

No. 731,800.

PATENTED JUNE 23, 1903.

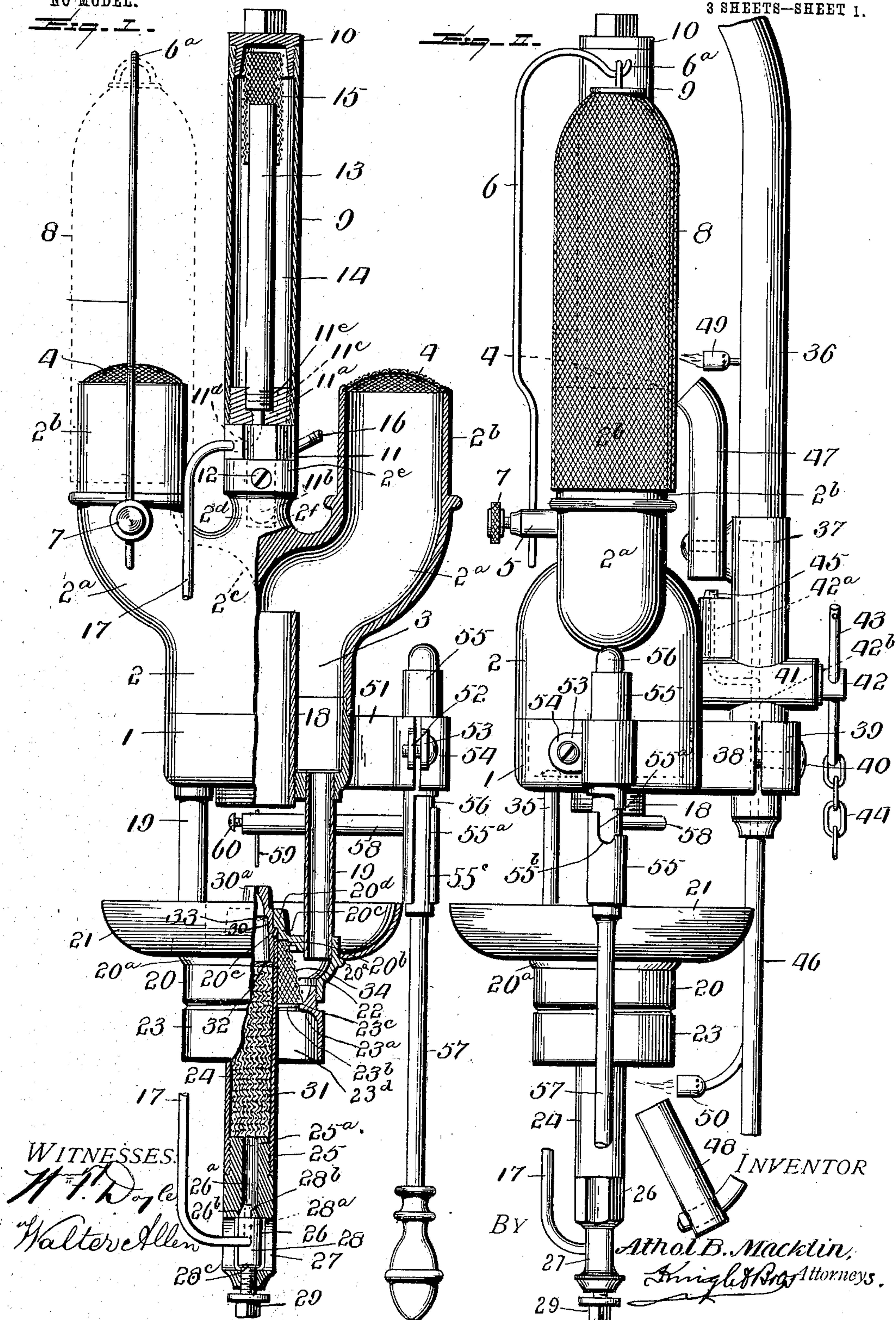
A. B. MACKLIN.

## HYDROCARBON VAPOR BURNER.

APPLICATION FILED JULY 2, 1902.

NO MODEL.

