

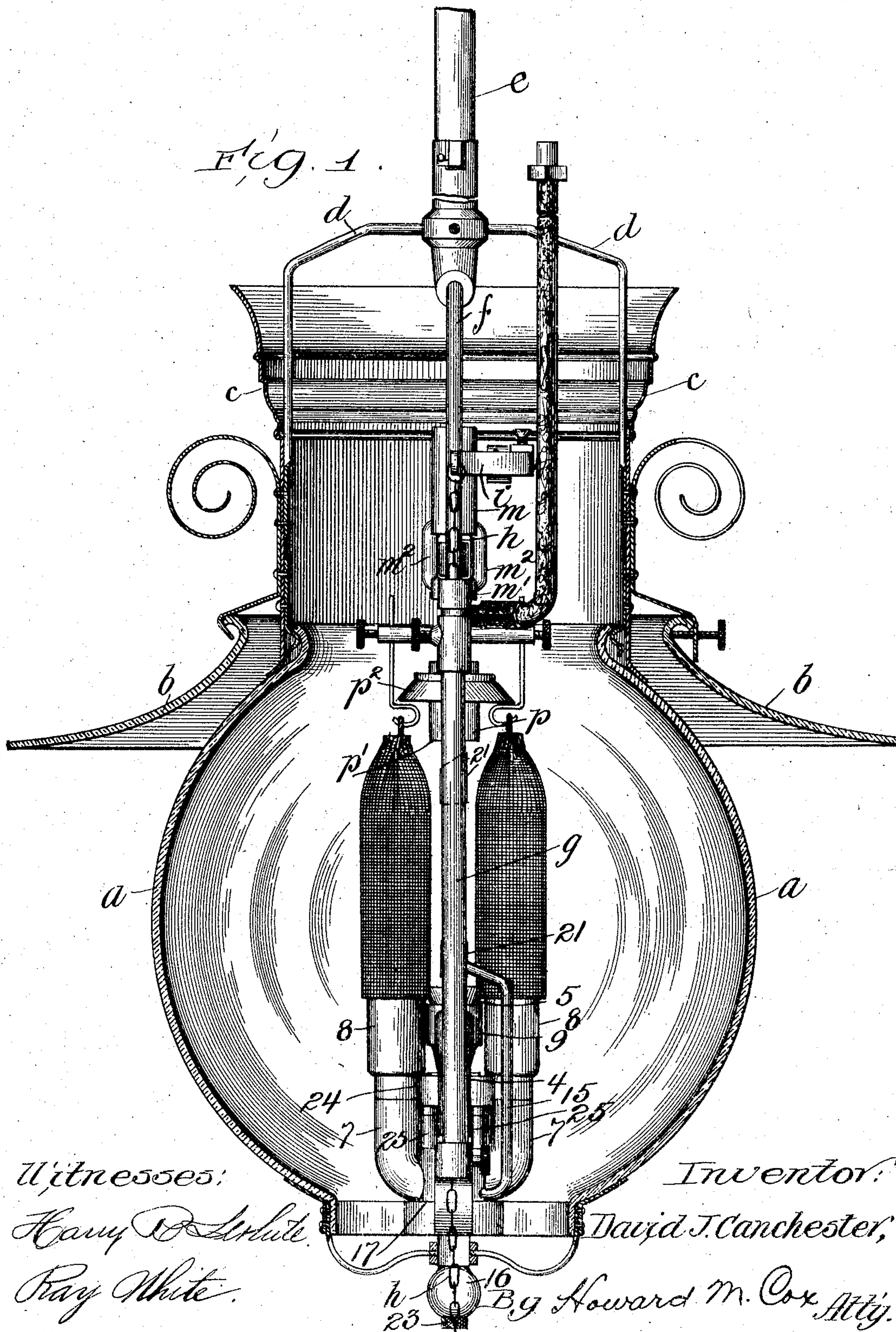
No. 778,402.

PATENTED DEC. 27, 1904.

D. J. CANCESTER.  
VAPOR BURNER.

APPLICATION FILED JAN. 29, 1904.

