(No Model.) 4 Sheets—Sheet 1.

W. VOGEL.

BURNER FOR LIQUID FUEL.

No. 406,013. Patented June 25, 1889.

Fig. 1.

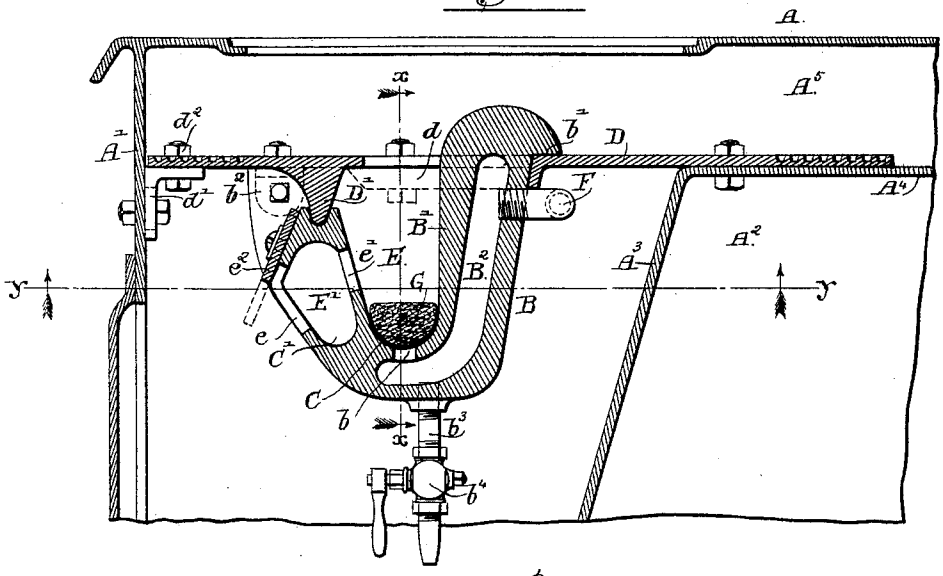


Fig. 2.

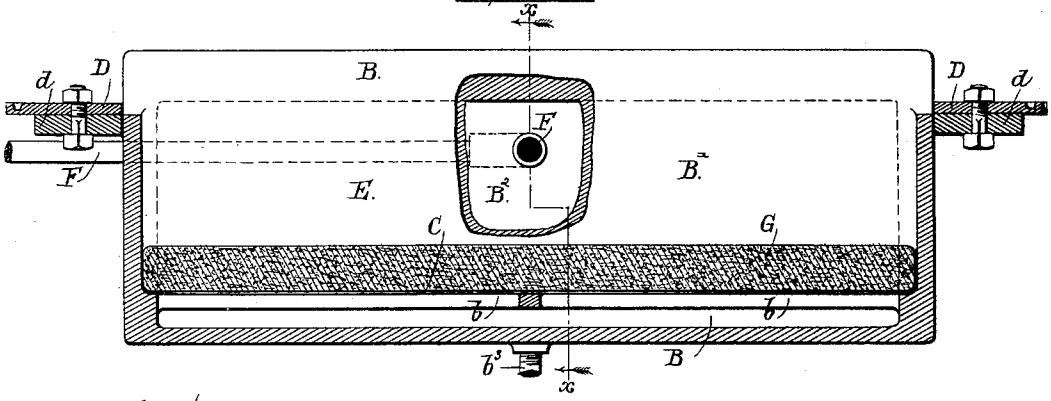
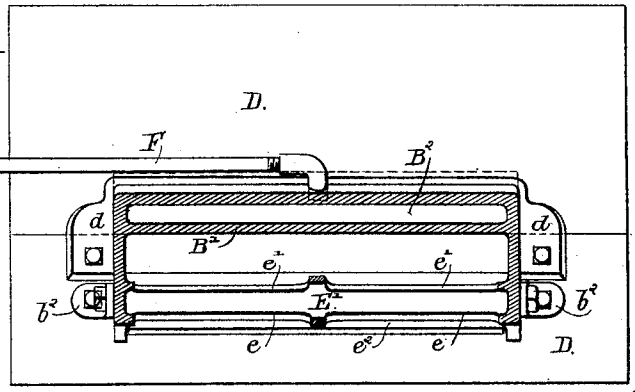


Fig. 3.



Witnesses.—
Louis M. F. Whitehead
Chas. T. Long.

Inventor.—
William Vogel.

Wayton & Poole
Attorneys

by.—

N. PETERS, Photo-Lithographer, Washington, D. C.

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W. VOGEL.

BURNER FOR LIQUID FUEL.

No. 406,013. Patented June 25, 1889.

Fig. 4.

