No. 765,442. PATENTED JULY 19, 1904.

J. F. SCHREYER.

OIL BURNER.

APPLICATION FILED OCT. 21, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

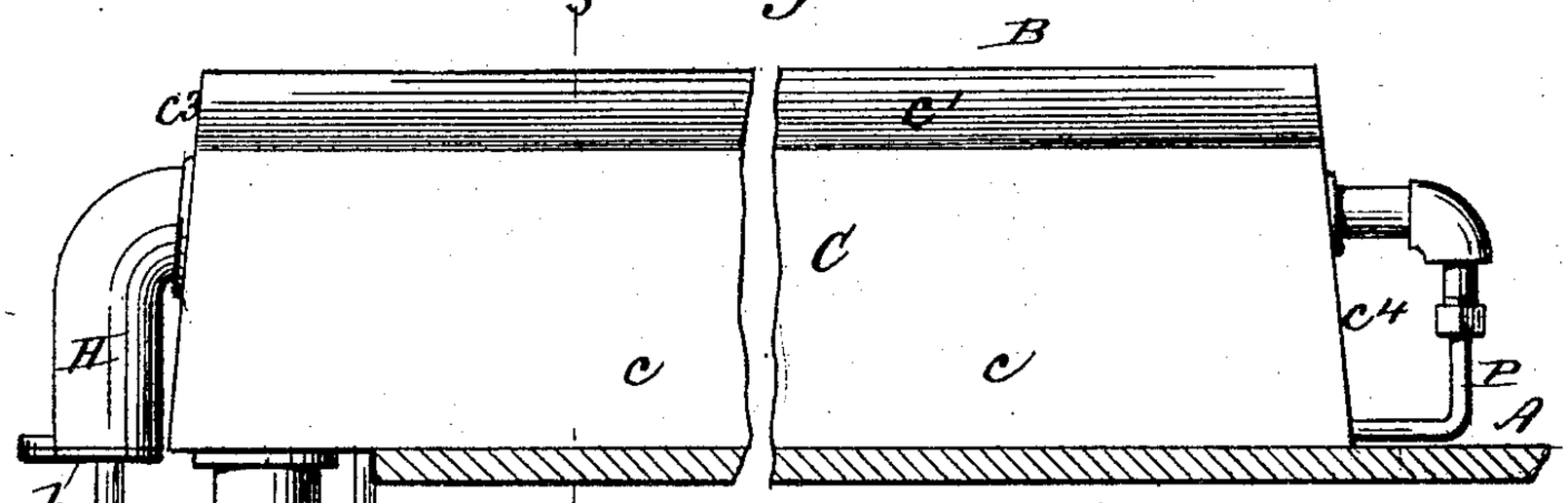


Fig. 5.

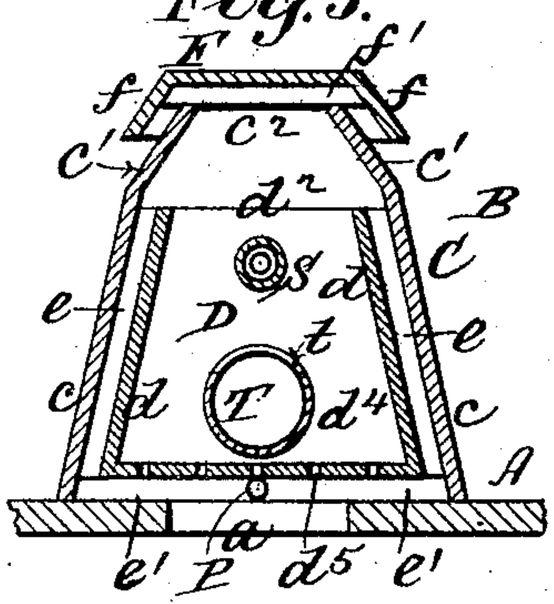


Fig. 2.