3 SHEETS—SHEET 1.





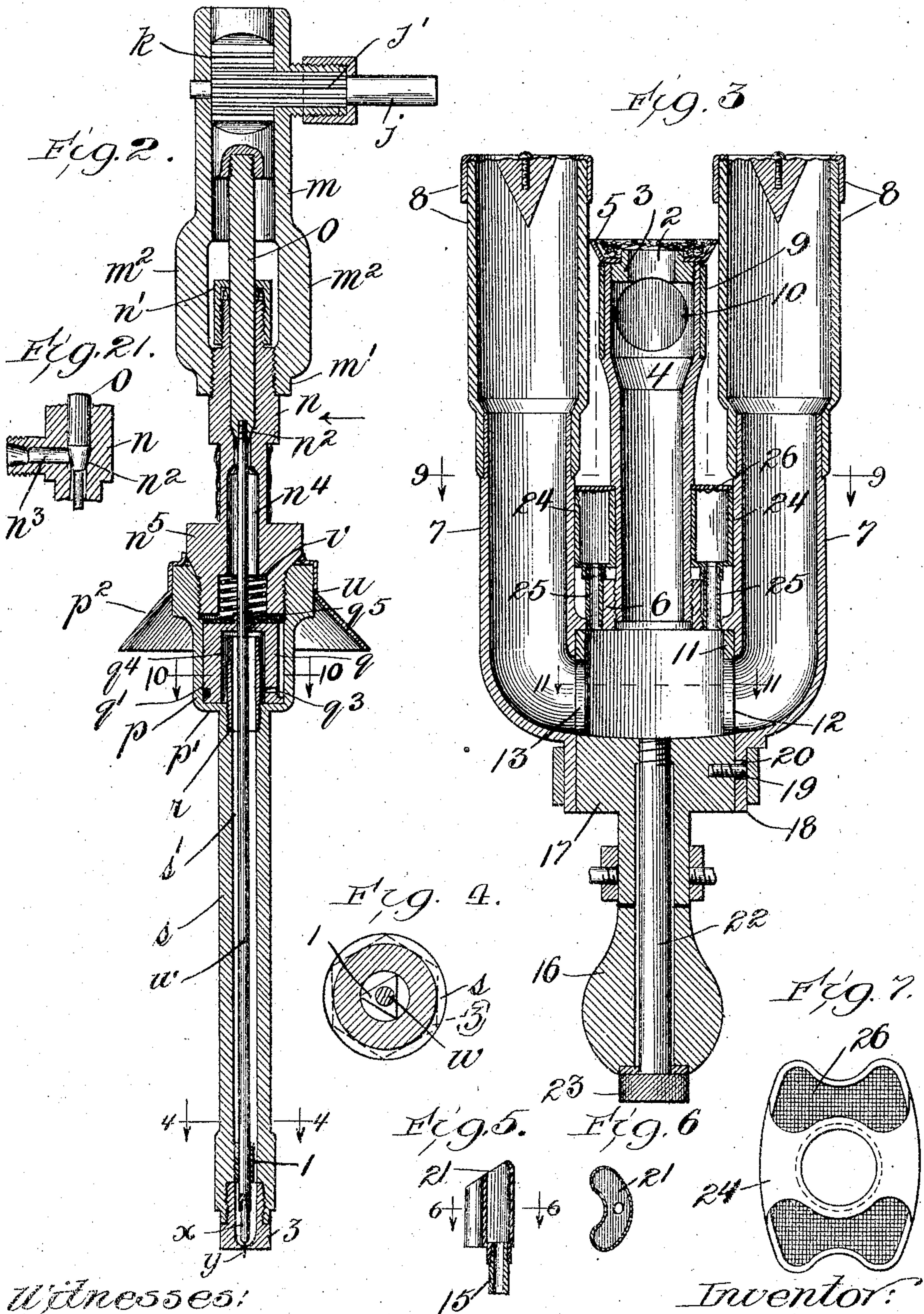
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Witnesses:

Harry D. White  
Ray White.

Inventor:

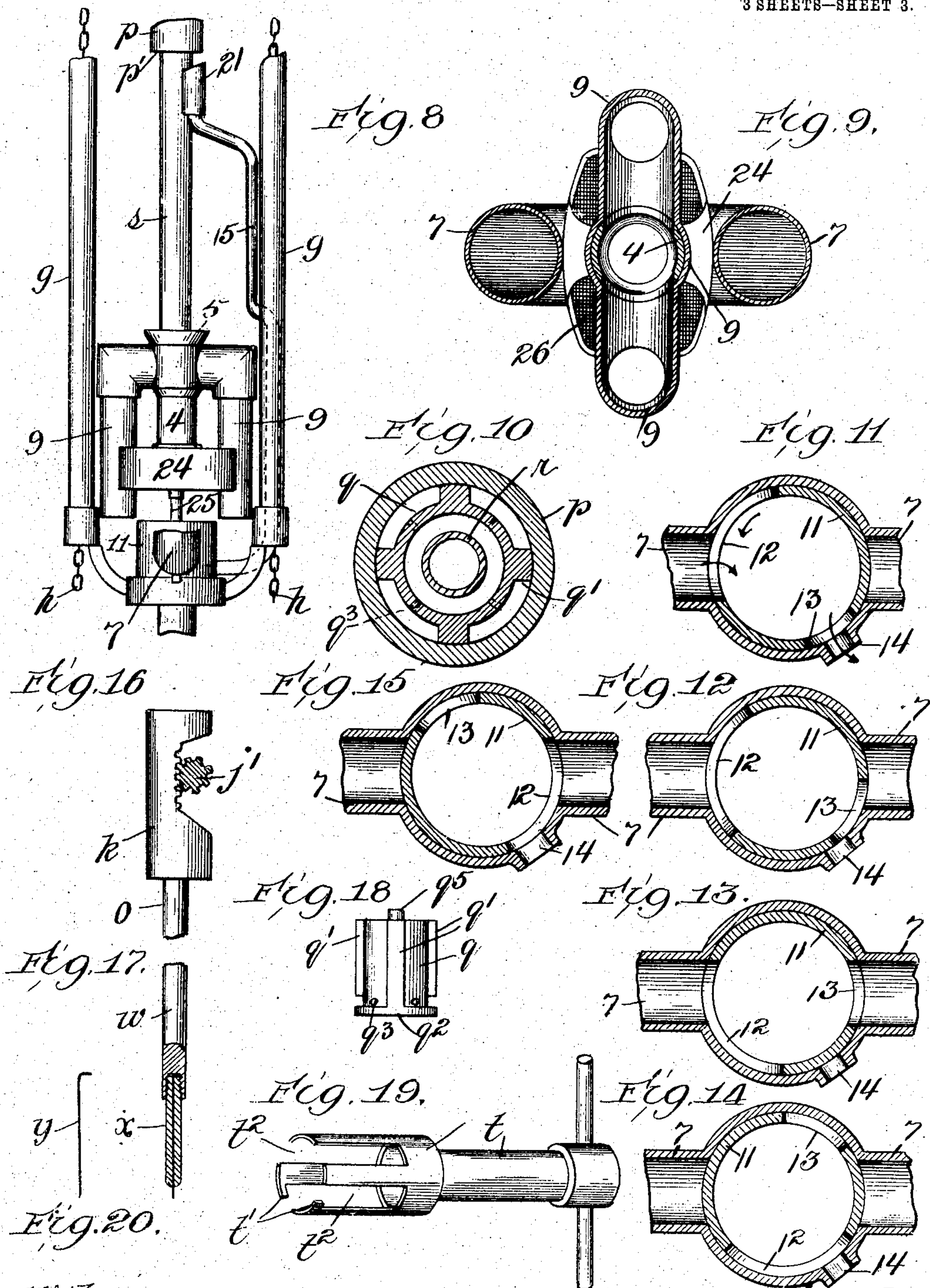
David J. Canchester.  
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3 SHEETS—SHEET 3.



Witnesses:

Harry C. White.  
Ray White.

Inventor

David J. Canchester

By Howard M. Cox Atty.



# UNITED STATES PATENT OFFICE.

DAVID J. CANCHESTER, OF CHICAGO, ILLINOIS.

## VAPOR-BURNER.

SPECIFICATION forming part of Letters Patent No. 778,402, dated December 27, 1904.

Application filed January 29, 1904. Serial No. 191,175.

*To all whom it may concern:*

Be it known that I, DAVID J. CANCHESTER, a citizen of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Vapor-Burners, of which the following is a specification.

My invention relates to vapor-burners adapted for lighting or heating; and the objects of the invention are to produce an apparatus of improved construction and arrangement, as will more specifically be pointed out in the following description and accompanying claims.