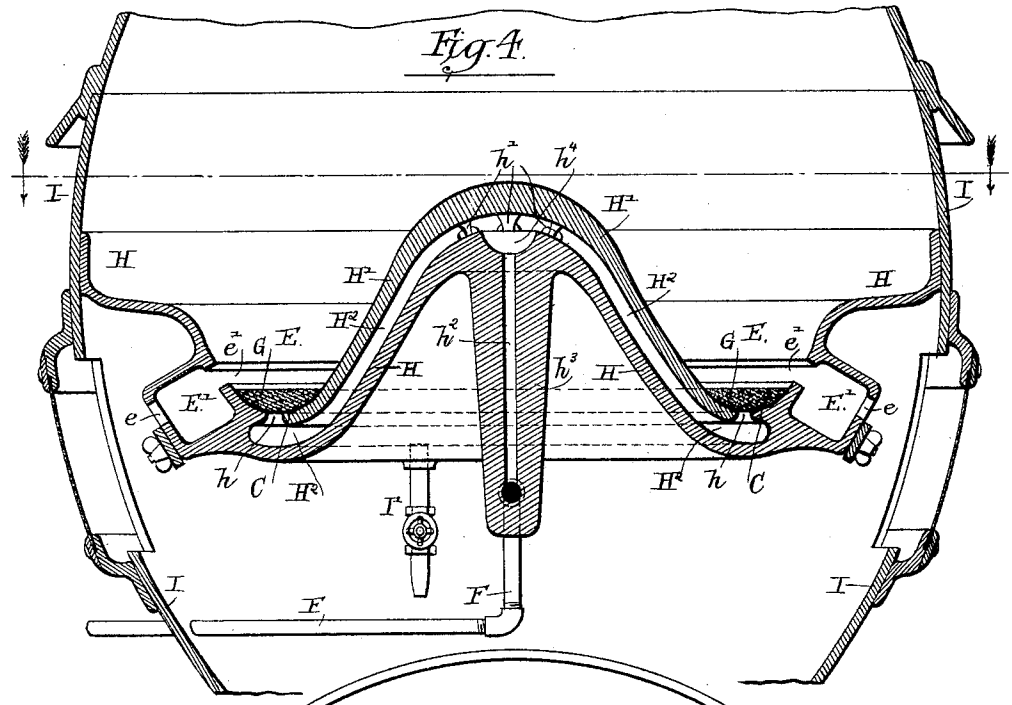
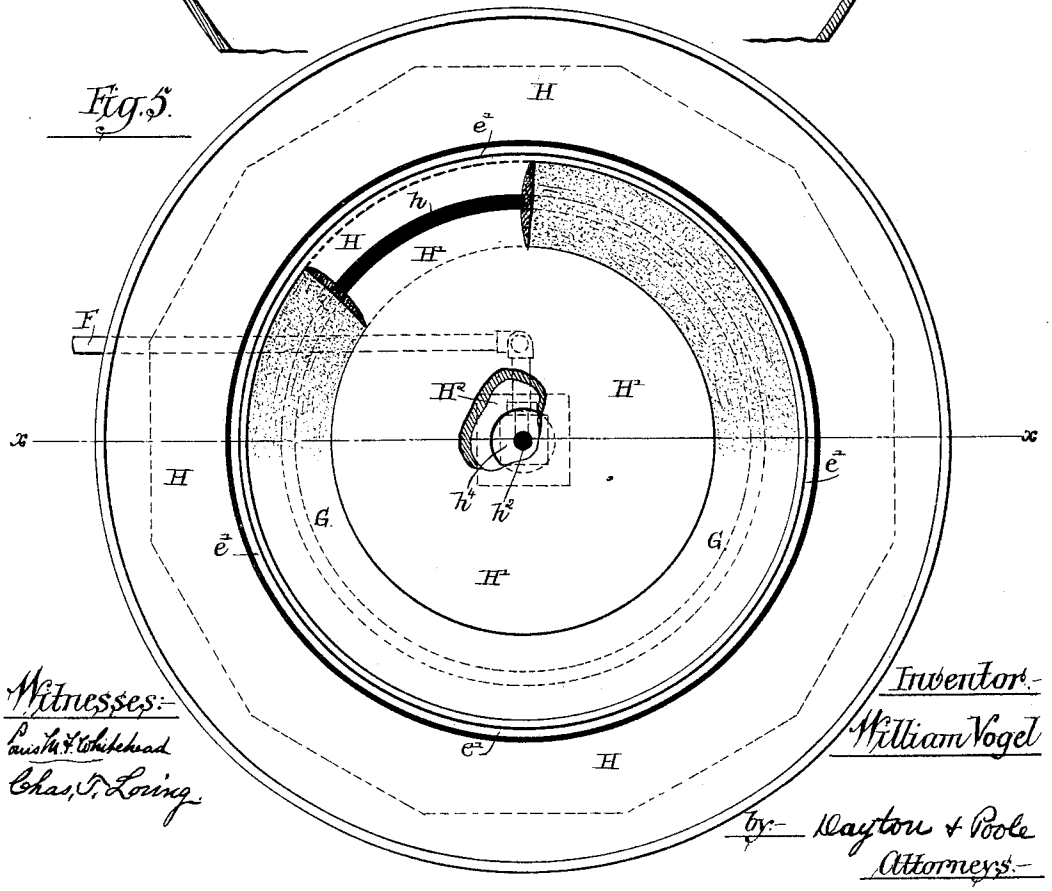