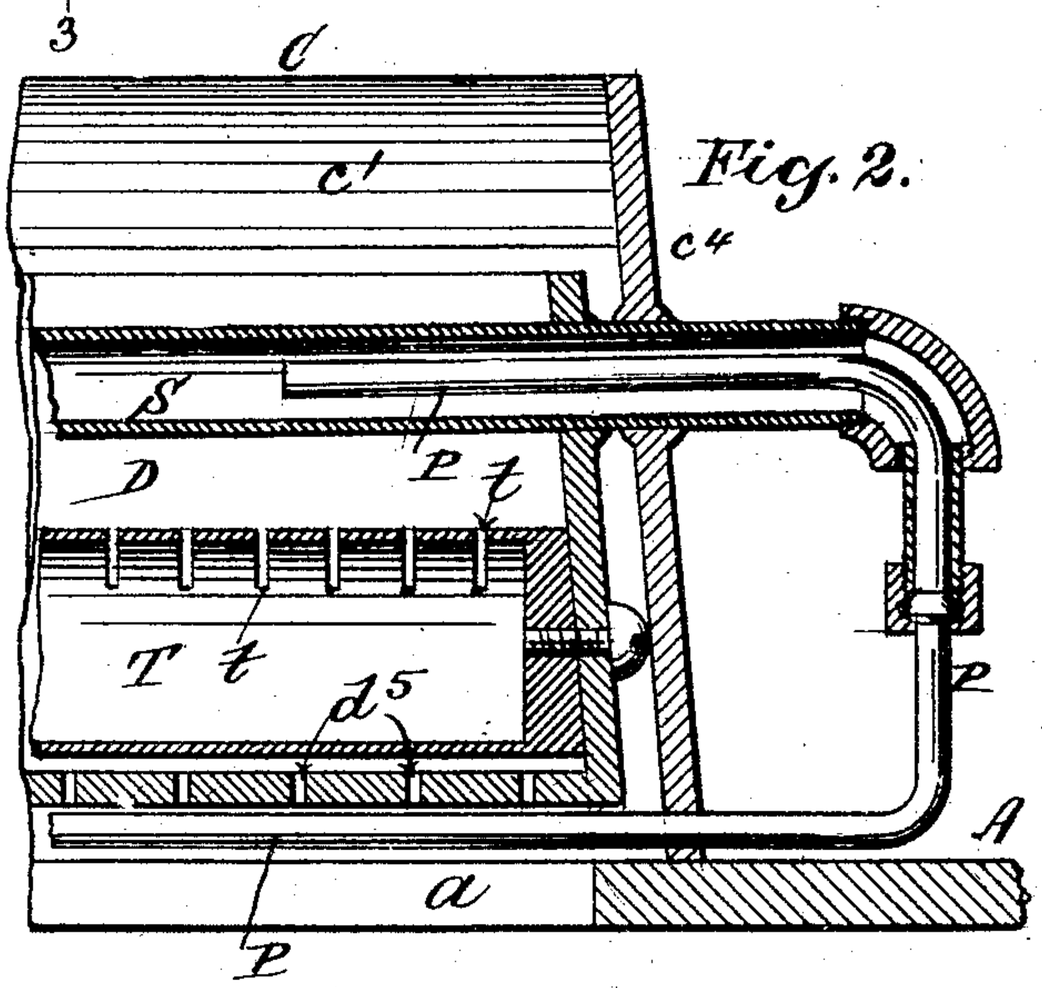


Fig. 4.

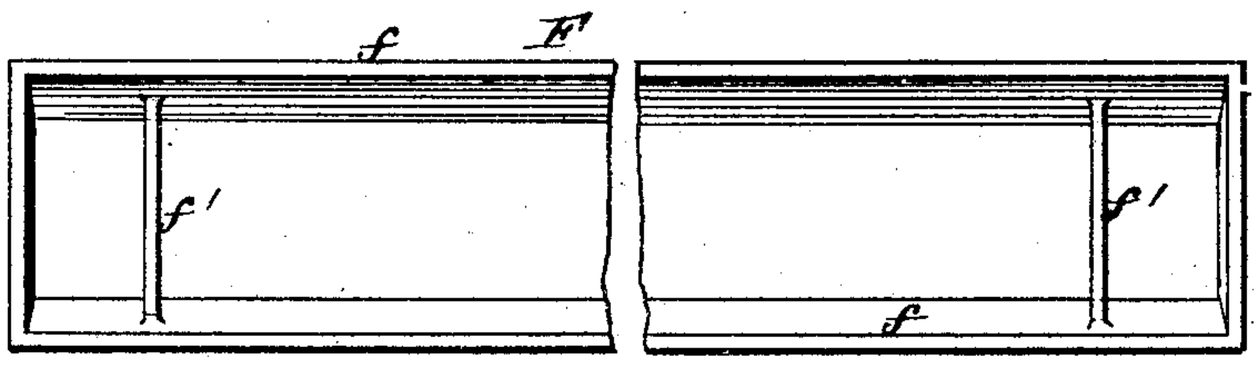
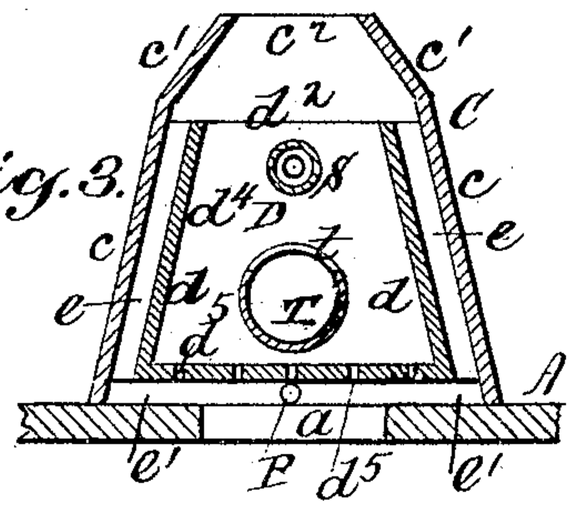


Fig. 3.



