No. 711,512. Patented Oct. 21, 1902.

E. B. LUDWIG.

GAS GENERATOR FOR STREET LAMPS.

(Application filed Apr. 5, 1901.)

(No Model.) 2 Sheets—Sheet 1.

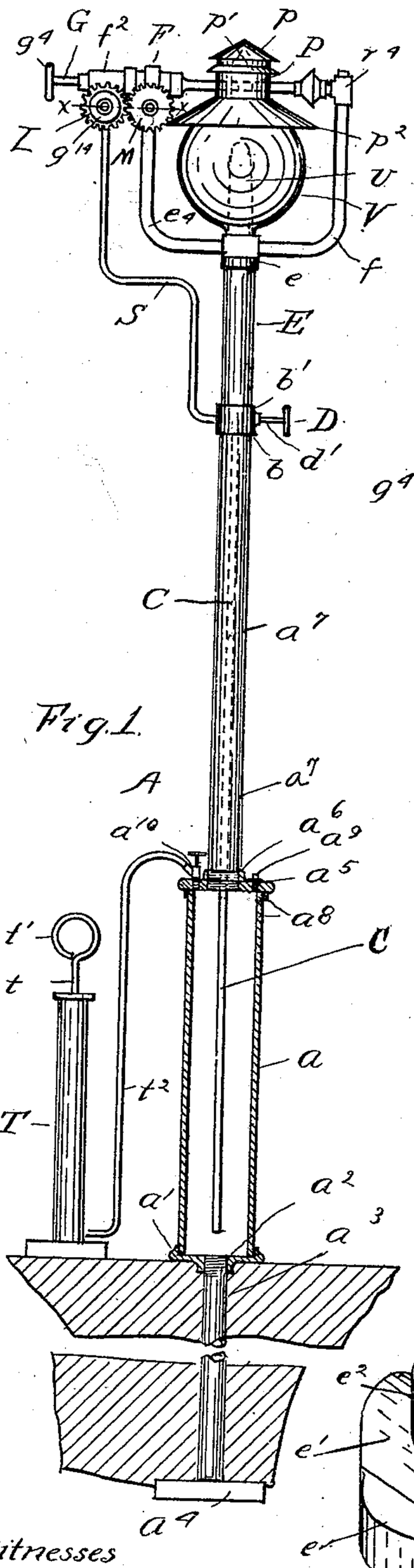

Fig. 1.

