

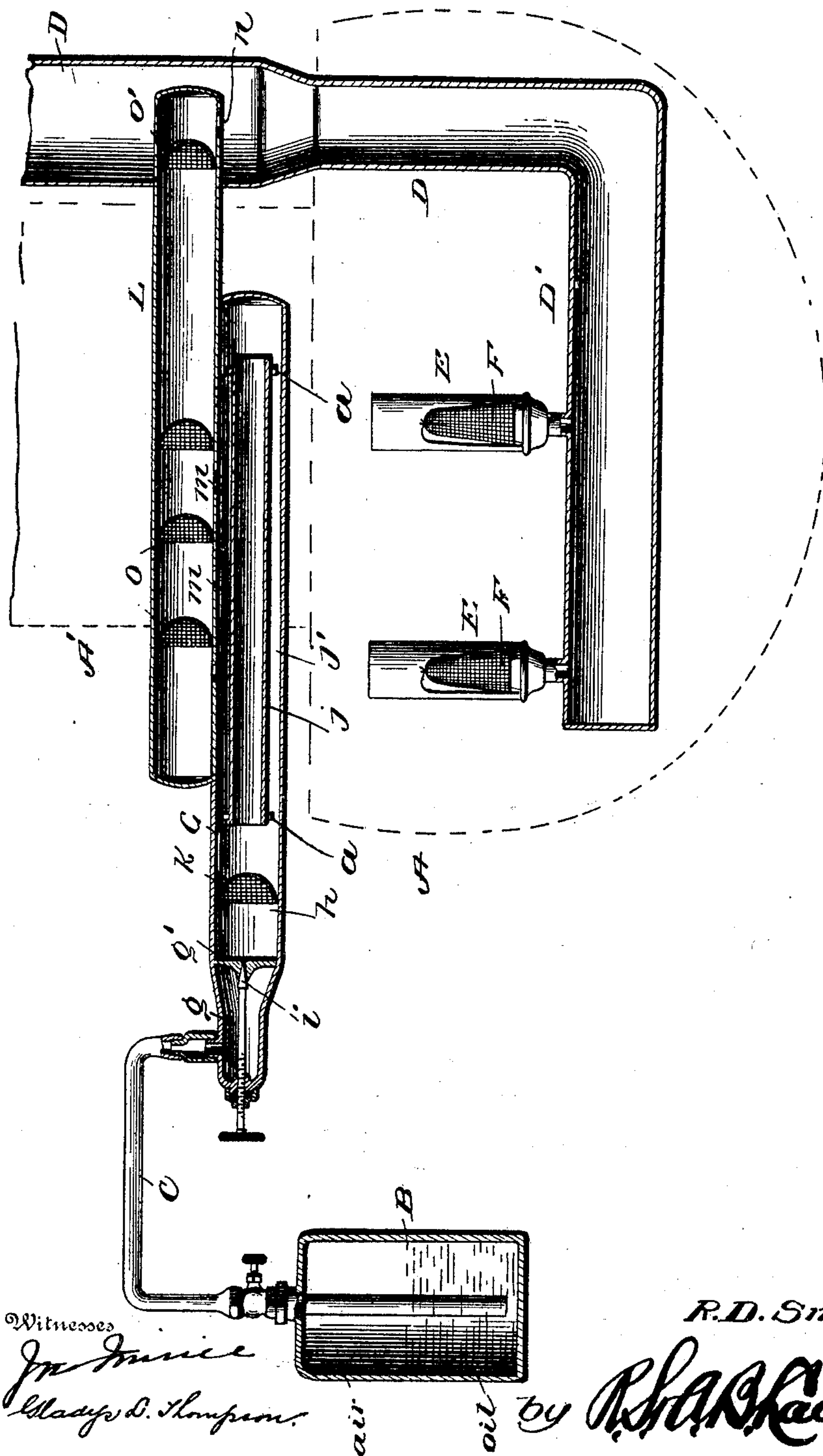
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Patented May 28, 1901.

