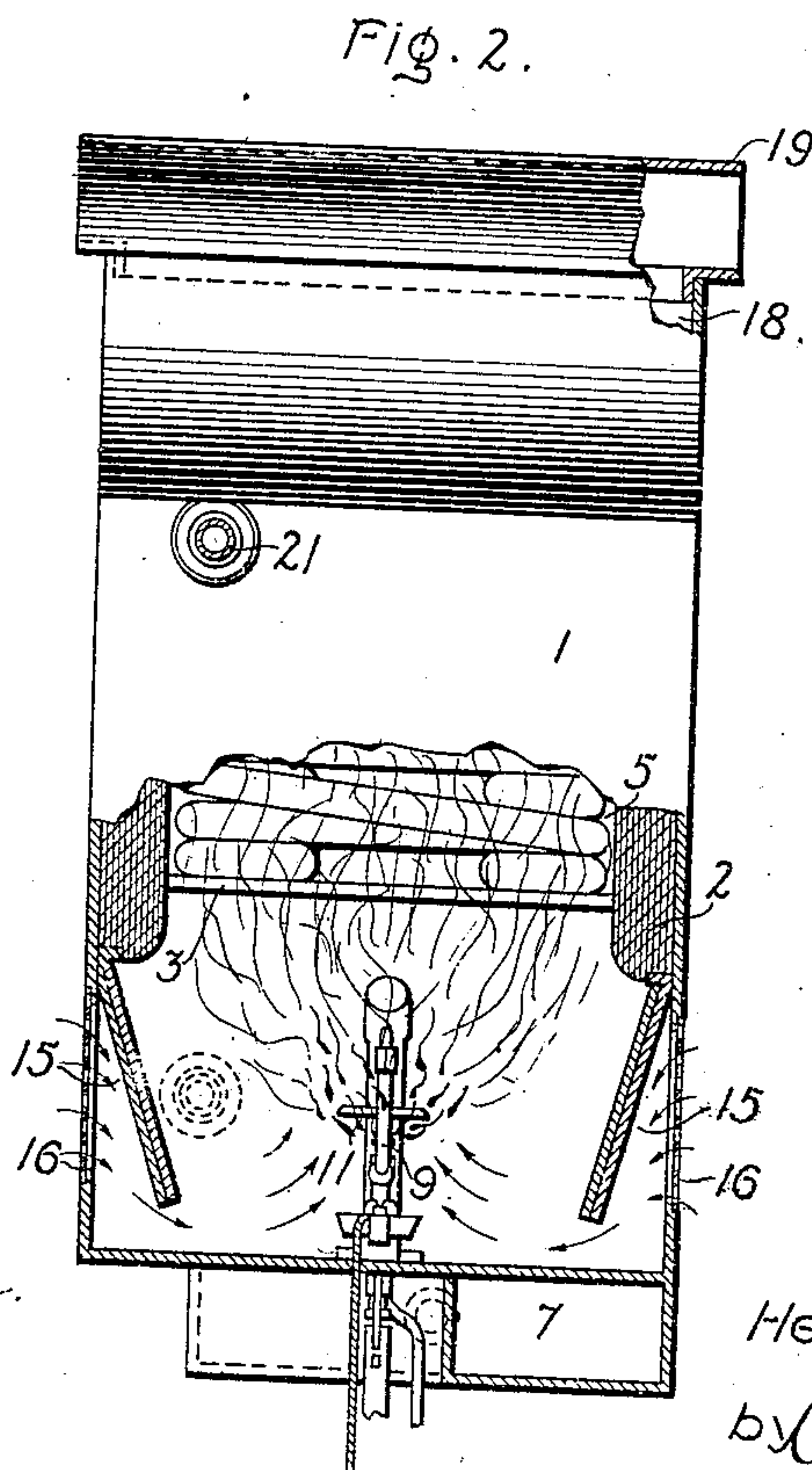