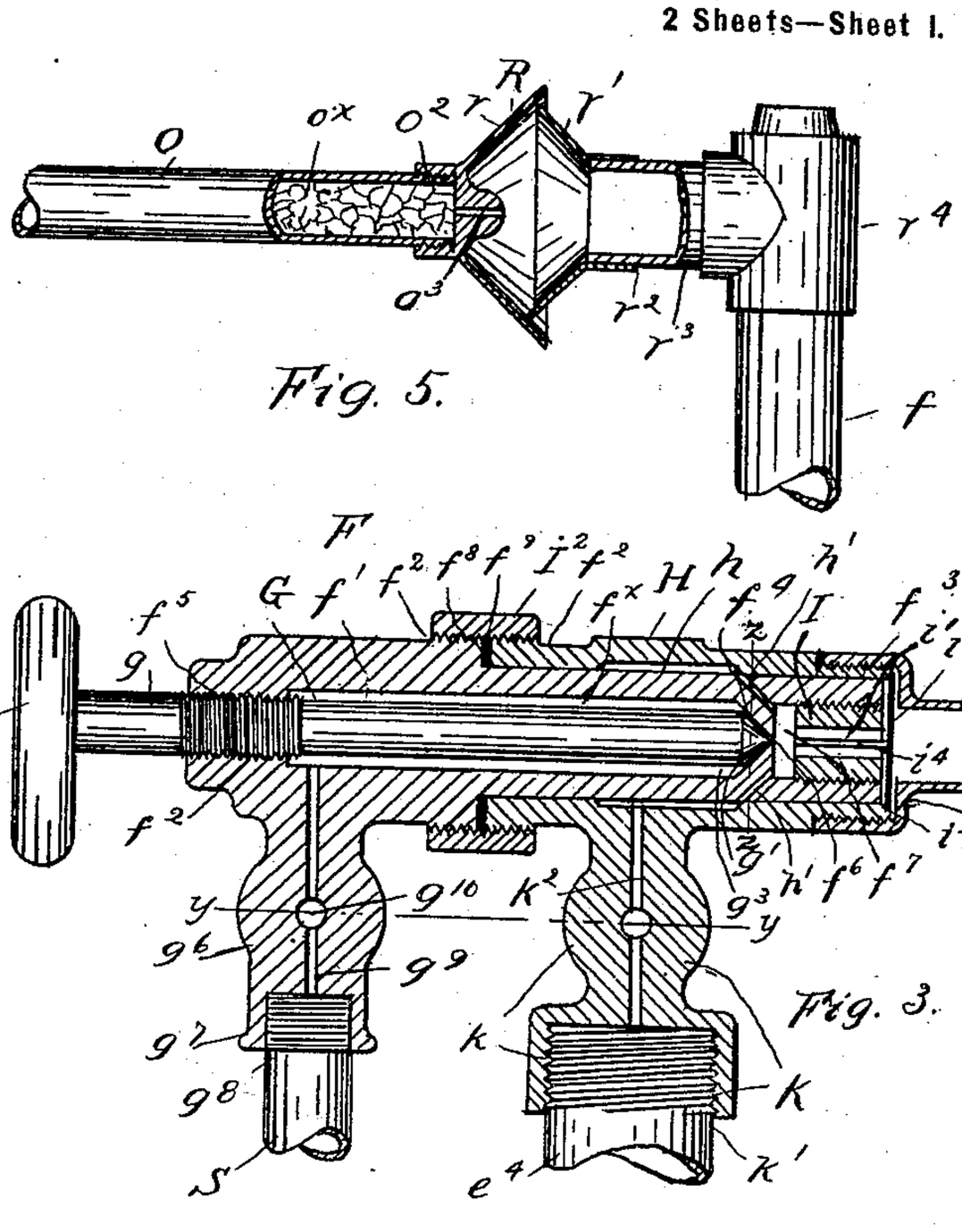

Fig. 5.

Fig. 3.

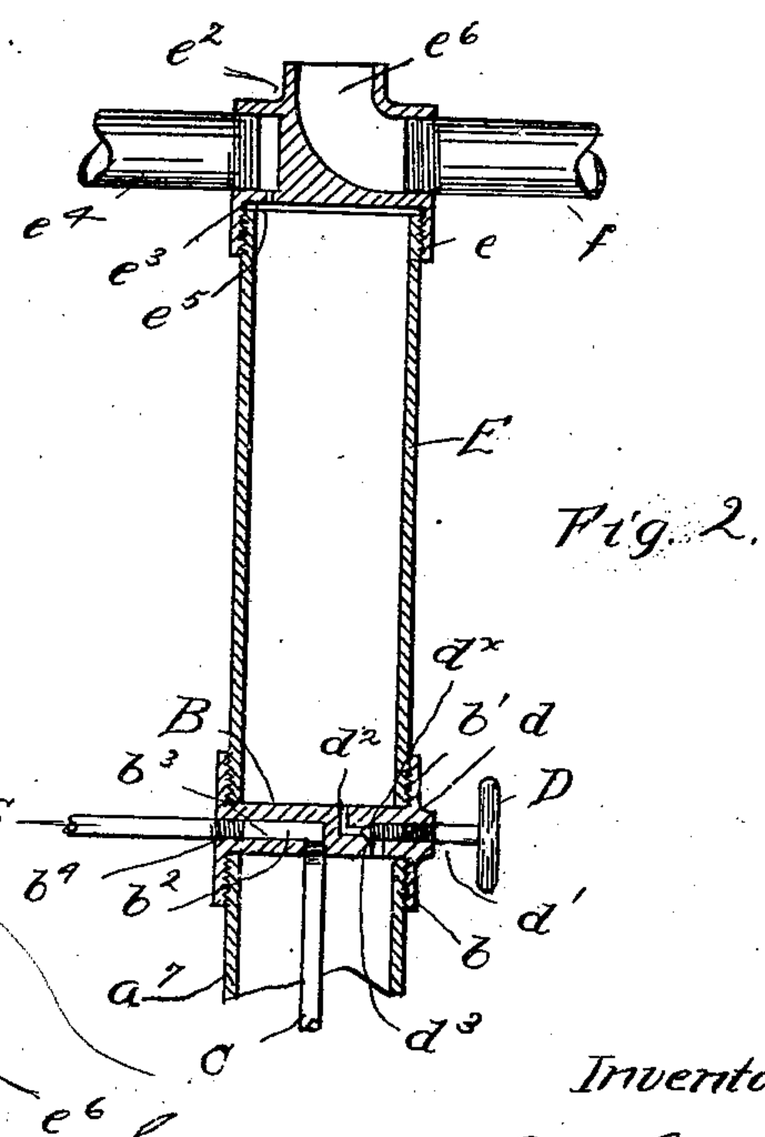

Fig. 2.

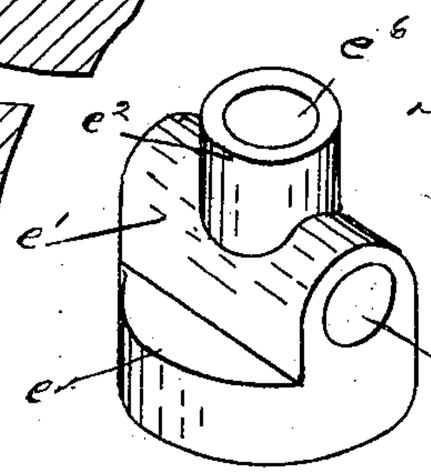

Fig. 6.

Witnesses

Theodore C. Sparks.

Annie L. Greer.

Inventor

Edmund B. Ludwig

By Richards & Manning Att'y.

No. 711,512. Patented Oct. 21, 1902.

E. B. LUDWIG.

GAS GENERATOR FOR STREET LAMPS.

(Application filed Apr. 5, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 9.