I obtain my objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view, partly in section, of the assembled apparatus. Fig. 2 is a vertical sectional view of the generator and needle-valve and parts for operating same. Fig. 3 is a vertical sectional view of the burners and connected parts. Fig. 4 is a transverse sectional view taken on the line 4 4, Fig. 2. Fig. 5 is a detail view of the burner-opening of the pilot-light. Fig. 6 is a transverse sectional view taken on the line 6 6, Fig. 5. Fig. 7 is a top view of the screen and spreader designed to be placed at the top of the auxiliary heater. Fig. 8 is a fragmentary view of the burner parts looking in the direction of the arrow, Fig. 1. Fig. 9 is a horizontal sectional view taken on the line 9 9, Fig. 3. Fig. 10 is a horizontal sectional view taken on the line 10 10, Fig. 2. Figs. 11 to 15, both inclusive, are horizontal views of the burner-valve, taken on the line 11 11, Fig. 3. These successive views illustrate the operation of said valve. Fig. 16 is a fragmentary view of the rack and pinion whereby the needle-valve is operated. Fig. 17 is a fragmentary view showing the manner of joining the stem of the needle-valve to the needle-valve holder. Fig. 18 is a side view of the separator. Fig. 19 is a fragmentary view of the key for operating said separator. Fig. 20 is a side view of the preferred construction of the wire needle. Fig. 21 is a fragmentary sectional view looking in the direction of the arrow, Fig. 2, showing the oil-inlet.

Similar reference characters denote similar parts throughout the several views.

When my invention is used for lighting, the complete device will be inclosed with a globe *a* and shade *b*, attached to any suitable stack *c*, suspended by any suitable means—such, for example, as the arms *d*, adapted to be suspended from a rod *e*. In the present construction the burner parts are suspended from said rod *e* by means of the frame-rods *f*, which carry at their lower extremity the frame-tubes *g*. Said frame-tubes *g* are hollow, and for convenience the operating-chains *h* pass downwardly through them from the controlling-lever *i*. This arrangement serves both to conceal the greater portion of the chains, and also by protecting them lessens the danger of accidental movement of the controlling-lever *i*. Said controlling-lever is fastened by means of a set-screw or other device to the spindle *j*, which controls the rack *k* by means of the pinion *j'*. By preference the body portion of said rack *k* is cylindrical and fits within the upper portion of the rack-casing *m*. Said rack-casing terminates at its lower extremity in the collar *m'*, which is interiorly threaded to receive the valve-casing *n*. The upper cylindrical portion of rack-casing *m* is joined to said collar portion *m'* by means of the arms *m<sup>2</sup>*, which are integral with both of said parts *m* and *m'*. This arrangement forms an open construction both for the purpose of reducing the amount of heat that will be conducted upward from the valve-casing to the upper operating parts and for affording access to the packing-nut *n'*, which forms a stuffing-box at the upper extremity of said valve-casing *n*, through which the valve *o* works. Said valve-casing *n* is provided with a tapered portion *n<sup>2</sup>*, which forms a seat for the correspondingly-tapered lower extremity of valve *o*, whereby the flow of oil entering through the supply-aperture *n<sup>2</sup>* in said casing *n* may be shut off from the generator below. The passage *n<sup>4</sup>* is formed in the valve-casing *n*, below the valve-seat *n<sup>2</sup>*, for conducting the oil downwardly toward the generator.

The generator consists of a casing *p*, which screws onto the enlarged lower extremity or plug *n<sup>5</sup>* of the valve-casing *n* and receives the



separator  $q$ , which is shown separately in Fig. 18 and also shown in section on larger scale in Fig. 10.

The separator  $q$  is provided with vertically-  
5 arranged fins or ribs  $q'$ , which fit tightly enough within the generator-casing  $p$  to scrape the inside walls thereof when said separator is rotated. At the bottom of the separator a ring or collar  $q^2$  is formed, which also fits  
10 within said generator-casing tightly enough to scrape the walls thereof when the separator is lifted out of the casing. Said separator is adapted to rest upon the bottom of the generator-casing formed by the annular  
15 shoulder  $p'$  thereof, and said ring  $q^2$  constitutes a false bottom to said generator whereon impurities may be precipitated, so that such impurities may be removed from the generator by lifting out the separator. In order  
20 that oil may flow through the separator, however, one or more apertures connect with the interior chamber  $q^4$ . Said vertical ribs  $q'$  not only act as scrapers, but serve to divide the downwardly flow of oil into a number of  
25 streams, so that the oil may be more thoroughly distributed over the surface of the generator and vaporization more completely effected. The purifying-tube  $r$  screws into the upper opening of the extension-tube  $s$  and  
30 extends up into said generator-casing  $p$ .

