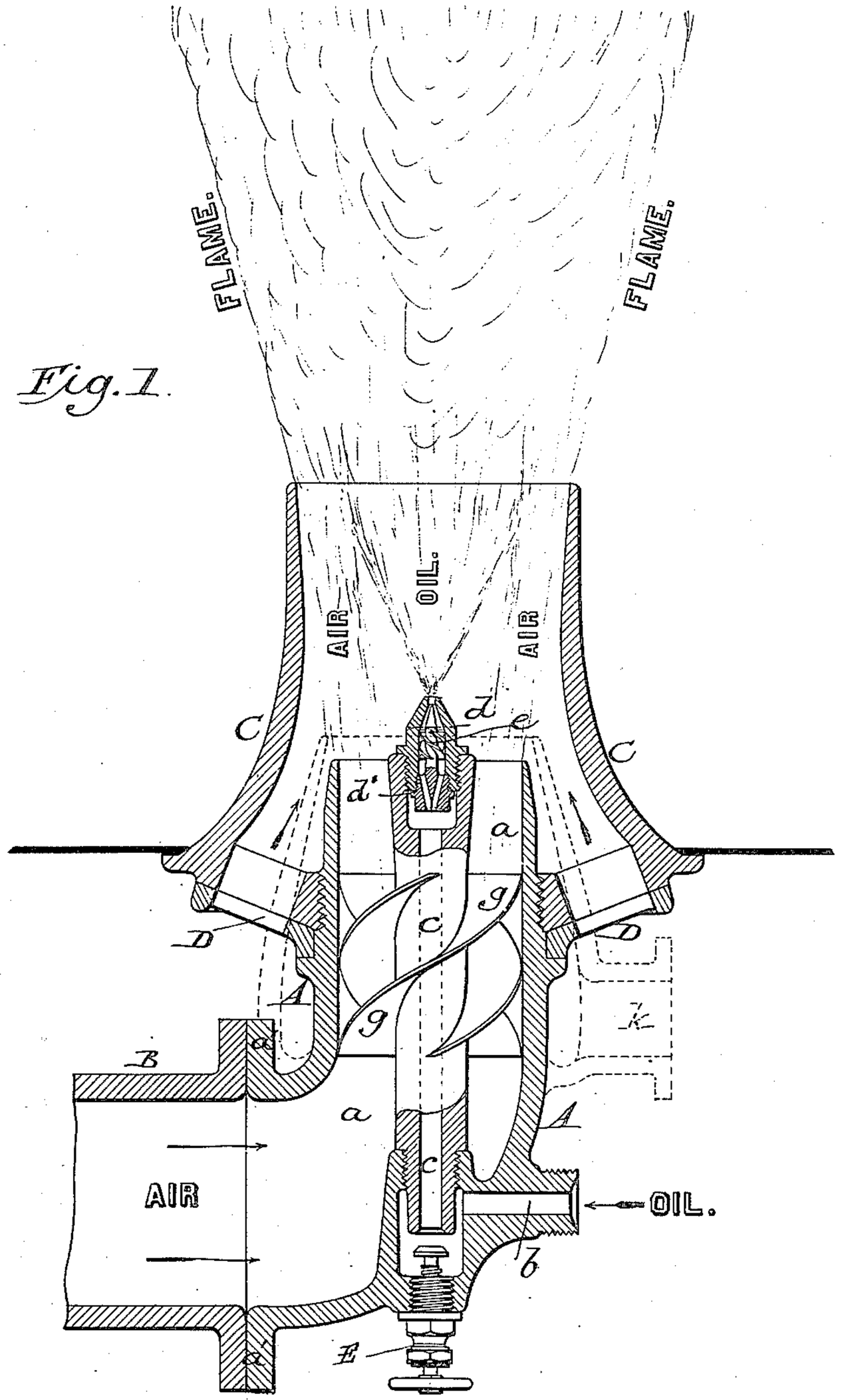
(No Model.) 2 Sheets—Sheet 1.