R. D. SMITH.  
VAPOR BURNING APPARATUS.

(Application filed Jan. 9, 1899.)

(No Model.)



Witnesses

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# UNITED STATES PATENT OFFICE.

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## VAPOR-BURNING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 674,941, dated May 28, 1901.

Application filed January 9, 1899. Serial No. 701,633. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT D. SMITH, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Vapor-Burning Apparatus; and I do hereby 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.

This invention relates to improvements in vapor-burning apparatus, and particularly to vaporizing attachments or appliances for vapor-lamps; and the purpose of the same is to provide a vaporizing device which will insure a steady and even supply of gas to the burners, prevent choking or stopping up of the gas-education opening by excess of carbon, residue, or oil thereto, the flooding of the vaporizing tube or chamber with oil, or the feed of the oil to said tube faster than it is vaporized; to increase the area of heating-surface of a vaporizing-tube of a given size, so as to secure rapid vaporization; to provide for the direct heating of the vaporizing-tube and component parts from the burners, and thereby make the apparatus self-generating, and to otherwise generally simplify and improve the construction and promote the practical efficiency of vaporizing appliances of this class.

With these and other minor objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, which will be hereinafter more fully described, and particularly pointed out in the appended claims.

The accompanying drawing, forming a part of this specification, is a vertical longitudinal section of a vaporizing appliance embodying my invention.

Referring now more particularly to the drawing, A represents the globe, and A' the chimney or flue, of a vapor-lamp of approved construction, (shown in broken lines,) and B a tank or reservoir from which the hydrocarbon oil is forced by compressed air to the vaporizer through a conducting-tube C. At one side of the chimney or flue is arranged a vertical mixing-tube D, open at its upper end for the admission of air thereto and having

its lower end projecting down into the globe and provided with a horizontal arm D', extending across to the opposite side of the globe and carrying the burners E, over which incandescent mantles F are suspended in the usual manner.

The outer end of the conducting-tube C is suitably connected to supply oil to an oil inlet or feed compartment *g*, formed at the outer end of the vaporizing tube or chamber G and separated from the generating portion *h* thereof by a partition *g'*, and this partition is provided with an induction-opening governed by a needle-valve *i*, by which the feed of the oil to said chamber may be regulated. A perforated or foraminous partition, diaphragm, or spraying device of any kind may, however, be employed in place of the form of partition shown to feed the oil in the form of spray into the generating portion of the vaporizing-chamber for the purpose of facilitating its conversion into vapor. The inner end of the vaporizing chamber or tube is closed against the exit of oil at that point and extends horizontally a sufficient distance into the chimney or flue A' of the lamp (indicated by broken lines) at the side diametrically opposite the mixing-tube to bring the major portion of the tube directly over the burners, so that the heat from the flames of the latter will maintain the tube in a highly-heated condition to generate gas as long as the lamp is in operation, thus providing a generating appliance which dispenses with the use of auxiliary means for heating the vaporizing-tube.

Arranged within the vaporizing tube or chamber is an auxiliary vaporizing device consisting of a short pipe or tube *j*, which is concentrically supported therein by perforated or winged collars or pieces *a*, arranged at the ends thereof to provide an intermediate annular space or passage *j'* for circulation of the oil and the vapor generated therefrom, and located within the chamber and intermediate the partition *g'* and the front or outer end of this pipe or tube *j* is a perforated diaphragm consisting of a wire-gauze cap or disk *k*, which is pressed tightly in the tube. This gauze cap or disk serves to divide the hydrocarbon oil or fluid into a plurality of streams and acts as a sieve and