In operation the oil passes from the discharge-passage  $n^4$  downwardly through the passages formed between the ribs  $q'$  of the separator, thence through the small apertures  
35  $q^3$  into the interior chamber  $q^4$ , thence upwardly over the top of the purifying-tube  $r$ , thence downwardly through the passage  $s'$ , formed in the generator extension-tube  $s$ . As the result of this construction the oil as it  
40 passes on the outside of the separator begins to volatilize and the greater part of the impurities are formed at this point and dropped onto the ring  $q^2$ . These impurities also appear on the inner walls of the generator  $p$  and  
45 are removed by first rotating the separator to loosen said impurities by means of said ribs  $q'$ , and, second, by lifting said separator out of said generator, the ring  $q^2$  also scraping the generator-walls as it is lifted out. In order  
50 that the entire inner surface of the generator  $p$  may be scraped, one of the ribs  $q'$  extends downward completely to the bottom ring  $q^2$ ; but the remaining ones of said ribs terminate at a point slightly above said ring  
55 to thereby form points of engagement for the fingers  $t'$  of the separator-key  $t$  and also to form passages whereby the oil may pass around the bottom of the separator. The body of said key is in the form of a hollow  
60 cylinder having slots  $t^2$  therein for non-interference with the ribs  $q'$  of the separator  $q$ . The outside diameter of the cylindrical portion of the key  $t$  is preferably somewhat smaller than the inside diameter of the gen-  
65 erator  $p$  in order that the key may freely en-

ter said generator to remove the separator, even though the walls of the generator have a considerable coating of precipitated carbon or other impurities.

A disk-like spreader  $u$  fits over the top of  
70 the separator  $p$  to conduct the oil directly to the walls of the generator  $p$  for the purpose of effecting quick generation. A helical spring  $v$ , located in the recessed lower extremity of the generator-plug  $n^5$ , serves to hold the  
75 spreader  $u$  and separator  $p$  down in position within the generator. The needle-stem  $w$  screws into the lower extremity of the valve  $o$  and extends downwardly through the passages  $n^4$  and  $s'$  and purifying-tube  $r$ . Said  
80 stem fits closely within the apertured top of the separator  $p$ , and in order to prevent the oil from passing through the top of the separator alongside of the stem  $w$  a raised neck  
85  $q^5$  is formed at the top of said separator. Said neck also serves as a guide for said needle-stem  $w$ . The lower extremity of the stem  $w$  is interiorly threaded to receive the holder  
90  $x$  of the needle-wire  $y$ . The said needle-holder is centrally bored to receive said wire, and the upper extremity of the wire is bent over, so that when the parts are assembled the needle-wire is held tightly in place with the  
95 lower extremity projecting somewhat below the lower extremity of the holder  $x$ , so as to penetrate the aperture formed at the bottom of the needle-valve seat  $z$  and keep said aperture clean by reason of its up-and-down movement  
100 coincident with the movement of the valve  $o$ . Said needle-valve seat screws into the interiorly-threaded lower extremity of the generator extension-tube  $s$ . For the purpose of guiding the lower extremity of the needle-stem  $w$  a  
105 guide 1 is placed near the lower extremity of said generator extension-tube  $s$ . Said guide is preferably triangular in cross-section to thereby afford a passage-way for the vapor. The vapor-jet nozzle  $z$ , which is provided with a vapor-jet orifice, is hexagonal in cross-section, so that  
110 the same may be readily unscrewed and the vapor may readily escape and pass downward in case there is any leakage between said valve-seat and the generator extension-tube  $s$ . Said  
115 nozzle fits within the aperture 2 of the plug 3, screwed into the upper extremity of the mixing-chamber 4. An alcohol-cup 5 is provided at said plug 3 for preheating the generator. Said mixing-chamber screws into the  
120 interiorly-threaded boss 6, formed at the point of union of the main burner-tubes 7 7. Said burner-tubes lead away from said point of union to burners—such, for example, as the  
125 burners 8 8. The inverted air-tubes 9 9 connect with the upper extremity of the mixing-chamber 4 through the apertures 10 therein. The lower extremity of said tubes are open and are located at a point below said apertures 10. The purpose of said tubes is to supply air to said mixing-chamber at the point  
130 where the vapor first enters into the latter.



As a result of this construction only so much air is drawn into the mixing-chamber as is necessary to maintain atmospheric pressure therein and complete combustion, and, more-  
 5 over, opportunity is afforded for heating the air before entrance into the mixing-chamber, as will be hereinafter more fully described.

The burner-valve 11 is located within the burner-tubes 7 7 just below the mixing-chamber 4 and is provided with two apertures 12 and 13 of unequal width adapted to communicate with tubes 7 7 and also with the opening 14, which leads to the pilot-burner tube 15. Said burner-valve is rotated by means of the knob 16, which controls the plug 17, of which said valve is a part, and the parts are so arranged that by rotating said valve any one of the following conditions may be obtained, to wit: First, both tubes 7 7 may be  
 10 open with the passage 14 closed; second, either one of said tubes 7 7 may be open while the other one is closed and passage 14 is open, and, third, both of the tubes 7 7 may be closed while the passage 14 is open. These various  
 15 conditions are illustrated in Figs. 11 to 15, inclusive. The construction of the parts also permits one of the tubes 7 7 to be partly shut off while the other one remains completely open. This last condition is illustrated in Fig. 12.