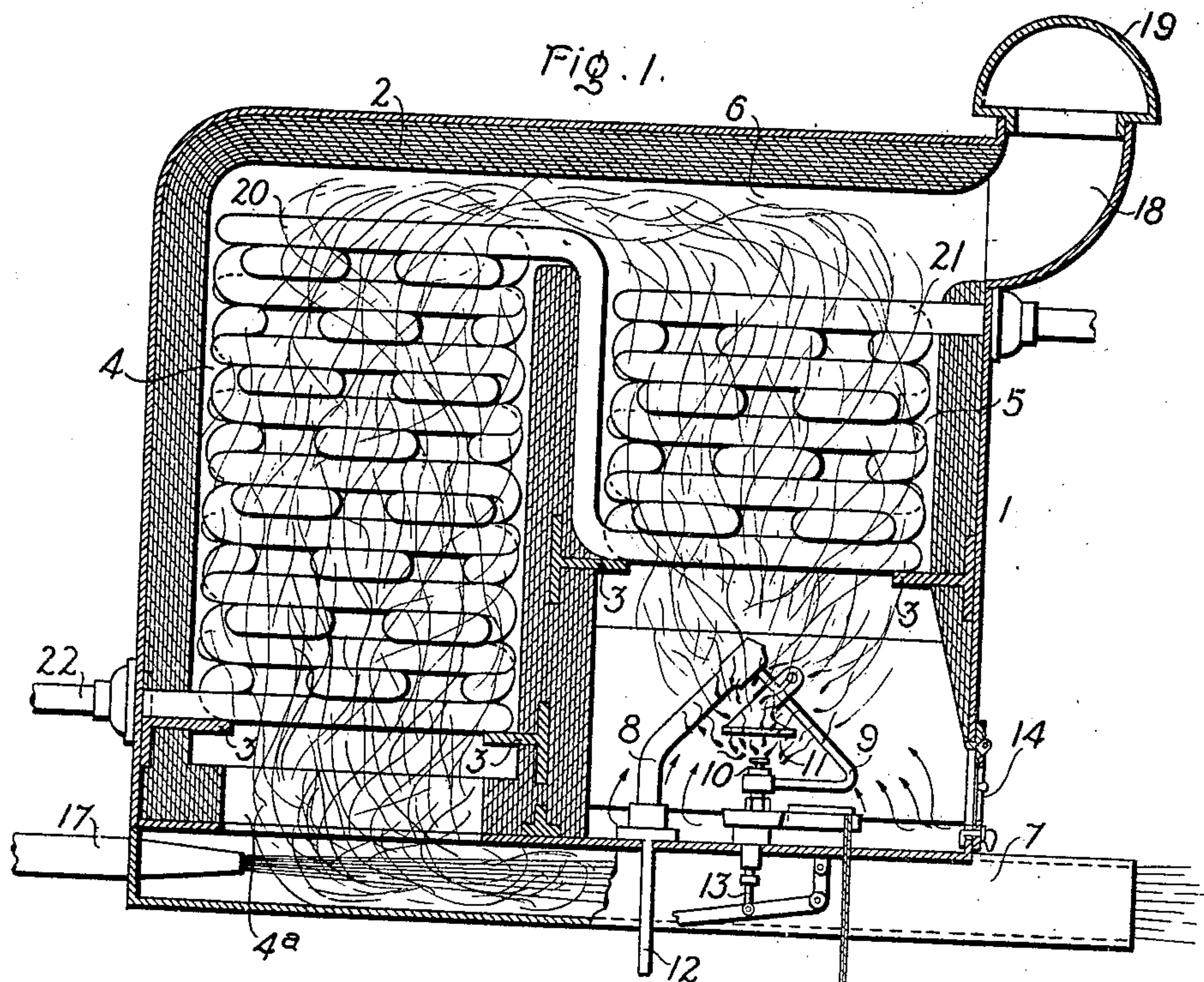


