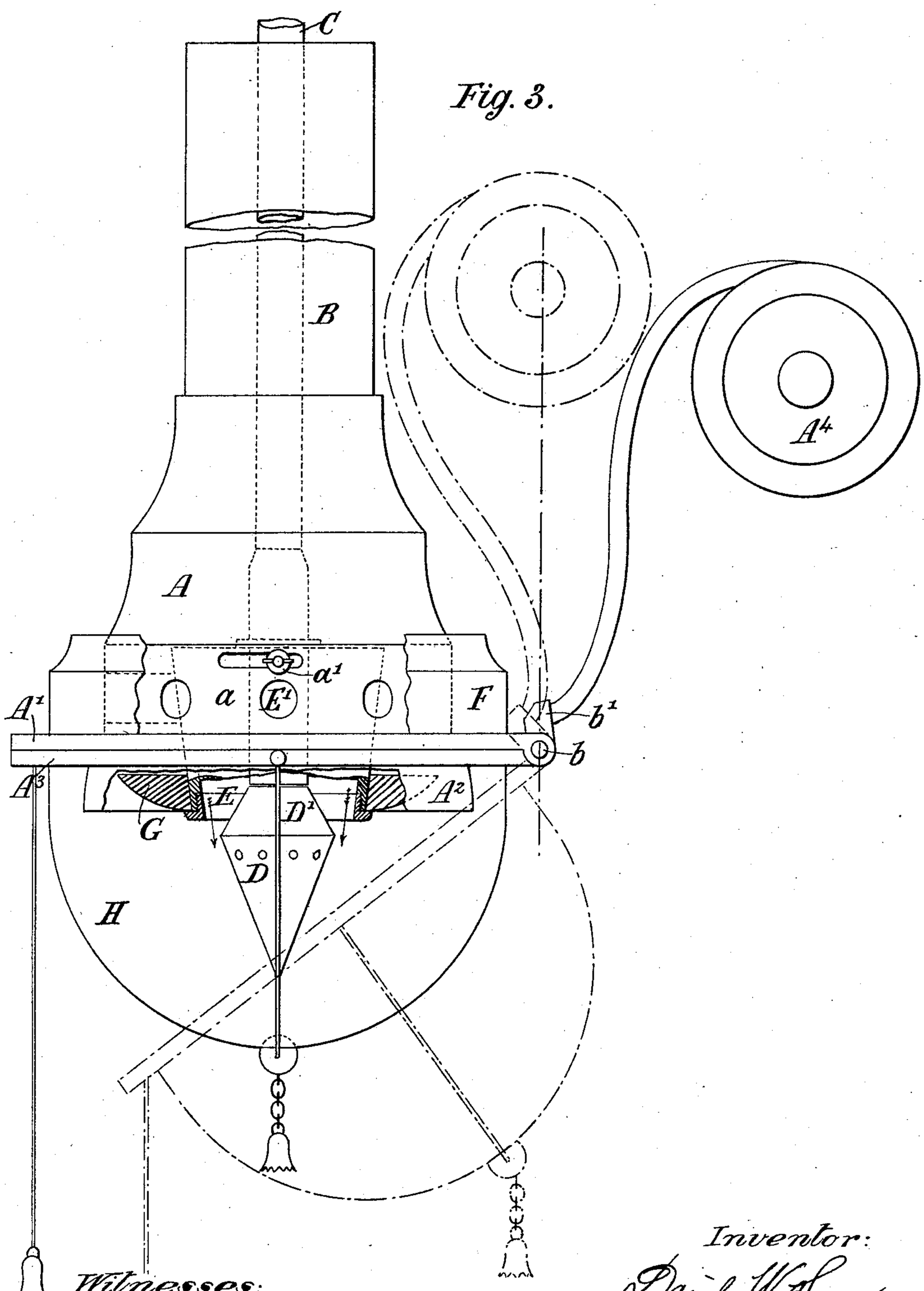

Fig. 3.

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Inventor:
David W. Sugg
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UNITED STATES PATENT OFFICE.