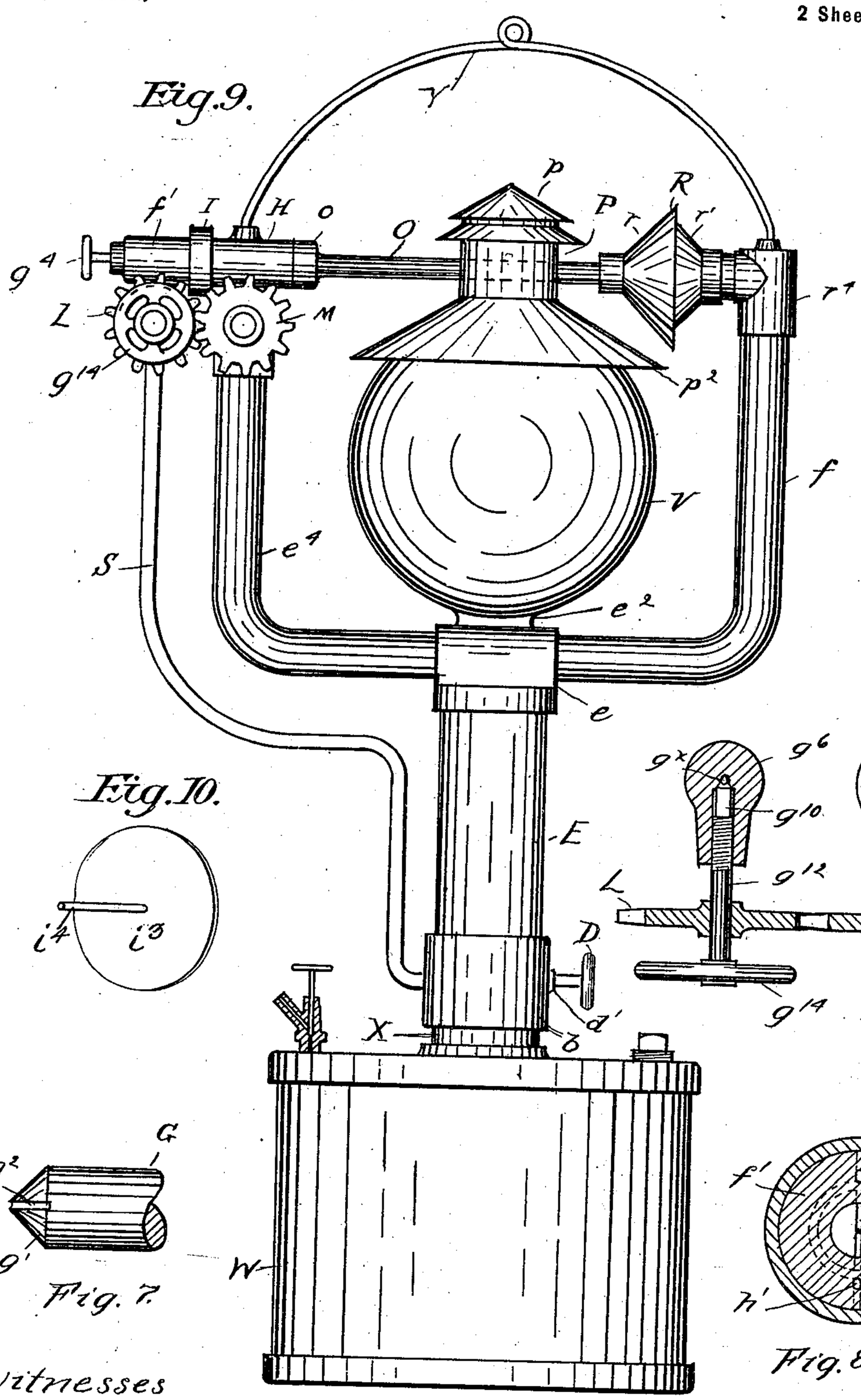

Fig. 10.

Fig 4

Fig. 7.

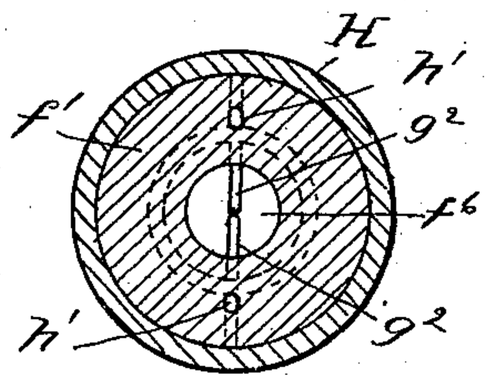

Fig. 8.

Witnesses
Theodore C. Sparks.
Annie L. Greer.

Inventor
Edmund B Ludwig
By Richards & Manning Att'y.

UNITED STATES PATENT OFFICE.

EDMUND B. LUDWIG, OF KANSAS CITY, MISSOURI.

GAS-GENERATOR FOR STREET-LAMPS.

SPECIFICATION forming part of Letters Patent No. 711,512, dated October 21, 1902.

Application filed April 5, 1901. Serial No. 54,476. (No model.)

To all whom it may concern:

Be it known that I, EDMUND B. LUDWIG, a citizen of the United States of America, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Gas-Generators for Street-Lamps; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The object of my invention, primarily, is a self-generating carbureting apparatus for street-lamps; second, the automatic regulation and supply of the vaporized carbureted agents in quantity; third, to comminute the liquid to be sprayed.

The invention consists in the novel combination and construction of parts, such as will be first fully described, and specifically pointed out in the claims.

