No. 777,680. PATENTED DEC. 20, 1904.

V. F. LÄSSOE & L. D. LOVEKIN.

OIL BURNER.

APPLICATION FILED AUG. 22, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

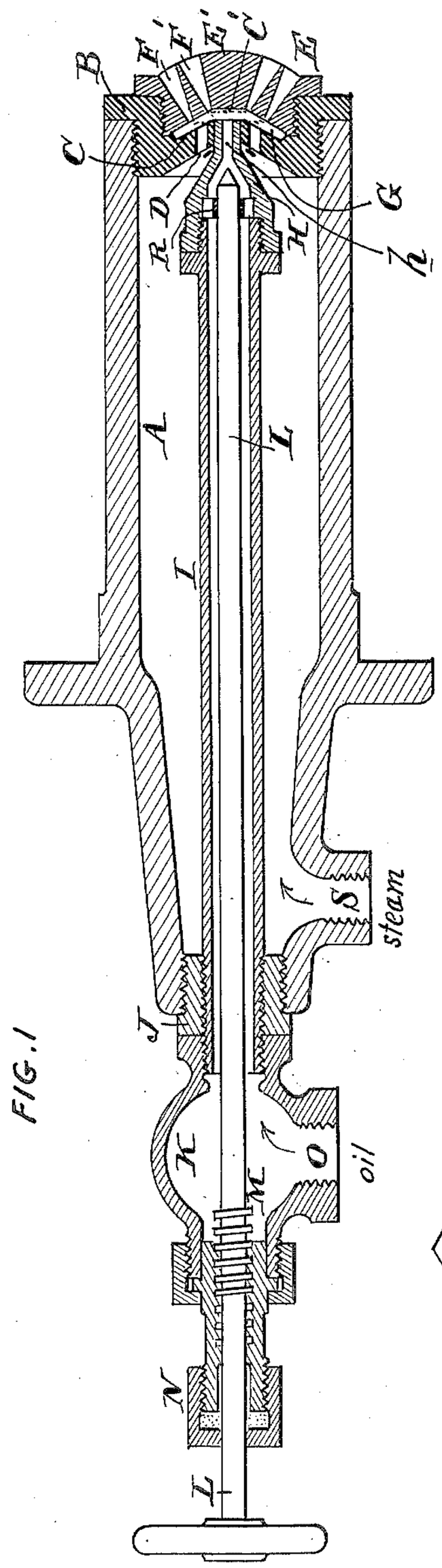

FIG. 1

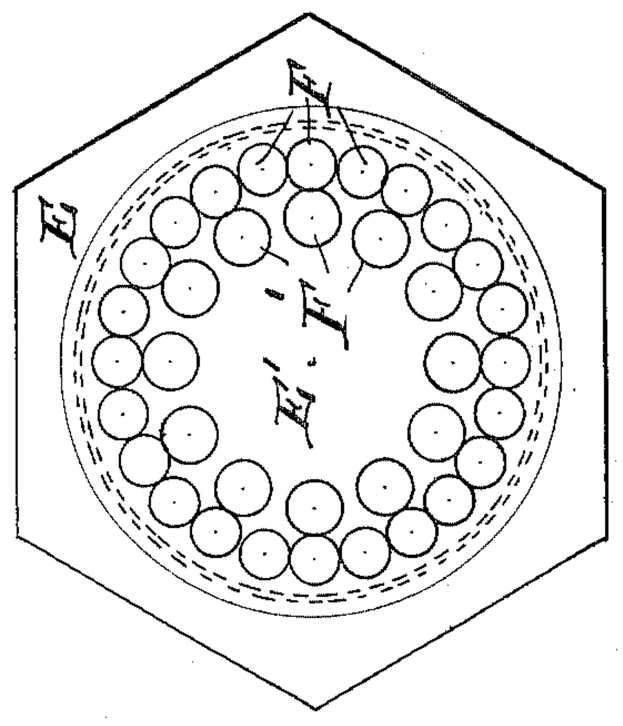

FIG. 3

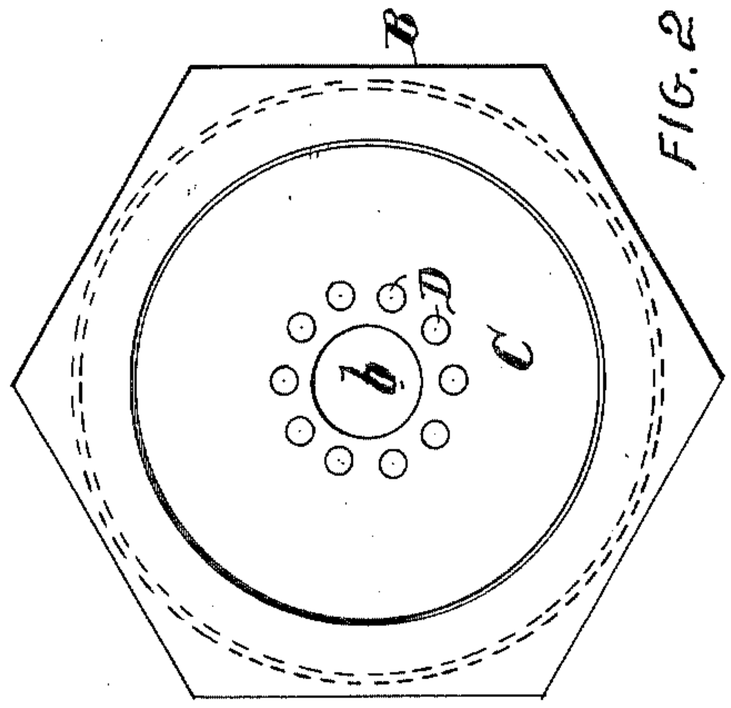

FIG. 2

Attest
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NO MODEL. 2 SHEETS—SHEET 2.