L. SCHUTTE.

OIL AND GAS BURNER.

No. 391,865. Patented Oct. 30, 1888.

Fig. 1.



WITNESSES.

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INVENTOR.

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By Phil. T. Dodge.

Atty.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

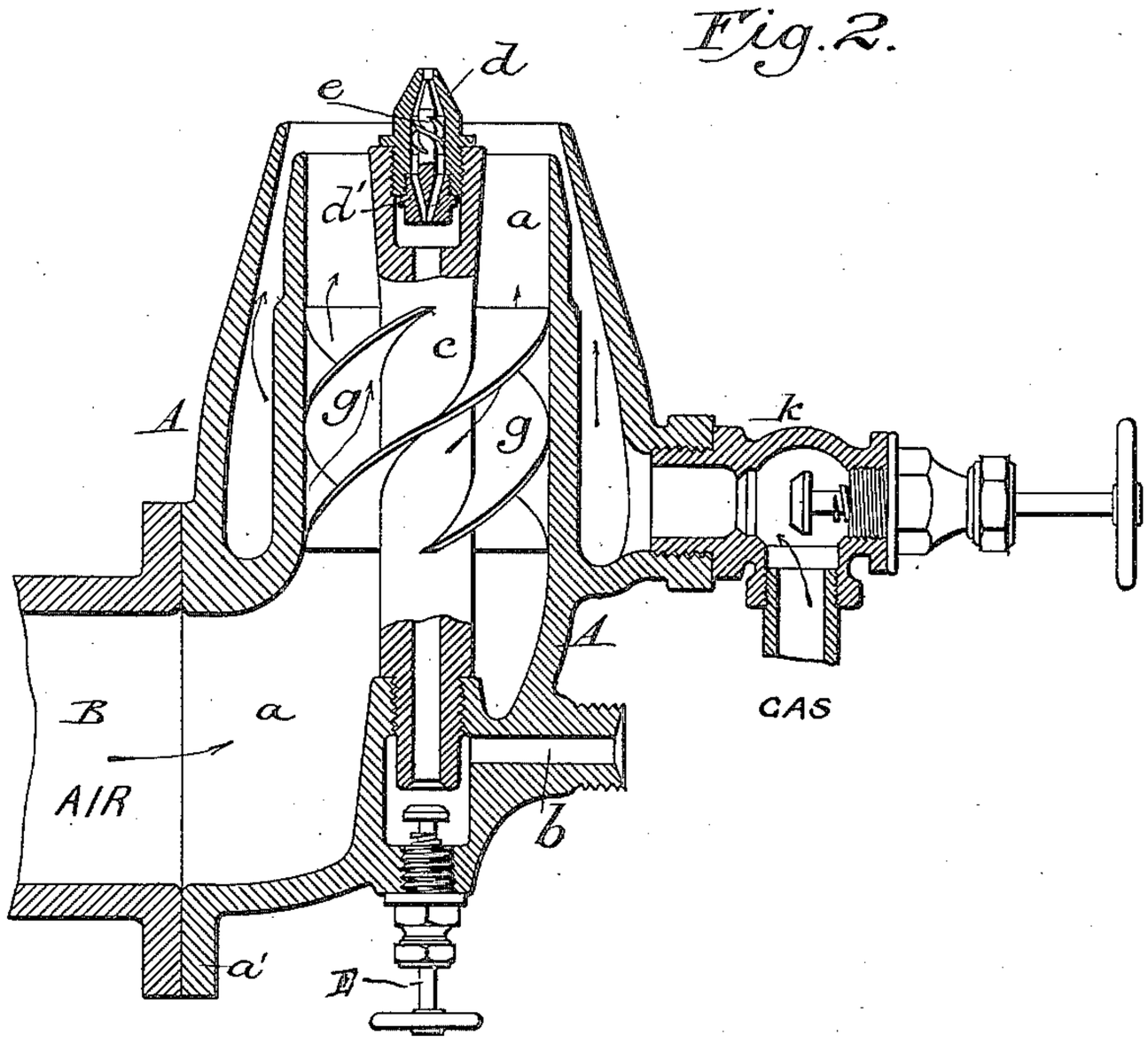
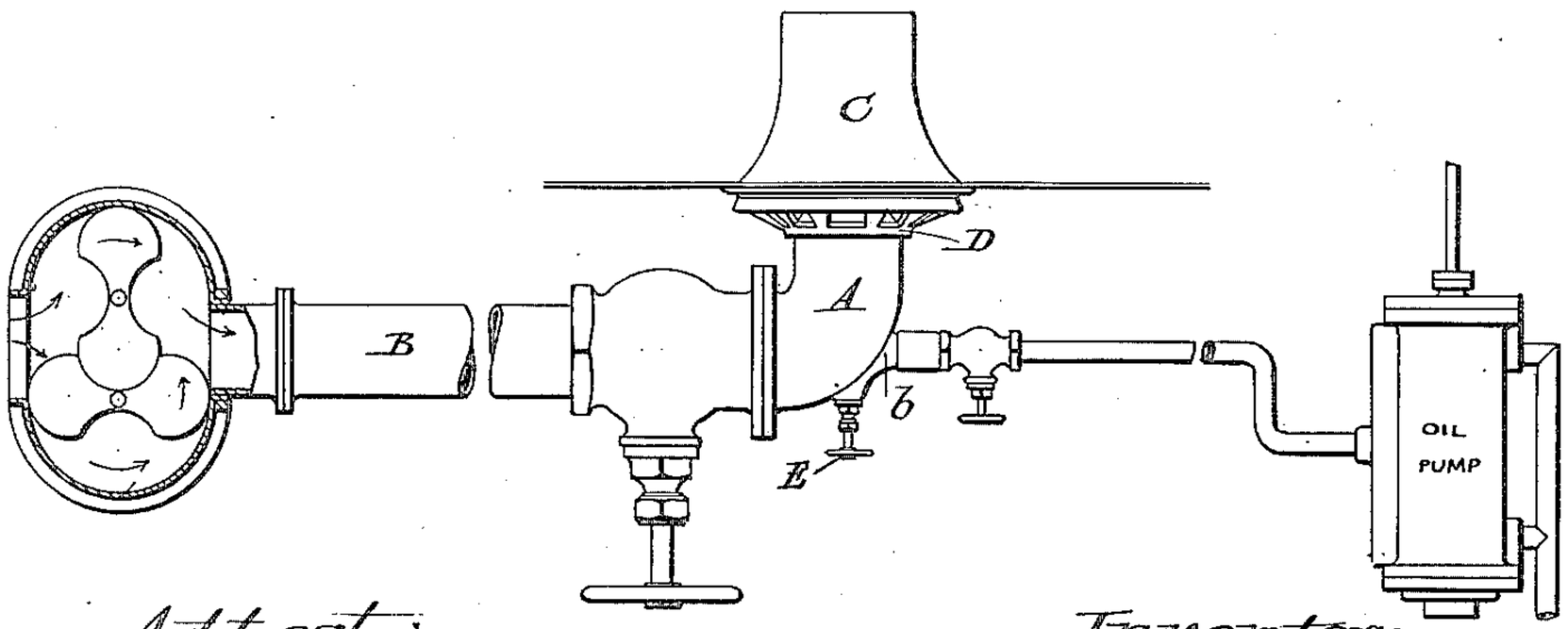