DAVID W. SUGG, OF WESTMINSTER, ENGLAND.

INVERTED GAS-LAMP.

SPECIFICATION forming part of Letters Patent No. 407,622, dated July 23, 1889.

Application filed January 28, 1886. Serial No. 190,002. (No model.) Patented in England February 21, 1884, No. 3,707; in France March 28, 1885, No. 167,948; in Belgium November 21, 1885, No. 70,937; in Italy June 26, 1886, XXXIX, 394; in Spain September 18, 1886, No. 9,483, and in Austria-Hungary October 1, 1886, No. 20,909.

To all whom it may concern:

Be it known that I, DAVID WILLIAM SUGG, of Vincent Works, Vincent Street, in the city of Westminster, England, have invented a new and useful Improvement in Inverted Gas-Lamps, (and upon which I have obtained Letters Patent as follows: England, February 21, 1884, No. 3,707; France, March 28, 1885, No. 167,948; Belgium, November 21, 1885, No. 70,937; Italy, June 26, 1886, No. 394, Vol. 39; Austria, October 1, 1886, No. 20,909, and Spain, September 18, 1886, No. 9,483,) of which the following is a specification.

This invention relates to what are now known as "inverted gas-lamps;" and the object of the invention is to obtain more perfect combustion and a considerable increase in the lighting-power of the flame of an inverted gas-burner than heretofore, and otherwise to improve the character of this class of lamp.

My invention is applicable either to street-lighting or for domestic purposes.

In the accompanying drawings, Figure 1, Sheet I, is a side elevation (full size) of a lamp for domestic use. Fig. 2 is a vertical section of the same. Fig. 3, Sheet II, is a side elevation (full size) of a lamp, showing the means of securing the glass globe so as to permit of its being readily opened and closed for lighting and other purposes.

A is a bell-shaped or other hollow body—say of brass—which is formed with an external annular flange A′ at its lower extremity, and is secured to the end of a tube B, which serves as a chimney. This chimney may at its lower end be perforated, by which means an upward flow of cold external air is induced, which keeps the chimney cool.

C is the gas-supply pipe, the outer end of which may be secured by a ball-and-socket or other suitable joint to the ceiling, or in any other convenient manner to the wall or other part of the apartment. To the inner end of the pipe C is secured a socket C′, into which screws the gas-burner D. The gas-supply is regulated by a governor C×, suitably placed at some convenient point on the gas-pipe C. The socket C′ supports an apron or air-casing E, which surrounds the burner-tip D, and is here represented as made in the form of a cylinder having a closed upper end and an open lower end, and to which the external air is supplied by the radial tubes or hollow arms E′, and which I term the "air-cylinder" or "cone." These tubes are screwed into the walls of the cylinder or cone E, and are inserted through corresponding holes in the body A, so that the external air for supporting combustion can pass direct to the air-cylinder or cone. The number of the tubes E′ will vary according to the size of the lamp; but for a lamp of the size shown in Fig. 1 five tubes will be sufficient, while for the lamp in Fig. 3 ten may be used.

The tubes E′ are inserted near the mouth of the bell-shaped body A, and the air-cylinder or cone E will project some distance below the body A. The burner D projects slightly beyond the cylinder or cone, so that the gas will issue at a lower level than the mouth of the cylinder or cone. The lower end of the air casing, cylinder, or cone E is entirely open and is very much larger in diameter than the burner-tip B. The internal diameter of the air-casing E is here represented as about three times as large as the burner-tip, where its orifices are placed.

In some other forms of inverted burner the air to support combustion before it reaches the flame has been caused to pass by a more or less circuitous route, in which it becomes highly heated, and it is thereby supposed to increase the illuminating-power of the flame. In other words, the object sought to be obtained is to produce a regenerative burner. In my opinion, which is well borne out by results, the regenerative principles are not those which produce the best effect, the essential points to be attained consisting, first, in causing the air at considerable velocity to strike the flame at or about a right angle at the point of ignition of the gas, and, second, in retaining the carbon of the gas in contact with the air a sufficiently long time to insure a thorough combination of the oxygen of the air with the carbon of the gas.