Fig. 5.



Witnesses:-
Louis W. Whitehead
Chas. F. Loring.

Inventor:-
William Vogel
by:- Dayton & Poole
Attorneys.

N. PETERS, Photo-Lithographer, Washington, D. C.

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W. VOGEL.

BURNER FOR LIQUID FUEL.

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Fig. 6.

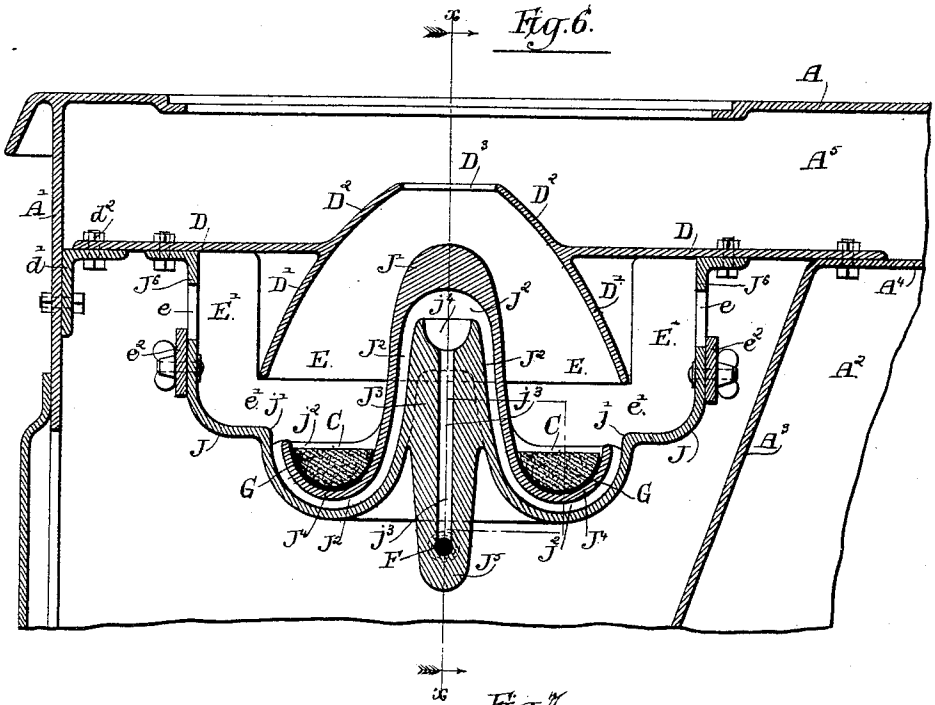
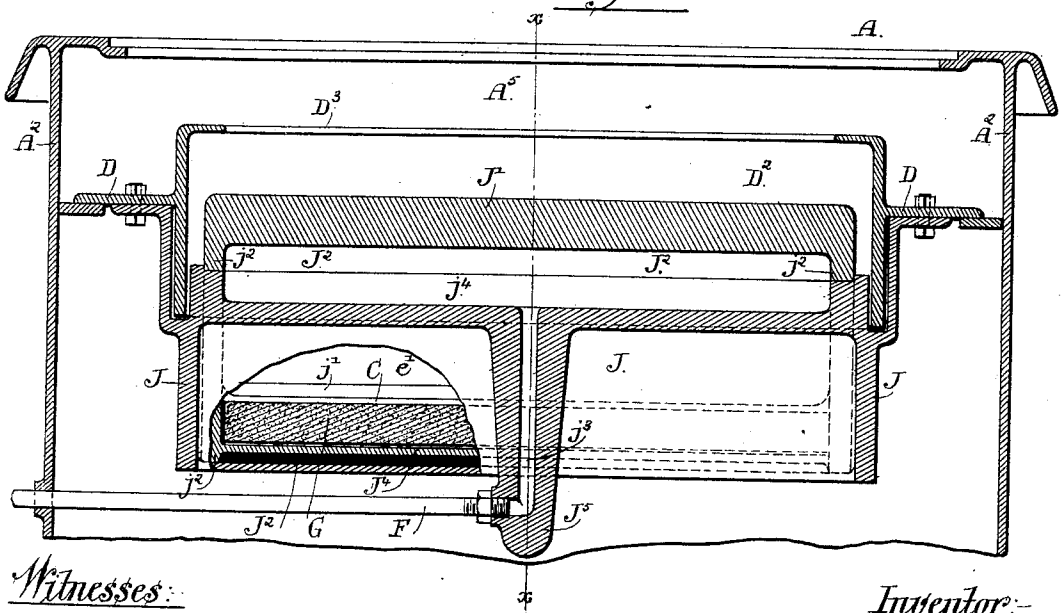