Fig. 3.



Attest:

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UNITED STATES PATENT OFFICE.

LOUIS SCHUTTE, OF PHILADELPHIA, PENNSYLVANIA.

OIL AND GAS BURNER.

SPECIFICATION forming part of Letters Patent No. 391,865, dated October 30, 1888.

Application filed November 5, 1887. Serial No. 254,402. (No model.)

To all whom it may concern:

Be it known that I, LOUIS SCHUTTE, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain Improvements in Oil and Gas Burners, of which the following is a specification.

My invention has reference, first, to a burner adapted for the use of liquid fuel—such as hydrocarbon oil—and, second, to a burner having in addition to the oil-burning devices supplemental parts, by which it is also adapted to burn gas when desired.

My invention relates to that class of burners by which the liquid fuel is atomized and combined with atmospheric air. The most important requirement in connection with such burners is that the liquid fuel shall be finely divided and intimately combined with the air in constant proportions. Many burners making use of steam and air jets to effect the mechanical separation of the fuel and its combination with air have been devised; but in practice it has been found that in order to secure a satisfactory action in other respects it was necessary to reduce their openings and passages to such minute proportions that it was impossible to maintain a proper adjustment and prevent stoppages and irregularities in action. Now the principal aims of my invention are to avoid the necessity for the small openings, to insure the perfect atomization of the fuel and its intimate admixture with the air, and to secure changes in the amount of fuel consumed, as occasion may require, without adjusting any of the parts of the burner. To this end I make use of a burner in which the stream of oil in its course to the point of delivery is first given a rotary motion and then delivered through a round unobstructed opening of large size in such manner that it issues in the form of a hollow cone and in the condition of a fine spray or mist. This expanding jet is projected centrally into a surrounding column of air and mingles therewith.

In the accompanying drawings, Figure 1 represents a longitudinal axial section through an oil-burner constructed on my plan. Fig. 2 is a similar section of the burner modified, to adapt it for the use of either oil or gas, as occasion may require. Fig. 3 is a diagram showing the connection of the air and oil pressure apparatus with the burner.

Referring to Fig. 1, A represents the body of the burner constructed in tubular form, with a large internal bore, *a*, for the passage of air therethrough, and with a lateral neck, A′, by which it may be connected to a pipe, B, leading to a fan, pump, or other suitable apparatus for supplying air under pressure. At its base the burner is provided with a lateral neck, *b*, for the admission of oil. This neck communicates through an intermediate chamber with a tubular spindle, *c*, which is screwed into the body of the burner, and which extends forward centrally through the air-passage to the forward end, where it is provided with a delivery-nozzle, *d*, screwed therein. This nozzle, which is provided with a central delivery-orifice, contains a fixed spindle, *e*, having on its exterior a series of spiral wings or blades adapted to impart to the outflowing oil a spiral or rotary motion around the line of its trajectory. The spindle is preferably formed upon a perforated plug, *d′*, screwed into the rear end of the nozzle, and terminating at its forward end within the nozzle somewhat in rear of the delivery-orifice, as shown in Fig. 1, this construction allowing an uninterrupted circular passage around the forward end of the spindle at the points where the oil issues from the nozzle.

In order to secure a proper atomization of the oil and to prevent the choking of the delivery-orifice, it is of importance that the outlet or delivery-orifice shall be of circular form and without obstruction of any kind therein; hence the importance of the fact that my spindle *e* terminates within the burner at a distance from the point at which the oil is released. The oil being compelled to act against the spiral blades receives a rapid rotation, and then issuing with this rotation as a solid unbroken stream at the center it is effectually scattered or atomized by the centrifugal force developed.

In order that the air-current may also receive the rotary motion in issuing through the passage *a* around the air-jet, I locate within the passage *a* spiral blades or ribs *g*, preferably formed on the outside of the spindle *c*, as shown in the drawings.

In order that the air-jet delivered through the nozzle *a* may induce the inward flow of an additional volume of air, I apply around the nozzle *a* a second and larger nozzle, C, extending forward beyond the other nozzles, as shown. This is so arranged as to leave an annular inlet between it and the exterior of the nozzle *a*.

In order to properly control the admission of the air through the nozzle C, I provide the same with a rotary ring, D, having a series of openings adapted to register with corresponding openings in the base of the nozzle C. This ring constitutes an ordinary valve or register of familiar form.

