

A. H. EDDY.
APPARATUS FOR BURNING OIL.

No. 540,651.

Patented June 11, 1895.

Fig. 1.

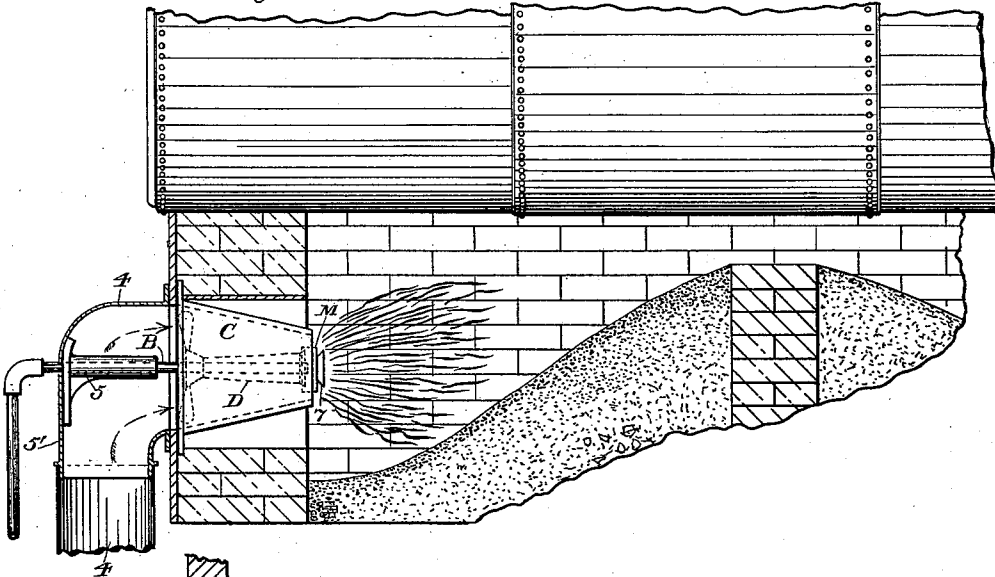
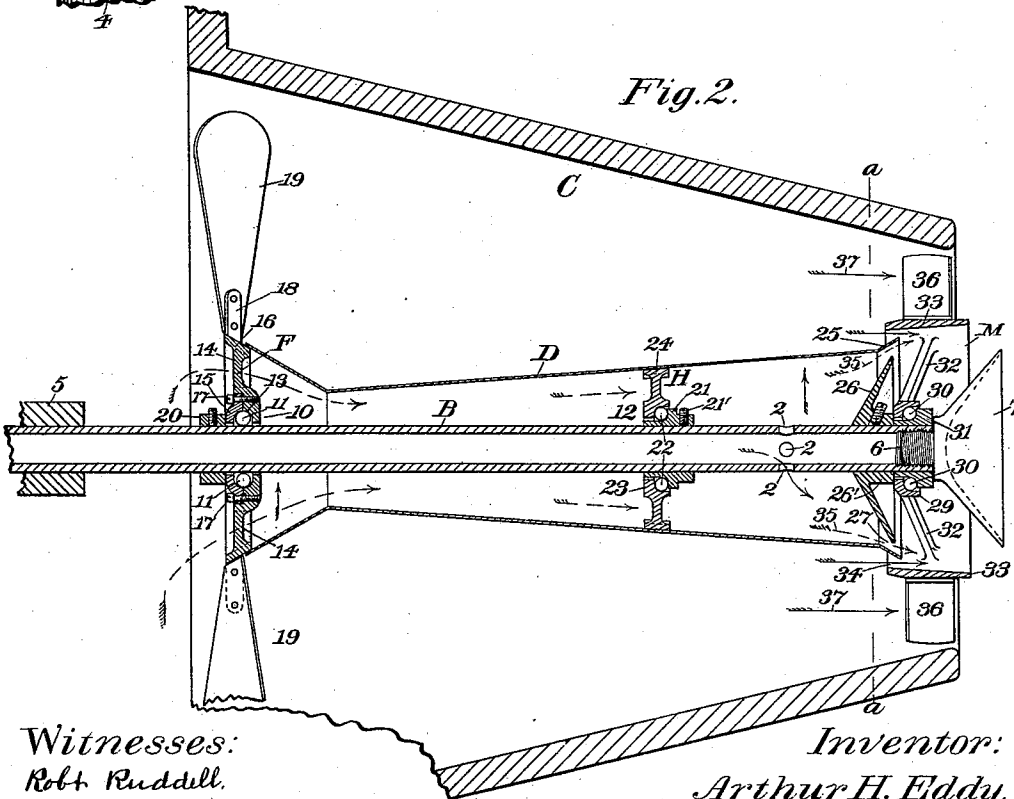


