J. E. GRUDA.

OIL BURNER.

APPLICATION FILED SEPT. 26, 1907.

908,249.

Patented Dec. 29, 1908.

2 SHEETS—SHEET 1.

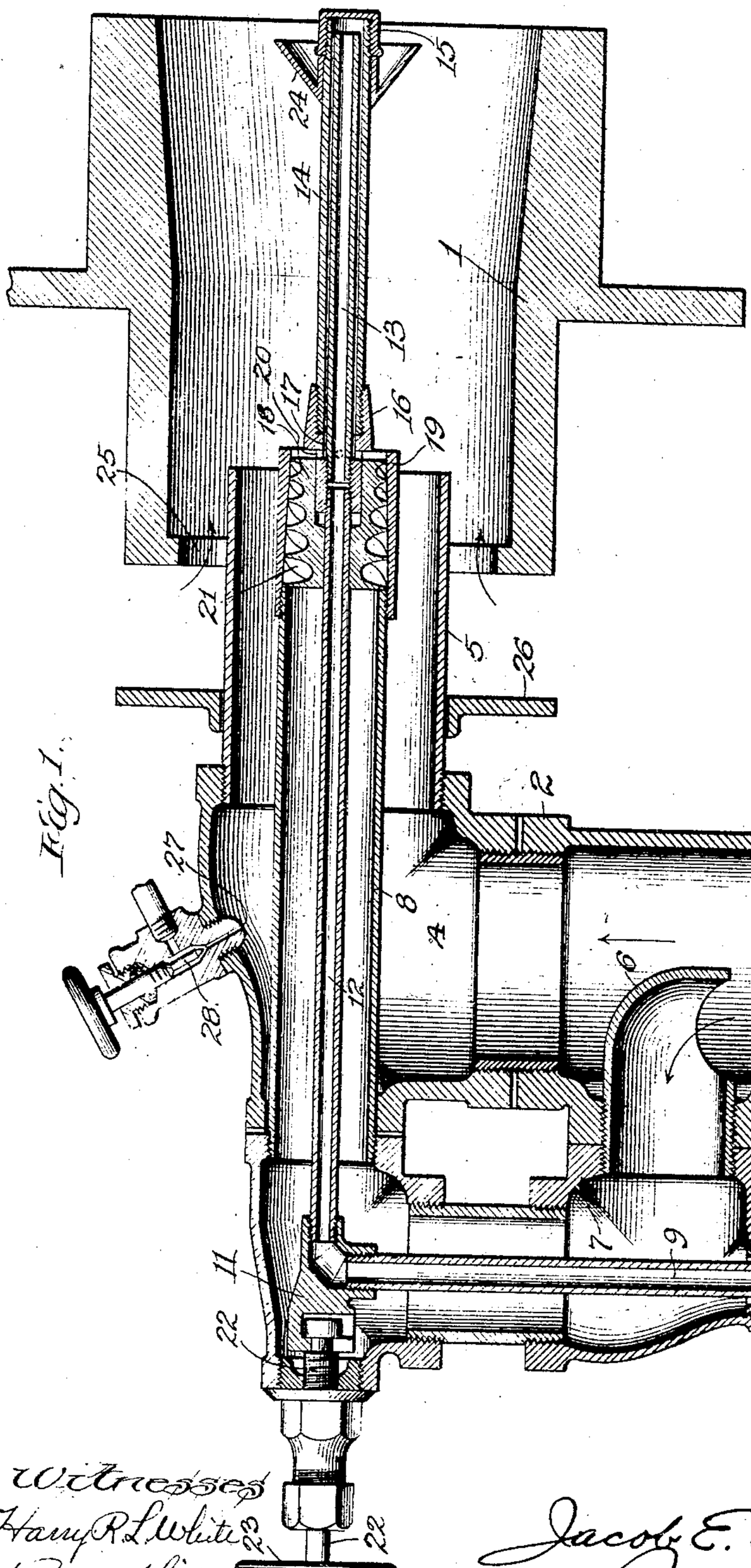

Fig. 1.