In operating the burner, oil is delivered under pressure through the neck *b*, spindle *c*, and nozzle *d*, the oil issuing from the latter in a forward direction in a finely-divided or atomized condition, the jet expanding in the direction of delivery in the form of a hollow cone, as represented in the drawings. Air is at the same delivered through the nozzle *a*, whence it issues in a tubular column around the outside of the oil jet, the jets impinging one upon the other, as indicated in the drawings, in such manner that a thorough and uniform admixture of the air and oil is effected. The outflowing currents of air and oil induce an additional current of air through the nozzle C, this supplemental supply of air commingling with the other as it issues from the nozzle C. Suitable valves will be provided for controlling the delivery of air through the nozzle *a*, and a valve, E, is provided for controlling the oil-delivery. It is to be understood that the external cone or nozzle, C, is not a necessary feature of the burner and that it may be omitted, if desired.

When the burner is to be adapted for use with gas or with a supplemental supply of air, I adopt the construction shown in Fig. 2. As here shown, the nozzle C is closed or joined at its base to the nozzle *a* and provided on one side with a throat or inlet, *k*, through which either gas or air may be admitted.

To provide for a wide range in the capacity of the apparatus, I propose to provide the oil-supply under suitable pressure and means of admitting the oil to the burner under more or less pressure, as demanded. For example, if the minimum pressure at which a proper atomization takes place is thirty pounds per square inch the volume of pressure at this point would represent the minimum capacity of the instrument. If now the pressure of the oil be increased, the capacity of the burner will be correspondingly increased. Any increase in the delivery of oil is to be accompanied by a corresponding increase in the volume of air delivered through the burner. This may be accomplished by a regulation of the air-supply or otherwise. Instead of forcing the oil or gas through the burner, good results may be attained in some cases by applying a suction to the distant end of the fire-box in which the burner is used.

If a sufficiently high pressure is used for the oil-spray and with properly-proportioned surrounding tubes, the oil-spray will form the actuating-jet of an air-injector, and by this means draw in and furnish its own air-supply for combustion. This is a particularly desirable feature in starting a fire when the natural draft may not be as high as after the fire is started, or in applying the burner to locomotives where the air-blast is at disposal when the locomotive is in motion.

I am aware that it has been proposed to deliver oil through a conical nozzle having shallow grooves on its internal surface, and that it has been proposed to provide the air-passages of oil-burners with inclined spiral ribs. I believe myself to be the first, however, to provide an oil-delivery nozzle from which the oil is projected in a free condition to the point of combustion with an unobstructed delivery-opening and ribs or passages by which the oil is first given a rotary motion and thereafter delivered in a solid stream through said opening.

What I claim is—

1. In an oil-burner, a final oil-delivery nozzle provided with a round unobstructed delivery-orifice, and with internal spiral blades terminating at a distance from the delivery-orifice, whereby the oil is first given a rotary motion and thereafter delivered in a solid jet through the orifice, to the end that it may be atomized by centrifugal force.

2. In an oil-burner, the combination of an air-delivery nozzle and a central and final oil-delivery nozzle, the latter provided with a round unobstructed oil-delivery orifice and with internal blades terminating in rear of said orifice, whereby the oil is delivered through the orifice as a rotating solid stream, atomized by centrifugal force, and delivered in its atomized condition centrally into the column of air flowing through the surrounding air-nozzle.

3. In an oil-burner, the combination of the central and final oil delivery nozzle having the round unobstructed delivery-orifice, and the internal spiral blades terminating in rear of said orifice, the air-delivery nozzle *a*, surrounding the first-named nozzle and terminating in rear of the oil-delivery, and an external nozzle, A, surrounding and extended slightly beyond the nozzle *a*, as shown.

In testimony whereof I hereunto set my hand, this 3d day of November, 1887, in the presence of two attesting witnesses.

LOUIS SCHUTTE.

Witnesses:
DANIEL HILDRETH,
FRANK SPILLIN.