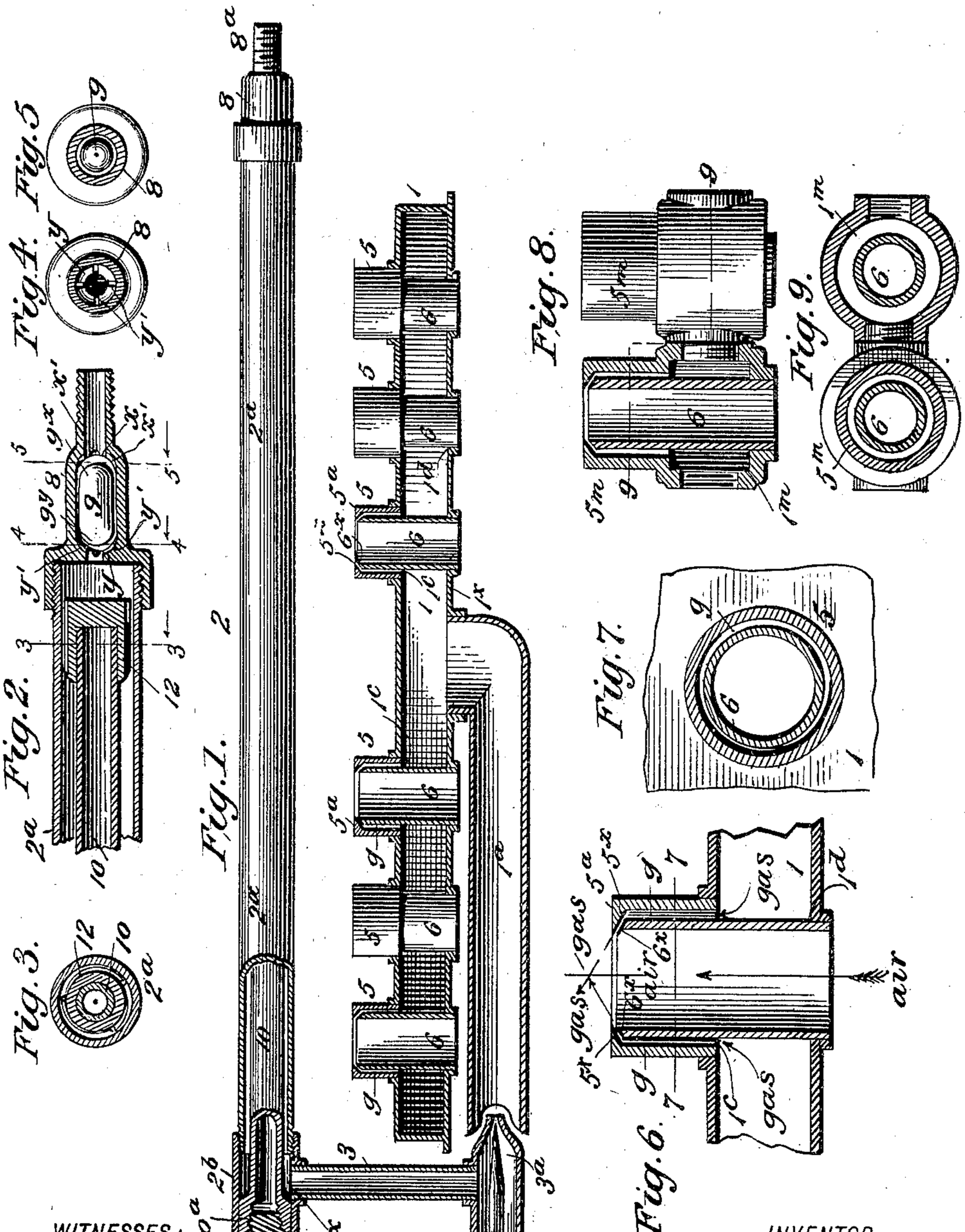
No. 725,003. PATENTED APR. 7, 1903.

R. J. MINER.

GASEOUS FUEL BURNER.

APPLICATION FILED AUG. 9, 1902.

NO MODEL. 2 SHEETS—SHEET 1.



