

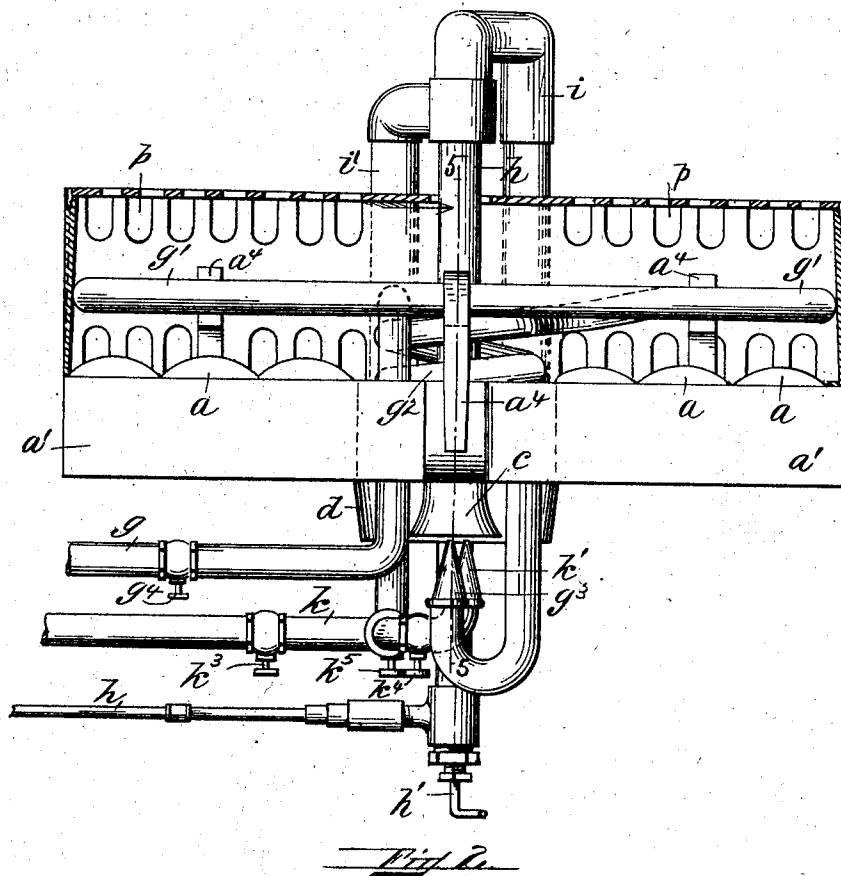
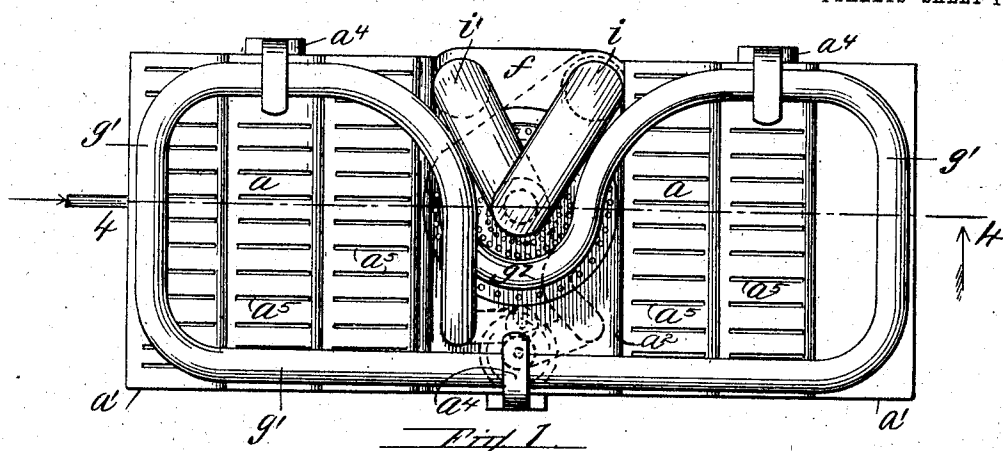
No. 796,079.