3 SHEETS—SHEET 1.





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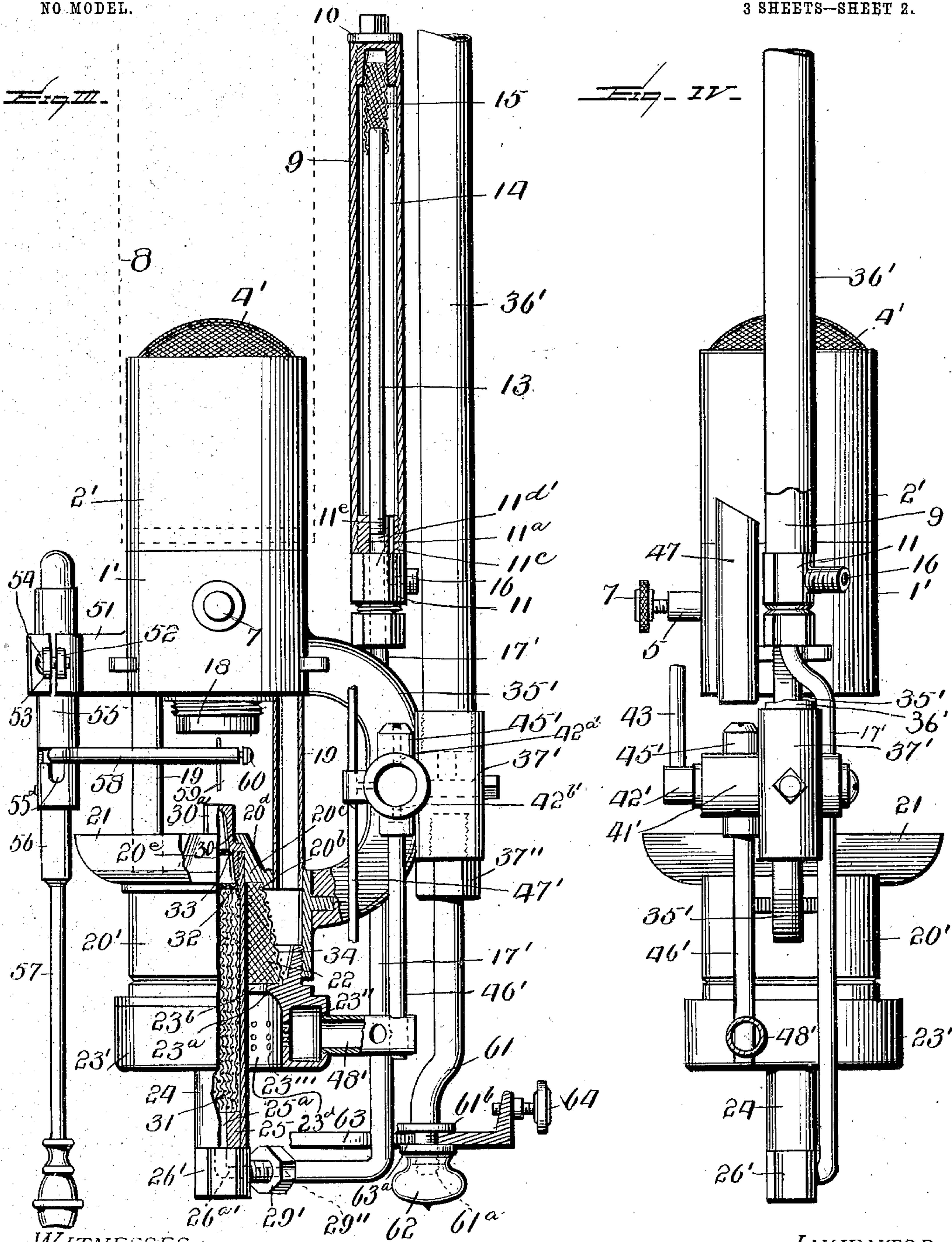
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