Fig. 7.



Witnesses:
Louis W. T. Whitehead
Jack D. Phillips

Inventor:
William Vogel.

by Dayton & Poole
Attorneys.

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 4 Sheets—Sheet 4.

W. VOGEL.

BURNER FOR LIQUID FUEL.

No. 406,013. Patented June 25, 1889.

Fig. 8.

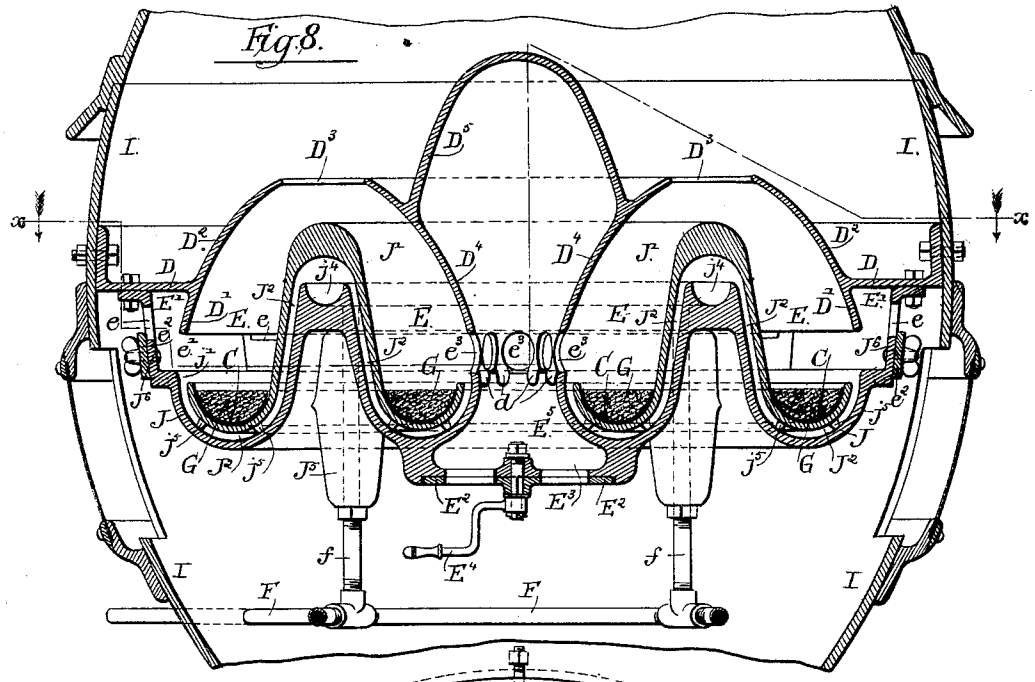
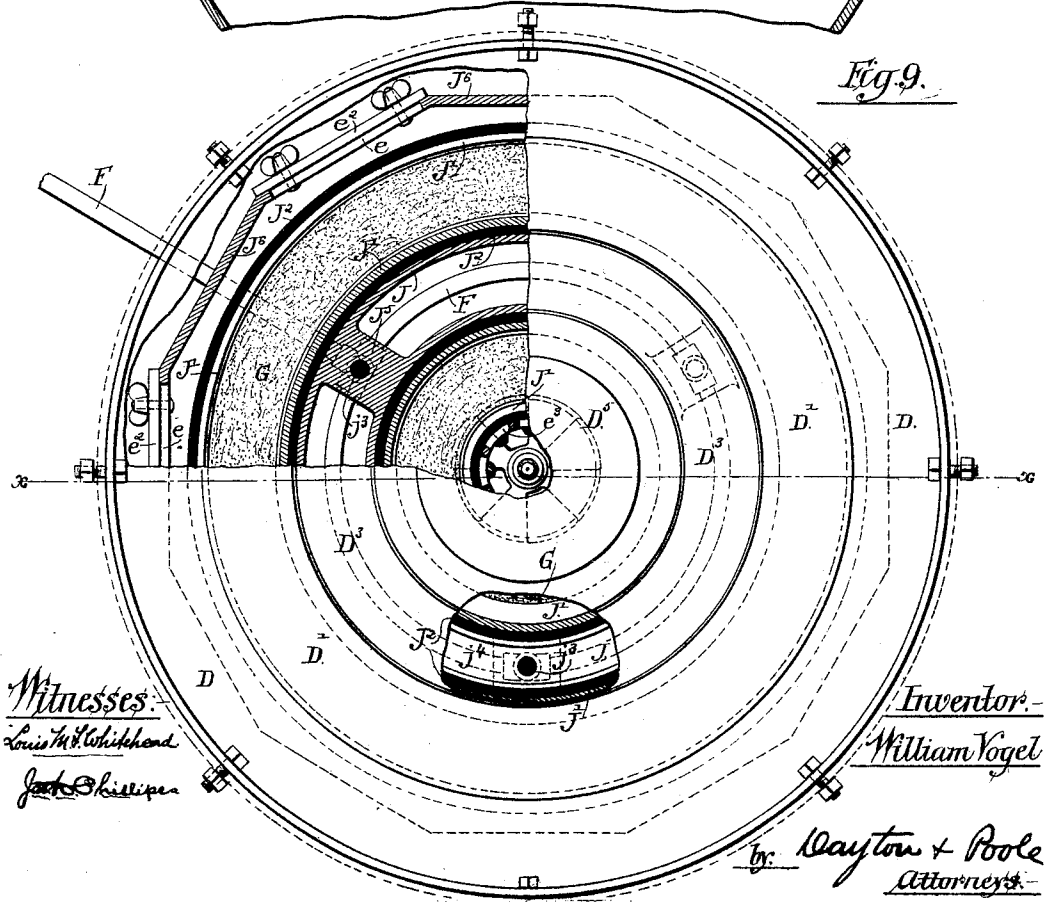