PATENTED AUG. 1, 1905.

J. N. LEACH.
BURNER.

APPLICATION FILED NOV. 11, 1902.

4 SHEETS—SHEET 1.



Witnesses:
D. J. Wentworth -
L. F. Goldman

Inventor:
John N. Leach.
By N. L. Frothingham
his Attorney

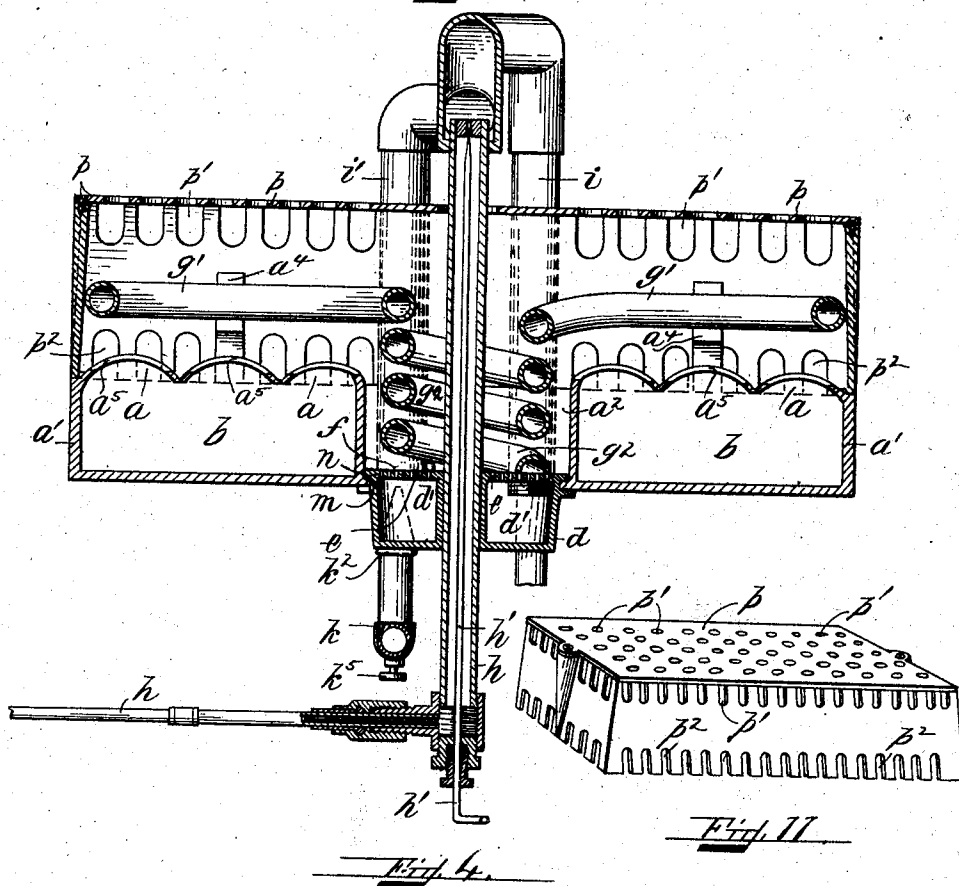
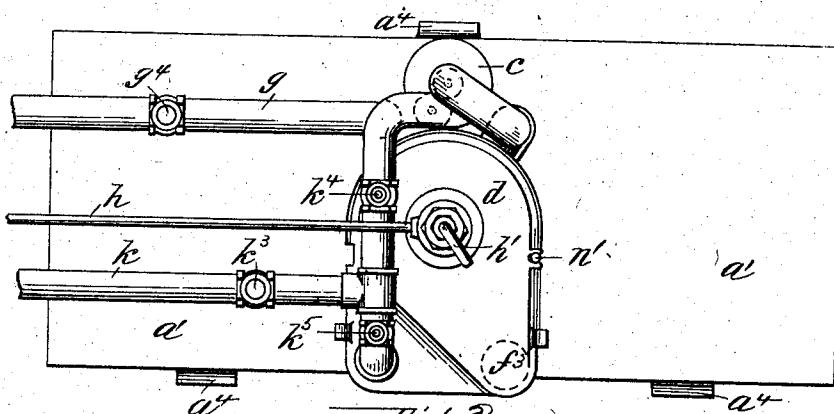
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