No. 829,925.

PATENTED AUG. 28, 1906.

H. LEMP.
HYDROCARBON BURNER.

APPLICATION FILED FEB. 14, 1903.



WITNESSES:
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UNITED STATES PATENT OFFICE.

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HYDROCARBON-BURNER.

No. 829,925.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Original application filed January 16, 1901, Serial No. 43,510. Divided and this application filed February 14, 1903. Serial No. 143,314.

To all whom it may concern:

Be it known that I, HERMANN LEMP, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Hydrocarbon-Burners, of which the following is a specification.

The present invention is a division of my pending application, Serial No. 43,510, filed January 16, 1901, on flash-boilers, which division is made under the requirements of Rules 41 and 42 of the United States Patent Office.

In the operation of hydrocarbon-burners, particularly of the kerosene type, it is important to provide means whereby the incoming currents of air are properly warmed and also to provide means for discharging or directing the said air-currents in such manner that they will properly mingle with the kerosene-vapor.

The present invention has for its object to improve the operation of hydrocarbon-burners by providing a means for supporting and inclosing them whereby the currents of air entering the casing or inclosure are properly warmed and controlled and also by providing separate and distinct flue-openings for discharging the products of combustion after the heat has been substantially abstracted therefrom.

For a consideration of what I consider to be novel and my invention attention is called to the accompanying description and claims appended thereto.

In the drawings which illustrate an embodiment of my invention, Figure 1 is a vertical section of a boiler-casing and fire-box with the boiler-tubes and the burner in elevation, and Fig. 2 is a front elevation with certain of the parts broken away.

1 represents a boiler-casing, which is divided into two compartments, and located in each of the compartments is a portion or section of a flash-boiler. The interior of the casing is provided with a suitable lining 2, of fire-brick or other heat-resisting material. Extending across the casing in a manner to support the boiler-tubes and also to hold the fire-box lining are T-shaped supports 3, which are secured to the casing in any suitable manner. The compartments 4 and 5

are separated from each other at the bottom, but are connected at the top by the horizontal flue or passage 6. The right-hand compartment is closed at the bottom by a plate which also forms the top of the chute 7, the latter forming a part of the downdraft-flue. Mounted on this plate is a hydrocarbon-burner. In the present instance it is shown as comprising vaporizing-tubes 8 and 9, a plug 10 having a fuel-opening or nozzle, and a baffling-plate 11. The baffle-plate must be in close proximity to the burner-opening, so that the vapor will be deflected laterally, and thus pick up the necessary amount of air. The incoming air-currents are warmed and directed by suitable baffle-plates. Fuel is supplied to the burner from any suitable source through the pipe 12, and care should be taken to have the fuel enter the vaporizer at its coolest point in order to prevent carbonization. In order to reduce the flame when no steam is being drawn from the boiler, a pin or needle 13 is provided, which partially closes the opening in the burner-nozzle and is actuated by the lever or any suitable device from a convenient point. The rear end of the casing is provided with a door 14 to permit inspection of the burner. As shown, it is also provided with a damper, such as is common in furnace-doors, whereby the admission of air to the burner can be regulated. It is to be noted, however, that the openings in the door, which are controlled by the damper, are below the baffle-plate.

On the sides of the casing adjacent to the burner are deflector-plates 15, Fig. 2, which prevent the air from directly striking the flame. They cause the air-currents to be deflected downward below the baffle-plate and burner-flame. Air is admitted to the lower sides of the casing through perforations 16. These perforations or openings are so disposed relatively to the nozzle and baffle-plate that the vapor on being distributed laterally would partially escape from the combustion-chamber; but as the deflecting-plates are arranged over the openings they tend to prevent the vapor from escaping and deflect the same upwardly. The baffle-plate causes the kerosene-vapor, which is projected from the nozzle under high velocity, to spread outward, and as it spreads the necessary amount

of air is entrained to afford complete combustion. The deflector-plates are heated by the flames. Hence the air will be warmed before it can mingle with the vapor. By directing the incoming currents of air downward, so that they enter the fire-box below the burner-opening, they will thoroughly mix with the vapor. The warming and mixing of the air-currents is conducive to good economy in operation. The fire-brick linings, the deflector-plates 15, and the burner constitute a fire box or chamber. The jet of vapor between the nozzle and baffle-plate is exposed to the heat of the flame in the chamber, but being of high velocity it is prevented from igniting. Ignition of the vapor takes place after it has been deflected from the baffle-plate, which latter, in effect, pulverizes the stream of vapor, so that sufficient air becomes incorporated therewith to support combustion. The flame produced by the mixture obtained in this manner is blue in character, free of all sooty or solid carbonaceous matter, and is of large volume, sufficient to heat the boiler.

