

No. 735,298.

PATENTED AUG. 4, 1903.

F. A. RAY.  
BURNER.

APPLICATION FILED JULY 27, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

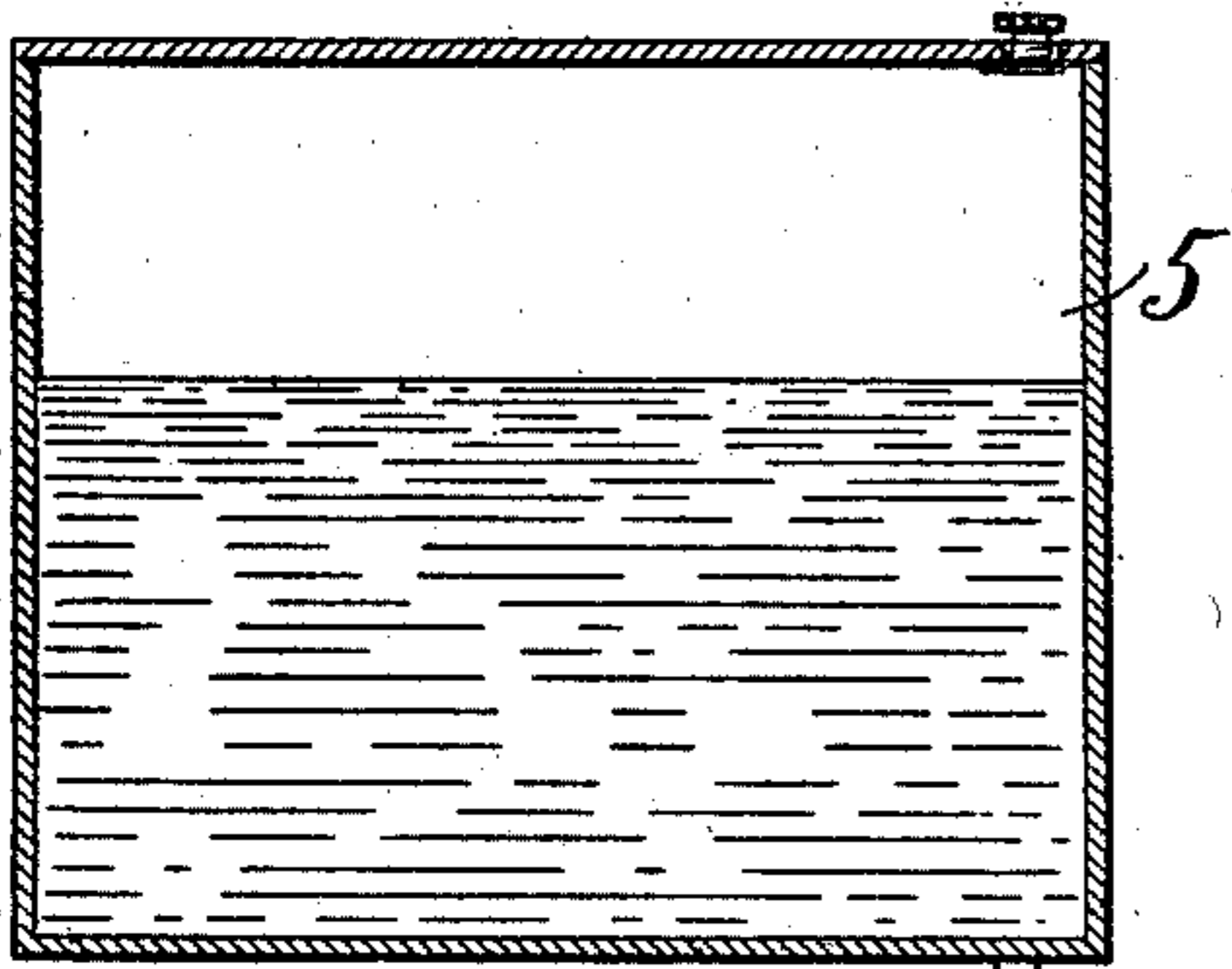


FIG. 1.