FIG. 4

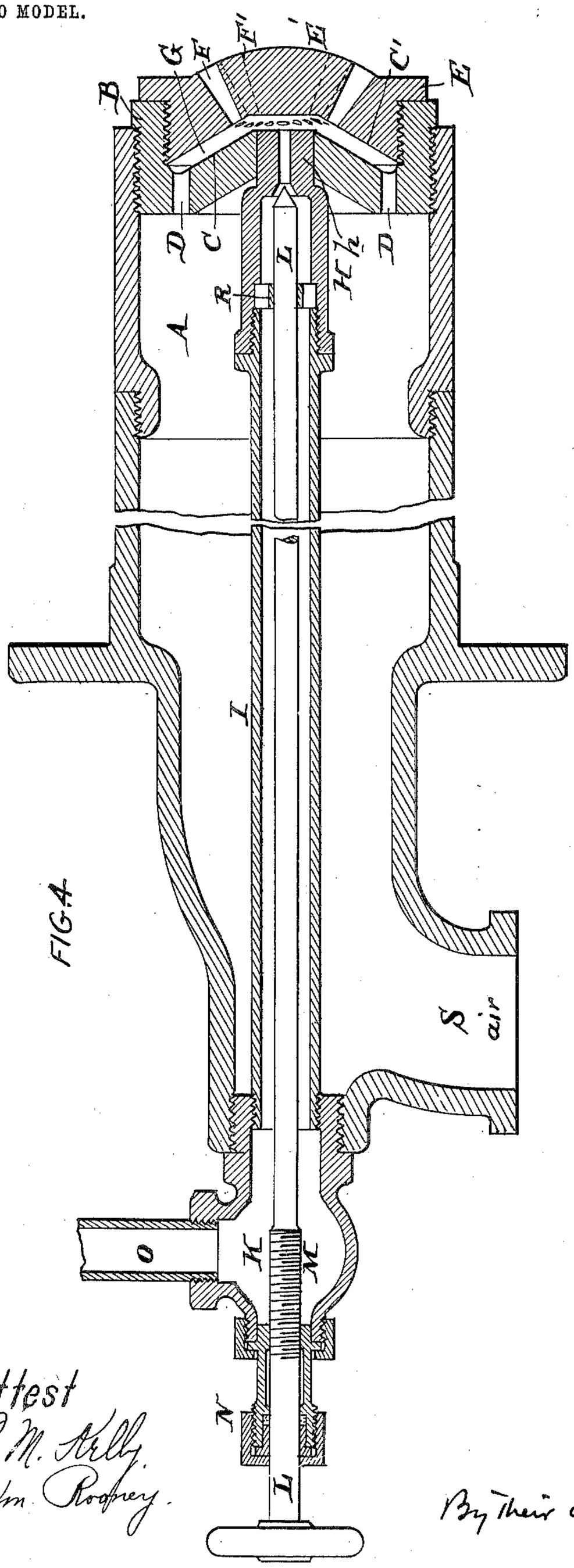


FIG. 6

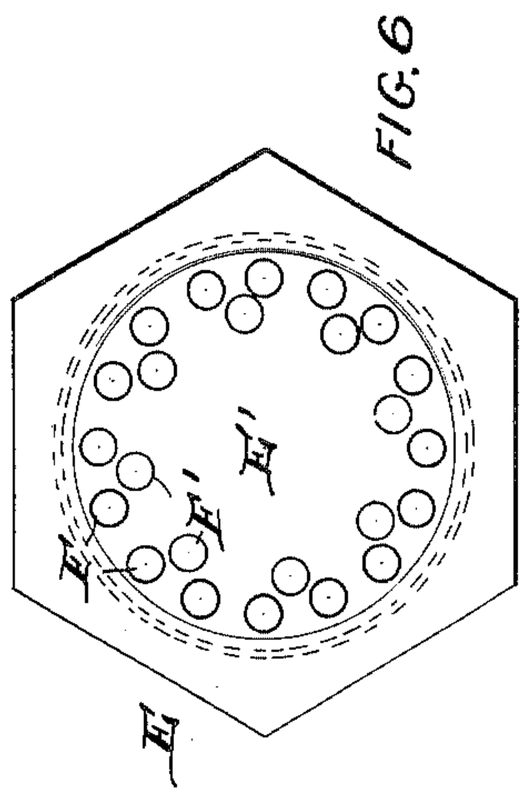
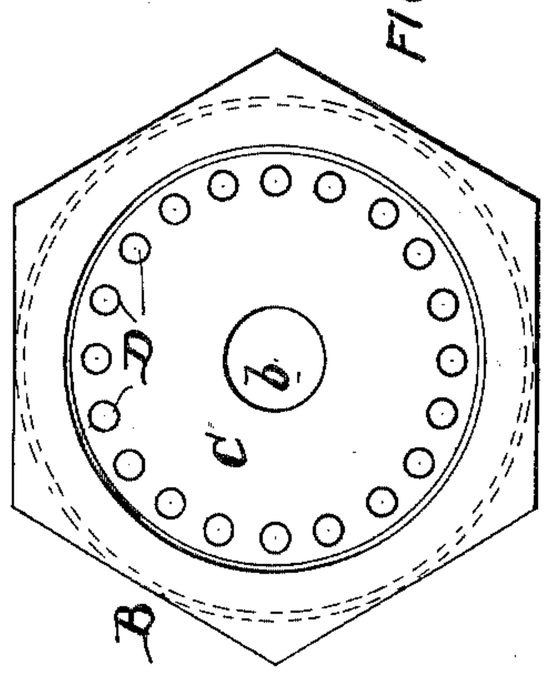


FIG. 5



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UNITED STATES PATENT OFFICE.

VALDEMAR F. LÄSSOE, OF NEW YORK, N. Y., AND LUTHER D. LOVEKIN, OF PHILADELPHIA, PENNSYLVANIA.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 777,680, dated December 20, 1904.

Application filed August 22, 1904. Serial No. 221,660.