Situated below the burner-casing is a chute 7, composed of a thin metal casing, and forming part of the downdraft-flue. The left-hand end of the chute has an opening 4^a, which coincides with the opening 4 in the left-hand compartment of the boiler-casing. The opening and chute constitute a flue, and through it the products of combustion pass to the external atmosphere under the forced draft. Extending into the flue 7 on the front end is a steam-carrying pipe 17. I may with advantage use the exhaust from an engine receiving its steam from the boiler. The fire-gases under natural draft pass upward through the vertically-extending flue 18 and then laterally through the cross-flue 19. The latter may extend wholly or partially across the boiler-casing, as desired. Under forced draft the fire-gases pass through the horizontal flue 6, then downward through the left-hand compartment, thence through the opening 4^a into the horizontal rearwardly-opening flue 7. The object of this arrangement is to create a forced draft, so that the products of combustion instead of passing out through the up or natural-draft flue 18, thereby shunting a portion of the boiler-tubes, will pass through all of the tubes and out at the bottom.

The boiler is composed of two connected sections 20 and 21, each section being located in a separate compartment in the boiler-casing and supported by the T-shaped pieces 3. Water enters the boiler through the pipe 22 and at some intermediate point in the boiler is flashed into steam, and from that point on the steam or other vapor is superheated. Assuming that the delivery of steam from the boiler to the engine ceases and that the burner-flame is reduced by inserting the pin

13, this cuts off the exhaust from the pipe 17 and the products of combustion will pass out through the flue 18 and the cross-flue 19, or, in other words, through the natural-draft opening. Under this condition the temperature of the boiler-section 20 in the left-hand compartment rapidly decreases, causing the steam therein to condense, and the water will settle in the bottom tubes or grids. The flame from the burner will, however, maintain a certain amount of steam in the boiler-section 21 in the right-hand compartment, which can be drawn when it is desired to start the vehicle or other mechanism into operation. The arrangement of parts is such that the flame from the burner is sufficient to maintain steam in the right-hand section when the pin or needle 13 is inserted. The water in the boiler-section 20—the one in the left-hand compartment—acts as a reserve supply and takes the place of that commonly supplied by the manually-actuated water-pump. The amount of steam in section 21 of the boiler is sufficient to start the engine, and the exhaust-steam therefrom entering the flue 18 will draw the products of combustion up through the compartment 5, through the flue 6, and down through compartment 4, as indicated in Fig. 1. When steam is discharged from the boiler, the pin 13 should be moved downwardly to give full burner-opening. This will vaporize the water in both sections of the boiler. Hence more steam will be furnished to the engine, and as the amount of exhaust therefrom continues to increase the draft will increase. As the demand on the boiler increases the supply of water should be increased.

In accordance with the provisions of the patent statutes I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination, a boiler, a combustion-chamber therefor, a nozzle which discharges a jet of hydrocarbon vapor into the chamber in vertical direction, a baffle-plate arranged above and in close proximity to the nozzle which receives the vapor-jet before it ignites and spreads it laterally, and air-supplying means arranged in the combustion-chamber which conveys the air downwardly to the bottom of the chamber and delivers it to the vapor after the same leaves the baffle-plate.

2. In combination, a boiler, a combustion-chamber therefor which is closed at its bottom and is provided with air-admitting openings in its side, means located in the combustion-chamber which generates vapor and delivers it directly into the same unmixed with

air, means for distributing the vapor in the chamber for mixing it with air, and means which prevents the tendency of the flames to pass through the openings and also controls the supply of air to the combustion-chamber.

3. In combination, a boiler, a combustion-chamber therefor which is closed at its bottom and is provided with air-admitting openings in its side, a vapor-generating device in the chamber which delivers therein a high-velocity vapor-jet in a definite direction, a baffle-plate which receives the jet and distributes the vapor in a plane at right angles to the jet, and plates which extend over the openings and impart a definite direction to the incoming air.

4. In combination, a combustion-chamber, a vaporizer therein which is heated directly by the flame, a nozzle connected with the vaporizer for discharging a jet of hydrocarbon vapor into the chamber at a velocity sufficient to prevent burning of the vapor, a baffle-plate for atomizing the jet of vapor and deflecting it laterally before ignition to mingle with air, and means for supplying air to the chamber from a region which permits the air to combine with the atomized vapor before burning.

5. In combination, a boiler, a combustion-chamber which is closed to the atmosphere at its bottom, means for supplying hydrocarbon vapor to the chamber in the form of a jet, means for scattering the vapor before ignition in a direction substantially transverse to that of the jet, and means which is heated by the flames and delivers heated air to the chamber from the sides and at a point below the vapor.