WITNESSES:  
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*W. P. Pettit*

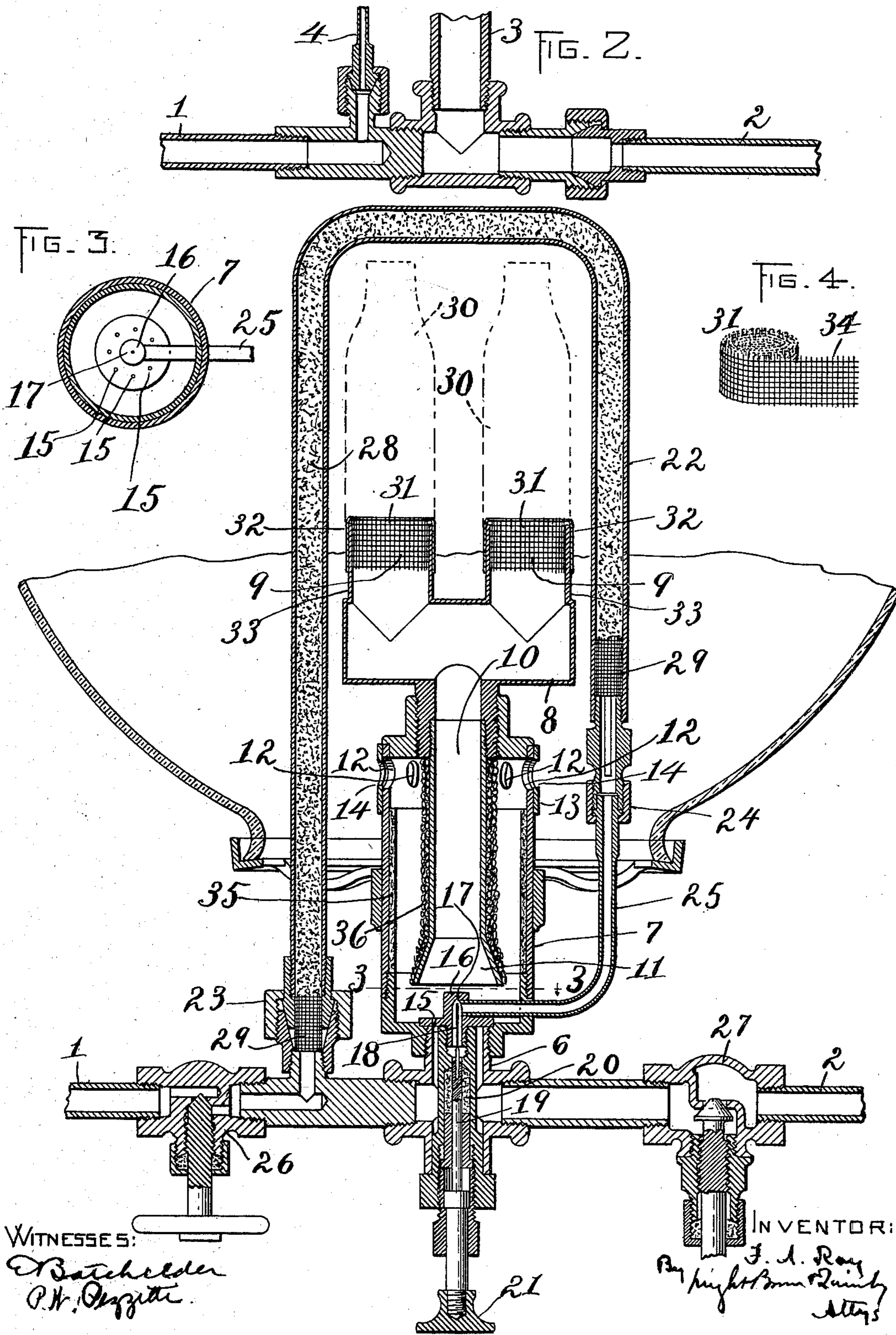
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F. A. RAY.  
BURNER.

APPLICATION FILED JULY 27, 1901.

NO MODEL.

2 SHEETS—SHEET 2.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

FOREST A. RAY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE STANDARD LIGHT COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

## BURNER.

SPECIFICATION forming part of Letters Patent No. 735,298, dated August 4, 1903.

Application filed July 27, 1901. Serial No. 69,891. (No model.)

*To all whom it may concern:*

Be it known that I, FOREST A. RAY, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Burners, of which the following is a specification.

This invention relates to burners for use in lamps and other situations; and its object is to provide an intense heat with a minimum expenditure of fuel.

The invention also has for its object to provide certain improvements in the structure of burners, as more fully hereinafter specified.

The invention consists in the improved burner and the improved lamp hereinafter described and claimed.