To all whom it may concern:

Be it known that we, VALDEMAR F. LÄSSOE, of the city and county and State of New York, and LUTHER D. LOVEKIN, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Oil-Burners, of which the following is a specification.

The object of our invention is to provide a simple and durable construction of burner which has capacity for spraying the oil to be burned by forcing it through a nozzle in a thin sheet or film in a confined chamber and subdividing it by a series of transversely-acting currents of a spraying medium, such as air or steam under pressure, preferably in diagonal directions, which are forced through the chamber, so as to produce a spraying motion to the finely-divided oil and spraying medium beyond the end of the burner where the mixture is burned.

The burner herein described is especially adapted for use in the system of burning oil as fuel in our Letters Patent No. 744,373, dated November 17, 1903, a reference to which will show the manner of supplying the burner with oil and spraying medium under pressure and clearly illustrating the manner in which we have commercially applied our invention.

In carrying out our invention forming subject-matter of the present application we employ an air or steam tube having its rear end provided with an air or steam inlet and its forward end with spraying bushings or transverse plates, one of which has a central aperture for receiving the oil-nozzle and both of which have a series of surrounding spraying-apertures between which the oil is forced in a film and through which the air or steam is forced under pressure and so as to carry the oil with it, the end apertures being arranged on an incline, so as to impart a spreading motion to the air or steam and oil, and with said air or steam tube we combine a central oil-tube having its rear end furnished with a connection for oil and its forward end with a nozzle fitting the inner bushing, so as to discharge into the oil-chamber between the bushings, and a regulating and spraying rod adjustably secured in the oil-tube for regulating the character of oil film or spray delivered from the nozzle.

Our invention also comprehends details of construction which, together with the above features, will be better understood by reference to the drawings, in which—

Figure 1 is a longitudinal sectional elevation of an oil-burner embodying our improvements. Fig. 2 is an elevation of the inner bushing. Fig. 3 is an elevation of the outer bushing. Fig. 4 is a sectional elevation similar to Fig. 1 of our improved burner adapted to spray the oil by use of air. Fig. 5 is an elevation of the inner bushing of same, and Fig. 6 is an elevation of the outer bushing thereof.

A is the steam-tube of the burner, through which the steam is forced. The steam is supplied to the tube by an inlet S and is discharged at the forward end through apertures D in bushing B and apertures F F′ in bushing E, screwed into the end of the tube. The inner of these bushings, B, is extended on its front surface, preferably in a conical form, as at C, and the outer of the bushings is screwed into the inner bushing and has its rear face made with a conical depression C′. In this manner a conical space or chamber G is formed between the two bushings, into which oil is forced from the nozzle H. The outer bushing has its front surface outwardly rounded, as at E′, and through this the apertures F F′ extend, preferably on an incline away from the axis of the burner. The oblique axes of the two series of apertures F F′ form different angles with the axis of the burner, and said apertures are made conical and preferably with their outer edges substantially touching, so that the vapor from the adjacent apertures shall commingle as it leaves the burner to form a continuous body of flame. This contacting of the apertures is clearly shown in Fig. 3. The inner bushing B has its apertures D preferably arranged parallel to the axis of the burner and so as not to come into direct alinement with the apertures F F′, as shown. In this manner the film of oil which is spread by impinging upon the conical recessed surface of the bushing E is

struck by the jets of steam passing from the tube A through the apertures D and forced through the apertures F F′ in a finely-subdivided condition. As the sprayed oil leaves the burner it has a spreading motion, and this further aids in subdivision and proper admixture of the oil with air for complete combustion.