Witnesses:
D. W. Gardner.
Frank E. Rosch

Inventor:
John F. Schreyer
By his Attorney
Les. Wm. Miller

No. 765,442. PATENTED JULY 19, 1904.

J. F. SCHREYER.

OIL BURNER.

APPLICATION FILED OCT. 21, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 8.

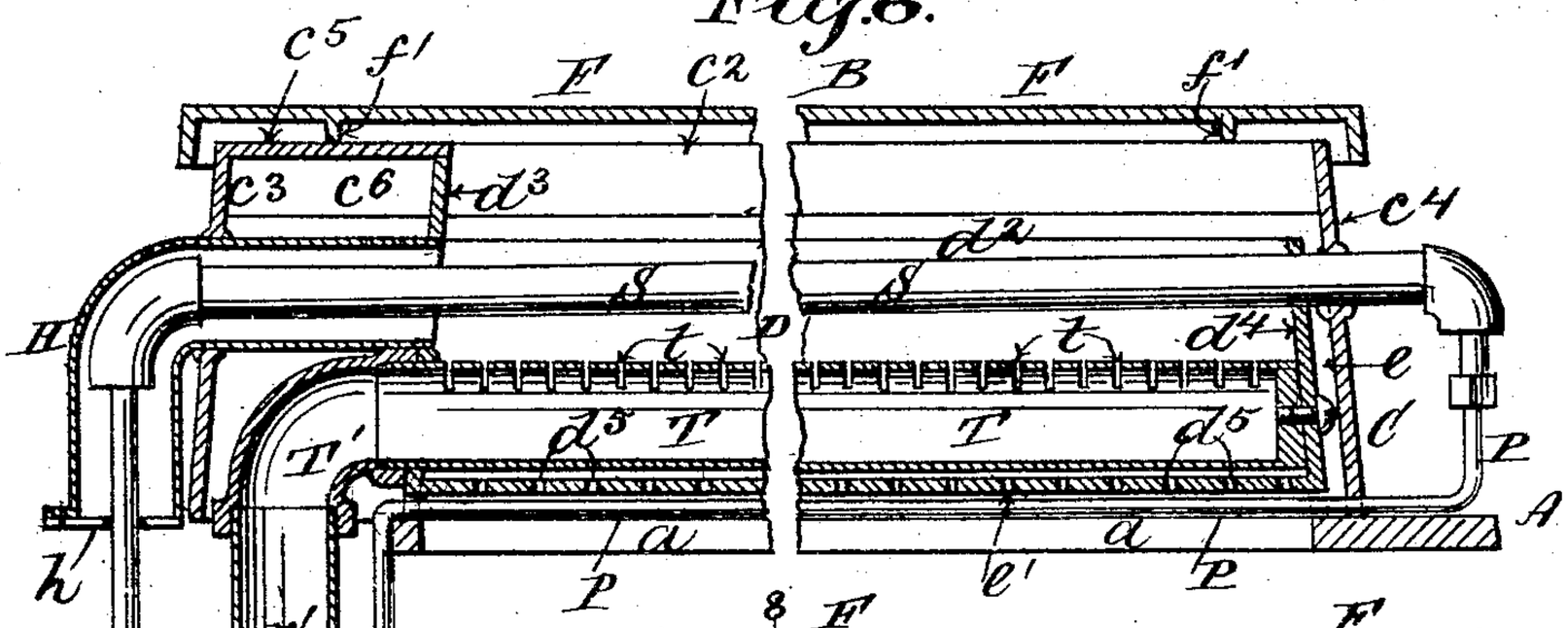


Fig. 10.

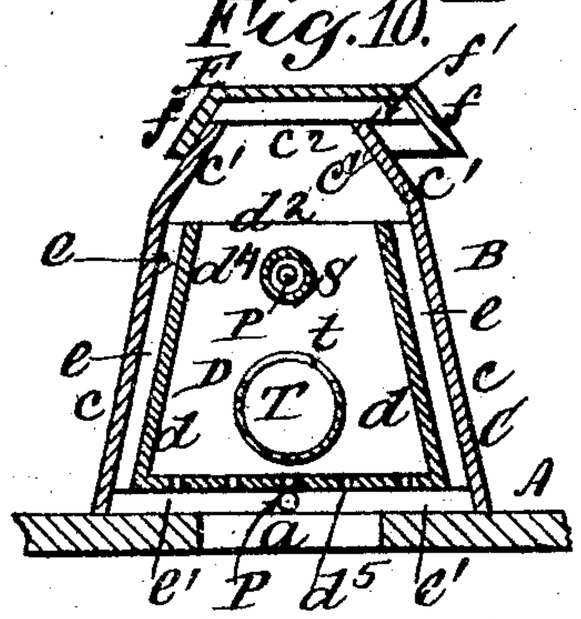


Fig. 6.