WITNESSES:

Louis Dieterich

L. Wentzell.

INVENTOR

Robert J. Miner

BY

Fred G. Dieterich & Co

ATTORNEYS

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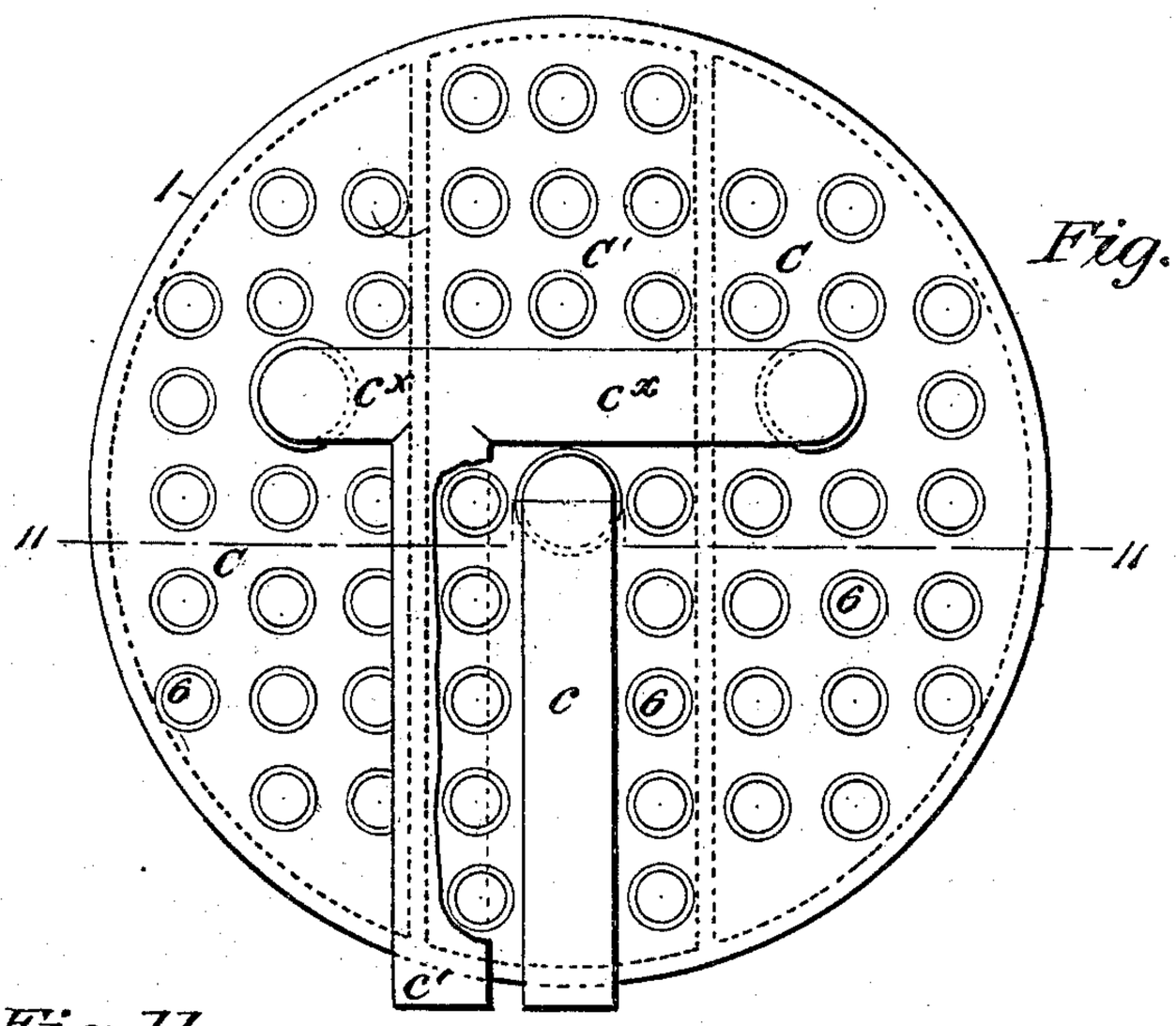
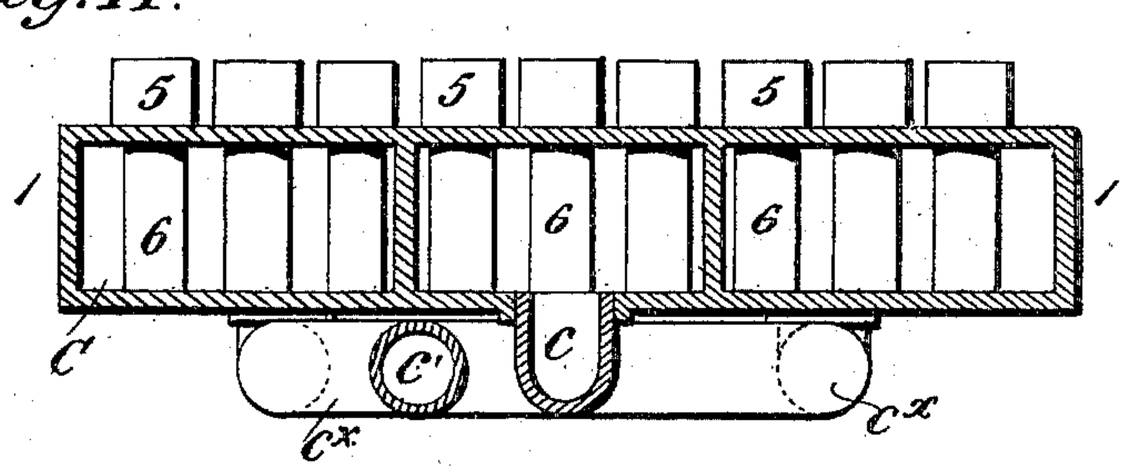