In the drawings, Figure 1 is a view of the hollow liquid-receiving and compressed-air-storing lamp-post, partially in vertical section and its base anchored in the ground, also showing a side view of the self-generating lamp upon which the carbureting-valves for the liquid to be vaporized and the gas-mixing agents are operated and also the pump for compressing air. Fig. 2 is a vertical sectional view of the upper end of the lamp-supporting hollow post, showing the supplementary receiver for the compressed air and its valve, also showing the end of the delivery-pipes for the generated gas and for the delivery of the compressed air to the valve. Fig. 3 is a vertical sectional view of the vapor-spraying-device casing for the admission of the fluid to be vaporized under pressure and also showing a portion of the vaporizing or heating pipe and the balance-valve. Fig. 4 is a horizontal sectional view of the separate valves controlling the admission of the liquid to be vaporized and the gas-mixing agent to the spraying-valve casing, taken upon the line *x x* of Fig. 1 and also line *y y* of Fig. 3. Fig. 5 is a vertical sectional view of the fluid heating or vaporizing pipe and of the air and gas mixing chamber and a portion of the distributing-pipe for the generated gas, showing the adjustable sleeve connection for the movable part of the air and gas mixing chamber. Fig. 6 is a detail view in perspective of the cap upon the end of the supplementary receiver or pipe for compressed air. Fig. 7 is a detail view of the end of the valve-stem in the carbureting-valve casing, showing the groove in the cone-valved portion. Fig. 8 is a sectional view of the valve-casing, taken upon the line *z z* of Fig. 3, showing the orifices for the fluid and liquid. Fig. 9 is a view of the self-generating carbureting-lamp as in Fig. 1, enlarged, showing means for suspending the lamp, also showing the modified form of the receiver for the liquid to be vaporized under pressure. Fig. 10 is a detail view of the balance-valve.

Similar letters of reference indicate corresponding parts in all the figures of the drawings.

Referring to the drawings, A represents the hollow lamp-post for the reception of the liquid to be vaporized and which consists of an upright hollow cylinder or reservoir *a*, its lower end resting upon the surface of the ground. Both ends of the cylinder *a* are externally screw-threaded, and upon its lower end is an internally-screw-threaded flanged cap a', in which is a threaded opening a^2, in which is fitted the screw-threaded upper end of a rod a^3, the lower end of which rod penetrates the ground to a suitable depth and is connected rigidly with a circular anchoring-plate a^4. Upon the upper end of cylinder *a*, which extends the proper height, is a screw-threaded cap a^5, in which is a screw-threaded opening a^6, in which is fitted the externally-screw-threaded lower end of a tube or pipe a^7, which extends upwardly a considerable distance and is also externally screw-threaded at its upper end. At said upper end of pipe a^7 is a diaphragm B, of considerable thickness and larger in circumference than the pipe a^7. At the outer edge of and extending downwardly from the under side of the diaphragm B is an internally-screw-threaded annular flange *b*, which is fitted to the screw-threaded upper end of the pipe a^7. From the upper side and outer edge of the diaphragm B extends upwardly an internally-screw-threaded annular flange b'.

In the under side of diaphragm B at a point equidistant from its outer edge is formed a

screw-threaded opening b^2, extending nearly one-half the distance in the direction of the upper side of said diaphragm, in which is fitted the upper end of a small-sized fluid-conducting pipe C, the lower end of which pipe extends downwardly into the cylindrical receiver a and to a position a short distance above the bottom of said receiver or cap a'. Through one side of the diaphragm B is drilled an opening b^3, which extends to and communicates with the opening b^2 for pipe C, the outer end b^4 of which opening b^3 is screw-threaded. In the other side of diaphragm B in the direction of the opening b^2 is a screw-threaded opening d, in which is fitted a screw-threaded valve-stem d', the inner end of which stem is fitted to the valve-seat $d^\times$, and upon the other end of the stem is a hand-wheel D. Extending horizontally from the valve-seat $d^\times$ in the opening d a short distance is a tortuous passage d^2, smaller in size than the opening d, which is also extended at right angles upwardly through the upper surface of the diaphragm. In the under side of the diaphragm is an opening d^3, which communicates with the opening d a short distance from the valve-seat $d^\times$ toward the outer end of said opening.

In the screw-threaded annular opening b' is fitted the lower end of a short length of pipe E, which is the same size as pipe a^7 and forms the supplementary air chamber or receiver for compressed air, the upper end of which pipe is externally screw-threaded and extends a short distance in height or approximately to the height of the ordinary street-lamp post. At the upper end of pipe E is an internally-screw-threaded flanged cap e, which is fitted to the screw-threaded upper end of the said pipe. Upon the upper surface of cap e and integral therewith is a cast block e', extending across the said cap. (See Fig. 6.) From the upper surface of said block at a point equidistant from its end is an upwardly-extended neck e^2. In one end of the block e' is a screw-threaded opening e^3, in which is inserted one end of a small tube e^4 for conducting compressed air to the spraying-valve, hereinafter described. Through the cap e extends a small passage e^5, which passes upwardly into the opening e^3. In the other end of the block e is a passage e^6, which extends inwardly in the direction of the opening e^2 a short distance, then is directed upwardly in a curved line, passing through the neck e^2. The end of said opening in the block e is screw-threaded, and in said screw-threaded opening is fitted one end of a distributing-tube f for the generated gas.