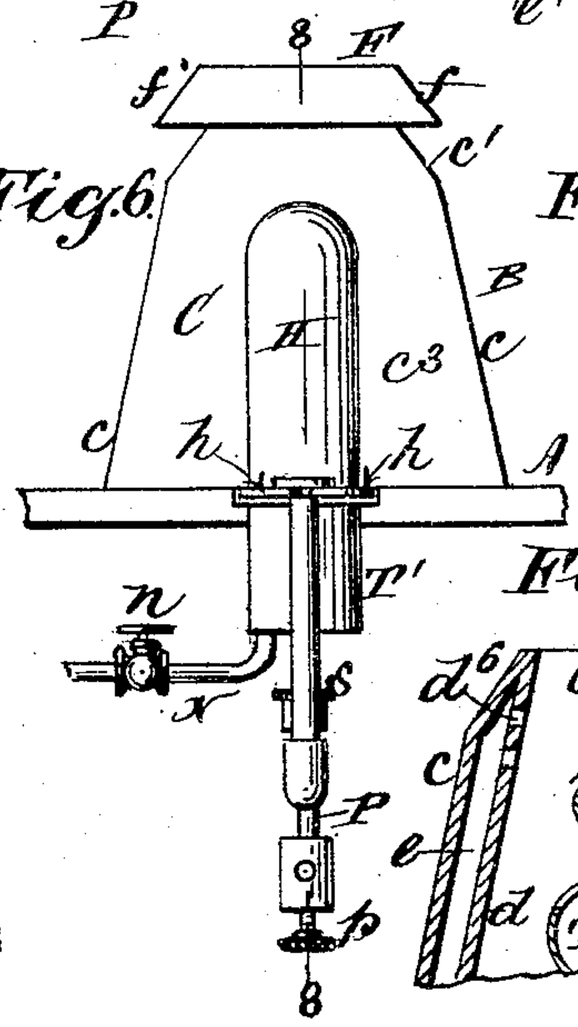


Fig. 7.

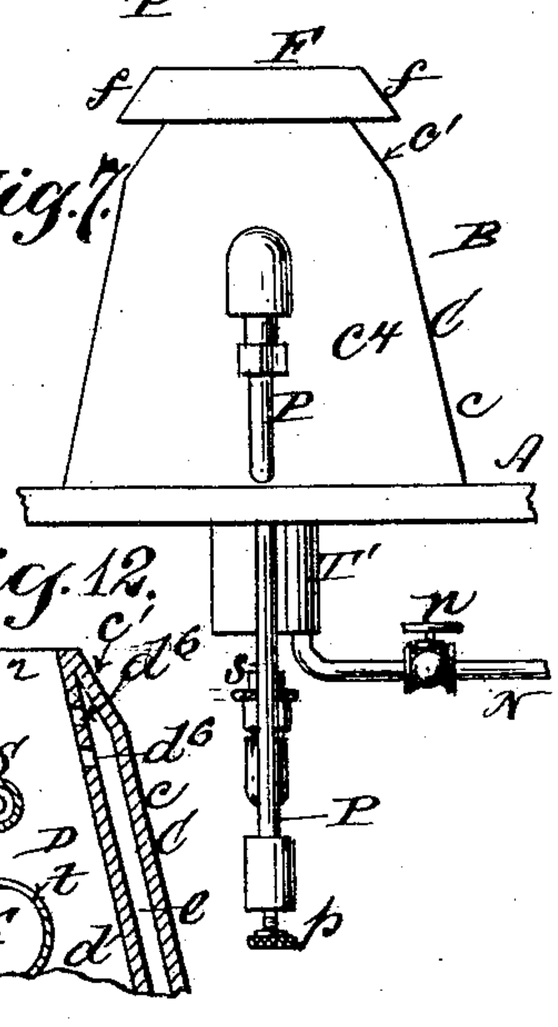


Fig. 12.

Fig. 9.