Fig. 10.

Fig. 11.



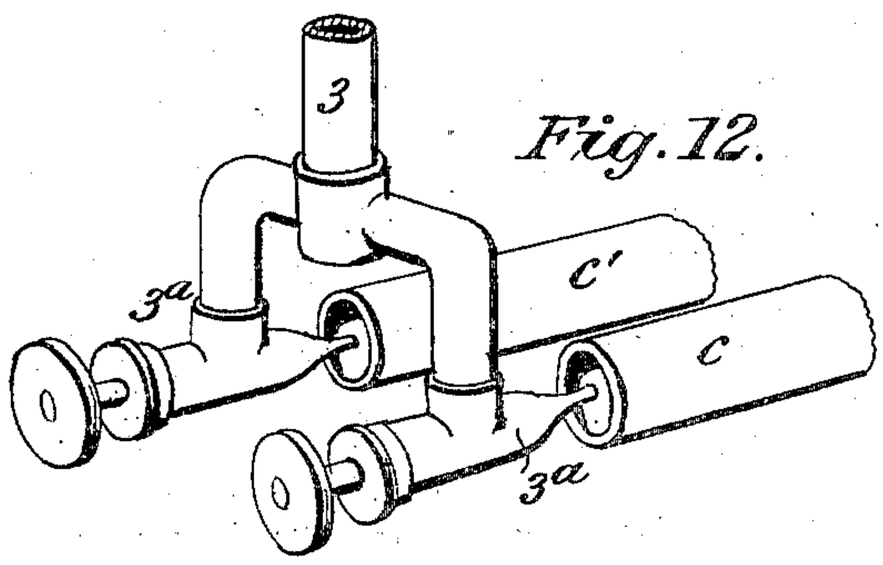


Fig. 12.

WITNESSES:

Louis Dieterich

L. Bentzell.

INVENTOR

Robert J. Miner

BY

Fred'g Dieterich & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

ROBERT J. MINER, OF GREENWICH, CONNECTICUT, ASSIGNOR OF THREE-FOURTHS TO WILLIAM S. JESSUP AND W. L. TUCKER, OF NEW YORK, N. Y.

GASEOUS-FUEL BURNER.

SPECIFICATION forming part of Letters Patent No. 725,003, dated April 7, 1903.

Application filed August 9, 1902. Serial No. 119,077. (No model.)

To all whom it may concern:

Be it known that I, ROBERT J. MINER, residing at Greenwich, in the county of Fairfield and State of Connecticut, have invented a new and Improved Gaseous-Fuel Burner, of which the following is a specification.

My invention relates to that type of gaseous-fuel or kerosene-oil burners fed from a gaseous-vapor supply common to all of the burners, and it primarily seeks to provide an improved burner of the character stated of a simple and economical construction especially well adapted for generating steam on motor-vehicles and for such other purposes where gaseous fuel is employed for heating.

In its generic nature my invention comprehends a novel coöperative arrangement of generating means, a series of burners, a valve-controlled gaseous-vapor-discharging member which forms a coöperative part of the generating means, and a vapor-distributing chamber or shell with which all of the burners are operably joined and provided with an inlet for receiving the vapor from the valve-controlled discharging member.