F represents the novel carbureting spraying device, which consists of a longitudinally-extended valve-casing f' of considerable thickness, which is cored out longitudinally, forming an opening $f^\times$, extending from one end f^2 of the valve-casing to within a short distance of the other end f^3 of said casing. At the inner end of the core is a cone-shaped valve-seat f^4. In the end f^2 of the valve-casing the cored part of the casing for a short distance is reduced in size and screw-threaded, as at f^5. Extending through the valve-seat f^4 is a small-sized opening f^6. The end f^3 of the valve-casing extending longitudinally to the valve-seat f^4 is also cored out, forming an opening f^7, the size of the opening being in excess of the width of the opening $f^\times$ upon the other side of the valve-seat. The opening f^7 is screw-threaded.

G represents the valve-stem, the outer end g of which is screw-threaded a short distance to fit the screw-threaded opening f^5, the inner end of the stem being cone-shaped at g' to fit the valve-seat f^4. In the outer surface of the cone-shaped end of the valve-stem are the grooves $g^2\,g^2$, which extend from opposite sides of the valve-stem to the pointed end of the cone and in planes parallel with the face of the cone, as seen in Figs. 7 and 8, the opening f^6 in the valve-seat exposing slight portions of the grooves at the point of the cone. The valve-stem G is also reduced longitudinally in size, extending from the cone-shaped end g' to the threaded portion g, or nearly the length of the longitudinal opening $f^\times$, and thus providing a valve-chamber extending around the stem of the proper extent to admit of the passage of the liquid to be sprayed. Upon the end g of the valve-stem is a hand-wheel g^4, whereby the stem may be removed from the valve-casing should the grooves g^2 become clogged. With the under side of the end portion f^2 of the valve-casing and cast integral therewith is a globe-valve casing g^6, upon the under side of which casing is a neck or flanged extension g^7, in which is a screw-threaded upwardly-extended tube-opening g^8. From the inner end of the opening g^8 extends a small-sized passage g^9, which leads upwardly through the globe-valve casing g^6, through the valve-casing f', into the chamber or opening $f^\times$. In the globe-valve casing g^6 and extending in a line horizontally or at right angles to the passage g^9 is a valve-opening g^{10}, having a valve-seat $g^\times$, as seen in Fig. 4, which communicates with the passage g^9, the outer end of which opening g^{10} is screw-threaded, and in said opening is a screw-threaded valve-stem g^{12}, the inner end of which stem is cone-shaped and extends within the valve-seat $g^\times$. Upon the outer ends of the valve-stem g^{10} is a hand-wheel g^{14}. The outer side of the end f^3 of valve-casing f', extending from a point f^4 in a vertical line with the inner end of the opening $f^\times$ near the valve-seat $g^\times$ in the direction of the end f^2 of said casing a little over one-half the distance toward said end, is reduced in size circumferentially in a slight degree, forming a shoulder f^8, and extending around said reduced portion is an annular shell or casing H, of slightly-curved circumference internally, between which casing H and the reduced portion of the casing f' is an annular space or chamber h. The inner end of casing H abuts

against the shoulder f^8. Between the shoulder f^8 and the inner end of the casing H is a washer f^9, composed of lead or other suitable material. Upon the outer surface of the inner end of casing H and also upon the valve-casing f' are formed right and left hand screw-threads, and extending around said screw-threaded parts is a nut I^2, which is also provided with right and left hand screw-threads, securing said casing H to the valve-casing f'. In the valve-casing f' and communicating with the end of the chamber or annular opening h in the direction of the end f^3 of the casing are separate passages or perforations h' h', one of which extends from the upper side of the casing f' downwardly through said casing at an angle in a plane parallel with the inner side of the cone-shaped valve-seat f^4 into the opening or chamber f^7, the other perforation extending from the underside of the valve-casing f at the same angle through said casing upwardly into the chamber f^7 in a plane parallel with the inner side of the valve-seat f^4. Within the screw-threaded opening f^7 is an externally-screw-threaded plug I, the outer end of which plug forms a valve-seat for a balance-valve, hereinafter described, and between the inner end of which plug and passages f^6 and h' h' is formed the spraying-chamber. Extending longitudinally through the plug I is a small perforation or passage i'. The other end of plug I extends to within a short distance of the end f^3 of the valve-casing f', and in said casing f^3 is an annular groove i^2, concentric with the opening f^7 and near the outer end of plug I, in which groove is a balance-valve i^3 of lesser circumference than the concentric groove i^2 and lesser thickness compared with the width of the groove. Connected with the inner side of the balance-valve i^3 is a pin or stem i^4, smaller in size than the perforation i' in the plug, which extends within the opening i' in the said plug I.

With the annular casing H is cast or formed integral therewith a globe-valve casing K, which is similar to the valve-casing g^6, which also extends downwardly the same distance as the casing g^6 and is provided with a flanged portion k, slightly larger in size than the opening g^8 in said casing g^6, in which portion k is a screw-threaded opening k'. Extending upwardly from the opening k' is a small passage k^2 for the compressed air, which extends through the valve-casing K and communicates with the annular chamber h within the shell H. Extending horizontally through the valve-casing K is a screw-threaded valve-opening k^3, as shown in section in Fig. 4, the inner end of which opening communicates with the opening k^2 and in which opening k^3 is a screw-valve stem k^4, the inner end of which stem is cone-shaped and extends to the valve-seat k^5 of like formation in the valve-casing g^6.

Upon the valve-stem g^{12} to the valve g^6 on the inner side of wheel g^{14} is a small cog-gear L, and upon the outer end of the valve-stem k^4 is a cog-gear M, which meshes with the gear L.