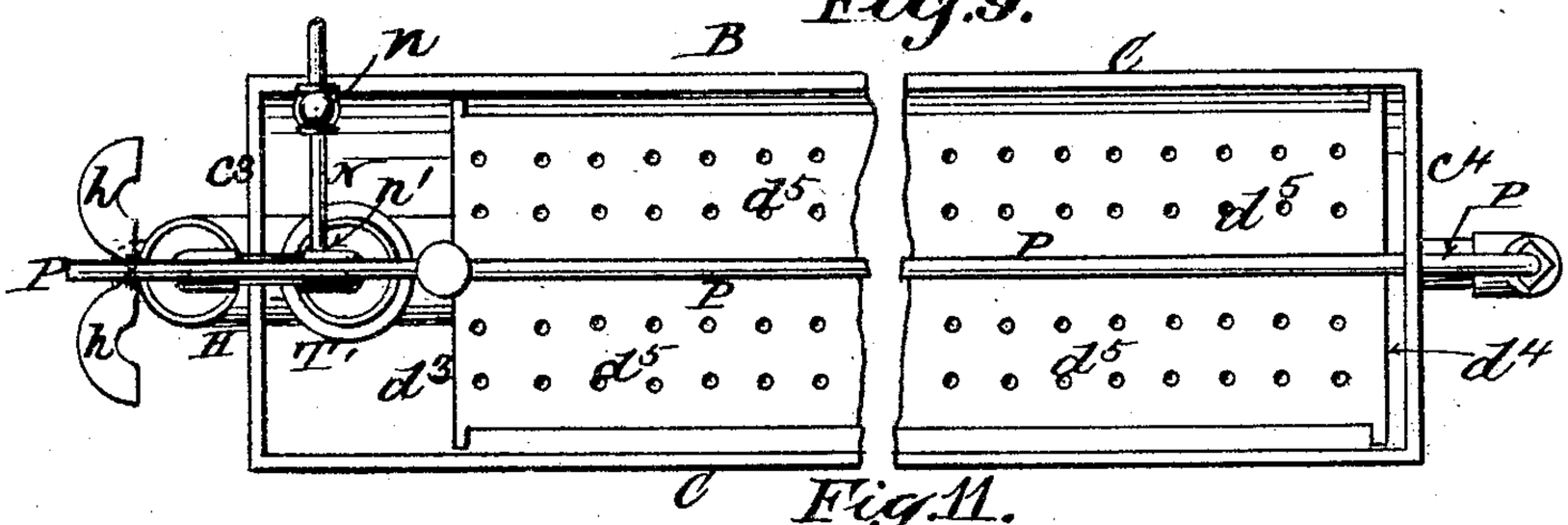
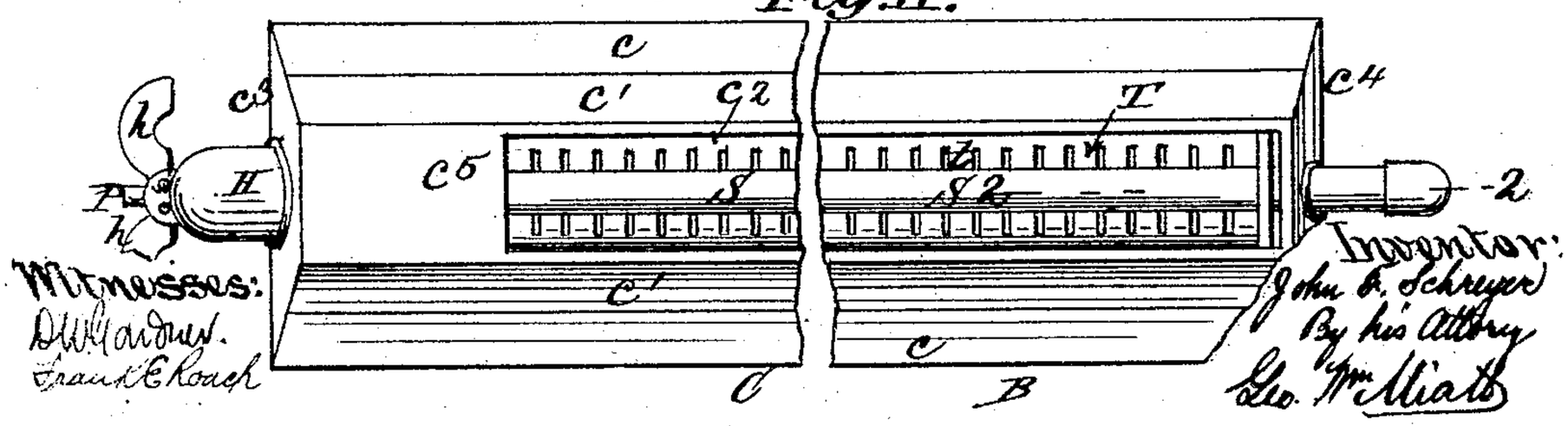


Fig. 11.



Witnesses:
D. W. Gardner.
Frank E. Roach

Inventor:
John F. Schreyer
By his Attorney
Geo. Wm. Miatt

No. 765,442. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

JOHN F. SCHREYER, OF NEW YORK, N. Y.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 765,442, dated July 19, 1904.

Application filed October 21, 1903. Serial No. 177,864. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. SCHREYER, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Gas and Oil Burners, of which the following is a specification sufficient to enable others skilled in the art to which the invention appertains to make and use the same.