My invention also embodies in its complete make-up a generator comprising an outer tube or shell and a hollow filler longitudinally movable within the outer tubular shell, which primarily serves to aid in maintaining the radiated heat on the inside of the tube or shell in close contact with the inner wall of the said shell, whereby to provide for quickly heating the said outer shell or tube and for keeping it in a uniform generative condition, said hollow filler also serving under certain conditions to act as a cleaner for removing soot or other incrustations or deposits from within the generating tube or shell.

Again, my present invention embodies a novel type of automatically-operating valve devices for controlling the inflow of the gaseous fluid and shiftable in reverse directions by the variable endwise fluid-pressure in opposite directions, whereby under ordinary fluid-pressure to control the feed of the fuel fluid and maintain it at a uniform predetermined flow and under a reverse or vapor pressure to cut the flow of the volatile fluid down to a predetermined minimum degree.

In its more subordinate features my invention consists in certain details of construction and combination of parts, all of which will hereinafter be fully explained, and specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section, parts being in elevation, of my improved burner. Fig. 2 is an enlarged longitudinal section of the intake or oil-receiving end of the generating tube or shell and illustrates the automatically reversely-shiftable valve devices hereinafter specifically referred to. Fig. 3 is a cross-section on the line 3 3 of Fig. 2. Figs. 4 and 5 are similar views on the lines 4 4 and 5 5 of Fig. 2 looking in the direction indicated by the arrows. Fig. 6 is a detail vertical section of one of the burners. Fig. 7 is a horizontal section thereof. Fig. 8 is a longitudinal section of a slightly-modified form of burner. Fig. 9 is a horizontal section on the line 9 9 of Fig. 8. Fig. 10 is an inverted plan view of a burner-body formed with three separate sets of burners, a separate feed for the central set of burners, and a single feed for the two outer sets of burners. Fig. 11 is a transverse section of the burner shown in Fig. 10. Fig. 12 is a detail view illustrating the arrangement of the main feed-pipe and the valve-equipped laterals for feeding the separate sets of burners in the construction of burner shown in Figs. 10 and 11.

In all forms of my improved burner the same includes a shallow shell 1, of cylindrical or other desired shape, dependent on the particular use for which my burner may be desired. The shell 1 serves as a gaseous-vapor collector, and in the simplest form it has a single feed-pipe 1^a, which is connected to the bottom plate 1^x of the shell centrally thereof and communicates therewith, as clearly shown in Fig. 1, from which it will also be noticed the entrant end of the pipe 1^a is held adjacent to the ejector-nozzle 3^a of the vapor-feed pipe 3, which nozzle is controlled by a needle-valve 4, of the ordinary construction.

In the simplest form of my invention, as illustrated in Fig. 1, the shell 1 is equipped with a series of burners, all of which communicate with the interior of the said shell

1, from which all of the said burners are fed; but each of the said burners has a separate air-feed, as clearly shown. Each burner consists of a short hollow tubular member 5, detachably or rigidly joined with an outlet 1^c in the top plate of the shell 1, and the upper end of the hollow member 5 terminates with an inwardly-projecting annular flange 5^a, the under edge of which is beveled upward and outward, as indicated by 5^x, for a purpose presently explained. Within the member 5 is fitted a pipe-section 6 of somewhat less diameter than the outer tubular member 5, into which it projects, and the said pipe-section 6 extends down through the shell 1, is fixedly or detachably connected with the bottom plate thereof, and joins with an air-aperture 1^d in the said bottom plate, as shown. The pipe 6, as will be best understood from Fig. 6, extends sufficiently close to the walls of the member 5 to produce a narrow annular passage *g* for the outflow of the gaseous vapor from within the shell 1 toward the tip or ignition end of the burner. The upper end of the air-pipe section terminates just under the flange 5^a of the member 5, and the upper edge thereof is beveled, as at 6^x, in a plane parallel with the bevel 5^x on the member 5^a, and the two beveled surfaces 5^x 6^x oppose each other in such manner as to provide a restricted annular discharge-opening from which the gaseous vapor will be ejected toward the axial center of the air-pipe 6, and thereby provide a positive and uniform intermixing of the air and vapor at the tip or igniting end of the burner. This manner of ejecting the volatile fluid and intermixing it with the air is very advantageous, for the reason that there is practically no waste of the volatile vapor on account of a non-mixing with the air or by reason of non-combustion, as the annular rim on the member 5 prevents the volatile vapor from passing upwardly in a plane with the vertical direction of the air-current through the pipe 6 and the consequent waste of the fluid from spreading laterally from the burner. Furthermore, the flange 5^a on the member 5 acts as a baffle for properly deflecting the volatile vapor inward into the air-current that is drawn up through the pipe 6, and by reason of the inward inclination of the said flange and the restricted circular discharging-orifice being at a point some distance above the point where the gas is fed into the member 5 and disposed out of a vertical plane danger of the flame passing backward or following the fuel down the tube 5 and into the gas-holding shell is rendered impossible.