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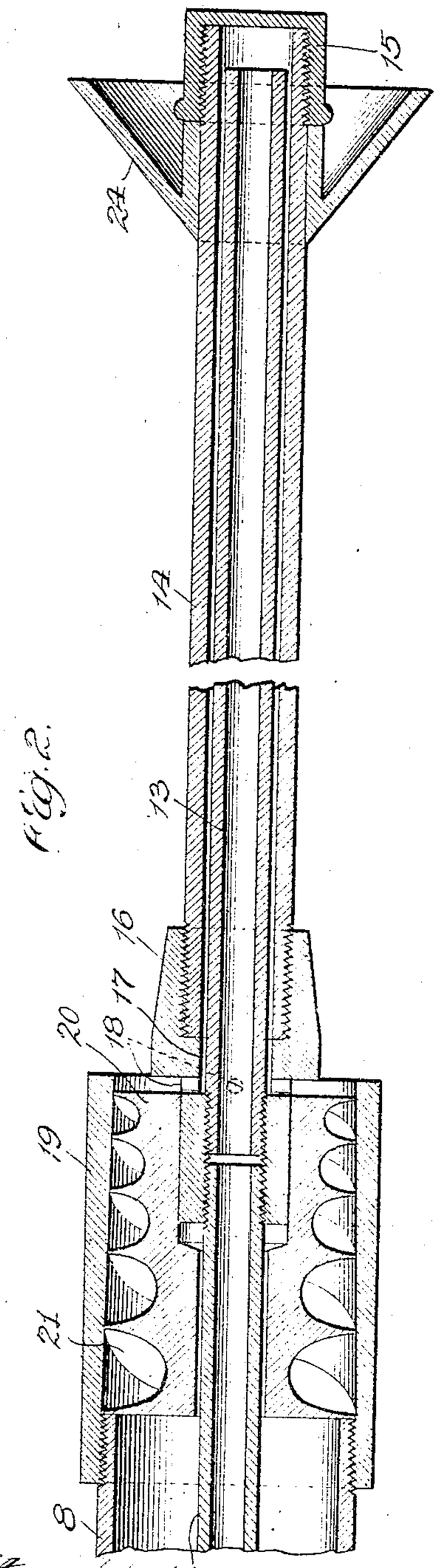

Fig. 2.

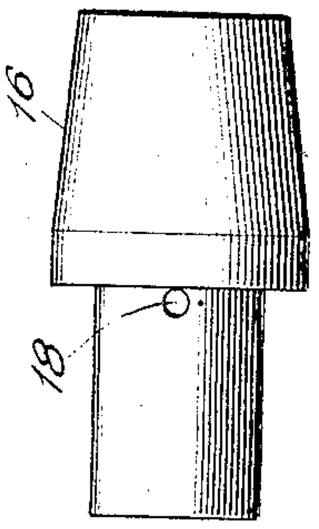

Fig. 4.

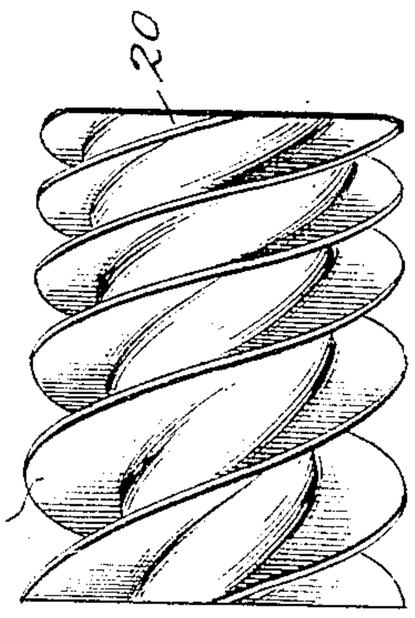

Fig. 3.

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UNITED STATES PATENT OFFICE.

JACOB E. GRUDA, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO ARTHUR M. GRUDA, OF CHICAGO, ILLINOIS.

OIL-BURNER.

No. 908,249. Specification of Letters Patent. Patented Dec. 29, 1908.

Application filed September 26, 1907. Serial No. 394,678.

To all whom it may concern:

Be it known that I, JACOB E. GRUDA, a citizen of the United States of America, and a resident of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Oil-Burners, of which the following is a specification.

The main objects of this invention are to provide an improved form of oil burner for furnaces, which is capable of efficiently burning any grade of fuel oil which will flow in a pipe; to provide an improved form of vaporizer for apparatus of this character; to provide improved means for mixing air and oil so as to produce a flame of maximum temperature; and to provide an improved arrangement of parts to insure thorough combustion of the vaporized oil before it comes into contact with the comparatively cool walls of the furnace. These objects are accomplished by the device shown in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of an oil burner constructed according to this invention. Fig. 2 is an enlarged sectional detail of the air and oil mixing devices. Fig. 3 is an elevation of the air-inlet fitting, showing the tapered spiral passages in its periphery. Fig. 4 is an elevation of the oil-inlet fitting.

In the construction shown the furnace is provided with a combustion chamber 1, which extends through the front wall and is fastened thereto by means of flanges. This chamber is open at each end and extends inward of the furnace far enough to confine the flame throughout the length of the oil vaporizing apparatus, as will hereinafter appear.

The burner comprises a hollow casing 2, which in the form shown is made up of a plurality of detachable parts. The pipe 3 connects the air passages of the casing 2 with a suitable source of air under pressure, as a blower. The main volume of air from the pipe 3 passes through the passage 4 and is conducted by a pipe 5 into the combustion chamber 1. A deflector 6, in the form of a curved nipple, extends into the passage 4 and deflects a portion of the air current into the passage 7, which communicates with the interior of the atomizer pipe 8 located concentrically within the pipe 5, and also discharging into the chamber 1, as will hereinafter appear.