Fig. 9.



Witnesses:
Louis W. Whitehead
Jas. A. Phillipps

Inventor:
William Vogel
by Dayton & Poole
Attorneys.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM VOGEL, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE VOGEL PETROLEUM HEATING COMPANY, OF SAME PLACE.

BURNER FOR LIQUID FUEL.

SPECIFICATION forming part of Letters Patent No. 406,013, dated June 25, 1889.

Application filed February 25, 1887. Serial No. 228,817. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM VOGEL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Burners for Liquid Fuel; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel burner for liquid fuel of the same general character as the burner described in a prior application for Letters Patent of the United States, Serial No. 210,046, filed by me August 5, 1886. The burner shown in said application comprises as its main features a trough or receptacle for the liquid fuel, shown in said application as provided with a porous bed, means affording a continuous supply of fuel to the trough or receptacle, and a burner-casing provided with suitable inlet and exit passages affording a supply of air to and conducting the products of combustion away from the burning oil within the trough or receptacle. The burning device embodied in the present application embraces improvements in burners of the character set forth in several particulars, as will hereinafter appear.

In the accompanying drawings my invention is shown as embodied in several different forms of burners, and as applied both to cooking and heating stoves.

In the said drawings, Figure 1 illustrates in central vertical section an oil-burner adapted more especially for use in a cooking-stove, the section being taken upon line $x\ x$ of Fig. 2. Fig. 2 is a vertical longitudinal section of the same, taken upon line $x\ x$ of Fig. 1. Fig. 3 is a sectional view of the burner removed from the stove, taken upon the horizontal line $y\ y$ of Fig. 1, looking toward the top of the burner. Fig. 4 is a sectional view taken upon line $x\ x$ of Fig. 5, illustrating a burner generally similar to that shown in Figs. 1, 2, and 3 applied to a heating-stove, the burner in this instance being of annular form. Fig. 5 is a plan view of the burner shown in Fig. 4. Fig. 6 is a cross-sectional view of a somewhat different form of burner applied to a cooking-stove, the section being taken upon line $x\ x$ of Fig. 7. Fig. 7 is a longitudinal section of the same, taken upon the vertical line $x\ x$ of Fig. 6. Fig. 8 shows in cross-section, taken upon line $x\ x$ of Fig. 9, a burner like that shown in Figs. 6 and 7, but of annular form. Fig. 9 is a sectional plan view of the same, taken upon line $x\ x$ of Fig. 8.

