No. 861,662. PATENTED JULY 30, 1907.

V. F. LÄSSOE & L. D. LOVEKIN.

OIL BURNER.

APPLICATION FILED AUG. 27, 1906.

3 SHEETS—SHEET 2.

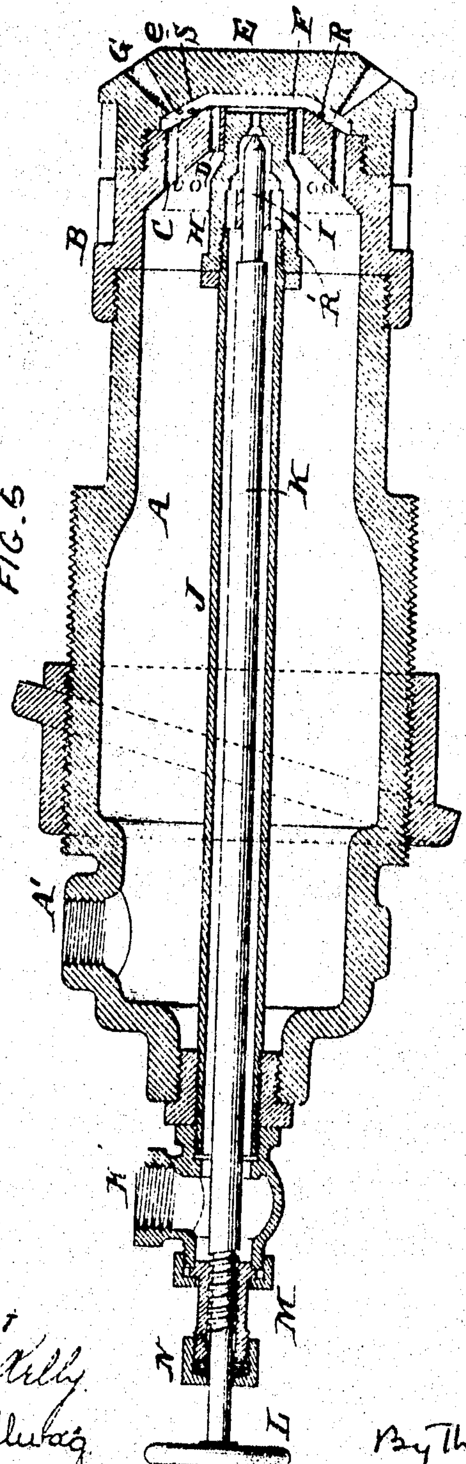

FIG. 5

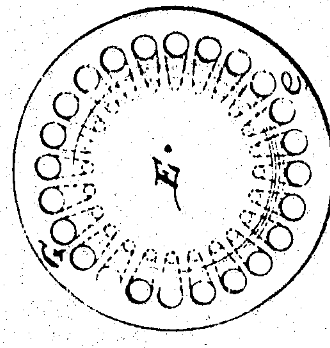

FIG. 6