One of the advantages of this construction is that the burners are not all shut off simultaneously; but one is turned on before the other is closed, thereby enabling one of the burner-tubes to be lighted from the flame of another  
 20 before the latter is turned completely off.

The plug 17 is held in position within the boss 18 at the bottom of the burner-tubes by means of the pin 19 running in the slot 20 in said boss, as best shown in Fig. 3. Said tube  
 25 15 is provided with a pilot-burner 21, the opening whereof is located adjacent to the bottom of the generator *p*, as shown, for example, in Fig. 8. The main purpose of said burner is to keep the generator *p* hot during the time when the burners 8 8 are not in use. This will hold the device in readiness to generate vapor without waiting for preheating by means of alcohol. A secondary purpose of the pilot-burner is to furnish means for lighting the vapor when the burners 8 8 are turned  
 30 on. In order that the heat from the pilot-burner may be retained in contact with the generator *p* and also to protect the upper parts of the device, a hood *p*<sup>2</sup> is mounted near the upper extremity of said generator.

The knob 16, above referred to, is held in close contact with the lower extremity of plug 17 by means of a screw 22, provided with a head 23. The vertical apertures or bores in the knob 16 and part 17 are of a diameter larger than the diameter of the shank of the screw 22, and this affords a cylindrical space or passage surrounding said screw-shank through which the oil may drain when the  
 35 said screw-shank is only partially withdrawn

from plug 17. The upper extremity of said screw screws into said plug 17 at the bottom of the valve 11, and any oil which may have collected within said valve may be drained off by merely backing off the said screw sufficiently to disengage the threaded extremity thereof from the threaded upper portion of the plug 17.

In order that the air entering from the open lower extremities of the tubes 9 9 may be heated before coming into contact with the vapor in the mixing-chamber 4, I provide an auxiliary heater 24, which is located adjacent to said tubes 9 slightly above the lower open extremity thereof. The vapor is supplied to said  
 40 auxiliary heater through the tubes 25 25 from the burner-valve 11. The top of said auxiliary heater is provided with a flame-spreading gauze 26. (Shown in plan in Figs. 7 and 9.)

In order to assist in mixing air with the vapor entering the mixing-chamber, said mixing-chamber is somewhat small compared to the combined cross-sectional area of the main burner-tubes, pilot-burner, and auxiliary  
 45 burner, and I have found by experiment that the combustion is assisted and the flame rendered more steady by providing a large storage-chamber at the outlet of the mixing-chamber. For this reason I make the burner-valve 11 of large capacity, and this has another advantage—namely, that the tubes 25 are enabled to rise straight and direct from within said valve, which is cylindrical and open at the top. In the best construction the casing  
 50 for said valve 11 is formed by the metal surrounding the lower openings of the burner-tubes 7 7 and pilot-burner opening 14. I do not desire to limit myself to the precise construction or arrangement of the parts here shown, as considerable modification may be made without departing from the spirit of my invention. It is within my contemplation that this invention may be employed for its heating as well as its lighting properties.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a vapor-burner, the combination with burner parts, of a controlling-lever for controlling the supply of oil to the burner parts, chains for operating said controller-lever, and a framework for supporting said burner parts, said framework comprising vertically-arranged tubes extending downward from said controlling-lever for receiving the said chains to thereby guide the same and lessen the danger of accidental movement of said controlling-lever.

2. In a vapor-burner, the combination with burner parts, of a shut-off valve, a rotary spindle for controlling said valve, a lever for controlling said spindle, chains for operating said lever, a framework for supporting the burner parts, and vertically-arranged tubes forming a part of the framework of the de-



vice, said tubes receiving said chains for the purpose described.

3. In a vapor-burner, the combination with burner parts, of a valve for controlling the flow of oil thereto, a valve-casing, a packing-nut screwing onto the top of said valve-casing around said valve to thereby form a stuffing-box therefor, a sliding member  $k$  located above said packing-nut for operating said valve, a casing for guiding said sliding member and a plurality of arms  $m^2$  forming an open-work connection between said valve-casing and said guide-casing whereby access is afforded to said packing-nut.