My invention relates to burners for the consumption of hydrocarbon vapor in which the vapor is superheated and injected with entrained air into a burner situated in a combustion-chamber and below the superheater, which is also situated in a combustion-chamber.

The object of my invention is to insure the perfect combustion of the fuel-vapor, first by superheating the vapor and injecting it into the burner with the entrained air, as heretofore, and then by introducing into the products of combustion thus attained a supplementary supply of air, as hereinafter set forth. I accomplish this mainly by and the distinguishing feature of my invention consists in the use of a hood or jacket surrounding the combustion-chamber and so spaced with relalation thereto as to form air-passages through which air is conducted to the top of the combustion-chamber, the air being heated during such passage preparatory to its introduction into the products of combustion.

My invention also includes certain other features in the construction and arrangement of parts hereinafter described and claimed specifically.

In the accompanying drawings, Figure 1 is a side elevation of opposite ends of my improved burner. Fig. 2 is a sectional elevation, upon an enlarged scale, of the rear end of the burner, taken upon plane of line 2 2, Fig. 11. Fig. 3 is a transverse section taken upon plane of line 3 3, Fig. 1. Fig. 4 is a view of the under side of the deflecting cap-plate. Fig. 5 is a transverse section similar to Fig. 3, showing the deflecting cap-plate in position. Fig. 6 is an elevation of the front end of the burner; Fig. 7, an elevation of the rear end of the burner; Fig. 8, a central longitudinal section of the burner upon plane of line 8 8, Fig. 6, the central portion of the burner being represented as broken away. Fig. 9 is a view of the under side of opposite ends of the burner; Fig. 10, a transverse section illustrating one of the uses of the deflecting cap-plate. Fig. 11 is a plan of the same parts, and Fig. 12 shows a modification in the form of the ignition-chamber.

One or more of my improved burners may be used in a furnace, fire-box, stove, range, boiler, or other form of heater, as may be found desirable, and the burner may be of any desired length and either straight or curved, as desired or requisite to meet the requirements of special use.

The main portion of the burner B as a whole rests over an elongated opening *a* in the floor A of what may be designated as the "fire-box" or "combustion-chamber" of the heating device to which the burner is applied, the lower edges of the hood C bearing against said floor A and creating a seal which excludes from the fire-box or combustion-chamber air entering through the said opening *a*, except in so far as the same passes through the burner B, as hereinafter described. The side walls *c c* of the hood C converge upward, preferably parallel to the converging side walls *d d* of the ignition-chamber D, to a point approximating or just above the upper edges of the said side walls *d d* of the ignition-chamber D, from which point the upper portions *c′ c′* of the side walls *c c* of the hood C converge inward toward each other still more, so that the opposed upper edges of the side walls *c c c′ c′* of the hood C form an elongated opening c^2 approximating the width of the elongated opening d^2 formed by and between the upper edges of the converging side walls *d d* of the ignition-chamber D below, the said opening c^2 in the hood C being preferably of slightly less width than that d^2 of the ignition-chamber for the purpose of concentrating the air and gases as they escape from the burner. The end walls c^3 c^4 of the hood C, as well as those d^3 d^4 of the ignition-chamber, are shown as slightly inclined, although this is not material, for the reason that it is

the air-passages *e e*, formed by and between the opposed parallel side walls of the hood and the ignition-chamber, that form an important factor in my construction of burner, since it will be seen by reference to the transverse sections in the drawings that the lower portions of these air-conduits *e e* communicate with the air-space *e'* below the ignition-chamber D, which horizontal air-space *e'* is in direct communication with the elongated opening *a* in the floor A of the fire-box.

The front end wall d^3 of the ignition-chamber D extends upward above the opening d^2 and to meet a horizontal flange c^5, formed across the top of the front portion of the head C, as will be seen by reference to Fig. 8. This forms a compartment c^6 between the front end wall c^3 of the hood and the said front end wall d^3 of the ignition-chamber D, said compartment c^6 being open at the bottom, but the air in the compartment being excluded from the space above the ignition-chamber D by the wall d^3 and flange c^5.