Outside the body A is a perforated band *a*, which is intended to regulate the size of the

air-openings, as required. When properly set, this band is secured by a screw *a a'*, as shown in Fig. 3, or in any other convenient manner. To prevent a too great rush and to break up the currents of air, the openings are covered with a wire-gauze guard F.

Outside of and supported by the air-cylinder E is a flange or deflector G, the diameter of which varies according to the size of the lamp, and which serves to prevent the currents of air turning up the chimney immediately after they leave the air-cone, or, in other words, keeps the air in contact with the flame.

It is well known that with vertical flat flames it is almost impossible to obtain perfect combustion, as the currents of air rise parallel with the flame and are not forced to commingle therewith, so that the oxygen of the air does not properly combine with the carbon of the gas, but, becoming heated, passes away rapidly, carrying with it much of the carbon. Thus a yellowish instead of a clear white flame is produced, and the air of the apartment is vitiated by the smoke arising through the non-consumption of the carbon. A similar effect results from ordinary flat flames when used horizontally, as in sun-burners, the smoke arising in this case being greater than in the former, even when high-pressure burners are employed, which is usually the case in this class of burner, with a view to avoid as much as possible the formation of smoke.

In Fig. 2 it will be seen that the diameter of the air cylinder or cone E is considerably greater than the diameter of the burner, so that there will be a considerable volume of air descending, which will beat down the flame and cause it to spread out into a saucer shape. Thus the air will be forced into contact with the flame at the moment the gas issues from the burner, whereby the blue portion generally found in most gas-flames is converted into a luminous portion and the illuminating-power of a given quantity of gas is considerably increased. Furthermore, the tendency of the flame is to rise, while the tendency of the air is to descend, so that there is, so to speak, a continual battle going on between the two forces, so that the air becomes thoroughly mixed with the gas.

By the employment of my open cylinder E and the flange G the air is forced not only into contact with the flame, but is caused to remain for a sufficient length of time in contact therewith to allow its oxygen properly to combine with the carbon of the gas before passing to the chimney, and I thereby obtain almost perfect combustion. The gasways in the burner are set at an angle of about forty-five degrees, so that the gas on issuing from the burner will start in a slightly downward direction. The products of combustion will pass off round the flange G to the chimney; but to insure this taking place I form the body A with a petticoat or prolongation A^2, or I may fit into the mouth of the bell-body a ring, which forms a directing-guard not only to turn the products of combustion up the chimney, but to prevent their striking on the glass globe H, which surrounds the burner. This guard A^2 should be set so that its lower edge is at or about on a level with the external openings of the gasways in the burner. The guard A^2, in combination with the globe, also serves to give direction to the currents of air entering from the outside by the holes *c c* in the perforated air-distributer formed in the flange A' of the body A, and by means of which the glass globe is kept comparatively cool and the under side of the flame is supplied with oxygen. For these purposes the said guard A^2 is made either with a flaring mouth or opening at its lower edge, as shown in Fig. 3, or at least with a mouth that is wide open or uncontracted, as shown in Fig. 2. The direction taken by these currents of air is indicated by the arrows *y y*.