In the form of the device shown in Figs. 1, 2, and 3, A indicates the top, A′ the front wall, and A^2 A^2 the side walls of a stove. A^3 indicates an inclined inner wall, forming a partition between the fire space or chamber and the oven of the stove, said plate A^3 being connected at its top margin with the horizontal plate A^4, forming the top of the oven, and also the lower wall of the passage A^5, through which the products of combustion from the burner pass to the smoke-pipe of the stove. The burner in this instance consists mainly of a casting B, formed to provide an oil-holding trough or receptacle C at the lower part of the burner, and a horizontal plate D, to which the casting B is attached. The plate D serves to close the space between the fire-box and exit-flue of the stove, so as to prevent the passage of air except through draft-openings of the burner. The said plate D is shown as made in two parts connected by lugs $d\ d$ upon one part, which are bolted to the other part. Said plate is sustained in the stove by resting its rear edge upon the plate A^4, and at its front edge upon brackets $d'\ d'$, attached to the front wall A′, the plate being desirably held in place by bolts $d^2\ d^2$. The casting B is shaped to form an inclosure or combustion-chamber E, located over the oil receptacle or trough C, the rear wall of the said chamber being formed by a part B′ of said casting B, while its front wall is formed partially by a depending flange D′ upon the plate D. As herein shown, the wall B is provided at its upper end with a lip or flange b', which is hooked over the edge of the opening in the plate D, so as to sustain the rear part of the casting, the front part of the said casting being attached to the plate by means of angle-pieces $b^2\ b^2$, bolted to the parts, as shown. A tight joint between the flange D′ and the

front wall of the casting B is conveniently made by a groove in the casting, into which the lower edge of the flange D′ is fitted.

F is an oil-supply pipe by which liquid fuel is supplied to the burner from an elevated tank or other source of supply. The pipe F is connected with the trough C by means of a passage B^2, formed in the rear part or wall B′ of the casting B, extending from the top of the latter downwardly beneath the said trough, with which said passage communicates by means of a slot or opening *b*. In the particular construction illustrated the passage B^2 is made to extend the full width or length of the burner, as shown in Figs. 2 and 3. The oil-holding trough or receptacle C is herein shown as provided with a porous bed G, made of pumice-stone, asbestus, fire-brick, some refractory granular substance, or other material adapted to give a porous character to the bed.

At the lower front part of the casting B is formed a chamber E′, extending horizontally the full length of the casting, and provided with an air-inlet slot or opening *e* in its outer wall, a second slot or passage *e′* being formed in the wall of the casting, between the said chamber E′ and the combustion-chamber, for the passage of air to the top of the porous bed. The said opening *e* is, as shown, located at the front edge of the trough or oil-receptacle C, and the lower part of the chamber is formed to provide a second oil-trough C′, to receive and hold any oil which may overflow through the opening *e′* from the trough C. The walls of the chamber E′ are, as shown and preferably constructed, cast integral with the casting B, and the outer air-inlet *e* is desirably provided with a regulating-valve e^2.

In the operation of the burner, oil is delivered from the supply-pipe F to the chamber B^2, from which it flows into the trough C. The wall B′ of the combustion-chamber is maintained at a high temperature by the flame in the combustion-chamber, so that the oil will be highly heated in flowing through the said passage B^2, and will reach the trough C in such heated condition, thereby tending to promote the rapid and perfect combustion thereof.

The passage B^2 is desirably made sloping in the manner shown, so that the oil flowing from the pipe F will spread and flow over the wall of the passage. The oil fed to the trough C rises through the porous bed G, when the latter is present, and burns at the top of said bed, as set forth in said prior application above referred to. The employment of a porous bed is not, however, essential to the operation of the burner; but its use is for several reasons preferred in practice.

Air for supporting combustion is admitted through the usual draft-openings of the stove, and passes through the chamber E′ into the chamber E, where combustion takes place. The walls of said chamber E′ will obviously be retained at a high heat during the operation of the burner, owing to their continuity with the walls of the combustion-chamber, and the air will therefore become heated to a considerable extent in its passage through the chamber, with the advantage of aiding the rapid and complete combustion of the oil, which latter, as before stated, is also highly heated before flowing to the trough C. The quantity of air which enters the heating-chamber E′ may be controlled by the valve e^2; but the regulation of the draft to the burner will usually and more conveniently be performed by the draft-controlling devices of the stove.

The oil overflowing at any time from the trough C to the trough C′ will remain in the latter until vaporized by the heat of the parts. Such overflow will commonly take place when the fire is first started, and the metal of the trough and adjacent parts of the burner is cold, by reason of the fact that the oil burns more slowly before the parts have become heated, and it may, therefore, at such times run into the trough C more rapidly than it is consumed. When the burner becomes thoroughly heated, however, the oil which has accumulated in the overflow-trough will usually become vaporized or will be consumed.