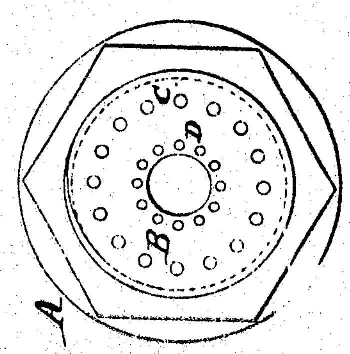

FIG. 7

Attest
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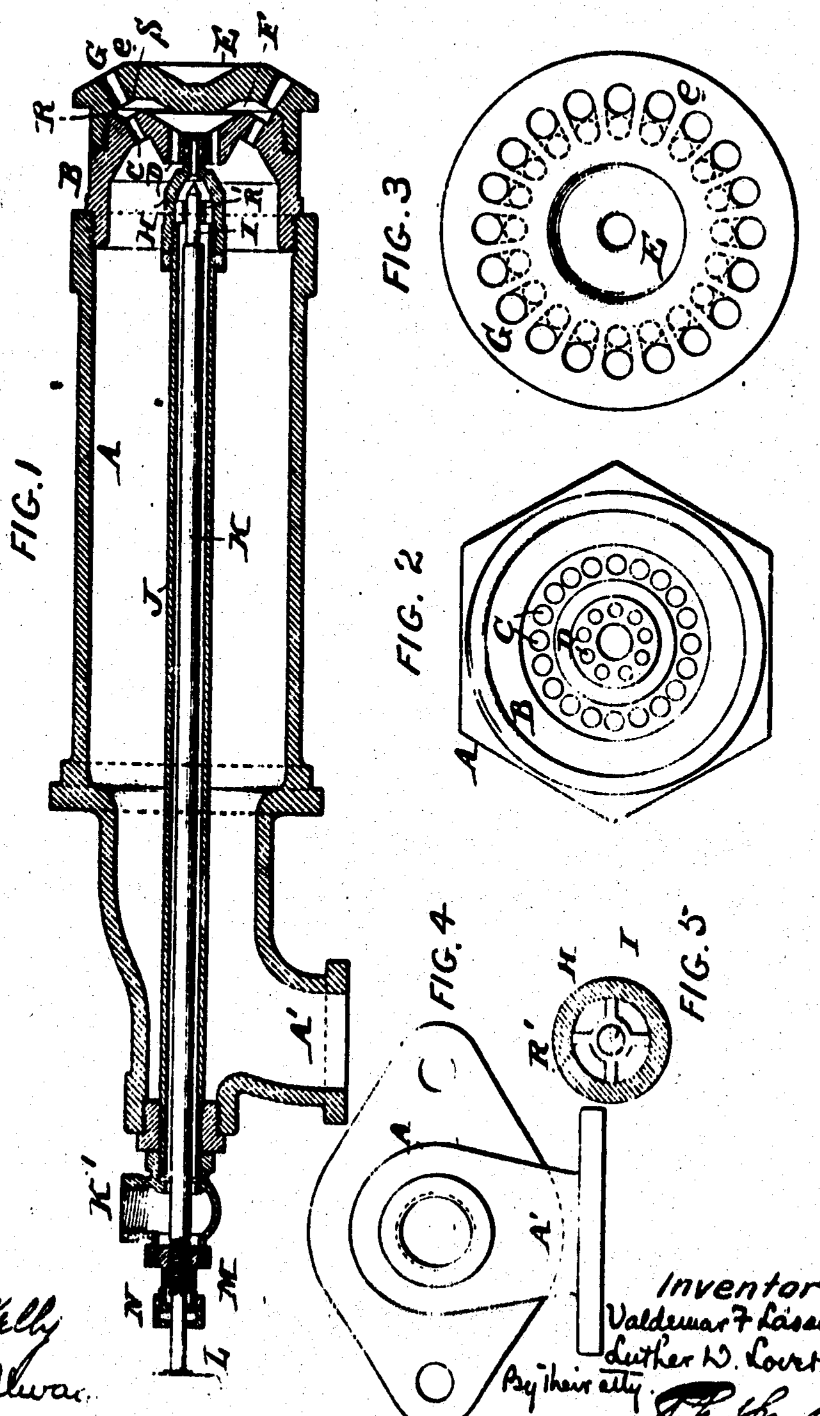
2 SHEETS—SHEET 1.



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3 SHEETS—SHEET 3.

