F. H. SHEPHERD.

Vapor-Generating Burner.

No. 211,113. Patented Jan. 7, 1879.

Fig 1.

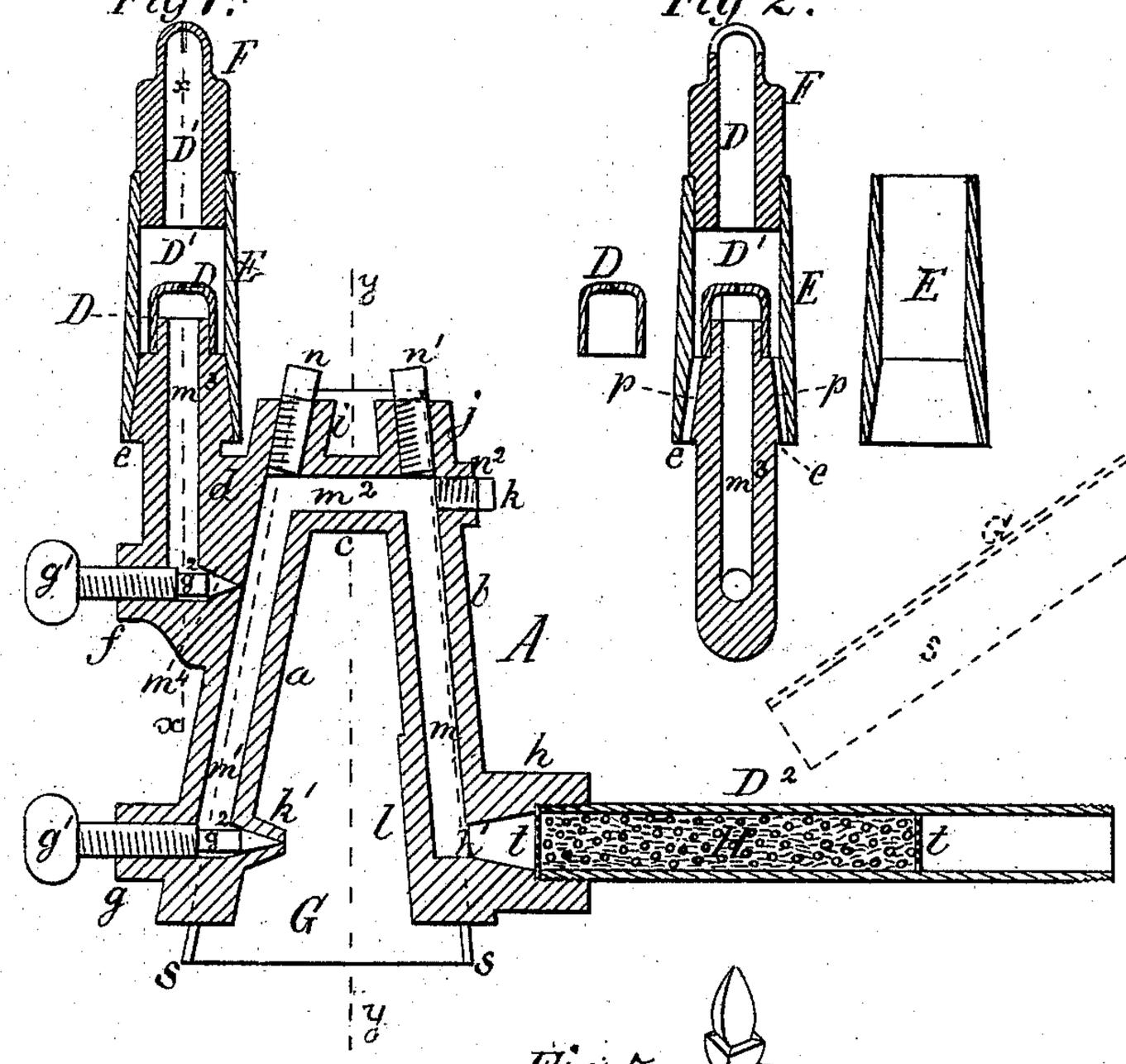

Fig 2.