For large lamps the mouth of the cylinder or cone E should be more or less contracted, in order to obtain the necessary velocity in the air-supply to produce the best results. To obtain this velocity I find it most convenient to form the burner, as shown in Fig. 3, with a conical upper portion D', which is screwed onto the gas-pipe C. By raising or lowering this cone the annular opening of the cylinder E will be contracted or enlarged, as required. In all cases, however, the circumference of the mouth or lower opening of the cylinder or cone E must be larger than the circumference of a circle circumscribing the circle of the external orifices of the ring of jets or gasways in the burner for the following reason, viz: The air is thereby caused to impinge on the flame at the point of ignition of the gas and becomes sufficiently incorporated therewith to consume all the carbon of the gas at an early period, and thus practically the whole of the flame is luminous, whereas in the opposite case the air would receive a direction parallel to the flame, and the result would be imperfect combustion, owing to the oxygen not being supplied in sufficient quantity to consume all the carbon and the stopping up of the chimney and passages with a carbon deposit. In this class of lamp the globe has to be removed in order to light or relight the burner, and as the lamp is often placed at some height from the floor this necessitates the use of a pair of steps or standing on a chair, with the attendant risk of letting the globe fall and breaking it. Moreover, the glass after the lamp has been burning becomes exceedingly hot, and it is impossible to handle it to relight the lamp should the gas be put out accidentally. Now, to avoid these inconveniences I so construct the lamp that the glass may be readily pushed on one side to open it for lighting the burner and equally readily closed when the burner is lighted. The glass globe H is secured to an annular

frame A^3 or ring, preferably channel-shaped in cross-section, which is hinged to the flange A′ of the lamp-body A.

To the globe-frame, at or near the hinge, I attach a weight A^4, which is so arranged that it will retain the globe-frame in either the open or closed positions as long as may be required.

In Fig. 3 I have shown one arrangement for effecting my object. The frame A^3 is hinged at *b* to the body A, and is provided with a projection, tail-piece, or stop *b′*, which will regulate the distance the frame A^3 is to open. A^4 is a counter-weight, which in the drawings is shown as screwed into the projection *b′*. This counter-weight must exactly counterpoise the frame A^3, so that in whatever position the frame may be placed it will remain in that position. The position and form of the weight are capable of modification. Thus the weight may surround externally the body A of the lamp, and it may be pivoted to a lug secured to the body A. The weight is provided with a tail or projection, which rests against the projection *b′* of the globe-frame A^3. As the globe with its frame is tipped on one side, the projection *b′* will press against the tail-piece of the weight and raise the weight A^4, and as the weight exactly counterpoises the frame and globe it will remain in that position until the globe is closed. In the two examples above described the tipping of the globe into the dotted position, Fig. 3, Sheet II, is effected by pushing it gently on the side opposite to the hinge with the lighting-torch; or a less weight than that necessary to counterpoise the globe may be secured to the projection *b′*, as in Fig. 3, and an extra weight may be provided, which will more than counterbalance the frame and globe, and which is attached to the main weight A^4 by a cord, chain, or rod. The opening of the globe will be effected by raising the auxiliary weight with the hand or otherwise, so that the greater weight of the globe and frame will overcome that of the main weight.

The main weight A^4 is so arranged that when the globe is open the greater portion of its weight will be thrown on the inside of the vertical line drawn through the hinge, and this, added to the weight of the globe and frame, will overcome the auxiliary weight and serve to maintain the globe in the open position, the closed position being regained by pulling on the auxiliary weight.

As lamps of this class will usually be swinging lamps, it will be evident that to place a weight on one side thereof will tend to throw them out of the vertical, and to prevent this I secure to the other side of the lamp an equivalent weight, which will maintain the equilibrium. In most cases the weight will be hidden from view by being inclosed in a glass vase or other ornamental casing secured to the lamp.

I may find it advantageous to use a pilot-light, as shown at W, Fig. 2.

D designates a burner-tip, and D^3 a pipe or extension thereof.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

In a lamp, the combination, with the shell, of a downwardly-extending gas-tip, a cylindrical apron having a closed upper end and an open lower end surrounding said gas-tip at such distance therefrom as to leave an annular air-space between said apron and the gas-tip, air-tubes opening upon the outside of said shell and communicating with the interior of said apron, perforations in said gas-tip below the lower end of said apron and extending obliquely to the axis of the gas-tip, a deflector at the lower end of said apron, a petticoat having open upper and lower ends and surrounding said apron at a distance therefrom, a perforated air-distributer between said petticoat and the outside of the lamp, and a cup-shaped globe secured upon the lamp into which the gas-tip extends and which receives the air from said air-distributer to be passed to the under side of the flame, substantially as specified.

DAVID W. SUGG.

Witnesses:
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