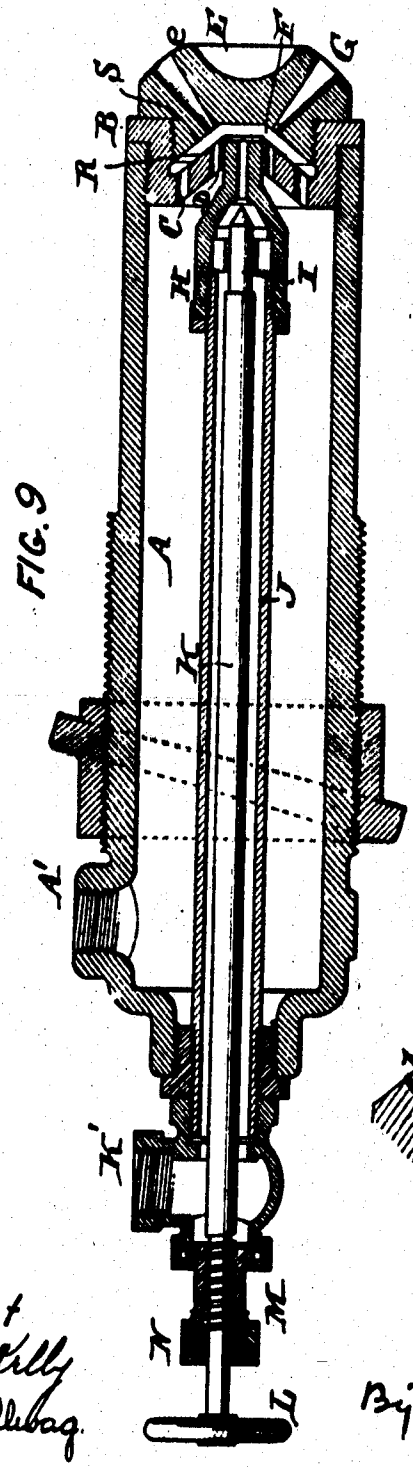

FIG. 9

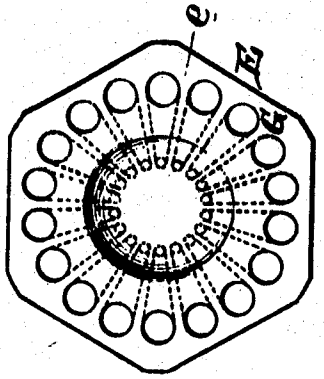

FIG. 11

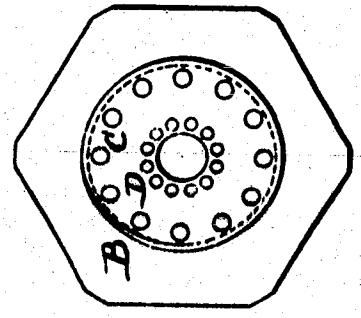

FIG. 10

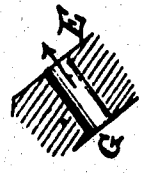

FIG. 12

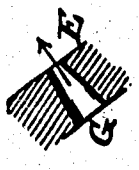

FIG. 13

Attest
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Inventors
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Luther D. Lovekin
By their atty

UNITED STATES PATENT OFFICE.

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

OIL-BURNER.

No. 861,662. Specification of Letters Patent. Patented July 30, 1907.

Application filed August 27, 1906. Serial No. 332,131.

To all whom it may concern:

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

Our invention has reference to oil burners and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

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 in a sprayed sheet or film in a confined chamber and subdividing it by a multiple series of transversely-acting currents of a spraying medium such as air or steam under pressure, which are forced through the chamber so as to produce a greater spraying action and intimate mixing of the finely-divided oil and spraying medium before its delivery from and beyond the end of the burner where the mixture is burned.

Our object is further, to provide, through the multiple series of transversely acting currents of spraying medium, means to keep the outer cap of the burner cool and thereby prevent the dissociation of carbon and its deposit in the outer apertures through which the oil and air or steam are sprayed whereby clogging and defective burning of the oil is prevented.

The burner herein described is adapted for use in the system of burning oil as fuel described in Letters Patent No. 744,373, dated November 17, 1903, granted to us, a reference to which will show the manner of supplying the burner with oil and spraying medium under pressure, and clearly illustrating the one of the ways in which we have commercially applied our invention. In said Letters Patent is described the burner for use with oil and air at low pressures, but when we apply our invention in locomotives or stationary steam plants, the steam is employed as the spraying medium and at pressures of 125 pounds down to 80 or less pounds as the conditions provide. In these cases the oil is also forced into the burner at corresponding or higher pressures.

In those cases where our burner is employed in metallurgical or heating or melting furnace operations, the spraying medium is air and the pressure of both the air and the oil may be as low as 20 pounds.

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-caps 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 apertures in the inner cap being arranged preferably in two concentric circles and those in the outer cap on an incline, so as to impart a spreading motion to the air or steam and oil, as the mixture leaves the burner, and with said air or steam tube we combine a central oil-tube having its rear end furnished with a connection for receiving oil under pressure and its forward end with a nozzle fitting the inner cap, so as to discharge into the oil chamber between the caps, and a regulating and spraying rod adjustably secured in the oil-tube for regulating the quantity 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 cap of the same; Fig. 3 is an elevation of the outer cap of the same; Fig. 4 is an end elevation of the body; Fig. 5 is a cross section of the oil nozzle; Fig. 6 is a longitudinal sectional elevation of another or modified form of our improved burner; Fig. 7 is an elevation of the inner cap of the same; Fig. 8 is an elevation of the outer cap of the same; Fig. 9 is a longitudinal sectional elevation of another modified form of our improved burner; Fig. 10 is an elevation of the inner cap of the same; Fig. 11 is an elevation of the outer cap of the same; and Figs. 12 and 13 are sections showing modified shapes of spraying apertures for the outer cap.