O represents the gas vaporizing or heating pipe, one end o of which is enlarged circumferentially to the size of the end f^3 of the spraying-valve casing and said enlarged end internally screw-threaded and fitted to screw-threads w which are formed on the outer end of the shell or casing H of the spraying-valve F. The end of the enlarged portion o of tube O abuts against the outer end of the shell or casing H. Within tube O is a filling $o^\times$, of wire-gauze or like substance.

P represents a short flue for obtaining draft to the flame, through the sides of which the outer end of the pipe O passes, upon the upper end of which is a hood p, secured thereto by strip p'. With the lower end of the flue P is connected an annular deflector p^2. The outer end of the vaporizing-pipe O is externally screw-threaded, and upon said end is a threaded nipple o^2, in the end of which nipple is a passage or orifice o^3.

R represents the air and gas mixing chamber, one portion r of which consists of an annular outwardly-flaring or cone-shaped shell which extends from the outer side of and is integral with the nipple o^2. The other adjustable portion consists of a cone-shaped shell r', the circumference of which is slightly smaller than the shell r, the outer edges of which shell r' extend within the outer edges of the shell r. The annular inner edge of the shell r' is connected rigidly with the end of a slidable sleeve r^2. Within said sleeve r^2 extends one end of a short length of pipe r^3, the other end of which pipe extends within a two-way pipe joint or elbow r^4.

The spraying-valve F and the vaporizing-pipe O are placed in position a considerable distance above the opening e^6 for the generated gas in the upper end of the chamber E in the lamp-post, the deflector p^2 on the draft-flue P on the heating-pipe O being directly above said opening e^6. The other end of tube f for the passage of the generated gas extends upwardly from the cap e in the pipe E and is connected with the pipe-joint r^4. The other end of the tube e^4, connected with the pipe or chamber E, extends outwardly a short distance and then extends in an upward direction and is connected with the threaded opening k' in the globe-valve K. Another tube S is connected at one end with the threaded opening g^8 in the portion g^7 of the globe-valve g^6, and which conducts the fluid to be vaporized, and the other end extended downwardly as far as the line of diaphragm B in the lamp-post A and connected with the threaded opening b^4 in said diaphragm. In the cap a^5 on the upper end of the cylinder or receiver a of the lamp-post is a threaded opening a^8 for supplying the receiver with the hydrocarbon or gasolene, which is closed by a screw a^9.

T represents an air compressor or pump of

the ordinary description, having a plunger t and a handle t'. With the lower portion of the air-compressor is connected one end of a flexible tube t^2, the other end of which tube extends to the cap a^5, in which cap is a cut-off valve a^{10}, and with which valve said tube t^2 is removably connected.

Upon the neck of cap e on the pipe or shoulder E is an ordinary mantle U, around which extends a transparent globe V, the lower end of which rests upon the cap e^2.

In the employment of the apparatus for street-lighting the cylinder or receiver a of the lamp-post is supplied nearly its full capacity with gasolene, as the preferred mineral product, through the opening a^8 and the opening closed by the plug a^9. The valve d' in the diaphragm B and k^4 g^{12} in the globe-valves k' and g^6 being closed, the compressed-air pump T is operated to supply the upper portion of the receiver a and the pipe a^7 with air under pressure, the valve a^{10} in the cap a^5 being opened for the purpose. As soon as the necessary pressure of air is obtained the valve a^{10} is closed. The air thus confined forces the gasolene up the pipe C, through the passage b^2, and also through the tube S to the valve-seat $g^\times$ in the globe-valve g^6. For the initial production of a vapor in order to effect instantaneous lighting of the lamp the valve D in the diaphragm B is opened in a slight degree to admit the compressed air into the pipe or receiver E, which passes through the tortuous opening d^2 d^3 and which also passes through the small orifice e^5 into the pipe e^4 to the valve-seat k^5 in the globe-valve K. The valve D is then closed. The wheel g^{14} on the spraying-valve is then turned and which through the gears L M on valve-stems g^{12} and k^4 turns both stems simultaneously, opening the valves sufficiently to admit gasolene through the passage g^9 in the globe-valve g^6 to the chamber $f^\times$ around the valve-stem G, and at the same time the compressed air is admitted through the passage k^2 in the globe-valve K to the annular chamber h. The gasolene in the chamber $f^\times$ passes through the grooves g^2 g^2 in the cone-shaped end of the valve-stem G in minute quantity, and upon reaching the point of the said end the two streams meet with force enough to form a spray in chamber f^7. The compressed air which passes through the orifices h' h' meets and mixes with the spray formed by the two streams of gasolene in meeting and readily vaporizes it, thereby forming a hydrocarbon vapor in the chamber f^7 of quick-lighting efficiency. This vapor passes through the opening i' in the plug I and around the outer edge of the balance-valve i^3 through the vaporizing-pipe O to the gas-mixing chamber R, which being closed the vapor passes through the tube f to the opening e^6 in the cap e. This vapor is then ignited above the opening, and the flame being directed upon the vaporizing-pipe O continues to burn until the compressed air is wholly exhausted from the supplementary receiver E, the pipe O in the meantime becoming heated in a sufficient degree to generate the gas. The gasolene under pressure from the receiver a passes through freely the vaporizing-pipe O and is vaporized. The section r' of the gas-mixing receiver, into which the generated gas now passes, is then moved or adjusted from its closed position on the pipe r^3, so as to admit the proper quantity of air, which instantly mixes with the generated gas, and the combined air and gas passes through the pipe f to the opening e^6, and a large brilliant flame of great illuminating power is constantly maintained, the pressure in the receiver a being sufficient to afford the consumption of the large quantity of gasolene employed and for a long period of time.