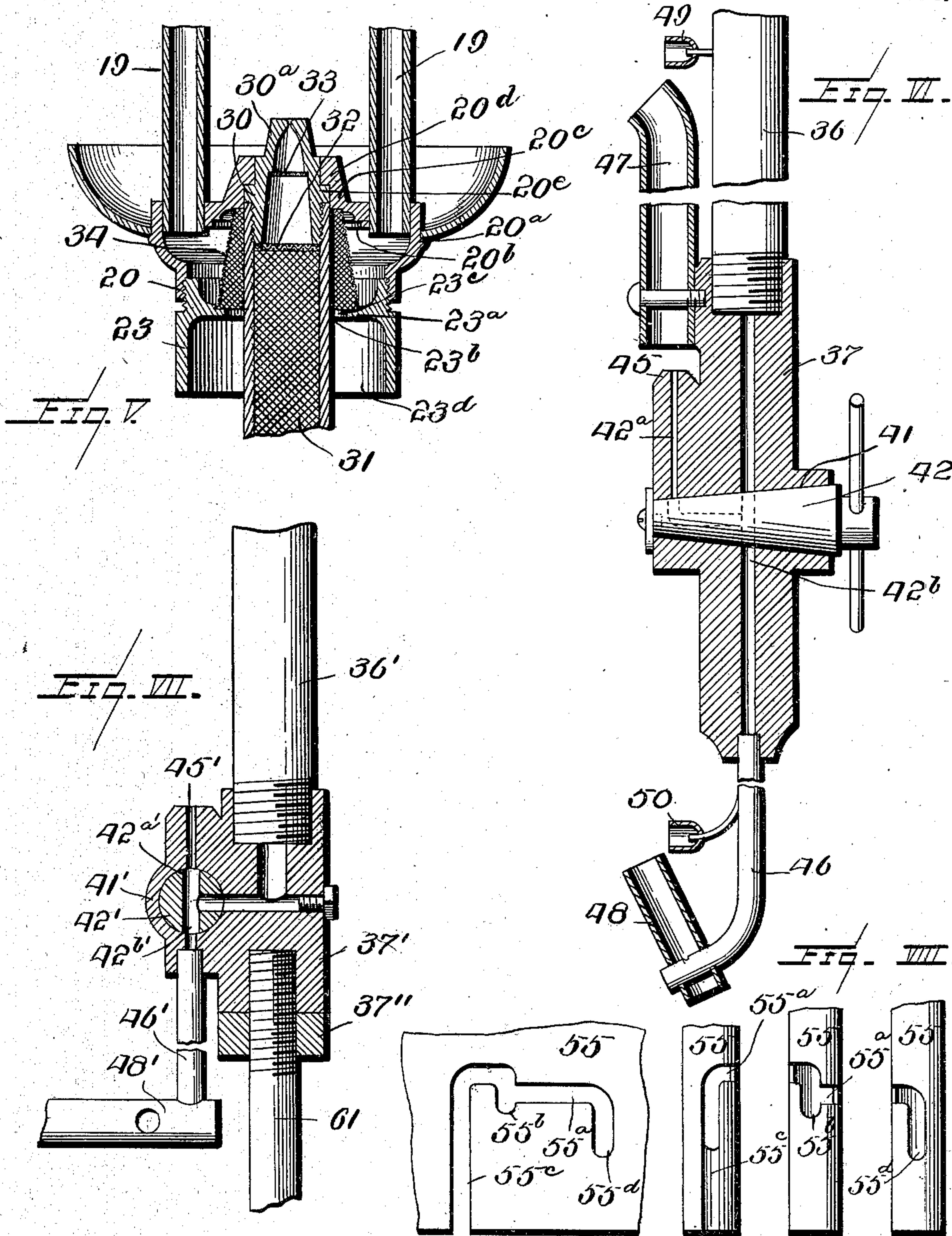
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## HYDROCARBON-VAPOR BURNER.