Of the accompanying drawings, Figure 1 represents a side elevation of a lamp constructed in accordance with my invention. Fig. 2 represents a vertical section thereof on an enlarged scale. Fig. 3 represents a section on the line 3 3 of Fig. 2. Fig. 4 represents a detail perspective view showing the construction of the burner-plugs.

The same reference characters indicate the same parts or features in all the drawings wherever they occur.

Referring to the drawings, 1 2 represent tubes or conduits forming a rectangular or substantially O-shaped frame surrounding the lamp and supported by a stem 3, consisting of a gas-pipe connected with a source of illuminating-gas and continuous with the tube 2. The tube 1 is partitioned off from the tube 2 and constitutes a water-leg, which is supplied with water under pressure through a pipe 4 from a tank 5. The desired water-pressure in the tube 1 may be supplied by maintaining an air-pressure in the tank 3 above the level of the water or by elevating the tank sufficiently to give a gravity-pressure of the desired amount, or the water-pressure may be obtained in any other suitable manner, as by connecting the pipe 4 with a street-supply. It is desirable that the pressure in the pipe 1 should be kept substantially uniform.

6 is a cylindrical casing supported by the frame 1 2 and supporting above it a larger

cylindrical casing 7, which in turn supports above it a burner-casing 8, having a pair of burners 9 9. A vertical mixing-tube 10, connecting with the interior of the burner-casing 8, extends downwardly therefrom nearly to the bottom of the casing 7 and is provided at its lower end with a flaring mouth or orifice 11. At the upper end of the casing 7 is an annular series of perforations 12 12, constituting air-inlets and controlled by a valve in the form of a ring 13, provided with perforations 14 14, which may be slid into and out of register with the perforations 12 by rotating said ring. The interior of the casing 6 connects with the gas-pipe 2 and with the interior of casing 7 through a series of perforations 15 15, formed in a partition separating the two casings.

37 is a wrapping of sound-deadening material surrounding the mixing-tube 10.

16 is a steam-nozzle surrounded by the gas-perforations 15 15 and directed into the mouth of the mixing-tube 10, said nozzle having a minute outlet or perforation 17. A needle 18, mounted upon a stem 19, which slides through a stuffing-box 20 and is provided with a handle or knob 21 at its lower end, is guided in alinement with the steam-outlet 17 and is adapted to be moved into said outlet to clean the latter whenever this becomes necessary.

22 represents a substantially U-shaped water-vaporizer or steam-generator, forming an arch over the burners; with its top and side legs in heating relation thereto and connected at one end by a union or coupling 23 with the water-pipe 1 and at the other end by a union or coupling 24 with a small pipe 25, which is jointed to the steam-nozzle 16. A valve 26 in the water-pipe 1 controls the supply of water to the vaporizer 22, and a valve 27 in the gas-pipe 2 controls the supply of gas to the gas chamber or casing 6. The vaporizer 22 consists of an outer metallic tube or casing filled with granular carbon 28, which is retained in the tube by means of removable perforate plugs 29 29, placed in the ends of the tube. The granular carbon 28 being of a refractory nature is not destroyed or injured by the action of heat on the vaporizer, and it has the

effect of greatly increasing the interior heating-surface of said vaporizer, so as to secure a rapid vaporization of the water therein. The water is fed directly and continuously to the vaporizer by its own pressure. The valve 26 is only used to shut off the water when the burner is not in use and can be wide open when the burner is in operation, for the steam-pressure in the vaporizer then regulates the supply of water required by it. The pressure of steam obtained is nearly equal to the pressure of the water column. In the latter part of the length of the vaporizer the steam generated in the first part of its length becomes highly superheated and passes through the burner without condensation. The granular carbon besides acting as heating-surface also acts as a filter, both for the water and for the steam generated therefrom, with the result that a very pure supply of steam is furnished to the nozzle 16.

Above each of the burners 9 9 I have shown a refractory mantle 30, which becomes heated and gives a high illumination from the effect of the impingement of the flame from the burner thereon.