The back pressure of the gas upon the balance-valve working upon a larger area than the initial pressure of the gas has a tendency to push the balance-valve against the outer end or face of the plug I, consequently reducing the quantity of gas passing around the edge of the balance-valve to the vaporizing-chamber and controlling, automatically, the quantity of gas passing to the vaporizing-chamber. As the initial pressure goes down of the gasolene the quantity is kept constant by the balance-valve. I may decrease the length of plug I and increase the length of the spraying-chamber, if preferred.

I have shown, Fig. 9, an enlarged view of the novel carbureting-lamp constructed precisely the same as in Fig. 1, adapted, however, to be suspended in position, and which may be employed for illuminating public buildings, as well as streets. For this purpose the main supply-reservoir W for gasolene is made shorter in length than the reservoir a in Fig. 1 and larger in circumference, the pipe X, connecting the reservoir with the flanged diaphragm, being short in length. The reservoir is filled with gasolene and charged with the compressed air in the same manner as the reservoir a in Fig. 1. In order to suspend the lamp, a wire bail Y is employed, which is connected at one end with a lug on the pipe-joint r^4 and at the other end with a lug on the spraying-valve.

The spraying device F may be employed in connection with any apparatus for generating gas, it being also adapted for vaporizing oil and water in hydrocarbon-burners or with steam and oil.

Other modifications of the invention may be employed within the scope of the invention.

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

1. The combination in a hydrocarbon-burner, of a vaporizing-tube, and a valve-casing having a spraying-chamber and connected with said vaporizing-tube so as to leave an annular groove, a balance-valve arranged in said groove to separate the spraying-chamber from the vaporizing-tube, the

area of the interior of the vaporizing-tube adjacent to said valve being greater than the area of the spraying-chamber.

2. The combination in a hydrocarbon-burner, of a vaporizing-tube, and a valve-casing having a spraying-chamber and connected with said vaporizing-tube so as to leave an annular groove, a balance-valve arranged in said groove to separate the spraying-chamber from the vaporizing-tube and having a projection extending loosely into said spraying-chamber, the area of the interior of the vaporizing-tube adjacent said valve being greater than the area of the spraying-chamber.

3. A carbureter comprising a valve-casing having separate inner and outer concentric chambers for the reception of the carbureting agents to be vaporized, and a perforate, conical valve-seat at the end of the inner chamber, said valve-casing having orifices at the corresponding end of the outer chamber in opposite, inwardly-inclined planes, and a spraying or vapor chamber upon the opposite side of the valve-seat, with which the said orifices communicate, a valve-stem in the inner chamber of the valve-casing and a cone-valve upon said stem having grooves on its surface, inclined toward the perforation in the valve-seat, means for supplying said concentric chambers of the valve-casing with carbureting agents to be vaporized under pressure, a perforate plug in the outer end of the spraying or vapor chamber, for the passage of the vapor, a balance-valve bearing upon the outer end of said plug and having a passage for the vapor between the outer edge of said valve and the inner surface of the valve-casing, and a loose-fitting stem on the said valve extending within the perforation in said plug.

4. A carbureter comprising a valve-casing having separate inner and outer concentric chambers for the reception of the carbureting agents to be vaporized, and a perforate conical valve-seat at the end of the inner chamber, said valve-casing having orifices at the end of the outer chamber, in oppositely-inclined planes, and a spraying or vapor chamber upon the opposite side of the valve-seat, with which said orifices communicate, and an annular groove in the valve-casing within said chamber, a valve-stem in the inner chamber of the valve-casing, and a cone-valve upon said stem having grooves inclined toward the forward end of said cone-valve, means for supplying the carbureting agents to the respective inner and outer concentric chambers of the valve-casing under pressure, a perforate plug on the inner side of the annular groove of the spraying-chamber closing the outer end of said chamber, a balance-valve within the said groove, and a stem on said valve extending loosely within the perforation in said plug.

5. A gas-generating apparatus comprising a reservoir for storing the liquid to be vaporized under pressure, and an air-compressor, a supplementary receiver for compressed air and a pipe connected therewith and with said reservoir, and a valved connection between the reservoir and the spraying-chamber, a vaporizer for the fluid, a spraying device connected with the vaporizer, having a spraying-chamber at one end thereof, and a balance-valve within said chamber, having a passage for the vapor between the outer edge of the said valve and the inner surface of the spraying-chamber, a supply-pipe connected with the spraying device and extending within said reservoir, and a supply-tube connected with the supplementary, compressed-air receiver and also connected with the spraying device.