SPECIFICATION forming part of Letters Patent No. 731,800, dated June 23, 1903.

Application filed July 2, 1902. Serial No. 114,129. (No model.)

*To all whom it may concern:*

Be it known that I, ATHOL B. MACKLIN, a subject of the King of Great Britain, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Hydrocarbon-Vapor-Burning Apparatus, of which the following is a specification.

My invention relates to an improvement on the construction of my hydrocarbon-vapor-burning apparatus shown in Letters Patent No. 707,517, dated August 19, 1902.

My present invention differs from the construction of apparatus shown, described, and claimed in the said Letters Patent in that the bell-shaped mixing or commingling chamber is removed from its position between the burners to a place at a lower elevation within the body of the burner, thus securing the advantage of a less circuitous passage for the vapor and air, a direct feed to the burner, a good mixture of vapor and air, and greater pressure against the mantles, with a corresponding increase in the brilliancy of the light produced. In the position formerly occupied by the mixing or commingling chamber I place an upper vaporizer or "distiller," which is heated by the mantles. In the regular vaporizer I insert a coiled cylinder of wire-gauze wound without a mandrel, and in the upper end of the tube of this vaporizer or immediately resting on the top of the gauze cylinder I place a disk or washer of fine-mesh wire-gauze and above this another disk of gauze of still finer mesh to serve as a final screen about half-way up the vapor-nipple. The upper vaporizer is provided with a Bunsen burner as well as the lower vaporizer and is connected with the gas-tube of the lower vaporizer, the gas-tube being provided with a two-way valve having a handle providing means whereby both Bunsen burners are opened and closed simultaneously. The lower vaporizer is provided with a peculiar construction of valve for controlling the flow of vapor thereto from the outlet-pipe of the upper vaporizer. The vapor-nipple is also raised three-eighths of an inch out of the intense heat of the auxiliary flame by increasing the height of the hub upon which it is mounted, and I find that a decided gain is accomplished.

Other novel features in the details of construction have been included in the present invention, as hereinafter described.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure I is in part a front elevation and in part a vertical section of my improved hydrocarbon-vapor-burning apparatus having a double burner. Fig. II is a side elevation thereof. Fig. III is in part a front elevation and in part a vertical section of my improved hydrocarbon-vapor-burning apparatus having a single burner. Fig. IV is a side elevation of the same. Fig. V is a detail vertical section of the auxiliary or lower burner and adjacent parts shown in Fig. I. Fig. VI is a vertical longitudinal section through the gas-supply pipe shown in Fig. II. Fig. VII is a vertical section of the gas-valve shown in Fig. IV. Fig. VIII is a detail view of the sleeve for supporting the cleaner needle-bar, showing the stepped slot in which the arm of the needle-bar is moved.

1 is the lower section, and 2 the upper section, of a circular main-burner body shouldered together and providing a mixing or commingling chamber 3 for the vapor and air. The upper section 2 is formed in one piece with burner tubes or branches 2<sup>a</sup>, having burners 2<sup>b</sup> provided with gauze burner-caps 4, with a pendent deflector 2<sup>c</sup>, located over the mixing-chamber 3, and with a central boss 2<sup>d</sup>, surmounting the pendent deflector and positioned between the burner-tubes and having a rim 2<sup>e</sup> and a vertical socket or recess 2<sup>f</sup>.

5 represents posts extending laterally from the sides of the burner-tubes, in which are adjustably secured rods 6 by means of binding-screws 7. The rods 6 are provided with hooked upper ends 6<sup>a</sup>, from which are suspended the mantles 8, which overhang and surround the burners.

On the central projection 2<sup>d</sup> I mount an upper vaporizer or distiller adapted to be heated by the burners and mantles owing to their close proximity thereto. This upper vaporizer consists of an outer tube 9, closed at its upper end by a screw plug or cap 10 and at its lower end is provided with a terminal



formed with a lower part 11 in the form of a wrench-nut and an upper part 11<sup>a</sup>, screw-threaded into the lower end of the outer tube 9. The lower part of this terminal is provided with a projection 11<sup>b</sup>, fitting in the vertical recess or socket 2<sup>f</sup> of the central boss 2<sup>d</sup> for supporting the upper vaporizer therein, which is removably secured by a set-screw or bolt 12, working through the rim 2<sup>c</sup>. The terminal is also formed with a side fuel or oil duct or passage 11<sup>c</sup>, a central vapor duct or passage 11<sup>d</sup>, and a screw-socket 11<sup>e</sup>, surrounding the upper end of the central vapor-duct, in which is supported, by its screw-threaded lower end, an inner tube 13, extending to a point near the upper end of the outer tube 9, producing with the cylinder a vaporizing-chamber 14. Surrounding the top of the inner tube 13, between the exit of the vaporizing-chamber 14 and the inlet to the inner tube 13, is a gauze cylinder 15 for filtering the vapor passing therethrough and collecting the carbon therefrom.