cushion to strain the oil and prevent the same from flowing too freely or suddenly into the heated portion of the vaporizing-chamber and compensates for any irregularity in the feed of the oil due to variations of pressure in the tank after the needle-valve has been primarily adjusted. The auxiliary heating device serves several important functions. As it is heated by the flames from the burners, it provides an additional area of heating-surface and acts in conjunction with the vaporizing-tube to quickly vaporize the oil. It also restricts the area or fluid-carrying capacity of the generating-chamber, so that the latter can only hold a certain quantity of oil, and it thus prevents the oil from flooding or feeding into said chamber faster than it can be converted into vapor. Furthermore, the inner tube serves to insure a smooth and even flow of the oil and provides an additional surface for the collection of the carbon and other residue which remains upon the reduction of the oil into vapor. By this construction practically all of the residuum is retained in the vaporizing-tube and prevented from passing out with the vapor and choking or stopping up the gas-eduction opening. The oil is consequently vaporized as fast as it enters the generating-chamber and a steady and even supply of gas insured from the outset.

A gas-eduction chamber or tube L extends through the chimney or flue A' of the lamp and is secured by brazing or otherwise to the upper surface of the vaporizing-tube, and the two tubes L and G are in communication by means of a series of openings *m*. One end of the gas-tube is closed, while the other end thereof projects into the vertical portion of the mixing-tube D and is provided in its bottom with an eduction-opening *n*, through which the vapor discharges into the mixing-tube and mixes with the air drawn thereinto to form gas, which passes down the tube and through the horizontal arm D' thereof to the burners. Arranged in the gas-tube in advance of each opening *m* is a perforated or foraminous diaphragm in the form of a wire-gauze cap or disk *o*, and before the eduction-opening a similar diaphragm *o'*. These disks *o* and *o'* act as sieves to catch and retain in the tube any small particles of carbon that may pass out of the vaporizing-tube. By thus providing a vaporizing-tube adapted to retain practically all the carbon residue and an auxiliary gas-tube containing a series of sieves to catch any little particles that may escape therefrom the vaporizing device may be used for a long period without cleaning and the gas-eduction opening kept clear to prevent a reduction or stoppage of the flow of the vapor to the mixing-tube.

In operation the vaporizing-tube and parts are preliminarily heated by an alcohol or other flame and the needle-valve *i* opened to allow the oil flowing under pressure to enter the outer end of the generating portion of the tube. The oil is checked and strained in its

passage by the gauze diaphragm *k* and then flows evenly to the highly-heated portion of the vaporizing-tube in which the inner pipe or tube is located. Upon arriving at the outer or induction end of the inner pipe some of the liquid enters through the part therein and traverses said pipe until it reaches the eduction-port at the inner end of the pipe, when it again returns into the vaporizing-tube, the oil or fluid thus being divided into a plurality of streams and subjected to the heat of the vaporizing-tube itself and that of the pipe within the same, so that it is quickly converted into vapor. The carbon and other residuum remaining upon the reduction of the volatile elements of the oil into vapor is caught and retained to a large extent within the vaporizing-tube, the inner tube providing an additional area of collecting-surface to which the said residuum clings. The vapor then flows into the gas-tube through the openings *m* and through the gauze diaphragms *o* and *o'* contained therein to the eduction-opening *n*, when it passes into the mixing-tube D and is commingled with the air drawn thereinto to form gas, which flows down said mixing-tube and through the horizontal arm D' thereof to the burners. The straining of the vapor as it passes through the wire-gauze diaphragms in the gas-tube results in the separation therefrom of any little particles of carbon which may have passed out of the vaporizing-tube, and thus all liability of choking or clogging of the gas-eduction opening by residuum is avoided. It will be understood from the foregoing description that the gas when generated is ignited by the flame used at the outset and that the heat from the burners is then utilized to maintain the vaporizing-tube, the auxiliary tube in the vaporizing-tube, and the gas-tube in a highly-heated condition as long as the lamp is in operation. It will also be understood that the gas-tube acts as a superheater to maintain the gas in a highly-heated condition and prevent condensation.