Fig. 2.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

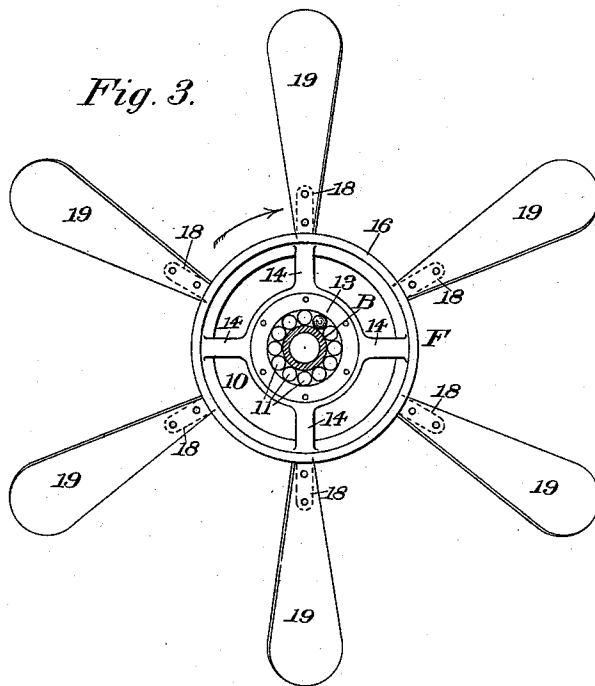


Fig. 4.

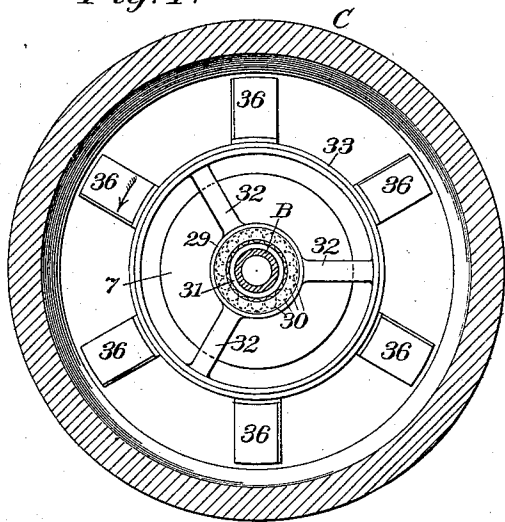
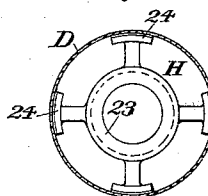


Fig. 5.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR BURNING OIL.

SPECIFICATION forming part of Letters Patent No. 540,651, dated June 11, 1895.

Application filed May 17, 1894. Serial No. 511,582. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR H. EDDY, a citizen of the United States, residing at Windsor, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Apparatus for Burning Oils, of which the following is a specification.

This invention relates to apparatus for burning oil; the object of my present invention being to furnish an improved apparatus whereby fuel-oil in a crude, refined or partially refined state may be effectively reduced by a centrifugal action to a highly atomized condition and mixed with relatively larger quantities of air preparatory to ignition, to thereby secure complete aeration and meet the requirements of perfect combustion.

In the drawings accompanying and forming a part of this specification, Figure 1 is a sectional side elevation of a portion of a boiler-furnace, showing an oil-burner embodying my invention applied thereto. Fig. 2 is a central longitudinal section of the burner on an enlarged scale. Fig. 3 is a detail in side elevation of one of the spreaders, the spreader-shaft being shown in cross-section. Fig. 4 is a cross-sectional view of the burner, taken in line *a a*, Fig. 2, looking toward the right hand in said figure. Fig. 5 is a detail of the central bearing for the spreader-tube.

Similar characters designate like parts in all of the figures.

In the preferred form thereof herein shown, the apparatus for reducing my invention to practice, comprises a main air-supply chamber or casing, an intermediate revoluble aerating or mixing-chamber located within the main air-supply chamber, an oil-supply in communication with the aerating chamber, one or more spreaders adjacent to said aerating chamber in position and adapted for disseminating the inflowing oil, and means for rotating said spreaders, as will be hereinafter more fully described.

The outer casing or air tube of the burner, designated by C, is preferably in the nature of a hollow cone as shown in the drawings. This casing is connected with the air-supply pipe 4, through which the air-blast is conducted from some suitable blower. (Not shown.)