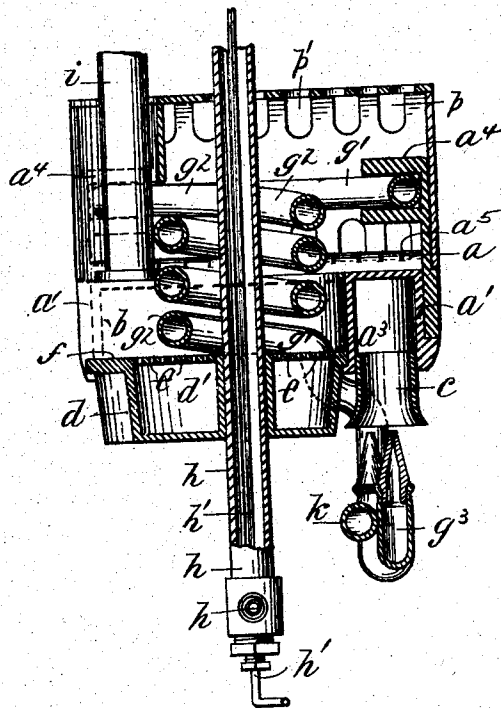


Fig. 5

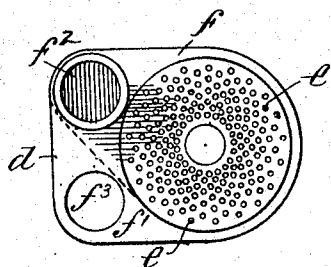


Fig. 6

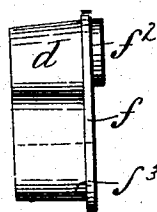


Fig. 7

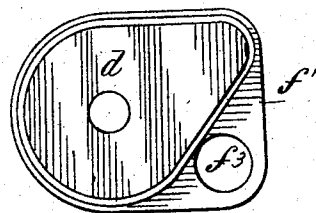


Fig. 8

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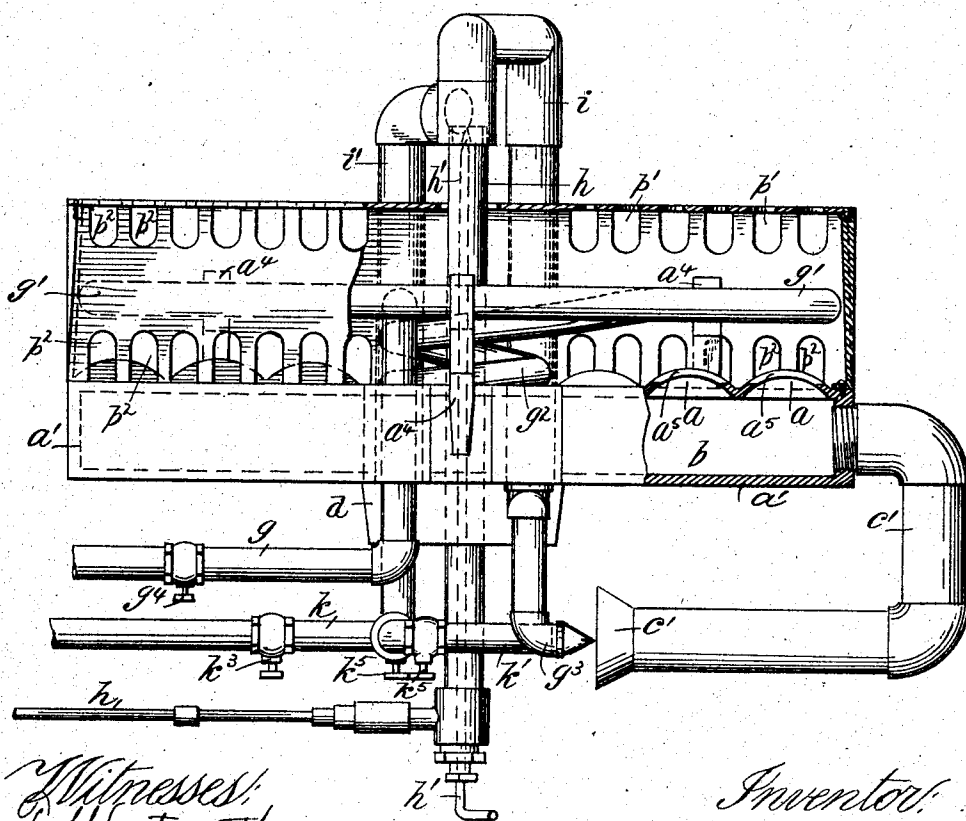
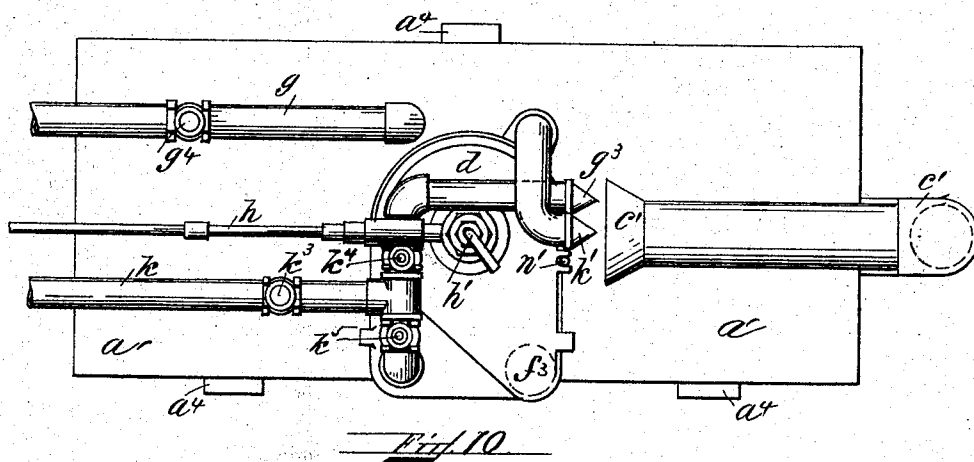
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BURNER.

APPLICATION FILED NOV. 11, 1902.

4 SHEETS—SHEET 4.



Witnesses:
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Inventor:
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his Attorney

UNITED STATES PATENT OFFICE.

JOHN N. LEACH, OF MELROSE, MASSACHUSETTS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO NATIONAL OIL HEATING COMPANY, A CORPORATION OF MAINE.

BURNER.

No. 796,079.

Specification of Letters Patent.

Patented Aug. 1, 1905.

Application filed November 11, 1902. Serial No. 130,834.

To all whom it may concern:

Be it known that I, JOHN N. LEACH, a citizen of the United States, residing at Melrose, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Burners, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to burners, and more particularly to a class thereof especially adapted for heating purposes and to use kerosene, crude oil, or other hydrocarbons.

The object of the invention is to provide a burner especially adapted for use in connection with domestic cook-stoves and which is adapted to effectively volatilize the fuel-oil and use the carbureted hydrogen generated therefrom alone or to use ordinary illuminating-gas alone or to use an admixture of these gases in either the primary or the secondary burner.

A further object is to provide a burner wherein the main flame may be readily controlled and the volatilization of the fuel-oil (when such is used) after interruption or total suspension may be resumed without the necessity of manual ignition.