Connected with the side fuel or oil duct or passage 11<sup>c</sup> is the fuel or oil supply pipe 16. The vapor produced in the upper vaporizer flows through the central vapor duct or passage 11<sup>d</sup> to an outlet vapor-pipe 17, extending downwardly to a lower vaporizer, in which the vapor is superheated. 18 is a central air-tube located beneath the pendent deflector 2<sup>c</sup> within the mixing-chamber and extending through the lower section 1 of the main-burner body and screw-threaded thereto, so as to be adjustable therein with relation to the vapor-nipple 30 beneath and the pendent deflector above the central air-tube. Secured by their upper tinned ends to the lower section 1 of the main-burner body are depending gas tubes or "bleeders" 19, through which gas in the mixing-chamber is drawn downwardly and whose lower tinned ends are secured to the upper section 20 of an auxiliary or lower burner body having an annular exterior shoulder 20<sup>a</sup>, on which is supported a cup deflector 21. This upper section is also formed with a lower annular interior shoulder 20<sup>b</sup>, a central hub 20<sup>c</sup>, having an upward extension 20<sup>d</sup>, projecting inwardly to provide an upper annular interior shoulder 20<sup>e</sup>. The upper section provides a heating-chamber 22.

23 is the lower section of the auxiliary or lower burner body, having an annular interior flange 23<sup>a</sup>, providing a central air-opening 23<sup>b</sup> and a seat 23<sup>c</sup> and having screw-threaded connection with the upper section 20.

The lower vaporizer is constructed with a vertical tube 24, secured at its upper end within the shouldered central hub 20<sup>c</sup> in any suitable manner. The lower end of this tube is closed by a terminal formed with an upper part 25, screw-threaded to the tube 24 and having a central vapor duct or passage 25<sup>a</sup>, a middle part 26 of wrench-nut form, having a central vapor duct or passage 26<sup>a</sup> and a flaring-seat 26<sup>b</sup> and a lower part 27, in which is located a cylindrical head 28, having a cen-

tral vapor duct or passage 28<sup>a</sup>, with which the lower end of the vapor-pipe 17 is connected; a tapering upper end 28<sup>b</sup>, fitting in the flaring-seat 26<sup>b</sup>, and a concavity 28<sup>c</sup> in its lower end, against which impinges a screw-threaded plug 29, working through the lower part 27 of the terminal and whereby the cylindrical head is removably but tightly seated. Fitting within the extension 20<sup>d</sup> of the central hub 20<sup>c</sup> of the upper section 20 is a stepped vapor-nipple 30, screw-threaded into and supported by the tube 24 against the upper annular shoulder 20<sup>c</sup>. This vapor-nipple has an extension 30<sup>a</sup>, projecting above the hub extension 20<sup>d</sup> and above the cup-deflector 21 to isolate the exit of the nipple from the intense heat of the lower-burner flame.

31 is a filling formed of a coiled wire-gauze sheet located within and surrounding the central vapor-duct 25<sup>a</sup> of the plug 25, and supported on the filling against the vapor-nipple is a fine-gauze filtering-disk 32, while the outlet of the vapor-nipple beneath its upper step is further guarded by a finer-gauze disk 33, fitted there against. Supported on the interior seat 23<sup>c</sup>, above the flange 23<sup>a</sup>, within the heating-chamber 22, and fitting at its upper edge against the lower interior shoulder 20<sup>b</sup> and the central hub 20<sup>c</sup>, is a frusto-conical wire-gauze screen 34, through which the combined vapor and air or gas passes from the pendent tubes or bleeders 19 to the heating-chamber 22, toward the outer chamber 23<sup>d</sup>. 35 is a pillar or rod whereby the main and auxiliary burner bodies are rigidly connected to relieve the pendent tubes of the weight of the auxiliary-burner body.

36 is a pendent ordinary gas-supply pipe which may be connected with a city gas-main conveying illuminating-gas thereto, having a coupling 37, to which the apparatus is rigidly clamped by means of a supporting-arm 38 on the main-burner body, a clamp-plate 39, and screw or bolt 40. The coupling is formed with a valve-casing 41, having a plug-valve 42, provided with two ports or ways 42<sup>a</sup> 42<sup>b</sup> and turned by means of a handle 43, having provision for the attachment of a flexible connection 44, whereby the handle is operated. Controlled by the valve is an upper gas-nipple 45 and lower gas-tube 46, connected with upper and lower Bunsen burners 47 48, respectively adapted to operate in the vicinity of the upper vaporizer and the lower vaporizer, respectively.