The oil-nozzle H fits into the cylindrical central aperture *b* of the bushing B and has its orifice immediately above the central portion of the conical surface of the bushing E. The nozzle makes a tight adjustable joint with the bushing B, but so as not to allow the oil to escape back into the tube A. The adjustability of the nozzle with the bushing allows for difference in expansion of pipe I and tube A. The nozzle is fitted on its interior with a star-frame R, which is clamped in position upon a shoulder by the oil-pipe I when screwed in place. The rear end of the oil-pipe is secured to an L-head K, into which the oil is fed under pressure by inlet O. Extending through the head K and the pipe A is a valve-rod L, the end of which is tapered to form a throttling-valve, with the nozzle N to regulate the extent of the orifice for the escape of oil. By adjusting the rod L the supply of the oil to the chamber G may be varied. The rod L is made adjustable by having its rear end screw-threaded, as at M, and working in the head K. The extreme rear end of the rod passes through a stuffing-box N on the head and is provided with a hand-wheel by which to rotate it for adjustment purposes.

When the oil is forced in the chamber G under about fifteen pounds pressure, it is spread and brought to a condition of a very thin film. This is rapidly dissipated into a fine spray by the action of the series of steam-jets from the apertures D and F F′, which not only produce the subdivision, but also give to the mixture of steam and oil a spreading motion, as aforesaid, which is important in that it produces a better subdivision, a most intimate admixture with the combustion-air supplied to the furnace from around the burner, and an intermingling of the flame-jets, which secures uniform distribution of the heat within the furnace.

In use the burner fits into the usual furnace or fire-box, the flange on the burner-tube acting as a support and means for securing it in place upon the projecting front of the furnace. The bushings are conveniently made, as shown, as they may be accurately made and easily replaced, if injured. We, however, do not restrict ourselves in using the term "bushings" to any special details, but only with the understanding that these parts fill up the front end of the burner, so as to form a transverse closure therefor, with the exception of the spraying-apertures formed in them.

In some cases we prefer to employ air under pressure as the spraying medium in place of steam, and in such cases the air is supplied through the aperture S, as indicated in Fig. 4.

The apertures D in Fig. 4 and Fig. 5 are arranged near the outer portion of the conical chamber G, so as to be directed inward toward the oil-nozzle and adapted to spray the oil through the conical apertures F F′ in the bushing E. The apertures F F′ in Figs. 4 and 6 are shown as somewhat differently disposed from the arrangement shown in Figs. 1 and 3, being less in number because of the greater oxidizing power of the air. In all cases where steam is the spraying medium we prefer to have the flaring ends of these apertures in contact, or substantially so, for the purpose of causing the oil-spray from each jet to at once commingle with the oil-spray of the other adjacent apertures to produce a greater subdivision and a more even distribution of the flames from all of the jets, thereby creating a continuous solid body of flame and making the aprtures self-cleansing.

It will be observed that the chamber G is conical and with the apex directed away from the oil-nozzle and that the outer surface E′ of the bushing E is convex outward, so as to provide a proper surface for the outer ends of the flaring radiating apertures F F′.

While we prefer the construction shown, the details may be modified without departing from the spirit of the invention.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In an oil-burner, the combination of a tube for supplying a spraying medium under pressure having its front end closed by a transverse structure having a shallow outwardly-pointing conical oil-chamber formed by front and rear walls arranged close together and provided with a circular series of apertures through each of the walls the outer of which are conical with the large ends directed outward whereby air may be forced from the air-tube through said apertures and oil-chamber, and means for spraying oil under pressure against one of the walls of the oil-chamber whereby it is mechanically subdivided and directed radially toward the apertures so as to meet and be taken up by the air passing through said apertures.

2. In an oil-burner, the combination of a tube for supplying a spraying medium under pressure having its front end closed by a transverse structure having a shallow outwardly-pointing conical oil-chamber formed by front and rear walls arranged close together and provided with a circular series of apertures through each of the walls the outer of which are conical with the large ends directed outward and the axes of these apertures arranged obliquely to the axis of the burner as shown

whereby air may be forced from the air-tube through said apertures and oil-chamber, and means for spraying oil under pressure against one of the walls of the oil-chamber whereby it is mechanically subdivided and directed radially toward the apertures so as to meet and be taken up by the air passing through said apertures.