A still further object is to provide a burner wherein the initial charge of the hydrogen gas for the primary burner will be produced in a convenient manner.

The invention consists in combining, with a burner-plate and a mixing-chamber therefor, a vaporizer and an independent gas-supply pipe communicating with said chamber, whereby the fuel used may be either hydrocarbon gas produced in said vaporizer, illuminating-gas, or an admixture of these, in each instance combined with a proper proportion of atmospheric air, and in such other novel features of construction and arrangement of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings, Figure 1 is a plan view of the burner with deflector removed. Fig. 2 is a front elevation thereof, with deflector added, in section. Fig. 3 is a bottom plan view looking upward. Fig. 4 is a cross-section on the line 4 4 of Fig. 1 with deflector added. Fig. 5 is a cross-section on the line 5 5 of Fig. 2. Figs. 6, 7, and 8 are respectively a top plan,

a side elevation, and a bottom plan, of the primary burner-plate and the mixing-chamber therefor. Fig. 9 is a front elevation of a modification with the deflector shown in section. Fig. 10 is a bottom plan view of said modification, and Fig. 11 is a perspective view of the deflector.

Like letters refer to like parts throughout the several views.

The burner is designed for use in connection with any suitable type of stove, which, however, being well known and merely incidental to the invention and not an essential element thereof, is not herein shown and described.

The main heating-burner plate *a* is cast integral with or is so secured to a hollow base *a'* as to prevent the escape of gases from the mixing-chamber *b* thus provided within said base. The base is formed with an approximately central recess extending therethrough, as *a''*, the portions of the mixing-chamber thus divided being connected by a passage *a'''* at one side of said recess. Thus all portions of the mixing-chamber *b* are in such communication as to insure a proper distribution of the gaseous fuel. A mixing-tube *c* communicates with the passage *a'''* and the atmosphere and serves as a means to supply the mixing-chamber *b* with fuel-gases and air in the proper proportions.

The burner-plate *a* is preferably corrugated, and the upper ridges are slotted, as at *a⁴* *a⁵*.

Arranged within the recess *a''* and at a point some distance below the burner *a* is a second and smaller burner *e*, provided with a base *d*, in which is an independent mixing-chamber *d'* therefor. This mixing-chamber *d'* is preferably shaped as shown in Fig. 8, being extended beyond the burner-plate *e* to provide a clear space above this burner and at the same time a suitable means of communication between this chamber and the mixing-tube feeding the same. A top plate *f*, provided with an extension *f'*, closes this chamber, and openings *f²* and *f³* therein serve, respectively, to provide means of communication with the mixing-chamber *d'* and to permit the passage therethrough of an air-inlet pipe forming a portion of an individual fuel-supply system for the burner *e*. This construction provides a main burner *a* and a smaller burner *e*, having separate mixing-chambers *b* *d'* and a common combustion-space, which burners for conven-

ience will hereinafter be designated, respectively, the "secondary" and the "primary" burner.

The burners *a* and *e* are each provided with a double fuel-supply system for gas and for kerosene, crude oil, or other hydrocarbon, and these systems are so arranged as to permit the control of the secondary burner *a* independently of the primary burner *e*.

The oil-fuel-supply system for the secondary burner comprises a continuous pipe, as *g*, having connection with a detached source of oil-supply (not shown) and disposed above the burner *a*, constituting a vaporizer *g'* and formed into a coil above the primary burner, which coil constitutes a superheater *g''*. The portions of the pipe constituting the vaporizer *g'* are maintained in the proper relation to the burner *a* by means of a plurality of brackets, as *a'*, extended upwardly from the base *a'*. The superheater *g''* is in direct communication with the mixing-tube *c* and is provided with a suitable spraying-nozzle, as *g''*, discharging thereinto. The quantity of oil fed through this supply system is regulated by means of the valve *g'*, which is disposed at a conveniently-accessible point of the pipe *g*. This system, it will be observed, supplies the secondary burner only with oil fuel.