Oil enters the apparatus through the pipe 9, which is controlled by a valve 10 and is connected by the fitting 11 with the oil feed pipe 12, which extends along concentrically within the air pipes 8 and 5. Connected to the end of the oil pipe 12, and forming a continuation thereof, is an elongated gas generator centrally located with respect to the burner and comprising a pair of pipes 13 and 14 arranged one within the other and communicating at their outer ends. The pipe 14 extends beyond the open end of the pipe 13 and is closed at its end by a cap 15. Oil passing out of the end of the pipe 13 flows backward in the space between the walls of the pipes 13 and 14, to the inner end of the pipe 14, and is vaporized through contact with the heated walls of the pipe 14.

A fitting 16 rigidly connects the inner end of the pipe 14 with the pipes 12 and 13 and forms a coupling for connecting said pipes 12 and 13. The fitting 16 has a bore 17 larger than the external diameter of the pipe 12 and forming a continuation of the interior of the pipe 14. A plurality of radially disposed passages 18 permit the gaseous fuel to flow outward from the interior of the pipe 14. These are the fuel inlets of the combustion chamber. A convergingly tapered air nozzle 19 has threaded connection with the outer end of the air pipe 8. A member 20 fits within the nozzle 19, in alinement with the pipe 8, and has in its periphery a plurality of tapered spiral air passages 21. These passages, as will be seen from the drawing, are larger at the receiving end, which is at the left in the drawings, and are gradually contracted toward their delivery end. This arrangement of the air passages produces a whirling current of air of high velocity.

In the form shown there are four of such passages 21, and the fitting 16 is correspondingly provided with four fuel inlet passages 18, which are located so that the jets of gaseous fuel issuing from the passages 18 will intersect the paths of the atomizing air jets issuing from the passages 21. The result is a whirling flame which extends along and surrounds the pipe 14 in which the oil is gasified.

The fitting 16 slidably fits within a counterbore in the end of the fitting 20, said fittings telescoping with each other and being relatively adjustable for controlling the flow of fuel through the inlets 18, as will hereinafter appear. The fitting 11 has swiveled connec-

tion with a stem 22 which is provided with a handle 23 outside of the casing and which has threaded connection with the casing, so that the pipe 12 may be adjusted longitudinally within the pipe 8 by rotating the handle 23. In this manner the parts 16 and 20 are shifted relatively of each other and the part 20 acts as a valve controlling the escape of fuel at the inlets 18.

The air from the pipe 5 unites with the mixed air and gas from the passages 18 and 21, and serves also to direct the flame in a substantially cylindrical path along and concentric with the vaporizer. In order to prevent the flame from striking the comparatively cool walls at the opposite end of the furnace and causing a deposit to accumulate thereon, a conical deflector plate 24 is mounted at the end of the pipe 14 and serves to spread the flame in all directions upon leaving the chamber 1. An additional supply of air may be admitted through the passages 25 around the outside of the air pipe 5, when conditions require it. This passage 25 is controlled by a closure in the form of a plate 26 which is slidably mounted on the pipe 5 and may be slid into or out of position for closing the passage 25.

In burning certain kinds of oils, it is an advantage to supply moisture to the gaseous mixture, and to this end the casing is provided with a water inlet 27, through which a fine jet of water may be admitted to the air current passing through the pipe 5. The inlet 27 is controlled by a needle valve 28.

The operation of the device shown is as follows: When the device is in normal operation, the oil valve 10 is open and air is forced into the casing through the pipe 3 by means of a suitable blower. The air flows upwardly through the passage 4 and is discharged into the chamber 1 by the pipe 5. A portion of the air from the pipe 3 is deflected through the passage 7 and enters the chamber 1 from the pipe 8, after passing through the nozzle 19 and being converted into a whirling blast. The mixture of air and oil is ignited within the chamber 1, and the flame is carried along said chamber into the furnace. The flame heats the oil in its passage through the generator, and it enters the chamber 1 at the inlets 18 in the form of a gas which becomes thoroughly mixed with the whirling current of air and produces a flame of intense heat. By adjusting the handle 23, the areas of the inlets 18 may be regulated so as to produce the proper proportion of oil and air for the most perfect combustion. The plate 26 provides an adjustment whereby an additional regulation of the air supply may be had to suit atmospheric conditions. The concentric air currents entering the combustion chamber from the pipe 8 and the inlet 25, serve to cause the flame to closely envelop the generator.