The oil-spreader or atomizing and aerating

devices are shown supported upon a central pipe, B, which is, or may be, held in place or carried by means of a bracket, 5, fixed in any suitable manner to any convenient portion of one of the walls as 5' of the apparatus. Oil is supplied through this pipe by some suitable means, usually a pump (not shown), or, in some cases it may be allowed to simply run into the pipe from some properly elevated oil reservoir. The forward end of said pipe is shown closed by plug, 6, which in some cases may have thereon the guard-cone 7 for insuring the spreading of the oil away from the axial line of the pipe when the oil, mingled with air as herein described, enters the furnace-chamber.

On the pipe B is supported the principal spreading apparatus, which consists of the spreader tube D, means for supporting the tube about centrally of the pipe, and means for revolving the tube around the pipe. This tube, which also constitutes the intermediate air-chamber, is supported by some suitable bearings at 10 and 12, respectively, said bearings being preferably roller-bearings. The bearing at the left hand for supporting the rearward or outward end of the spreader tube D is shown having balls 11 running on the pipe B and held in place between the inner rim 13 of the spreader F and the cap 15 which is fixed to the spreader by screws 17. The spreader F shown in side elevation in Fig. 3 has a series of arms 14 connecting its inner end 13 with the outer rim 16, to which outer rim the end of said tube D is shown firmly fixed.

As a means for rotating the spreader F and spreader-tube D the spreader is shown provided with the arms 18 to which are fastened the propeller blades 19 so disposed that the air-blast which is forced through the casing C in the rear of the propeller blades at the enlarged end of the casing, as denoted by arrows in Fig. 2, revolves the spreader F and spreader-tube carried thereby rapidly, in one direction. A collar, 20, is shown fixed on the pipe B for preventing any backward movement of the spreader during operation. The other bearing 12 for the spreader-tube D is shown provided with a central cone, 21, adjustably-fixed to the central pipe B by means

of a set-screw, 21'. This so-called cone constitutes the inner track for the balls 22 which support the inner end 23 of another spreader or perforated disk H whose outer end, 24, is fixed in the spreader-tube D. At its forward end, at the right hand of Fig. 2, the spreader-tube D is shown provided with a flaring terminal flange, 25 and secured to the pipe B, adjacent to the end of the spreader-tube is a conical guard-disk, 26, whose periphery is sufficiently remote from the flange 25 of the spreader-tube as to leave a narrow space, 27, through which the partially atomized oil may be ejected from the tube D during the rotation thereof so as to be commingled with the inflowing air which surrounds said spreader-tube, as will be readily understood by reference to Fig. 2 of the drawings.

Oil is admitted to the spreader-tube D through transverse perforations 2, in the central pipe B, which perforations will preferably be located near the discharge-end of the tube D; the oil passing out through the outlets 2 in the central pipe B against the inner side of the spreader-tube, will, owing to the rotation of said tube, be spread into a thin layer or stream which flows along toward the discharge-end of said spreader-tube and mingling with the air-supply is thrown off in a thin sheet of vapor or spray at the edge of the terminal flange 25.

The major portion of the air-blast passes through the casing C outside the spreader-tube D, a portion of it however passing through the interior of the tube D so as to mingle with the oil when this passes through the space 27 and thereby assist in atomizing the same, causing a partially attenuated or aerated vapor to be thrown into contact with the influx of air surrounding the tube D.

The pressure of the air-blast against the propeller blades 19 tends to drive forward the spreader F and spreader-tube D, this forward thrust being taken up by the balls 22 against the cone 21, so that no provision against endwise movement is required in connection with the intermediate bearing or spreader H.

On the forward inner end of the central pipe B is a secondary or supplemental spreader-device which also operates as an aerating apparatus for further combining the oil-spray and air previous to its entrance in the furnace-chamber. This apparatus in the form thereof herein shown, consists of a spreader-wheel, designated in a general way by M, which is shown supported by its inner rim, 29, on balls, 30, which are shown supported on a cone, 31, fixed in any suitable manner on the pipe B. The arms 32 of the wheel M carry a rim, 33, which should be slightly conical in form, and whose rearward edge overlaps, by a short distance, the forward edge of the spreader-tube D, so that during the rotation of the spreader-tube D the vapor and liquid particles of oil ejected therefrom will be thrown against the outer rim of the wheel M. The rim 33 is

somewhat larger than the end of the tube D so as to provide a space 34 through which a considerable amount of air may pass from the outside of the tube D for mingling with the partially aerated vapor being ejected from said tube, which vapor being received within the rapidly-revolving and slightly conical spreader rim 33, is carried forward within said rim and thereby throwing into the furnace-chamber within and across the outer current of air, the vapor and air-currents being represented by the arrows 35 and 37, respectively.