Fig 3.

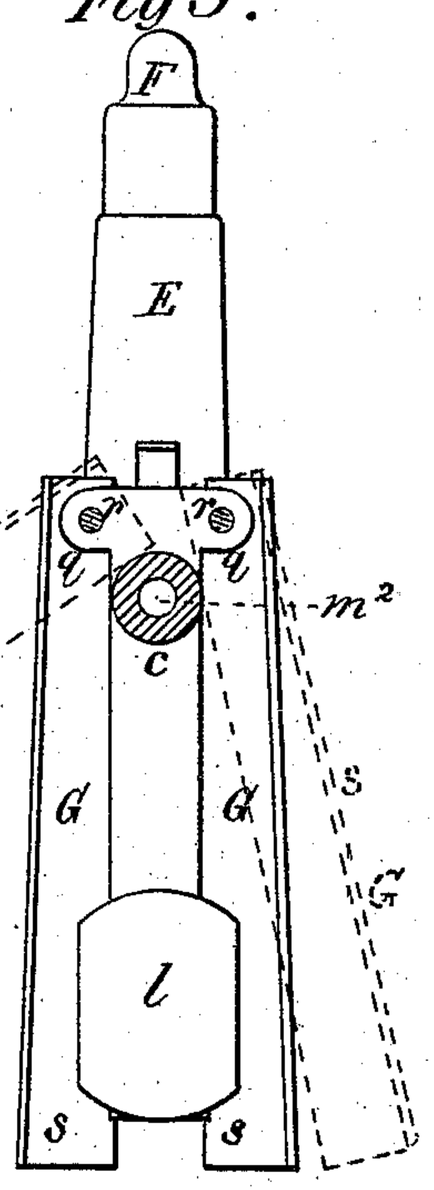

Fig 4.

Fig 5.