On starting the burner when the pipes 13 and 14 are cool, oil will issue in fine jets at the inlets 18. This will be atomized by the atomizing currents of air issuing from the passages 21 and may be at once ignited by a match inserted at the opening 25. As the pipe 14 becomes heated, gas is generated therein, and the flame in the chamber 1 rapidly reaches its maximum intensity, the final adjustment being made by means of the handle 23.

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

1. A device of the class described, comprising a centrally located gas generator, an oil feed therefor, a burner located a considerable distance inward of the end of said generator having fuel outlets arranged around said generator, and having outlets for an atomizing fluid comprising spiral passages arranged adjacent to said fuel outlets to produce a whirling flame enveloping the generator for vaporizing the oil in its passage to the fuel outlets.

2. A device of the class described, comprising a centrally located gas generator, an oil feed therefor, a burner located a considerable distance inward of the end of said generator and having air and fuel atomizing outlets arranged around said generator, said air outlets comprising spiral passages arranged to produce a whirling flame enveloping the generator, for vaporizing the oil in its passage to the fuel outlets.

3. An oil burner, comprising a central oil feed tube open at its front end, a gas generating tube surrounding said feed, being closed at its front end and extending backward a considerable distance along said oil feed tube, a gas outlet located rearward of the front end of said outer tube, an air outlet coacting with said gas outlet and adapted to feed and direct a tubular flame along said tubes for generating gas from the oil therein, and a deflector mounted on said tubes at their front end and adapted to spread the flame.

4. An oil burner, comprising a central oil feed tube open at its front end, a gas generating tube surrounding said feed, being closed at its front end and extending backward a considerable distance along said oil feed tube, said generator tube having therein a plurality of gas outlets located a considerable distance inward of the free end of said tubes, a member telescoping said tubes near said outlets and having therein a plurality of air passages directed along said tubes and across said outlets for mixing air with the gas issuing therefrom and directing the flame along said tubes toward the free end, and means for relatively adjusting said member and outer tube for enlarging and contracting said outlets.

5. An oil burner, comprising an air feed

tube, an oil inlet tube located within said air feed tube and extending longitudinally therethrough and having transversely disposed fuel outlets near the outer end of said air feed tube, a member surrounding said oil tube and fitting the inner part of said air feed tube near its outer end, said member having in its periphery a plurality of spiral passages disposed so as to direct jets of air across said fuel outlets for atomizing the fuel issuing therefrom and each tapered so as to be gradually contracted toward its delivery end.

6. An oil burner, comprising an air feed tube, an oil inlet tube located within said air feed tube and extending longitudinally therethrough and having transversely disposed fuel outlets near the outer end of said air feed tube, a member surrounding said oil tube and fitting the inner part of said air feed tube near its outer end, said member having in its periphery a plurality of spiral passages disposed so as to direct jets of air across said fuel outlets for atomizing the fuel issuing therefrom and each tapered so as to be gradually contracted toward its delivery end, said member and oil tube being relatively adjustable in a longitudinal direction for controlling the flow of fuel through said outlet.

7. An oil burner, comprising an air feed tube, an oil inlet tube located within said air feed tube and extending longitudinally therethrough and having transversely disposed fuel outlets near the outer end of said air feed tube, a member surrounding said oil tube and fitting the inner part of said air feed tube near its outer end, said member having in its periphery a plurality of spiral passages disposed so as to direct jets of air across said fuel outlets for atomizing the fuel issuing therefrom and each tapered so as to be gradually contracted toward its delivery end, said oil tube being extended a considerable distance beyond the outer end of said air tube and surrounded by a second tube communicating with said oil tube at its outer end and communicating with said fuel outlets at its inner end, said oil tube and outer tube being arranged to form a generator and adapted to vaporize the oil in its passage through said tubes.

8. A device of the class described, comprising a centrally located elongated gas generator, an oil feed pipe connected to one end of said generator, an atomizer surrounding said oil feed pipe and having at its end a converging tapered nozzle directed along said generator, a member fitting within said nozzle and having in its periphery a plurality of spiral passages each convergingly tapered toward said generator, and said generator having outlets adjacent to and discharging into paths of atomizing jets issuing from said spiral passages.

9. A device of the class described, comprising a centrally located elongated gas generator, an oil feed pipe connected to one end of said generator, an atomizer surrounding said oil feed pipe and having at its end a converging tapered nozzle directed along said generator, a member fitting within said nozzle and having in its periphery a plurality of spiral passages each convergingly tapered toward said generator, said generator having outlets adjacent to and discharging into the paths of atomizing jets issuing from said spiral passages, and an air pipe surrounding said atomizer pipe and adapted to direct a tubular air current along said generator to cause the flame at said burner to closely envelop said generator.

Signed at Chicago this 24th day of September 1907.

JACOB E. GRUDA.

Witnesses:
WM. R. RUMMLER,
E. A. RUMMLER.