The spreader-wheel M is revolved by means of wings or propeller-blades, 36, formed thereon, which blades are preferably set inclined oppositely to the blades 19 of the principal spreader apparatus, so that while the spreader-tube D revolves in one direction, the spreader-wheel M revolves in the opposite direction, thereby subjecting the oil to the most thorough mixture in its atomized condition with the air-blast. This aeration or mixture, being especially marked between the outer portions of the central air-blast and inner portions of the outer air-blast, is extremely effective and secures the best practical requirements for perfect combustion, so that when the combined air and oil-vapor is ignited it burns completely and uniformly.

In practice, only one roller-bearing for the wheel M is required since the pressure of the air-blast against the propeller-blades 36 holds the wheel M forward against the balls 30 and the cone 31 and actuates the same in a balanced condition. The hub 26' of the guard-disk 26 may form a collar, as herein shown, for preventing the backward movement of the wheel M away from the cone 31.

My improved apparatus comprises, briefly stated, in combination with an inclosing tube or casing, means for generating a rapidly-rotating current of air, means for rapidly and oppositely rotating a current of air within the first-mentioned current, and means for subjecting a stream of oil to the action of these concentric, oppositely-rotating currents. To accomplish this end the oil is introduced through the central pipe B into the spreader tube D in which is contained the central body of air, it being distributed around the walls of said tube D by the revolution thereof outside the central column of air, and vaporized thereby and by the rotation of said air-column, after which the resultant vapor is carried beyond the discharge end of the tube, and within and across the other column of air, which results in a highly aerated product, as will be readily understood by reference to Figs. 1 and 2 of the drawings.

Having thus described my invention, I claim—

1. In an oil-burner, the combination with an inclosing tube or casing, of means carried therein for generating a rapidly-rotating current of air, means for rapidly and oppositely

rotating a current of air within said first-mentioned current, and means for subjecting a stream of oil to the action of said air-currents, substantially as described and for the purpose set forth.

2. In an oil-burner of the class specified, two tubes located one within the other and one of which constitutes a casing and the other of which constitutes an oil-spreader, means for supplying oil to the interior of the spreader-tube, and means for rotating the spreader-tube and for forcing a supply of air through the interior of said tube, and for forcing a rotating current of air through the casing and around said spreader-tube simultaneously substantially as described and for the purpose set forth.

3. In an oil-burner, an inner and an outer air-tube concentric to each other, means for supplying air to the outer tube, means for supplying oil to the interior of the inner tube, and means for rotating said inner tube and for forcing a supply of air through the interior of said tube, and for forcing a rotating current of air through the outer tube and around said inner tube simultaneously substantially as described and for the purpose set forth.

4. In an oil-burner, an outer air-tube or casing and means for supplying air thereto, in combination with a perforated oil-supply pipe extending through said casing and carrying a spreading tube concentric with relation to the outer tube, and means for rotating said inner tube and forcing a supply of air through the interior of said tube, and for forcing a rotating current of air through the casing and around said inner tube simultaneously substantially as described and for the purpose set forth.

5. In an oil-burner, the combination with the outer tube or casing, of an air-blast pipe in connection with said tube, an oil-supply pipe supported within said tube and perforated at one end, a revoluble spreader-tube supported upon said pipe, means for supplying oil to the oil-pipe, and means for rotating the spreader-tube and for forcing a supply of air through the interior of said tube, and for forcing a rotating current of air through the

casing and around said spreader-tube simultaneously substantially as described and for the purpose set forth.

6. In an oil-burner, two concentric air-supply tubes of different diameters located one within the other, means connected with and adapted for rotating one of said tubes and for forcing a current of air to rotate within and longitudinally through the interiors of both of said tubes, and means for supplying oil to the interior of one of said tubes, substantially as described and for the purpose set forth.

7. In an oil-burner, the combination with an outer tube or casing, and with means for supplying air thereto, of two independent and concentrically-disposed spreaders mounted one within the other and adapted to be rotated in opposite directions by the force of the air-supply and one of said spreaders constituting an inner tube or casing, and means for supplying oil to said inner tube or spreader, substantially as described.

8. In an oil-burner, the combination with an outer tube or casing and with means for supplying air thereto; of a spreading apparatus, consisting of a spreader-tube supported for rotation within said casing, means adjacent to the rear end of the spreader-tube and adapted for forcing a supply of air through the interior of said spreader-tube, and one or more spreaders in the path of said air-supply; and means for supplying oil to the interior of said spreader-tube in advance of said last-mentioned spreaders, substantially as described.

9. In an oil-burner, the combination with a casing and means for supplying air thereto, of a concentric spreader-tube supported for rotation upon a perforated oil-supply pipe, means for rotating said spreader-tube, a spreader-wheel supported upon the oil-pipe adjacent to and overlapping the outer edge of the spreader-tube, and means for rotating said spreader-wheel oppositely to the direction of rotation of said spreader-tube, substantially as described.

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