A is the steam or air-tube or body of the burner, through which the steam or air is forced. The steam or air is supplied to the tube by an inlet A^4 and is discharged at the forward end through apertures C and D in inner cap B and apertures G in outer cap E screwed into or upon the end of the tube. The inner of these caps B is extended on its front surface, preferably as a conical form as at R through which the apertures C pass; and the outer of the caps is screwed over the inner cap and has its rear face made with an annular conical depression S. In this manner an annular conical space or chamber F is formed between the two caps, into which oil is forced from the nozzle H. The outer cap has its front surface outwardly rounded as at e and through this the tapered apertures G, extend, preferably on an incline away from the axis of the burner. The apertures may be made conical with the large diameter outward and preferably with their outer

edges closely arranged so that the vapor from the adjacent apertures shall commingle as it leaves the burner to form a continuous expanding body of flame.

The apertures G are made with the greatest conical shape when the pressures under which the oil and spraying medium is sprayed are greatest; and in those cases where the spray-medium is air and supplied at low pressure, the said apertures may be cylindrical or even inverted with the small ends of the conical apertures directed outward. For instance, the burners of Figs. 6 and 9 are suitable for high pressures whereas the burner of Fig. 1 is adapted for much lower pressures. With very low pressures of air as the spraying medium, the apertures G may be as in Fig. 12 or inverted cones as in Fig. 13 with the most satisfactory results, for where the oil and spraying medium is of low pressure they should be kept from undue expansion during their passage through the apertures G in the outer cap.

The inner cap B has one set of its apertures C and D preferably arranged parallel to the axis of the burner and so that one series of them shall not come into direct alinement with the apertures G. The other series of the apertures is in line with the apertures G in the outer cap, as shown. In this manner the film of the oil, which is spread by impinging upon the conical recessed surface of the cap E is commingled with steam or air and also is struck by the jets of steam or air passing from the tube A through the apertures C or D, as the case may be, and forced through the apertures G in a finely subdivided condition.

In the case of the high pressure burners, the apertures G and those of the inner cap need not be in the same line, as is evident from the comparison of Figs. 10 and 11 and also Figs. 7 and 8; but where low pressure air is used, then the best results are obtained where one of the series of apertures of the inner cap are in accurate alinement with the apertures in the outer cap, as is evident from Figs. 1, 2 and 3.

As the sprayed oil leaves the burner it has a spreading motion, and this further aids in subdividing and proper admixing of the oil with steam or air for complete combustion.

In Figs. 1 and 6 we have shown the apertures G in the outer cap in alinement with the apertures C of the inner cap, whereas on Fig. 9, the apertures G are in only general alignment with the apertures D of the inner cap. In Figs. 1 and 6, the sprayed oil is first mixed with steam or air from the apertures D before receiving the further admixture of steam or air and the impact thereof from the apertures C. In Fig. 9 the admixture comes from the apertures C and the impact is caused by the steam or air from apertures D. In this case, both the apertures C and D are in the same conical face R of the inner cap, and hence the admixture is fully assured notwithstanding that the apertures are beyond the area of the apertures G in the outer cap.

In Fig. 1, we have shown the apertures C in the inner cap oblique so as to correspond to the obliquity of the apertures G in the outer cap but though this is advantageous for low pressures, it is not essential.

The spraying medium, be it steam or air, is supplied through these apertures C and D of the inner cap so as to furnish an excess over that directly required in spraying, and more particularly for the immediate purpose of keeping the inner wall of the outer cap cool whereby it shall not cause carbon deposit by dissociation in the apertures G which would otherwise clog the burner.

The oil-nozzle H fits into the cylindrical central aperture of the inner cap B and has its orifice immediately above the central portion of the outer cap E. The nozzle makes a reasonably tight adjustable joint with the cap B, and this adjustability of the nozzle with the cap allows for difference in the expansion of pipe J 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 J when screwed in place. The rear end of the oil-pipe is secured to an angle head K′, into which the oil is fed under pressure. Extending through the head K′ and the pipe J is a valve-rod K, the end of which is tapered to form a throttling valve with the nozzle H, to regulate the extent of the orifice for the escape of oil. By adjusting the rod K, the supply of the oil to the chamber F may be varied. The rod K is made adjustable by having its rear end screw-threaded, and working in the head M. The extreme rear end of the rod passes through a stuffing-box N on the head and is provided with a hand wheel or lever L by which to rotate it for adjustment purposes.

When the oil is forced in the chamber, F under pressure, it is spread and brought to a condition of a film. This is rapidly dissipated into a fine spray by the action of steam or air from the series of steam or air apertures C and D, which not only produce the subdivision, but also give to the mixture of steam and oil in passing through apertures G 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. At the same time, the surplus of air or steam fed through the apertures C and D and made to impinge upon the inner wall of the outer cap, insures its being kept reasonably cool, with the result that the burner does not clog and requires practically no cleaning; in fact, it becomes self cleaning.