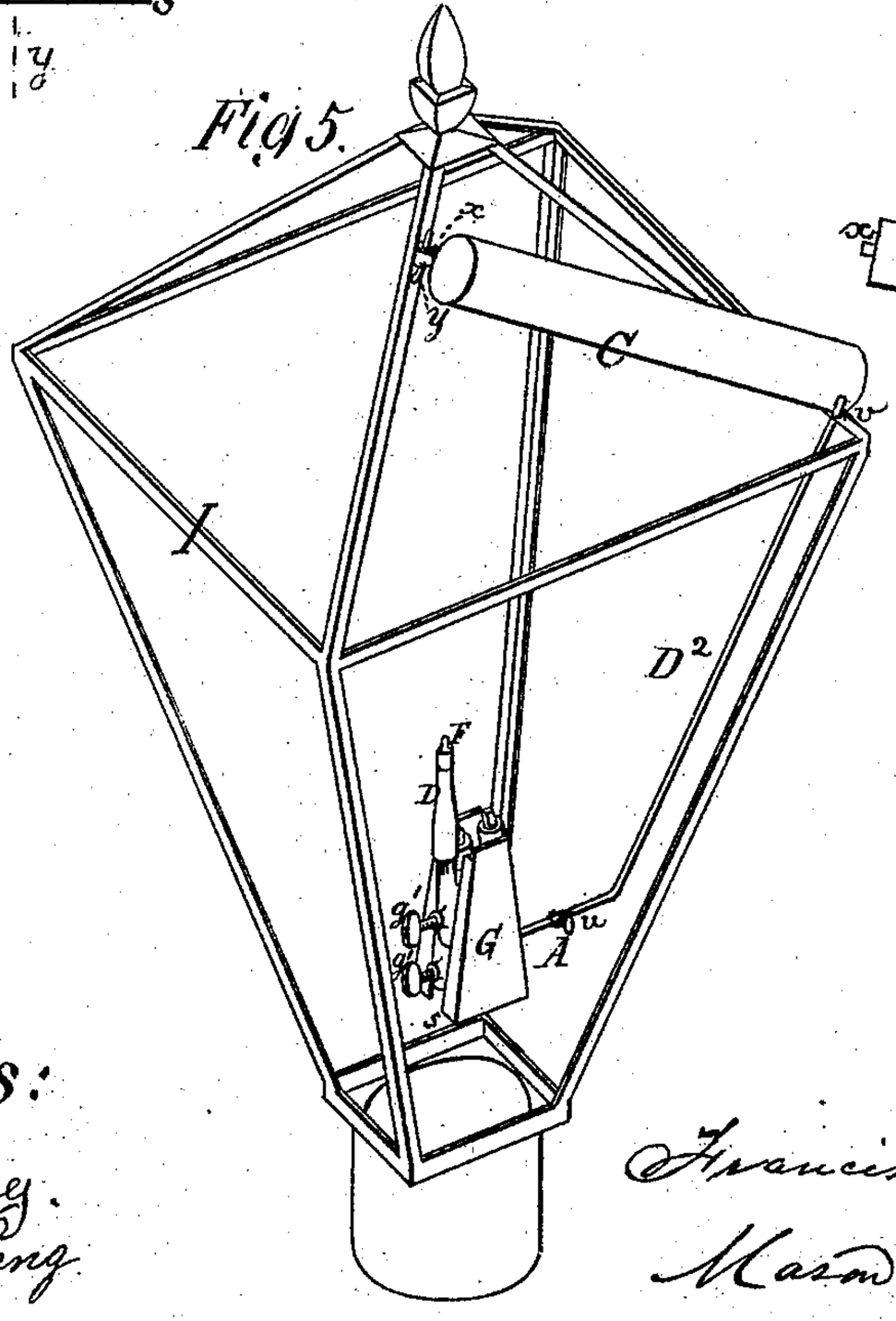

Fig 6.

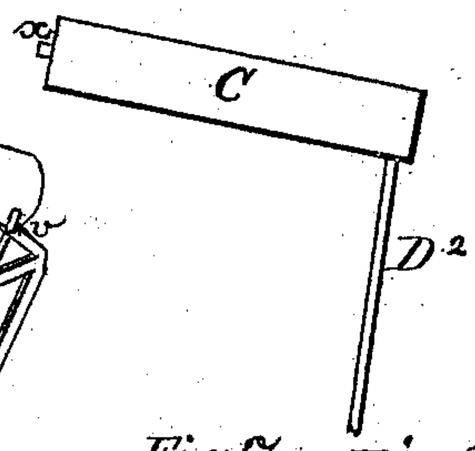

Fig 7. Fig 8.

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UNITED STATES PATENT OFFICE.

FRANCIS H. SHEPHERD, OF DAVENPORT, IOWA, ASSIGNOR TO SHEPHERD VAPOR GAS CO., OF SAME PLACE.

IMPROVEMENT IN VAPOR-GENERATING BURNERS.

Specification forming part of Letters Patent No. **211,113**, dated January 7, 1879; application filed November 14, 1878.

To all whom it may concern:

Be it known that I, FRANCIS H. SHEPHERD, of Davenport, Scott county, State of Iowa, have invented a new and useful Improvement in Vapor-Generating Burners and mode of attachment of same to street-lamps; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical longitudinal central section of my improved vapor-generating burner, enlarged, and disconnected from the fluid-reservoir and street-lamp. Fig. 2 is a vertical transverse section in the line *x x* of Fig. 1. Fig. 3 is a vertical transverse section in the line *y y* of Fig. 1. Fig. 4 is a detail view of one of the packing-beads of the supply-tube. Fig. 5 is a perspective view of a street-lamp with the fluid-reservoir and the vapor-generating burner applied to it; and Fig. 6, a detail view of the oil-reservoir and a portion of its conveying-tube; and Figs. 7 and 8 are end and top views of the same detail.