At b^3 is shown a discharge-pipe attached to the lowermost part of the passage B^2 to provide for the discharge of sedimentary matter and incombustible residuum which may accumulate in said passage after the burner has been some time in use. Said pipe is provided with a valve b^4, which may be opened at necessary intervals to allow the escape of such residuum.

In Figs. 4 and 5 is shown another burner, generally similar to that above described, but more especially adapted for use in a heating-stove, and containing an annular combustion-chamber and oil-holding trough. In said figures last named I indicates the outer shell of a heating-stove, and H a circular casting bolted at its side margins to said shell, and provided with a central elevated part and with a circumferential depression, forming, with the outer walls of the stove, an annular combustion-chamber E. The middle part of said casting H is covered by a separate plate or casting H′, which forms the inner wall of the annular combustion-chamber, and the marginal parts of which extend downwardly to and form part of the annular oil-holding trough C. Said plate H′ is sustained by projections or studs *h′ h′*, from the casting H, in such manner that a passage H^2 is formed between said plates and casting, through which passage oil is fed to the trough C from a central oil-supply passage h^2, herein shown as formed in a depending projection h^3 at the middle of the casting H, to the lower end of which the oil-supply pipe F is connected. The oil gains access to the trough C from the passage H^2 through a slot or passage *h*, formed in the bottom of the trough between the edge

of the central plate H′ and the opposing part of the casting H at the lower end of said passage H^2. The casting H is desirably provided at the middle of its elevated part with a receptacle or basin h^1, into which the oil is delivered by the passage h^2, and from which such oil flows outwardly over the inner inclined wall of the passage H^2, and is thereby heated before being fed to the trough C in the same manner as in the burner shown in Figs. 1, 2, and 3, and before described. The trough or receptacle C is shown as provided with a porous bed G, in this case of annular form. In this instance an annular hot-air chamber E′ is cast upon the outer part of the trough C, said chamber being provided with an annular air-inlet opening *e* and *e′*, located in the same position as the corresponding openings in the burner first described.

A valved exit-pipe I′ may be desirably connected with the lowest part of the passage H^2, for the purpose of allowing the escape of residuum which may accumulate in said passage.

In Figs. 6 and 7 I have shown a burner having a general resemblance to the burner above described, and shown in Figs. 1 and 2, but differing therefrom in several particulars, especially with relation to the construction of the oil-passages leading to the oil-holding receptacle and in the general construction of the casing of the burner. The burner shown in said Figs. 6 and 7 is more especially adapted for use in a cooking-stove, and is herein shown as applied to such stove, the parts of the stove in these figures being lettered in the same manner as the corresponding parts shown in Figs. 1 and 2. In said Figs. 6 and 7 J is a trough-shaped casting, forming the bottom and side walls of the burner-casing, and attached at its upper edges to a horizontal supporting-plate D by means of bolts, as shown, or otherwise. The middle part of the casting J is covered by a separate casting or shell J′, between which and the central elevated part J^3 of the said casting J are formed oil-passages J^2 J^2, through which oil is conducted into two parallel oil-holding receptacles or troughs C C, located one at either side of the central elevated part J^3. The said casting J′ is sustained upon the plate J by means of flanges j^2 j^2, located upon the ends of said casting and fitting closely the upper surface of the casting J, as more clearly shown in Fig. 7. The troughs C C are in this instance formed entirely by the lower marginal parts J^4 of the casting J′, which are bent or curved upwardly at their outer edges, and the passages J^2 J^2 extend entirely beneath the said troughs, and open at the outer edges of the latter in such manner that the oil flowing through the said passages J^2 will enter the troughs by flowing inwardly over the outer edges of the said troughs. The parts of the casting J adjacent to the troughs are desirably shaped to correspond with the lower surface of the latter, so as to form passages of uniform width extending beneath the troughs, the said casting being preferably extended above the outer edges of the troughs at the places indicated by *j′*, so as to cause the oil to flow from the passages J^2 J^2 directly into the troughs. The said troughs are in this instance provided with porous beds G, arranged and operating in the manner before described.