The bottom of the ignition-chamber D is preferably closed, but formed with a series of openings d^5 of any desirable shape for the admission of a prescribed quantity of air to the ignition-chamber below the burner-tube T, I having found by actual test and experiment that better results are attained by this means than when the bottom of the ignition-chamber D is entirely open, in which case there is too great an inrush of air. Furthermore, the perforated floor of the ignition-chamber by retarding the entrance of air heats that which does enter the ignition-chamber, and thereby renders it nascent, so that it combines more readily with the gaseous admixture of fuel and air escaping from the burner-tube T. At the same time the perforated bottom protects the ignition-chamber and burner T against an undesirable reduction in temperature. The burner-tube T extends the whole length of the ignition-chamber D, and the openings *t* for the escape of the gaseous fuel are preferably made in the form of transverse slots on the upper side of the tube. By this form and arrangement of slots I am enabled to discharge into the ignition-chamber D a large quantity of gaseous fuel in parallel jets with plenty of space between for contact and admixture with the air admitted through the perforated floor of the ignition-chamber. As a result a high degree of heat is attained by the ignition of the fuel within the chamber D and the unconsumed portion of the admixture of nascent gas and air escaping through the elongated opening d^2 in the top of the ignition-chamber D is is in the best possible condition for contact with the supplementary supply of air introduced through the conduits *e e*, the additional oxygen thus injected into the ignited products of combustion aiding materially in the reduction of the inflammable portion thereof. The flame passing out through the elongated opening c^2 in the top of the hood C may be allowed to ascend in volume, or it may be divided and deviated or simply deviated to one side or the other by the use of a deflecting cap-plate F, formed with downwardly-diverging flanges *f f* upon either edge, which are preferably substantially parallel to the converging upper edges *c' c'* of the hood C. The under side of the deflecting cap-plate F is formed with transverse ribs *f' f'*, which when the plate is in use rest upon the upper edges of the hood C, and thereby space the under side of the plate with relation to the edges of the hood underneath for the purpose of creating one or more passages for the escape of the flame laterally. Thus in Fig. 5 the deflector cap-plate F is centralized with relation to the hood, and the flame in this case will be divided and discharged at the opposite edges of the said plate, while in Fig. 10 the plate is shown as adjusted with one of its flanges *f* in contact with the inclined edge *c'* of the one wall fo the hood, in which case the flame will all be diverted through the opening created on the opposite side of the hood.

I have found that by the use of the cap-plate F, I am enabled to attain more intense heat than without it. It unquestionably insures the absolute consumption of all combustible matter unreduced in the flame by exposing an increased surface of the latter to the hot air in the fire-box, so that complete oxidation results. Furthermore, the deflector cap-plate is useful in directing the heat in a given direction, as in cook-stoves or ranges, where only one side may be required for use, &c.

The front end of the burner T is bent downward or otherwise formed to create a receiving and mixing passage T', into which the gaseous fuel is injected from a nozzle *s*, connected by suitable piping with a superheater S, which extends through the upper part of the ignition-chamber D above the burner-tube T. Either liquid or gaseous hydrocarbon fuel is introduced into the superheater S through a pipe P, in which is interposed a needle-valve *p*. The end of the fuel-pipe P is preferably extended into the interior of the superheater for some distance, as will be seen by reference to Fig. 2, so that when liquid hydrocarbon is used it is dropped onto the highly-heated interior surface of the superheater and immediately flashed into vapor. It is obvious that ordinary illuminating or fuel gas may be introduced into the superheater through the medium of the fuel-pipe P and valve *p*, if desired. In any case the gaseous fuel is expanded and superheated during its passage through the superheater S and is injected with force into the receiving and mixing passage T' by the nozzle *s*. The jet of vapor entrains a supply of air which increases the combustibility of the admixture.

Steam may be advantageously used when available in connection with my improved burner, and I have shown a steam-pipe N, valve *n*, and nozzle *n'*, arranged to inject steam under pressure into the receiving and mixing passage T'. By the use of steam as herein designated a fuel admixture rich in hydrogen as well as carbon, together with a high percentage of oxygen, is attained in the burner-tube T', which admixture when subjected to the action of the induced currents of air in the burner results in intense heat.

Where liquid hydrocarbon is used as a fuel for the burner, a preliminary heating of the superheater is desirable to insure the vaporizing of the first portion of the supply of liquid fuel, and this may be accomplished in various and well-known ways, as by the use of a blow-torch, &c. To facilitate this preliminary operation, I inclose the forward end of the superheater in a sleeve or flue H, the rear end of which opens through the wall d^3 into the ignition-chamber D and the outer end of which is provided with means by which the passage may be readily opened or closed, as by swinging dampers *h h*. When it is desired to start the burner with liquid hydrocarbon fuel, these dampers are opened and a jet or blast of flame introduced into and through the flue H by any suitable means until the temperature of the superheater is raised sufficiently to vaporize the liquid hydrocarbon when the latter is turned on at the valve *p* and the dampers *h h* are closed to prevent the admission of air through the flue H to the ignition-chamber.

Back draft is practically impossible in my form of burner on account of the strong induction created not only by the flame, but by the injection of the gaseous superheated fuel which sucks air into the receiver and mixer T', as before stated.

In order to effect a preliminary heating of the fuel-supply preparatory to its introduction into the superheater, I conduct the feed-pipe P along and in contact with the bottom of the ignition-chamber D, as shown in Fig. 8 of the drawings. The pipe P is thus arranged immediately under the igniter-tube, as seen in the transverse sections thereof, so that it will absorb the maximum of heat from the metallic floor of the ignition-chamber.