My invention relates to an improvement in that description of vapor-burner which employs an auxiliary burner or jet for vaporizing the fluid in its flow from the reservoir which contains it to the main burner or jet which produces the flame for illumination.

The nature of my invention consists in certain constructions, combinations, and arrangements of parts, as hereinafter described and specifically claimed, whereby cheapness in construction, durability, and convenience of manipulation are secured; also, convenience and cheapness of repair, and of application to a lamp-post are afforded; also, all inconvenience from too rapid flow of oil from the reservoir to the auxiliary and main jets is avoided; also, great nicety of adjustment of the supply of unoxidized vapor to the auxiliary burner used for generating the vapor from the fluid, and of the vapor or gas generated to the oxidizing-chamber and main jet or burner is effected; and also a vapor-generator is produced in which the unoxidized vapor is used for heating the plate and its adjuncts for converting the fluid into gaseous vapor, and the chamber in which the air is mixed with the vapor is located remote from the chamber in which it is generated, and thus only unoxidized vapor is passed through the heating-jet and then used for heating purposes, and only vapor which is oxidized on its way to the illumination-jet is used for illumination.

The whole arrangement is also such that the draft of the heating-jet is maintained while the heater and nearly every part of the generator are inclosed in a jointed case, which can be opened and closed without being detached from the apparatus. The mixing or oxidizing chamber is also detachable, for the purpose of allowing access to the removable needle-hole collet, and the replacement of the collet when it is worn out by a new one, thus saving the expense of a new generator and vapor-burner.

The generator and burner A is formed mainly of a single casting of metal, adapted for having the various apertures and passages drilled in it, as shown in the drawings. The casting is formed with two downwardly-divergent limbs, *a b*, which are united near their upper ends by a horizontal branch, *c*. On one of the limbs a vertical branch, *d*, is formed, starting about midway of the height of the limb *a*, and terminating a short distance above the top of the same.

The casting is formed with a collar and short lateral and longitudinal extensions, as at *e f g h i j k*, and also with a conical extension, *k'*, on the inner lower portion of its limb *a*, and a broad surface-plate, *l*, on the lower inner portion of its limb *b*, as shown in Figs. 1 and 2 of the drawings.

The limbs *a* and *b* are drilled downward through the extensions *i j* to a point a little below the centers of the extensions *g h;* and the branch *c* is drilled horizontally through the extension *k* to a point which intersects the chambers *m* m^1 of the limbs *a* and *b*. The passage m^2 thus formed in the branch *c* is the means of communication from chamber *m* to chamber m^1. The drill-holes in the extensions *i j k* are plugged gas-tight by square-headed screw-plugs *n* n^1 n^2, which can be removed for cleaning out the chambers *m* m^1 and passage m^2. The extension *g* is drilled cylindrically

until it intersects the chamber m^1, and then a conical drill is made to drill a conical passage through the conical extension k'. By this operation an auxiliary jet-tube for heating purposes is formed at k'. The passage formed in the extension g is screw-tapped, and a regulating-screw, g^1, having a reduced cylindrical end, g^2, is fitted to it, as shown. The extension h is drilled through, so as to have the passage h' formed in it intersect the chamber m of the limb b. For a short distance the passage h' is enlarged by a counterbore, and into this enlarged portion a tube, D^2, is inserted, as shown. This tube connects with the supply-reservoir C, as will be presently described.

The branch d of the metal casting for the burner and generator A is drilled downward to near its bottom, and a chamber, m^3, is thereby formed; and the extension f of this branch is drilled through horizontal with a cylindrical drill until the chamber m^3 is intersected by the passage formed in the extension f, and then a conical drill is used to drill a conical jet-passage, m^4, through the outer portion of the limb a of the casting, and thereby form a jet communication between chambers m m^1 and chamber m^3. The passage in the extension f is constructed and provided with a regulating-screw, g^1, in the same manner as the passage in extension g. On top of the branch d a removable collet, D, with a needle-hole through its top, is fitted, so as to rest upon the collar e, as shown. On the outside of the collar e, at opposite points, vertical air-grooves p are formed, as shown in Fig. 2.