4. In a vapor-burner, the combination with a shut-off valve  $o$ , of means for operating the same, a valve-casing for said shut-off valve, a generator below said shut-off valve, a needle-stem  $w$  attached to and operated by said shut-off valve and passing through said generator, a vapor-jet nozzle, a cylindrically-bored extension-tube connecting said nozzle to said generator, a needle-wire penetrating said nozzle, a needle-wire holder attached to the extremity of said needle-stem for removably holding said needle-wire, and a guide in said extension-tube for guiding said needle-stem, said guide being polygonal in cross-section to thereby permit the passage of fluid.

5. In a vapor-burner, the combination with a shut-off valve, of means for operating the same, a valve-casing for said valve, a generator below said shut-off valve, a needle-stem  $w$  attached to and operated by said shut-off valve and passing through said generator, a needle-valve mechanism at the lower extremity of said needle-stem, a generator extension-tube forming a connection between said generator and said needle-valve mechanism, said extension-tube being cylindrically bored and loosely inclosing said needle-stem; and a guide near the lower extremity of said generator extension-tube, said guide fitting within said tube and being polygonal in cross-section to thereby afford a passage-way for the vaporized oil.

6. In a vapor-burner, the combination of a generator, a generator extension-tube extending downward therefrom, a needle-stem  $w$  within said extension-tube, a needle-wire in said stem, a vapor-jet nozzle attached at the lower extremity of said extension-tube, a mixing-chamber below said nozzle, said mixing-chamber having a circular aperture at the mouth thereof adapted to receive said nozzle, said nozzle fitting within said aperture and being polygonal in cross-section for enabling said nozzle to be readily unscrewed from said extension-tube and for permitting the escape and downward passage of vapor in case there is any leakage between said nozzle and said generator extension-tube.

7. In a vapor-burner, the combination of a generator-casing  $p$  adapted to receive a supply of oil through its upper opening, and a separator  $q$  adapted to fit within said casing, said separator having a plurality of vertical ribs for distributing oil to different portions of said casing and scrape the inner walls thereof when said separator is rotated, said separator being interiorly chambered and having apertures near its lower extremity for permitting the discharge of hydrocarbon from the outside of said separator to the inside thereof and said separator having a ring  $q^2$  at the bottom thereof for constituting a false bottom and scraper for said casing.

8. In a vapor-burner, the combination of a generator-casing adapted to receive a supply of oil through its upper opening, a removable separator within said casing, ribs on said separator adapted to make contact with the inner walls of said generator-casing for scraping the same, and a ring at the bottom of said separator closely fitting said generator-casing, at least one of said ribs connecting with said ring for scraping the generator-casing at the portion thereof adjacent to said ring, and at least one of said ribs having a space between its lower extremity and said ring to provide means for withdrawing said separator from said casing.

9. In a vapor-burner, the combination of a generator-casing adapted to receive a supply of oil through its upper opening; a removable separator within said casing; ribs on said separator adapted to make contact with the inner walls of said generator-casing for scraping the same; a ring at the bottom of said separator closely fitting said generator-casing, at least one of said ribs connecting with said ring for scraping the generator-casing at the portion thereof adjacent to said ring, and at least one of said rings having a space between its lower extremity and said ring to provide means for withdrawing said separator from said casing; and a cylindrical slotted key adapted to loosely enter said casing between the separator-ribs, said key being provided with a finger for engaging the lower extremity of the shortened one of said ribs for withdrawing said separator from said casing.

10. In a vapor-burner, the combination of a generator-casing, a separator  $q$  fitting therein, a disk-like spreader on top of said separator for conveying the oil to the walls of said casing, and means for holding said spreader and separator down in position within said casing.

11. In a vapor-burner, the combination of a generator-casing, a separator  $q$  fitting therein, a disk-like spreader on top of said separator for conveying the oil to the walls of said casing, a plug fitting into the upper extremity of said casing, and a spring interposed between said plug and spreader for holding the latter down in position within said casing.

12. In a vapor-burner, the combination of a generator-casing; an extension-tube connected with the lower extremity thereof; a purifying-



tube within said generator-casing extending upwardly therein from said extension-tube; an interiorly-chambered separator adapted to fit over said purifying-tube so as to leave a space around the outside of said purifying-tube and also at the top thereof; ribs on said separator for scraping the walls of said generator-casing, the spaces between said ribs forming oil-passages; the lower portion of said separator having apertures for permitting the discharge of oil from the outside to the inside thereof; and means for supplying oil to the generator-casing above said separator.