The primary-burner fuel-supply system comprises a pipe *h*, which may take its oil from the same tank as the pipe *g* or a separate one, as desired, passing upward through the mixing-chamber *d'* and the superheating-coil *g''* and discharging into the mixing-tube *i*. Adjacent to the point of discharge of said pipe I provide an air-inlet *i'*, communicating with said tube *i*, the lower end of which passing through the plate *f* by means of the opening *f''* is in direct communication with the atmosphere. The quantity of oil supplied through the pipe *h* is regulated by means of the needle-point valve *h'*. I also provide a gas-supply pipe *k*, communicating with a gas-main and having two extensions provided, respectively, with a discharge-nozzle *k'* *k''*, which communicate, respectively, with the mixing-tube *c* of the secondary burner and the air-inlet *i'*, whereby gas may be supplied to each burner when desired for the purposes hereinafter described. Three valves *k''* *k'''* *k''''* are provided, which respectively control the entire gas-supply from the main, that of the nozzle *k'*, and of the nozzle *k''*.

The burner *e*—that is, the primary burner—is detachably connected with the burner *a*, so that it can be readily removed and cleaned and repaired whenever it may be necessary, the upper portion of this burner *e* being provided on each side with a groove *m*, into which a flange *n* on each inner side of the base *a'* fits and is adapted to slide. A pin or nail *n'* holds the burner *e* in its normal position. In order to detach the burner *e*, the pin or nail *n'* is withdrawn, the supply-pipes *h* and *g* dis-

connected, and the valve *h'* withdrawn. The burner *e*, together with the mixing-tube *i* and the air-inlet *i'*, may be drawn out in the direction of the arrow, Fig. 3, and detached from the main burner.

p denotes a deflector or hood provided with perforations *p'* *p'* and *p''* *p''*. This device fits over both the primary and secondary burners and is detachably connected with the brackets *a'* *a'* and is for the purpose of retarding and confining the flame, so as to insure more perfect combustion.

In Fig. 9 a modification is shown, the only difference in construction between this and that of the preferred form of invention being that the vapor and gas is introduced into the side of the combustion-chamber *b* instead of the bottom and through a mixing-tube *c'* somewhat longer than in the preferred form of invention.

The operation of the heretofore-described burner in so far as it has not already been disclosed is as follows: When oil fuel is desired to be used alone, the valves *k''* and *k'''* are opened and valve *k''''* is closed. As the illuminating-gas enters the air-inlet *i'* it receives an admixture of air and passes directly to the combustion-chamber *d'* through the mixing-tube *i*. The burner *e* is then manually ignited and the valve *h'* opened. As the oil under pressure passes through the pipe *h* above this burner the heat of the gas-flame and that of the already heated pipe vaporizes it, and in this condition it is charged into the mixing-tube *i*, where it receives an admixture of air and illuminating-gas from the inlet *i'*. This mixture passes to the combustion-chamber and thereafter sustains the flame of this burner and renders it permanent. The supply of illuminating-gas is then shut off, although it may be continued under proper regulation to insure the desired richness of the fuel fed to this burner. The flame of the primary burner *e* after the production of the initial charge of vaporized oil is self-sustaining without the use of this gas. This flame is not designed to produce sufficient heat for general use, the secondary burner *a* being provided for that purpose. When it is desired to ignite this secondary burner, the valve *g'* is opened and oil is passed through the vaporizer *g'* to the superheater *g''*. This superheating-coil being already heated by the flame of the primary burner *e*, as the oil passes therethrough its contact therewith and the continued heat of said burner converts it into a vapor more or less superheated, thus producing the initial charge for the secondary burner *a*. This charge passes from the superheater to the nozzle *g''* and mixing-tube *c*, where it receives a proper admixture of air, to the mixing-chamber *b*. As it passes from this chamber through the slots *a''* in the burner *a* it is ignited from the flame of the primary burner

e. If it be desired to enrich the vapor at this time, an admixture of illuminating-gas may be provided from the nozzle *k'* by opening the valve *k*⁴. The flame so produced acts directly upon the vaporizer *g'*, and thereafter the oil is vaporized therein, which vapor is afterward superheated while passing through the superheating-coil *g*². When so passed through the vaporizer and the superheater, a pure hydrocarbon gas is generated which when mixed with oxygen develops an intense heat with a small expenditure of liquid fuel. The arrangement of the primary burner *e* on a plane lower than the secondary burner *a* prevents extinguishment of the former from the back draft occasioned by the ignition of the latter therefrom.