Having thus described the invention, what is claimed as new is—

1. A vaporizing device, comprising a vaporizing tube or chamber having an oil-feed connection at or near one end and closed at its other end against the exit of gas or vapor, an auxiliary vaporizing member arranged therein, a gas-eduction tube or chamber connected to the upper surface of the vaporizing-tube and in communication therewith through a series of openings and provided at one end with an outlet, and a series of foraminous diaphragms in said gas-eduction tube, one arranged in advance of each of said openings and one before said outlet.

2. In a lamp of the character described, the combination of a vaporizing-tube extending horizontally into the flue or chimney of the lamp at one side thereof and having an oil-feed connection at its outer end and closed against the exit of oil or vapor at its inner



end, a gas-tube connected to the upper portion of the vaporizing-tube and in communication therewith and having one end projecting to the exterior through the opposite side of the chimney and provided with an eduction-opening, a burner in the globe of the lamp, and a mixing-tube leading from the eduction end of the gas-tube to the burner.

3. In a vapor-burner, the combination of a burner, a mixing-tube connected thereto, a vaporizing-chamber located horizontally above the burner, a gas-tube lying above and parallel with the vaporizing-chamber and having an end portion overlapping and in communication with the said vaporizing-chamber and having its opposite end in communication with the mixing-tube, an apertured pipe within the chamber, and a perforated diaphragm located within said chamber at or near the end of said pipe.

4. In a vapor-burning apparatus, the combination of a burner, a mixing-tube connected to and extending upwardly from the burner, a vaporizing-tube extending longitudinally above the burner, and a gas-tube also extending longitudinally above the burner and connecting the vaporizing and mixing tubes.

5. In a lamp of the character described, the combination of a burner arranged in the globe of the lamp, a vaporizing-tube extending horizontally into the chimney of the lamp at one side thereof and located above and in the heating zone of the burner, said tube having an oil-feed connection at or near its outer end and closed at its inner end against the exit of oil or vapor, a gas-tube also projecting into the chimney within the heating zone of the burner and in communication with the upper portion of the vaporizing-tube between the terminals of the latter and having one end projecting to the exterior through the opposite side of the chimney and provided with an eduction-opening, and a mixing-tube in communication with the eduction end of the gas-tube and projecting vertically therefrom into the globe and having a lateral arm connected to the burner.

6. In a vapor-burning apparatus, the combination of a burner, a vaporizing device ex-

tending longitudinally above the burner and comprising a vaporizing-tube and a superimposed gas-tube connected to the upper surface of said vaporizing-tube and in communication therewith, and a mixing-tube connected at its upper inlet end to the gas-tube and leading downwardly therefrom and thence under said vaporizing device and connected at its lower end to the burner.

7. In a lamp, a vaporizer arranged in the chimney of the lamp and composed of a vaporizing-tube and a gas-tube in communication therewith, said tubes respectively having their induction and eduction ends projecting through the chimney to the exterior, a burner in the globe of the lamp, an oil-reservoir in connection with the exteriorly-projecting induction end of the vaporizing-tube, and a mixing-tube leading from the said exteriorly-projecting eduction end of the gas-tube to the burner.

8. In a vapor-burner, a mixing-tube, a burner in communication therewith, a vaporizing-chamber arranged horizontally above the burner, and a gas-tube lying above and parallel with the vaporizing-chamber and having an end portion overlapping and in communication with the said vaporizing-chamber and having its opposite end in communication with the mixing-tube, in combination with an auxiliary heating device located within said vaporizing-chamber, and a perforated diaphragm at or near the end of said auxiliary heating device for dividing the hydrocarbon fluid into streams in said chamber.

9. In a lamp, a flue or chimney, a vaporizing-chamber, a gas-chamber in communication with the vaporizing-chamber, said vaporizing and gas chambers being extended longitudinally above the burner and in the heating zone thereof and located at or near the base of the flue or chimney, and a mixing-tube leading from the gas-chamber to the burner.

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

ROBERT D. SMITH. [L. S.]

Witnesses:

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