6. In combination, a boiler, a combustion-chamber, a vapor-generating device contained in said chamber and adapted to discharge vapor thereto, a baffle-plate for distributing the unburned vapor laterally, and means located above the bottom of the chamber for receiving air and directing it under the laterally-distributed vapor and serving to deflect the vapor upwardly.

7. In combination, a boiler, a combustion-chamber in cooperative relation thereto, a vaporizing-tube mounted in the chamber which is subjected to the heat of combustion, a nozzle for discharging vapor from said tube in a vertical jet, a baffle-plate for spreading the vapor-jet laterally toward the sides of the chamber before ignition occurs, and means for supplying heated air to the chamber from a point below the baffle-plate.

8. In combination, a boiler, a combustion-chamber therefor which comprises a casing closed at its bottom and having air-admitting openings in its side, means for discharging hydrocarbon vapor into the chamber, a baffle-plate for deflecting the vapor transversely of the chamber, and plates intermediate the baffle-plate and air-admitting open-

ings for preventing the escape of vapor and for permitting the entrance of air into the combustion-chamber.

9. In combination, a boiler, a combustion-chamber therefor comprising a closed bottom casing having air-admitting openings in the sides, means for discharging hydrocarbon vapor into the chamber at the region of said openings, and means intermediate said means and openings which intercepts the vapor and directs it upwardly and also directs the air from the openings downwardly toward the bottom of the casing before combining with the vapor.

10. In combination, a boiler, a combustion-chamber arranged in cooperative relation thereto, and having air-admitting openings in its sides, a vaporizing device mounted in the chamber and adapted to deliver vapor thereto, a baffle-plate arranged to distribute the vapor outwardly toward the openings, and inwardly-inclined deflector-plates supported intermediate to the baffle-plate and openings and extending downwardly adjacent to the bottom of the chamber.

11. In combination, a boiler, a combustion-chamber therefor, means for delivering a jet of vapor into the chamber at a high velocity and substantially in a medial line, a baffle-plate of relatively small area compared with the cross-section of the combustion-chamber and arranged above said means to deflect the vapor horizontally, deflector-plates for controlling the admission of air to the combustion-chamber, a natural-draft flue communicating with the chamber, and a forced-draft flue also communicating with the chamber.

12. In combination, a boiler, a combustion-chamber therefor which is provided with air-admitting openings in its side at some distance above the bottom, a vaporizer arranged in the combustion-chamber and heated by the flame therein, a nozzle connected with the said vaporizer for discharging a jet of vapor into the chamber at high velocity, means for regulating the size of jet of vapor issuing from the nozzle, a baffle-plate arranged in close proximity to the nozzle, deflector-plates arranged in the combustion-chamber which convey the air admitted through the openings downwardly toward the bottom of the chamber and below the baffle-plate, a natural-draft flue, a forced-draft flue, and means for creating a forced draft in the said latter flue.

13. In combination, a boiler, a casing therefor, a jet-burner, a baffle-plate which is situated in close proximity thereto, to receive the vapor-stream, and spreads the vapor in a plane at substantially right angles to the direction of the vapor-stream and into the space intermediate the casing and plate before ignition occurs, a flue opening into the boiler-casing, and a means for causing the

products of combustion to follow a path substantially parallel with the vapor-stream.

14. In combination, a boiler, a jet-burner having a nozzle with a single opening, a baffle-plate that is situated in close proximity to the nozzle and spreads the vapor laterally some distance beyond its periphery before ignition occurs, a vaporizer which is enveloped by more or less of the flame as the pressure of the vapor-jet is changed, a casing which incloses the boiler, a flue through which the products of combustion pass under natural draft, a second flue, and a means for creating a forced draft in the second flue.

15. 15. In combination, a boiler-casing which is provided with air-admitting openings in the wall thereof, a support which extends across the casing, boiler-tubes carried by the support, a base-plate which closes the bot-

tom of the casing against the admission of air, a burner carried by the base-plate, means for deflecting the jet of vapor from the burner outwardly in a horizontal plane, a deflector which is heated by the burner-flame and serves to warm the incoming currents of air, the said deflector being located between the burner and the casing, and coöperates with a wall of the casing to prevent air-currents from passing directly to the boiler-tubes while permitting them to pass under it to the burner-flame.

In witness whereof I have hereunto set my hand this 12th day of February, 1903.

HERMANN LEMP.

Witnesses:

DUGALD McK. McKILLOP,
JOHN J. WALKER.