The flame of the secondary burner may be nicely regulated by the use of the valve *g*⁴ and may be extinguished and relighted by simply closing and opening said valve, as the flame of the primary burner is sustained by a distinct fuel-supply system.

If desired, the oil-supply of both burners may be entirely cut off and gas alone used in the secondary burner, and this arrangement of a double fuel-supply system also admits of the regulation of the richness of the gaseous charge to a great extent.

It is not my intention to herein claim, broadly, the specific system of burners and vaporizers employed in volatilizing the fuel-oil, such being the subject-matter of another application of mine for Letters Patent filed October 22, 1902, Serial No. 128,254, and pending concurrently herewith. I do not desire to be understood, however, as limiting the invention to the precise details of construction hereinbefore described, as it is apparent that the specific relation and arrangement of the various parts may be varied to accommodate the burner to different types of stoves or to other analogous applications.

Having described the invention, what I claim as new, and desire to have protected by Letters Patent, is—

1. In a burner, the combination of a primary burner, a secondary burner, separate mixing-chambers therefor, mixing-tubes whereby said chambers respectively have communication with the atmosphere, an oil-fuel-supply system comprising a continuous pipe having in its length a vaporizer and a superheater disposed above and subjected respectively to the flames of said secondary and said primary burner, and connections providing communication between said vaporizer and a source of oil-supply and between said superheater and the mixing-tube of the mix-

ing-chamber of said secondary burner, an individual oil-supply-pipe system discharging into said primary-burner mixing-chamber, a gas-supply pipe discharging into said primary-burner mixing-tube and means whereby the oil-vapor and gas fed to said burners may be independently regulated.

2. In a burner, the combination of a primary burner, a secondary burner, separate mixing-chambers therefor, mixing-tubes whereby said chambers respectively have communication with the atmosphere, an oil-fuel-supply system comprising a continuous pipe having in its length a vaporizer and a superheater disposed above and subjected respectively to the flame of said secondary and said primary burner, and connections providing communication between said vaporizer and a source of oil-supply and between said superheater and the mixing-tube of the mixing-chamber of said secondary burner, an individual oil-supply-pipe system discharging into said primary-burner mixing-chamber, a gas-supply pipe discharging into said primary-burner mixing-tube, means whereby the oil-vapor and gas fed to said burners may be independently regulated and a deflector inclosing both said burners.

3. In a burner, the combination of a primary burner, a secondary burner, separate mixing-chambers therefor, mixing-tubes whereby said chambers respectively have communication with the atmosphere, an oil-fuel-supply system comprising a continuous pipe having in its length a vaporizer and a superheater disposed above and subjected respectively to the flame of said secondary and said primary burners, and connections providing communication between said vaporizer and a source of oil-supply and between said superheater and the mixing-tube of the mixing-chamber of said secondary burner, a gas-supply pipe having two extensions discharging respectively into said primary-burner mixing-tube and said secondary-burner mixing-tube adjacent to said oil-supply-pipe system, an individual oil-supply-pipe system discharging into said primary-burner mixing-chamber mixing-tube and means respectively whereby the oil-vapor and gas fed to each burner may be independently regulated.

In witness whereof I have hereunto affixed my signature, this 15th day of October, 1902, in the presence of two witnesses.

JOHN N. LEACH.

Witnesses:

N. L. FROTHINGHAM,
A. A. ASHMAN.