13. In a vapor-burner, the combination of a mixing-chamber, means for introducing hydrocarbon vapor into the top portion thereof, main burner-tubes connected to the lower portion of the mixing-chamber whereby the vapor is caused to flow downwardly through said mixing-chamber; inverted air-tubes for supplying air to said mixing-chamber; and means for heating said air-tubes, said air-tubes being inverted and connecting with said mixing-chamber near the point of entrance of the vapor, whereby a reversal of direction of motion of the air occurs at the point of meeting with the vapor.

14. In a vapor-burner, the combination of a mixing-chamber, means for supplying vapor thereto near one end thereof, main burner-tubes connected to the other end of said mixing-chamber; air-tubes connected to said mixing-chamber near the point of entrance of the vapor thereinto, said air-tubes lying substantially at the side of and parallel to said mixing-chamber and main burner-tubes; and an auxiliary heater at the side of said air-tubes, main burner-tubes and mixing-chamber for heating all of them simultaneously.

15. In a vapor-burner, the combination of a mixing-chamber, means for supplying vapor thereto near one end thereof, main burner-tubes connected to the other end of said mixing-chamber; air-tubes connecting to said mixing-chamber near the point of entrance of the vapor thereinto, said air-tubes lying substantially at the side of and parallel to said mixing-chamber and main burner-tubes; an auxiliary heater at the side of said air-tubes, main burner-tubes and mixing-chamber; and a spreader at the top of said auxiliary heater for directing the flame simultaneously to said mixing-chamber, main burner-tubes and air-tubes.

16. In a vapor-burner, the combination of a mixing-chamber, main burner-tubes coming together to form a burner-valve casing, a pilot-burner tube opening into the valve-burner casing which is thus formed by the union of said burner-tubes, and a cylindrical burner-valve having apertures in the sides thereof for controllably supplying vapor to said main burner-tubes and pilot-burner tube.

17. In a vapor-burner, the combination of a

mixing-chamber, main burner-tubes coming together to form a burner-valve casing, a pilot-burner tube opening into the valve-casing which is thus formed by said burner-tubes, and a cylindrical burner-valve having apertures of unequal width in the sides thereof, whereby one of said burner-tubes is shut off before the other.

18. In a vapor-burner, the combination of a mixing-chamber, main burner-tubes coming together to form a burner-valve casing, an auxiliary heater, supply-pipes leading thereto, and a cylindrical burner-valve for controlling the flow of vapor into said main burner-tubes, said burner-valve being open at the top, and being of sufficient diameter to include the receiving-openings of said heater supply-pipes.

19. In a vapor-burner, the combination of a generator, a mixing-chamber connected thereto, main burner-tubes connected to said mixing-chamber at the lower extremity thereof, a pilot-burner tube connecting with said mixing-chamber and having its burner-opening adjacent to said generator, and a burner-valve located at the points of union of said mixing-chamber and said burner-tubes, said burner-valve having apertures therein adapted to communicate with said main burner-tubes; and means for rotating said valve to thereby control the flow of vapor into said pilot-burner tube and said main burner-tubes substantially as described.

20. In a vapor-burner, the combination of a generator, a mixing-chamber connected thereto, main burner-tubes connected thereto near the lower extremity thereof, a pilot-burner tube also connected to said mixing-chamber and having its burner-opening adjacent to said generator, and a burner-valve located at the point of union of said mixing-chamber and said main burner-tubes, said burner-valve having apertures therein adapted to communicate with said main burner-tubes; a plug for rotating said valve, a boss below said mixing-chamber for receiving said plug, and a pin in said plug, said boss having a slot therein for receiving the projecting extremity of said pin to thereby retain said plug in position within said boss.

21. In a vapor-burner, the combination of a generator, a mixing-chamber connected thereto, main burner-tubes connected to said mixing-chamber near the lower extremity thereof, a pilot-burner tube also connected to said mixing-chamber and having its burner-opening adjacent to said generator and a burner-valve located at the point of union of said mixing-chamber and said main tubes, said burner-valve having apertures therein adapted to communicate with said main burner-tubes; a plug for rotating said valve, a boss below said mixing-chamber for receiving said plug, a pin in said plug, said boss hav-



ing a slot for receiving the projecting extremity of said pin to thereby retain said plug in position within said boss; a screw, threaded at its upper extremity for screwing into said  
5 plug, a screw-threaded aperture in said plug at the bottom of said valve, said plug having a passage therein of greater diameter than

the shank of said screw, whereby oil may be drawn off from said valve by unscrewing said screw, substantially as described.

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Witnesses:

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