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.

It is evident that, if desired, the apertures D may be formed in the inner cap very close to or in juxtaposition with the nozzle H. It is also to be understood that, while the conical form of the annular space F shown is preferable, it may be modified if so desired.

The inner and outer caps 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 "caps" 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 while in others we prefer to employ steam as the medium. The reason of this is, that where air is available, it is more preferable and should be used at low pressures, but where steam is employed directly from a locomotive

or other boiler there, being fed at a high pressure the oil should also be supplied at a high pressure.

It will be observed that the chamber F has its walls, through which the apertures C, D, and G pass, made conical with the apex directed toward the end of the burner, and the outer surface e of the outer cap E is made inclined or conical, so that the conical apertures G extend between substantially parallel surfaces, and because of this the vapors leave the apertures uniformly.

While we prefer the construction of the details shown, as being simple and inexpensive, said details may be modified to suit the designer or engineer employing the burner 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 provided with a shallow oil chamber formed by front and rear walls arranged close together the inner wall being provided with two concentrically arranged series of apertures opening into the tube for supplying the spraying medium and the outer wall being provided with a circular series of apertures directed outward and the axes of these latter apertures arranged obliquely to the axis of the burner and substantially over one set of the apertures in the inner wall whereby the spraying medium may be forced from the said tube through said apertures and oil chamber, and means for spraying oil under pressure against the outer wall of the oil-chamber whereby it is mechanically subdivided and directed centrally toward the apertures so as to meet and mix with and be taken up by the spraying medium passing through said apertures.

2. 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 provided with a conical oil chamber the outer walls of said chamber being provided with a series of apertures extending through it in a circle and arranged obliquely to the axis of the burner and the inner wall provided with two concentric series of apertures opening into the tube for supplying the spraying medium, an oil-nozzle opening into the chamber through the rear wall thereof and directed toward the front wall thereof, a valve and for controlling the oil passing through the nozzle into the chamber, and a pipe for supplying oil under pressure to the nozzle.

3. In an oil burner, the combination of a tube for supplying spraying medium, an inner cap having two series of apertures concentrically arranged, an oil nozzle opening through the central part of the inner cap, a valve to control the oil flowing through the nozzle, and an outer cap fitting over the inner cap to form a shallow mixing chamber and provided with a circle of apertures from which the combustible vapors and gas pass.

4. In an oil burner the combination of a tube for supplying spraying medium, an inner cap having two circular series of apertures concentrically arranged, an oil nozzle opening through the central part of the inner cap, a valve to control the oil flowing through the nozzle, and an outer cap fitting over the inner cap to form a shallow mixing chamber and provided with a circle of apertures from which the combustible vapors and gas pass.

5. In an oil burner, the combination of the tube A, combined with the inner cap B having two circular series of apertures C and D and a central hole for the oil nozzle, an oil nozzle opening through the hole in the inner cap, and an outer cap E having obliquely arranged tapered apertures G, the two caps being so connected that they form a shallow annular conical chamber F between them into which the several series of apertures open.

6. In an oil burner, the combination of a tube for supplying spraying medium, a shallow chamber arranged transversely across one end of the tube and having a series of apertures opening from opposite sides and arranged in circular form for permitting the spraying medium to pass entirely through the chamber and a second series of apertures out of alinement with the apertures of the first series for supplying the spraying medium to the chamber so as to strike its front walls to maintain it in a comparatively cool condition and prevent carbon deposition, and an oil nozzle opening into the chamber for delivering oil under pressure to the spraying medium and arranged at different distances from the two series of apertures.

7. In an oil burner, the combination of a tube for supplying spraying medium, a shallow chamber arranged transversely across one end of the tube, and having a series of oblique apertures opening from opposite sides and arranged in an annular form for permitting the spraying medium to pass entirely through the chamber and a second annular series of apertures and out of alinement with the first series for supplying the spraying medium to the chamber so as to strike its front walls to maintain it in a comparatively cool condition and prevent carbon deposition, and an oil nozzle opening into the chamber centrally with respect to the two annular series of apertures for delivering oil under pressure to the spraying medium.

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

VALDEMAR F. LÆRKE.
LUTHER D. LOVEKIN.

Witnesses as to V. F. Lærke:
W. A. Salkmann,
Oscar A. Kendiaw.

Witnesses as to L. D. Lovekin:
C. H. Clowe,
Philip Pinyon.