The vapor-feed pipe 3 connects with one end of the generating member 2, which extends horizontally over the burners and preferably over the central set thereof, and the said generating member consists of an outer tube 2^a, to the inner end of which is connected a socket 2^b, to which the discharge-pipe 3 is also joined, and the outer end of the said socket 2^b is open, for a purpose presently explained.

8 designates a valve-casing which is detachably secured to the outer or entrant end of the tube 2^a and is extended in the longitudinal plane thereof. By referring now more particularly to Figs. 2 to 5 it will be noticed the valve-chamber 8 has a nozzle 8^a for conveniently attaching thereto the oil-supply pipe, and at each of the opposite ends it has a semicircular valve-seat, the one at the entrant end of the valve-chamber being designated X, and the opposing one at the discharge end of the said chamber is designated Y. The valve-seats X and Y are of semicircular shape, whereby to properly coöperate with the correspondingly-shaped ends 9^x 9^y of the shiftable valve 9, which is floatably mounted within the chamber 8, and the said valve is of a length and diameter less than that of the chamber 8 and is automatically shiftable under varying fluid-pressures thereagainst from opposite directions. Under the ordinary adjustment of my improved burner the valve 9 assumes a midway position to permit of the maximum flow of the kerosene or other volatile fluid into the generating member 2. In operation should the fluid-feed pressure become excessive and greater than that of the gaseous or vapor pressure within the generating member 2 the valve 9 will shift to bring its end 9^y into engagement with the valve-seat Y, and thereby cut down the flow of oil into the generating-tube. As it is necessary, however, for the proper operation of my invention that the feed of the oil be not entirely cut off, the valve-seats X and Y are provided with radial grooves or channels X′ Y′, as clearly shown in Figs. 2 and 4, and which are so arranged as to provide for a predetermined minimum feed of the oil under all of the adjustments of the valve 9.

By providing a valve mechanism as described a simple and effective means for controlling the feed of the oil is provided when the feed-pressure is excessive, and for reducing the feed of the oil in case the vapor or gaseous pressure within the generating-tube becomes excessive—that is, greater than that of the oil-feed pressure against the valve 9—and in that event the end 9^x of the valve moves into engagement with its opposing valve-seat X, and in consequence the oil-feed will be thereby reduced to the predetermined minimum flow.

The generating means also includes a hollow space-filler 10, which consists of a tubular stem of somewhat less diameter than the tube 2^a, into which it is slidably projected through the open end of the union or socket member 2^b, and it is suspended within the said tube 2^a and out of contact with the inner walls thereof by a conical screw-plug 11, having a cap or flange 11^b to close the open end of the socket 2^b, its screw portion being arranged to engage with an internally-threaded conical socket 10^a, formed on the outer end

of the filler-tube 10, as clearly shown in Fig. 1. The object in using a hollow filler for the tube 2^a is twofold. First, it provides for concentrating the heat directly against the inner and outer surfaces of the tube 2^a, as the radiated heat within the tube 2^a is confined within the annular space between the filler and the tube 2^a, and by reason of such concentration of the heat within the tube 2^a the fluid as it passes into the generator and is restricted in its passage therein by being confined within the annular space between the filler and the tube 2^a is more quickly converted into vapor than would be possible if it were free to circulate within the entire cross-sectional area of the said tube 2^a. On the outer end of the filler 10 is fitted a cap-piece 12, the peripheral surface of which is roughened or ream-faced, so as not to close off the tube 2^a from the feed, and the said cap-piece 12 when the burner is out of operation is utilized as a cleaner for scraping off the incrustations, soot, or other deposits which accumulate within the tube 2^a, and such result is accomplished by pulling the filler 10 out of the open end of the socket 2^b and drawing the deposits within the tube 2^a to its outlet 2^x, with which the pipe 3 connects, it being understood that during the cleaning operation the said pipe 3, with its attached parts, is disconnected from the tube 2^a.