6. A carbureter comprising a reservoir for the liquid to be vaporized under pressure, means for supplying said reservoir with compressed air, a pipe connected with the reservoir at one end, a supplementary receiver for compressed air connected with the other end, and a diaphragm between said pipe and the said air-receiver having a passage therethrough for the compressed air, and a valve closing said passage, a valve-casing having concentric inner and outer chambers, and a spraying-chamber at one end of said casing, said inner chamber having a valve-seat at one end and a perforation leading to the spraying-chamber and orifices in the valve-casing leading from the outer chamber in said valve-casing to the spraying-chamber, a valve-stem in the inner chamber and a valve upon said stem within said valve-seat, a balance-valve in said spraying-chamber having a passage for the vapor between the outer edge of said valve and the inner surface of the spraying-chamber, a vaporizing-tube connected with the end of the valve-casing having the spraying-chamber, a liquid-conducting tube having one end extending within the reservoir containing the liquid under pressure, and the other end connected with the inner chamber of the valve-casing, a tube connected with the supplementary air-receiver and also connected with the outer chamber of the valve-casing, and a separate tube for the generated gas connected with the outer end of the vaporizing-tube having the other end extending beneath the said vaporizing-tube.

7. In a gas-generating street-lamp, a hollow post, a reservoir in its base for the reception of the liquid to be vaporized, means for supplying said reservoir with compressed air, a supplementary compressed-air receiver, a conductor of the compressed air leading from the reservoir in the base of the post to said supplementary air-receiver, and a valve cutting off the supply of compressed air, a gas-generator at the upper end of said post, a fluid-conducting tube connected with the generator and extending within the reservoir in the base of the post, and a tube connected with said generator and also connected with the supplementary compressed-air receiver.

8. In a gas-generating street-lamp, a hollow post, a reservoir in its base for the reception of the liquid to be vaporized, means for supplying said reservoir with compressed air, a supplementary compressed-air receiver upon said post, a conductor of compressed air leading from the reservoir in the base of the post to said supplementary air-receiver, and a valve cutting off the supply of compressed air, a gas-generator at the upper end of said post, a fluid-conducting tube connected with the generator and extending within the reservoir in the base of the post, a tube connected with said generator and also connected with the supplementary air-receiver, and means substantially as described for reducing the pressure of the fluid and compressed air in the gas-generator.

9. In a gas-generating street-lamp, a hollow post, a reservoir in its base for the reception of the liquid to be vaporized, means for supplying said reservoir with compressed air, a supplementary compressed-air receiver at the upper end of said post, and a conductor of compressed air leading from the reservoir in the base of said post to said supplementary receiver, and a valve cutting off the supply of compressed air to said receiver, a gas-generating valve-casing for the fluid and compressed air, having inner and outer concentric chambers and a spraying-chamber at one end of said valve-casing, said casing having its inner chamber provided with a perforate valve-seat, and orifices in said casing leading from the outer chamber to the spraying-chamber, a fluid-conducting tube having one end extending within the reservoir for the fluid in the base of said post, and the other end extending within the inner chamber of said valve-casing, and a valve in said tube, a compressed-air-conducting tube connected with the supplementary air-receiver and also with the outer chamber in the valve-casing, and a valve in said tube, a valve-stem in the inner chamber of the valve-casing, and a valve on said stem in said valve-seat, a vaporizing-tube connected with the end of said valve-casing having the spraying-chamber, and a balance-valve in the spraying-chamber having a passage for the vapor concentric therewith.

10. A gas-generating street-lamp comprising a hollow post, a reservoir for the liquid to be vaporized in the base of said post, means for supplying compressed air to said reservoir, a supplementary receiver for compressed air at the upper end of said post, and a conductor of the compressed air connected with the said reservoir and also with the supplementary receiver, a valve cutting off the supply of compressed air, a valve-casing having inner and outer concentric chambers, and a spraying-chamber at one end of the valve-casing, said valve-casing having a perforate valve-seat in the inner chamber and spraying-orifices in the outer chamber leading to the spraying-chamber, a valve-stem in the inner chamber, and a valve on said stem within said valve-seat, a vaporizing-tube connected at one end with the end of the valve-casing having said spraying-chamber, an air-mixing receiver at the other end of said tube, a pipe having one end extending within the reservoir for the liquid, and the other end extending within the inner chamber of the valve-casing, a tube for compressed air connected with the supplementary air-receiver and also connected with the outer chamber of the valve-casing, a balance-valve in the spraying-chamber having a passage concentric therewith for the passage of the vapor, a tube for the generated gas connected with the air and gas mixing receiver at one end, and having the other end extending beneath the vaporizing-tube, and means for regulating the supply of the liquid and also of the compressed air to the chambers in the valve-casing.

11. A gas-generating street-lamp comprising a hollow post, a reservoir for the liquid to be vaporized in the base of said post, means for supplying said reservoir with compressed air, a supplementary receiver for compressed air at the upper end of said post, a conductor of compressed air connected with said reservoir and also connected with the supplementary receiver, a valve cutting off the supply of compressed air to said receiver, a valve-casing for the air and liquid having inner and outer concentric chambers, and a spraying-chamber at one end of the valve-casing, said valve-casing having a perforate valve-seat in the inner chamber and orifices in the outer chamber leading to the spraying-chamber, a valve-stem in the inner chamber and a valve on said stem within said valve-seat, means substantially as described in the spraying-chamber for reducing the pressure of the air and liquid, a vaporizing-tube connected at one end with the end of the valve-casing having said spraying-chamber, an air-mixing receiver connected with the other end of said tube, having separate adjustable parts, a tube for the generated gas connected at one end with one of the separate parts of said air-mixing receiver, and having the other end extending beneath the vaporizing-tube, and valves in the fluid-conducting and compressed-air tubes.

EDMUND B. LUDWIG.

Witnesses:
CORYDON T. BUSH,
JOHN T. MARSHALL.