The oil-inlet pipe F is desirably connected with a passage j^3, formed in a depending projection J^5 at the central part of the casting J, said passage j^3 opening at its upper end into a longitudinally-arranged receptacle or trough j^4, formed in the top of the elevated part J^3 of said casting. Oil entering the burner through the said supply-pipe rises upwardly through the said passage j^3 and fills the trough j^4, from which it overflows at both sides into the passages J^2 J^2, and is thereby delivered to the troughs C C. The trough j^4 is preferably made to extend the full length or width of the burner, so that the oil will be distributed throughout the entire length of the said passages J^2 J^2, and will be evenly distributed along said passages, with the obvious advantage that the oil flowing from the trough will flow or spread evenly over the walls of the passages, and said oil will thus become much more rapidly and uniformly heated than when delivered at the middle of the passage, as is the case in the burner shown in Figs. 1, 2, and 3. Air-heating chambers E′ E′ are in this instance formed by depending flanges or deflectors D′ D′ upon the plate D. The lower edges of said flanges are located above and adjacent to the inner surface of the casting J at a point near the outer edges of the troughs C, so that said flanges form the sides of the combustion-chamber E of the burner, narrow lateral spaces or passages *e′*, through which air from said chambers E′ gains access to the combustion-chamber of the burner, being formed between the lower edges of the flanges and said casting. Air-inlet openings *e*, for access of air to the said chambers E′ E′, are provided in the upper part of the outer vertical walls J^6 of the casting J, these openings being desirably located at the upper parts of said walls, so that the air entering them will take a course obliquely downward through the said chambers, and will be caused to come in contact with and pass over the outer surfaces of the flanges D′ D′. The openings *e e* are desirably provided with sliding valves e^2, whereby access of air to the burner may be controlled as desired. The flanges D′ D′ are, as shown, extended above the plate D, as indicated at D^2 D^2, and bent or curved inwardly toward each other, so as to form a relatively-narrow slot or passage D^3, forming the outlet-opening of the burner.

In Figs. 8 and 9 is shown a burner similar to that illustrated in Figs. 6 and 7, but made in form more convenient for application to a circular stove, the troughs C and

other parts of the burner in this case being annular in form. In this instance an outer annular combustion-chamber E is formed by the outer wall of the casting J′ and downwardly and upwardly extending flanges D′ and D^2 upon the plate D, and a similar annular combustion-chamber is formed between the inner wall of said casting and an annular casting D^4 of the shape of an inverted cone, which is sustained at its center upon the inner annular rim of the casting J, lugs engaging the said casting J being employed to hold the casting D^4 in place. Said casting D^4 corresponds in shape with the flanges D′ and D^2, and is curved at its upper part outwardly toward the flange D^2, so as to form an annular outlet-opening D^3 for both combustion-chambers E E. The central opening of the casting D^4 is closed by a wall D^5, preferably made of dome shape, to avoid the accumulation of soot at the center of the burner.

An outer air-heating chamber E′ is in this case formed by the flange D′ of the plate D and adjacent parts of the casting J, which are made in the same manner as shown in Figs. 6 and 7, said casting being provided with several separate air-inlet slots or openings *e*, provided with sliding valves or plates e^2, as clearly shown in Fig. 9. Access of air at the center of the burner for supplying the inner combustion-chamber is afforded by a central draft-opening E^3, controlled by a rotating valve-plate E^2, which is provided with a handle E^4, by which the valve may be conveniently moved. Air entering through the opening E^3 enters a central air-chamber E^5, from which it passes to the combustion-space of the burner through openings e^3, made in the lower part of the casting D^4. When the burner is annular in form, as shown in these figures, the oil will be commonly supplied by means of three or more branch pipes *f*, leading upwardly from the circular supply-pipe F.

All of the several forms of burners herein illustrated and above described contain the same main features of construction in the following particulars, namely: First, an air-heating chamber formed in the metal of the burner adjacent to the combustion-chamber and provided with air inlet and outlet openings, and, second, an oil-passage through which the oil for supplying the burner is carried, said oil-passage being formed in a wall of the combustion-chamber or other surface exposed to the heat of the flame from the burner, whereby the oil is highly heated before reaching the place of combustion. As far as these features of the invention are concerned, therefore, my invention is not restricted to the exact construction in the parts above described; but embraces, broadly, the features of construction above generally set forth. Specific claims are, however, herein made to certain other novel details of construction described and illustrated.

I claim as my invention—

1. A burner for liquid fuel provided with an oil-holding trough or receptacle, the side walls of the burner forming a combustion-chamber above the said oil-holding trough, and a closed passage within the side wall of the said combustion-chamber, said passage communicating at its upper end with an oil-supply pipe and at its lower end with the oil-holding trough, all substantially as described.

2. A burner for liquid fuel provided with an oil-holding trough or receptacle, a casing forming a combustion-chamber above said oil-holding trough, a closed passage in the side wall of said combustion-chamber, connected at one end with an oil-supply and at the other end with the oil-holding trough, and a chamber in the wall of the casing forming a trough for the overflow, said chamber being provided with openings for supplying air to the combustion-chamber, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WILLIAM VOGEL.

Witnesses:
C. CLARENCE POOLE,
CHARLES T. LORING.