Around the collar of the branch d a long tube, E, is fitted by means of a tapering joint, and on top of this tube the main gas or vapor burner or tip F, with slit in it, is fitted.

Between the slitted portion of the burner F and the collet D a vapor-mixing chamber, D^1, is formed, as shown.

The casting of the generator and burner A has lugs q q formed on it, and through these lugs pins r r are passed. On the outer ends of the pins r flanged and flaring plates G G are hinged. These plates G, with their flanges, form a vertical draft-chamber, and exclude lateral blasts of air from the jet at k', and also confine the heat which is produced for generating the vapor between the limbs a and b until it escapes over the top ends of said plates.

From an inspection of the drawings it will be seen that the flanges s s of the plates G fit against the surfaces of the limbs a b, and thus, in conjunction with these limbs, form a pyramidal-shaped tube, open at top and bottom.

The tube D^2 is packed with beads, or beads and asbestus, as signified in Fig. 1 at H. This packing is confined at both ends by wire-gauze diaphragms t t. Beyond this packing a supply-cock, u, is provided. From the cock u the pipe or tube D^2 is extended up to and in communication with the fluid-reservoir C, it being first passed through a hole, v, in one of the inclined frame-pieces of the street-lamp I. The fluid-reservoir is provided with an eye-lug or loop-extension, x, and the street-lamp frame I with a hook, y. The loop x is passed over the hook y, and by such means, together with the tube D^2, which is passed down through the hole v of the lamp-frame, the reservoir is firmly held in an inclined position on the outside of the lamp-frame, as shown in the drawings.

The operation is as follows: Oil is supplied from the reservoir C through the supply-tube D^2 to the cock u. The flame of a spirit-lamp is now applied directly under the hinged plates G and heater-plate surface l, and when these parts are sufficiently heated, which occurs in about ten or fifteen seconds, a small quantity of fluid is allowed to flow through cock u (by opening said cock) into the packed pipe D^2. This fluid percolates slowly through the beads, or beads and asbestus, and, entering at h', strikes against the inner side of hot plate-surface l of chamber m, and by the action of heat thereof is vaporized and caused to fill the chamber m, passage m^2, and chamber m^1. The flame of the lamp may now be withdrawn and the jet-tube k' opened by turning back the regulating-screw g^1 opposite to it. This done, the jet from tube k' is lighted. The flame from the jet at k' strikes the outside of the broad surface-plate l of limb b centrally, and spreads laterally in opposite directions, and thereby heats the fluid at the moment of its entrance into chamber m to such an extent as to insure its vaporization. The full flow of fluid is now turned on at the cock u. In time the limbs a and b become intensely hot, and the unoxidized substance ascends in chamber m through passage m^2, and descends into chamber m^1, and passes out of the jet at k'. The gaseous vapor which cannot escape at k' becomes compressed in chamber m^1, and, the screw g^1 opposite passage m^4 being turned back, it escapes through the open conical jet-passage m^4 into the chamber m^3, and from thence flows through the needle-hole of the removable collet D into the mixing or oxidizing chamber D^1. Here the gaseous vapor is met by currents of air, which flow into the chamber D^1 through the upward-ascending channels or grooves p p, and, when thoroughly oxidized, escapes through the slit of the burner F, and is burned for the purposes of illumination.

The mode of attaching the reservoir to the street-lamp frame by means of a hook and loop, and the conducting-tube passed through a hole, as shown, is of value, since it avoids expense in the application of the invention.

The bead packing, or a packing of beads and asbestus mingled together in the tube D^2, affords advantages, as the same controls the flow of the oil, and is not liable to become clogged and corroded.

The arrangement of the heating surface-plate l opposite the point where the oil first enters, in connection with the upward and downward flowing of the vaporized unoxidized substance through the limbs b and a of the gener-

ator, together with the discharge of the vapor at k' for heating purposes, and its discharge above k' through the jet-passage m^4, is a very effective mode of insuring perfect vaporization of the fluid before it arrives at the mixing-chamber D^1.