The jet of steam issuing with considerable force from the nozzle 16 into the mixing-tube 10 draws the air which enters chamber 6 through inlets 12 12 into the mixing-tube by an ejector action and produces an intimate mixture of the air and steam with the gas issuing into said tube through the perforations 15 15. The mixture of the fluids is further promoted in passing through the burner-orifices. These orifices are filled by perforate plugs 31 31, held in place by flanged rings 32 32, which slip over the mouths of the burner-tubes 33 33. The plugs are made by rolling or wrapping a strip 34 of wire-gauze whose width is equal to the length of the plug into the form of a circular coil or roll, the construction being represented in Fig. 4, in which it is seen that the convolutions are in mutual contact. The effect of a burner-plug or outlet of this nature is to interpose a considerable resistance in the path of the fluids, securing their intimate mixture and overcoming the noise or whistling which is characteristic of many burners which are run under a heavy pressure of vapors or gases. The plugs 29 29 are of a similar construction to the plugs 31.

My improved burner gives a flame of very high temperature, due to the forcing of the fluids under pressure, their intimate mixture, and their complete combustion within a short distance of the burner-orifices. The steam becomes decomposed by the heat of the flame and burns with the air and gas. This decomposition is promoted by the presence of the highly-heated incandescent mantles 30, and the result is an intense illumination.

I do not confine myself to the use of illuminating-gas as a fuel, since the vapor of hydrocarbons generated in any suitable manner may be employed instead, nor do I confine

myself to the details of construction herein set forth nor to any particular number of burners, for it is obvious that a greater or less number than two may be employed with a corresponding number of refractory mantles when the invention is applied to lighting purposes.

I can use my apparatus as an oil-burner by substituting hydrocarbon oil for water in the vaporizer 22, in which event the gas-supply furnished through pipe 2 may be discontinued, except as a convenient means for a preliminary heating of the vaporizer. The gas thus used readily entrains its own air-supply in passing into the mixing-tube 10 before the oil is turned on. It will also be noted that the gas-outlets 15 and jet-outlet 17 are arranged parallel to each other, and the air-supply for both of these fuel-jets is derived from a common source—namely, the casing 7, fed by the air-inlets 12. This construction avoids any possibility of an escape of oil-vapor into the atmosphere through auxiliary air-inlets or otherwise when the vapor-jet is first turned on after the preliminary heating, as is observed in some prior forms of apparatus.

It will be seen that the nozzle-piece 16, containing the middle orifice 17 and surrounding or outlying orifices 15, abuts or overlies the gas-casing 6 and is traversed by the sleeve 40, which forms a bearing for the cleaning-needle 18, said sleeve having a screw-threaded connection at 41 with the nozzle-piece 16 and a shoulder 42 at its lower end abutting the lower end of the casing 6, whereby the parts are removably held in assembly. The vaporizer outlet-tube 3 is carried laterally into the chambered portion of nozzle-piece 16, and the cleaning-needle 18 traverses said chambered portion and not the vaporizing-tube, so that when the needle is operated to clear the vapor-outlet 17 of sediment none of the sediment in the vaporizing-tube is disturbed. The cleaning-needle is made parallel-sided, as shown, and is mounted so as to slide freely in a longitudinal direction. When cleaning is required, the needle can be projected into the orifice 17 and withdrawn without interrupting the operation of the lamp, for by reason of the parallel sides of the needle it does not tightly close the orifice, as a conical needle-valve would, and by reason of its sliding mounting it can be so quickly projected and withdrawn as to obstruct the orifice 17 only for a brief instant.

I claim—

1. A burner-tube having an outlet occupied by a roll or volute of wire-gauze with its convolutions in mutual contact, means for supplying combustible fluid to said burner-tube, means for supplying air to the burner-tube to mix with such combustible fluid, and means for supplying an additional fluid to said burner-tube.

2. In a burner apparatus, the combination of a Bunsen burner having a plurality of orifices for supplying said burner with different

fluids, a substantially O-shaped supporting-frame for said burner surrounding the latter and composed of separate branch conduits connected with the respective orifices, a source  
5 of water-supply connected with one of said conduits, and means for supplying a combustible fluid through the other conduit, a portion of the water-supply conduit having a granular filling confined therein.  
10 3. In a burner apparatus, the combination of a burner having an air-casing 7, a gas-casing 6 jointed thereto, a nozzle structure 16 abutting said gas-casing and having a middle orifice and an independent series of orifices

surrounding the same, and communicating 15 with the interior of the gas-casing, means for supplying vapor to said middle orifice, a removable sleeve 40 having a shoulder abutting the gas-casing and a screw-threaded connection with said nozzle-structure, and a cleaning-needle for said middle orifice mounted in 20 said sleeve.

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

FOREST A. RAY.

Witnesses:

R. M. PIERSON,  
C. F. BROWN.