3. In an oil-burner, the combination of the tube for supplying a spraying medium under pressure having its front end closed by a transverse structure having an oil-chamber formed with a conical internal depression with the apex directed toward the discharge end of the burner and a series of apertures extending through the front and rear walls of the chamber, an oil-nozzle opening into the chamber through the rear wall thereof and directed toward the deepest part of the conical depression, a valve-rod for controlling the oil passing through the nozzle into the chamber, and a pipe for supplying oil under pressure to the nozzle.

4. In an oil-burner, the combination of a tube for supplying a spraying medium under pressure having its front end closed by a transverse structure having an oil-chamber of small depth and a convex outer surface and provided with a series of apertures opening from the tube into the oil-chamber and a series of obliquely-arranged conical apertures opening from the oil-chamber to the convex surface with the larger ends directed outward, and means for supplying oil under pressure to the central portion of the oil-chamber.

5. In an oil-burner, the combination of a tube for supplying a spraying medium under pressure, a bushing structure fitted into the front end of the tube and consisting of a front and back portion forming a shallow conical oil-chamber between them with the apex directed away from the tube and having a series of apertures through the front and rear walls those in the front wall being conical with the large end outward, and an oil-nozzle for feeding oil under pressure into the chamber opening into the chamber centrally with respect to the series of apertures whereby the oil is spread in the chamber into a thin film and then atomized by jets of spraying medium forced through the apertures.

6. In an oil-burner, the combination of a tube for supplying a spraying medium under pressure having its front end closed by a transverse structure having an oil-chamber of small thickness and a convex outer surface and provided with a series of apertures opening from the tube into the oil-chamber and two concentric series of obliquely-arranged conical apertures opening from the oil-chamber to the convex surface with the larger ends directed outward and in which the obliquity of the apertures of the two series is different and their outer edges are in contact, and means for supplying oil under pressure to the central portion of the oil-chamber.

7. In an oil-burner, the combination of a tube for supplying a spraying medium under pressure having its front end closed by a transverse structure having an oil-chamber conical in form and of small thickness and a convex outer surface and provided with a series of apertures opening from the tube into the oil-chamber and a circular series of obliquely-arranged conical apertures opening from the oil-chamber to the convex surface with the larger ends directed outward and in which the outer edges of the conical apertures are in contact, and means for supplying oil under pressure to the central portion of the oil-chamber.

8. In an oil-burner, the combination of a tube for supplying a spraying medium under pressure having an atomizing-chamber at its front end provided with a series of apertures opening through the chamber from the inside of the tube to the outside of the atomizing-chamber and in which those apertures which open from the atomizing-chamber to the end of the burner are conical with the large ends directed outward and the adjacent apertures in contact, an oil-nozzle opening into the rear part of the atomizing-chamber and centrally disposed relative to the series of apertures, an oil-pipe for supplying oil under pressure to the nozzle, and an adjustable valve-rod extending to the atomizing-chamber for controlling the flow of oil through the nozzle.

9. In an oil-burner, a tube for supplying a spraying medium under pressure having its front end provided with an oil-chamber and spraying-apertures, combined with an oil-pipe extending through the tube and secured at its end most distant from the oil-chamber, a nozzle carried upon the end of the oil-pipe and having a cylindrical end forming a sliding joint with the rear wall of the oil-chamber whereby the tube and oil-pipe may have relatively different expansions, and a valve-rod for controlling the nozzle.

10. In an oil-burner, the combination of the tube A, a bushing B fitting the front end thereof and having a central opening *b* and a series of apertures D arranged about the central aperture, a second bushing E secured in the bushing B and having a rear inwardly-directed conical wall C′ and a series of apertures F the said bushings forming a shallow oil-chamber G between them with the conical end directed outward, an oil-nozzle H fitting the central opening *b* of the bushing B, and a valve-rod L for the nozzle.

In testimony of which invention we have hereunto set our hands.

VALDEMAR F. LÄSSOE.
LUTHER D. LOVEKIN.

Witnesses:
R. M. HUNTER,
R. M. KELLY.