In the modification in the construction of the ignition-chamber D shown in Fig. 12 the side walls are extended to meet the upper side walls of the hood, and such extensions of the side walls of the ignition-chamber are formed with openings d^6 to admit air from the passages *e e* for the same purpose as hereinbefore described and with like result. In either construction the induced current of air is heated during its passage through the spaces *e e* preparatory to its introduction into the products of combustion at the top of the combustion-chamber.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a horizontally-arranged retort, a vapor-pipe leading therefrom, a burner arranged to receive vapor and entrained air and to heat said retort, an ignition-chamber surrounding said retort and burner, and a hood inclosing the said ignition-chamber and spaced to provide an air-passage between the walls thereof and of the said ignition-chamber, whereby a supplementary supply of air is introduced into the products of combustion at the top of the combustion-chamber for the purpose set forth.

2. The combination of a horizontally-arranged retort, a vapor-pipe leading therefrom, a burner arranged to receive vapor and entrained air and to heat said retort, an ignition-chamber surrounding said retort and burner, said ignition-chamber being provided with air-openings in its bottom, and a hood inclosing the said ignition-chamber and spaced to provide an air-passage between the walls thereof and of the said ignition-chamber, whereby a supplementary supply of air is introduced into the products of combustion at the top of the combustion-chamber for the purpose set forth.

3. The combination of a horizontally-arranged retort, a vapor-pipe leading therefrom, a burner arranged to receive vapor and entrained air and to heat said retort, an ignition-chamber surrounding said retort and burner, said ignition-chamber being provided with air-openings in its bottom, and a hood inclosing the said ignition-chamber and spaced to produce an air-passage between the walls thereof and of the said ignition-chamber, the walls of the said hood being made to converge centrally above and over the upper end of the combustion-chamber, for the purpose of directing an auxiliary supply of heated air into the products of combustion rising from the combustion-chamber.

4. The combination of a horizontally-arranged retort, a vapor-pipe leading therefrom, a burner arranged to receive vapor and entrained air and to heat said retort, means for introducing steam under pressure into said burner, an ignition-chamber surrounding said retort and burner, said ignition-chamber being provided with air-openings in its bottom, and a hood inclosing the said ignition-chamber and spaced to provide an air-passage between the walls thereof and of the said ignition-chamber, whereby a supplementary supply of air is introduced into the products of combustion at the top of the combustion-chamber, for the purpose set forth.

5. The combination of a horizontally-arranged retort, a vapor-pipe leading therefrom, a burner arranged to receive vapor and entrained air and to heat said retort, an ignition-chamber surrounding said retort and burner said ignition-chamber being provided with

air-openings in its bottom, a hood inclosing the said ignition-chamber and spaced to provide an air-passage between the walls thereof and of the said ignition-chamber, and a deflecting cap-plate covering the opening in the top of the hood without closing the same for the purpose set forth.

6. The combination of a horizontally-arranged retort, a vapor-pipe leading therefrom, a burner arranged to receive vapor and entrained air and to heat said retort, an ignition-chamber surrounding said retort and burner, said ignition-chamber being provided with air-openings in its bottom, a hood inclosing the said ignition-chamber and spaced to provide an air-passage between the walls thereof and of the said ignition-chamber, and a cap-plate adjustably supported over said hood whereby the products of combustion escaping therefrom may be deflected to one side or the other or allowed to escape on both sides thereof for the purpose set forth.

7. The combination of a horizontally-arranged retort, a vapor-pipe leading therefrom, a flue surrounding the projecting end of said vapor-pipe for the purpose of facilitating the preliminary heating of the same, a burner arranged to receive vapor and entrained air and to heat said retort, an ignition-chamber surrounding said retort and burner, said ignition-chamber being provided with air-openings in its bottom, and a hood inclosing the said ignition-chamber and spaced to provide an air-passage between the walls thereof and of the said ignition-chamber, whereby a supplementary supply of air is introduced into the products of combustion at the top of the combustion-chamber for the purpose set forth.

8. The combination of a horizontally-arranged retort, a vapor-pipe leading therefrom, a burner arranged to receive vapor and entrained air and to heat said retort, said burner being formed with a series of narrow transverse slots for the purpose set forth, an ignition-chamber surrounding said retort and burner said ignition-chamber being provided with air-openings in its bottom; and a hood inclosing the said ignition-chamber and spaced to provide an air-passage between the walls thereof and of the said ignition-chamber, whereby a supplementary supply of air is introduced into the products of combustion at the top of the combustion-chamber for the purpose set forth.

JOHN F. SCHREYER.

Witnesses:
GEO. WM. MIATT,
D. W. GARDNER.