49 and 50 are upper and lower pilot-burners located in the gas-pipe and lower gas-tube and playing on the upper and lower vaporizers, respectively. Also extending from the main-burner body is a bracket 51, located at right angles to the supporting-arm of the apparatus, having clamp-jaws 52 53, controlled by a clamp-screw 54 and supporting a sleeve 55, having a stepped slot 55<sup>a</sup>, formed with a seat 55<sup>b</sup>, vertical open part 55<sup>c</sup>, and vertical blind part 55<sup>d</sup>. In the sleeve is mounted the needle-bar 56, similar to that described in my



Letters Patent hereinbefore referred to, having an operating-handle 57 and a curved arm 58, adapted to rest in the seat 55<sup>b</sup>, and needle 59, secured by a set-screw 60 to the curved arm.

Referring to Figs. III and IV, I show a modification of my apparatus in which my improvements are applied to a hydrocarbon-vapor-burning apparatus having a single burner. Parts corresponding to those shown in Figs. I and II are similarly lettered in Figs. III and IV. 1' is the lower section, and 2' the upper section, of a cylindrical upper or main burner body, which are shouldered together, the upper section having a gauze burner-cap 41. The upper vaporizer is provided with a terminal at its lower end, in which the outer vapor duct or passage 11<sup>d</sup> extends vertically therethrough. The lower-burner body is constructed with a cylindrical upper section 20' in one piece with a U-shaped bridge 35', which is also in one piece with and supports it from the lower section of the main or upper burner body. The lower section 23' of the lower-burner body is formed with an annular chamber 23'', having perforations 23''' in its inner wall and its outer wall connected with a lower Bunsen burner 48, which is in turn connected in horizontal position with a vertical gas-pipe 46'. The lower vaporizer is provided with a lower terminal having an upper part 25, formed with a central vapor duct or passage 25<sup>a</sup>, a lower part 26', of wrench-nut form, having a right-angle vapor duct or passage 26<sup>a</sup>' and a horizontal screw-threaded plug 29', connected with the lower part and having a vapor duct or passage 29'', with which the vapor-pipe 17' connects. 36' is a pendent ordinary gas-supply pipe on which the apparatus is supported by means of a coupling 37', formed on the bridge 35', and into this coupling the gas-pipe is screw-threaded, while the lower end of the coupling is closed by a screw-threaded plug 37''. 41' is the valve-casing, connected with the coupling 37', having a cylindrical valve 42' and vertical ducts 42<sup>a</sup>' and 42<sup>b</sup>', controlled by the valve and leading to a gas-nipple 45' and gas-pipe 46', which is connected with the valve-casing. 47' is the pilot-pipe, connected with the valve-casing. 61 is a pendent rod screwed into the bridge 35'. The pendent rod is provided with a screw-threaded lower end 61<sup>a</sup> and flange 61<sup>b</sup>. 62 is a thumb-nut working on the lower end of the rod, and between this thumb-nut and the flange on the pendent rod I support a globe-ring 63, having a radial slot 63<sup>a</sup> to enable it to be moved sidewise sufficiently so as to be released when the nut is loosened. 64 is a screw for securing the globe on its ring.

The pilot for igniting the mantles may be dispensed with, as the upper Bunsen flames serve the purpose.

The construction shown in Figs. III and IV is principally intended for large mantles.

The bleeder-tubes are tinned at their ends and are placed in core prints in the sand made to receive them, and when the molten metal is poured into the mold the ends unite

with the main casting by fusion, making a very substantial, neat, and economical job. These tubes were formerly inserted by threads at one end and by swaging at the other; but in practice they were likely to work loose, particularly as they were the only support of the upper part of the lamp.

Experiment has shown that the cup deflector, to prevent the gases of combustion from the auxiliary flame from entering the mixing-tube, gives better results if inverted, as shown, with the concave side uppermost.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A hydrocarbon-vapor-burning apparatus comprising a main-burner body having a central tube, a mixing-chamber surrounding the central tube, and a burner, a mantle, an upper vaporizer located vertically parallel with and alongside of the mantle, a lower-burner body, having a heating-chamber, depending gas-tubes, connecting the mixing-chamber of the main-burner body with the heating-chamber of the lower-burner body, a lower vaporizer supported in the lower-burner body beneath the central tube, playing thereinto and drawing the gas through the depending gas-tubes and through the heating-chamber and a vapor-pipe connecting the upper vaporizer with the lower vaporizer.