In Figs. 8 and 9 I have shown a slightly-modified form of the burners, and in the said form the tubular extension (designated by 5^m) is an integral part of a shell or chamber portion 1^m, and the chamber portion 1^m of each tubular extension 5^m is provided with a screw-tap, whereby all of the chamber portions 1^m can be connected in series. The air-pipe 6 in this construction is arranged the same as in the preferred form, and both the pipe 6 and the tubular extension 5^m have beveled surfaces at the ignition end, as shown.

In Figs. 10 and 11 the burner is illustrated as comprising three distinct vapor-collecting chambers, (designated by C C′ C,) into each of which a separate gas-feed pipe discharges. As shown in Figs. 10 and 12, but two gas-feed pipes *c c′* are used, one of which, *c′*, connects with the central chamber C′, and another, *c*, provided with laterals c^x c^x, that discharge into the outer chambers C, and the two pipes *c c′* are held to coöperate with the valved ejectors 3^a 3^a, which are joined with the pipe 3 in the manner clearly shown in Fig. 12.

Slight changes in the details of construction and further modifications of my invention may be made without departing from the scope of the appended claims.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a burner of the class described; a generating or vaporizing tube, a valve-controlled fuel-feed discharging into the entrant end thereof, a supplementary hollow tube of less diameter than the vaporizing-tube removably mounted in said vaporizing-tube, a cap for closing the inner end of said supplementary tube, said cap being of a diameter to closely fit inside of said vaporizing-tube, and having spiral grooves on its periphery, all being arranged as specified.

2. In a burner as described, the combination with the vapor-collecting chamber and the burners coöperatively joined therewith; of a generating or vaporizing tube supported over the burners, said tube having a pendent outlet-pipe and a valved ejector at one end, a valved fuel-feed pipe connected with the other end of the tube, a hollow space-filler detachably mounted within the vaporizing-tube, means for closing the inner end of said space-filler, consisting of a cap of a diameter to snugly fit the inside of said vaporizing-tube and having spiral grooves on its periphery, said cap also serving as a supporting means for the inner end of said space-filler, and a means for supporting the outer end of said space-filler whereby the said space-filler is supported within the said tube and out of contact with the walls thereof, as specified.

3. In an appliance as described, the combination with the burners, a generating or vaporizing tube coöperatively connected therewith, an outlet-pipe connected with the said tube, and a valved ejector on the said outlet-pipe for feeding the vaporized fluid to the burners; of a valve-chamber detachably mounted on the inlet end of the vaporizing-tube, said valve-chamber having a feed-inlet and provided with opposing valve-seats, one at the inlet and the other at the outlet end thereof, each of said seats having radial grooves or channels, a floatable valve within the valve-chamber, having its ends shaped to engage the opposing valve-seats, said valve being shiftably supported and endwise movable alternately in opposite directions to engage the opposing valve-seats by the varying fluid-pressures from the opposite ends, as set forth.

4. In a gaseous-fuel burner as described, a burner having a central and two outer independent compartments, a vaporizing-tube having a pendent outlet-pipe, said pipe having laterals, each provided with a valve-equipped ejector, a valve-chamber mounted on the inlet end of said vaporizing-tube, said valve-chamber having a feed-inlet and provided with opposing valve-seats, said valve-seats having radial grooves or channels, a valve within said chamber adapted to seat upon said valve-seats at predetermined times, a vapor-receiving tube coöperatively joined with each ejector, one of said tubes communicating with the central compartment of the burner and the other tube communicating with the two outer compartments, and firing-tubes connected with the several independent compartments of the burner, the central

ones of said firing-tubes being disposed in alinement with the vaporizing-tube, substantially as shown and described.

5. In an appliance as described, the combination with the burners, a generating or vaporizing tube coöperatively connected therewith, an outlet-pipe connected with the said tube and a valved ejector for the said outlet-pipe for feeding the vaporized fuel to the burners, said vaporizing-tube consisting of an outer tube having a valved inlet at one end and a hollow space-filler mounted within said vaporizing-tube, a cap having grooves in its periphery and of a diameter to snugly fit inside the vaporizing-tube, said cap adapted to close the inner end of the said space-filler, and an enlarged portion at the other end of the space-filler to prevent the discharge of the vaporized fuel to atmosphere, said enlarged end being internally threaded, a handle having a threaded member adapted to engage with said internally-threaded portion and forming a plug for closing said enlarged end of the hollow space-filler, whereby the said space-filler may be readily withdrawn from or inserted into said vaporizing-tube, all being arranged substantially as shown and for the purposes described.

ROBERT J. MINER.

Witnesses:
FRED G. DIETERICH,
JOHN L. FLETCHER.