The application of the regulating-screws g^1 on the side of the generator and burner A is a very useful improvement, as by this plan long screws extending vertically through the passages leading to the jet-tubes are dispensed with.

The employment of screws of the construction shown for regulating the flow of the gaseous vapor is important, as they not only serve for shutting off the gaseous vapor, but also for controlling its extent of flow, the upper screw g^1 serving to regulate the size of the main jet to the minimum and maximum.

The removable collet D enables the user to take off a worn-out collet and replace it with a new one at trifling cost.

The air-passages and air-chamber, whereby the vapor is oxidized before it passes through the main burner, insure a rich inflammable vapor for the flame-burner.

The hinged plates G, together with their flanges s, form a draft-tube, which insures a supply of air to the vapor-jet at k', and at the same time confines the hot air about the limbs a and b of the generator and burner A; and the plates, by being hinged, afford convenience for ready access to the jet k'.

The asbestus packing, with the beads mingled with it, will not only serve to prevent too rapid flow of the oil from the reservoir, but will also prevent the passage of too much heat toward the fluid-reservoir, and thus accidents from explosions at the reservoir will be prevented.

Having described my invention, what I claim is—

1. The single casting for a vapor burner and generator, consisting of the limbs $a\ b$, branches $c\ d$, extensions $f\ g\ h\ i\ j\ k$, collar e, surface l, lugs $q\ q$, and conical extension k', substantially as and for the purpose described.

2. The single casting for a vapor burner and generator, provided with passages and chambers drilled into it in the lines of the extensions $f\ g\ h\ i\ j\ k$, and down the branch d to the passage in extension f, substantially as and for the purpose described.

3. The combination of the chamber m, passage m^2, chamber m^1, jet-passages at k' and m^4, and heating surface-plate l, and chamber m^3, substantially as and for the purpose described.

4. The chamber m^1, with its jet-escape passage at k' for the unoxidized vapor opposite the vapor-generating chamber m, and with a jet-escape passage, m^4, on a higher plane for the vapor to pass to the oxidizing-chamber and thence to the main burner, substantially as and for the purpose described.

5. The regulating-screws g^1, applied horizontally and opposite the vapor-jet passages at m^4 and k', in combination with the chamber m^1, passage m^2, and chamber m, for the purpose of controlling the escape of the vapor from the chamber m^1, and for regulating the size of the main jet and heater flame, substantially as and for the purpose described.

6. The casting, of angular or arched form, with chambers and passage thereof of corresponding form, the said chambers or passage being tubes of themselves, and connecting with one another in the manner shown, whereby the vapor is generated at the lower portion of chamber m, and is then compelled to pass upward in contact with heated surfaces, then horizontally, and then downward to the auxiliary burner at k', substantially as and for the purpose described.

7. The combination of the removable collet D, having a needle-hole in its top, and the chambers $D^1\ m^3\ m^1\ m$, passages $m^2\ m^4$, and main burner or tip F, substantially as and for the purpose described.

8. The air and vapor mixing chamber D^1, formed by a removable tube-section, E, in combination with the chamber m^3, passage m^4, chamber m^1, air-passages $p\ p$, and main burner F, substantially as and for the purpose described.

9. The hinged and flanged plates G G, in combination with the vapor burner and generator, substantially as and for the purpose described.

10. The combination of the reservoir C, applied in position by the devices described, supply-tube D^2, bead or bead and asbestus packing H, and the vapor burner and generator, substantially as and for the purpose described.

11. The reservoir C, having the loop or eye-lug x, in combination with the lamp-frame I, having a passage, v, and with the tube D^2, substantially as and for the purpose described.

12. The combination of the vapor-burner tip F, chamber D^1, having air-inlets between the tube E and collar e, the removable collet D, having an aperture in its top, and the chamber m^3, substantially as and for the purpose described.

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Witnesses:
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