2. A hydrocarbon-vapor-burning apparatus comprising a main-burner body providing a mixing-chamber, a burner-tube, a burner, a mantle, a central tube extending into the burner-body, a vaporizer consisting of an outer fuel-tube and an inner vapor-tube and surmounting the main-burner body and located at one side of the burner and mantle a lower-burner body, gas-tubes connecting the burner-bodies, a lower vaporizer connected with the lower-burner body, and a vapor-tube connecting the upper and lower vaporizers.

3. A hydrocarbon-vapor-burning apparatus comprising a main-burner body, providing a mixing-chamber, burner-tubes, having burners, a boss having a socket, and located over the main-burner body, between the burners, a central tube extending into the main-burner body, and a vaporizer consisting of an outer fuel-tube and an inner vapor-tube and a terminal having a pendent projection fitting in the socket of the boss whereby it is supported between the burners.

4. A hydrocarbon-vapor-burning apparatus comprising a main-burner body providing a mixing-chamber, an upper vaporizer, consisting of an outer fuel-tube and an inner vapor-tube and surmounting the main-burner body, an auxiliary-burner body, the lower vaporizer and a vapor-pipe providing communication between the upper and lower vaporizers.

5. A hydrocarbon-vapor-burning apparatus comprising a main-burner body providing a mixing-chamber, an upper vaporizer consisting of an outer fuel-tube and an inner vapor-tube and surmounting the main-burner body,



an auxiliary-burner body, the lower vaporizer and a vapor-pipe providing communication between the upper and lower vaporizers.

6. The main-burner body providing a mixing-chamber and constructed with a lower section having an adjustable central tube, and an upper section shouldered to the lower section and having spreading burner-tubes, provided with burners, a deflector located over the outlet of the central tube and a central boss surmounting the pendent deflector and provided with a socket.

7. The combination of the main-burner body having a mixing-chamber, the gas-tubes depending from the main-burner body, lower-burner body comprising a lower section, an upper section formed with a central hub having an upward extension projecting beyond the central hub having an upward extension, and a stepped vapor-nipple supported in the central hub.

8. The lower-burner body comprising a lower section, having an interior annular flange, an annular seat, and a lower chamber, an upper section formed with an exterior annular shoulder, upper heating-chamber, a lower interior annular shoulder, a central hub, having an upper interior annular shoulder and upward extension, and a cup supported on and projecting upwardly from the exterior annular shoulder.

9. The lower-burner body comprising a lower section formed with an interior annular flange providing an opening and a seat around the opening, an upper section formed with a hub having an upward extension and lower and upper interior annular shoulders, a stepped vapor-nipple, having an upward extension, a vaporizer having a tube receiving and supporting the vapor-nipple in the central hub, a fine mesh-wire-gauze disk located at the base of the vapor-nipple, a finer wire-mesh-gauze disk located within the vapor-nipple, and a frusto-conical wire-gauze screen

extending from the seat to the hub of the upper section.

10. The lower vaporizer comprising a tube, a terminal located at the lower end of the tube having an inlet-duct, a coiled wire-gauze sheet within the tube surrounding the outlet to the duct, a stepped vapor-nipple supported by the tube, a fine wire-mesh-gauze disk located at the base of the vapor-nipple, and a finer wire-mesh-gauze disk located within the vapor-nipple.

11. The lower vaporizer comprising a tube, a terminal located at the lower end of the tube consisting of an upper part having an inlet-duct and fitting in the tube, a middle part having an inlet-duct, and an outer part, a head having an inlet-duct, and located in the lower part, an upper vaporizer having a terminal and a vapor-pipe connected with the terminal of the upper vaporizer and with the head in the terminal of the lower vaporizer.

12. The lower vaporizer comprising a tube, a terminal located at the lower end of the tube consisting of an upper part having an inlet-duct and fitting in the tube, a middle part having an inlet-duct and a flaring seat, a lower part, a head having an inlet-duct, a tapered upper end fitting in the flaring seat, and a concavity in its lower end, and a screw-plug working in the lower part and entering the concavity of the head and a vapor-pipe connected with the head.

13. A hydrocarbon-burning apparatus comprising an upper vaporizer, a lower vaporizer, a vapor-pipe connecting the vaporizers, a gas-pipe, a coupling having a valve-casing, and a valve, and Bunsen burners in communication with the valve-casing and operating on the vaporizers.

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