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ROTARY OIL BURNER

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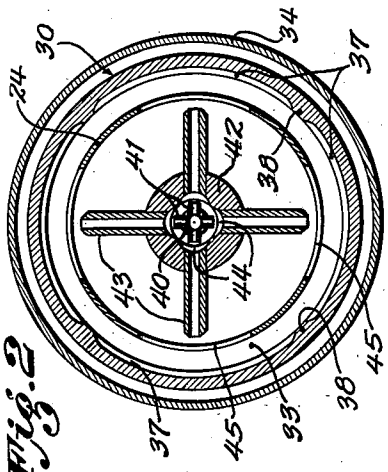


Fig. 2

Fig. 1

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ROTARY OIL BURNER

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25 Claims. (Cl. 158—53)

1

This invention relates to improvements in oil-burners of the rotary-furnace type disclosed in my copending applications Ser. No. 679,285 filed June 25, 1946, and Ser. No. 787,648 filed November 24, 1947; the latter application having issued on September 25, 1951 as Patent No. 2,568,763. The oil-burners of said copending applications are characterized by a bowl-like structure in whose interior the combustion is produced; and structure being rotated at high speed so that the flame therein, and that protruding from its mouth, are also rotated, whereby substantially complete combustion of the oil is effected within the bowl-like structure.

One object of the present invention is to provide means whereby the combustion can be initiated in a rotary oil-burner of the character described, either manually or automatically, from a point outside of the burner and remote from the path of flame issuing from the burner when it is in normal operation.

Rotary oil-burners of the character described are preferably provided with a cup-like structure, arranged concentrically within the bowl and carried thereby, for receiving the fuel-oil and projecting it by centrifugal force from the rim of the cup toward the side wall of the bowl to produce the combustible mixture. I have found that slight eccentricity of the side wall of the cup, or of the means for supplying the oil thereto, may cause the oil to be projected from the rim of the cup mainly from one side of the same so that a proper combustible mixture is not produced. It is therefore another object of this invention to provide means whereby substantially uniform projection of oil from the cup is effected in spite of such eccentricity of the parts as may result in normal manufacture.

Another object of the invention is to provide improved means for supplying air to the interior of the bowl, in addition to air supplied along with the oil by way of the mouth of the oil-projecting cup, for improving combustion within the bowl.

Another object is to provide an improved system for forcing air to the burner; this object being accomplished by the provision of a blower which is capable of supplying air in excess of that required by the burner, and adjustable means for by-passing or venting the excess air to the atmosphere; the arrangement being such that all of the air drawn into the blower passes in cooling relation to the motor employed for rotating the burner structure and the blower.

For full understanding of the invention, and

2

further appreciation of its objects and advantages, reference is to be had to the following detailed description and accompanying drawing, and to the appended claims.

In the drawing:

Figure 1 is a sectional view of an oil-burner system embodying this invention; and

Figure 2 is an enlarged sectional view taken along the line 2—2 of Fig. 1.

In the drawing, the numeral 11 generally indicates a hollow bowl-like structure, circular in cross-section and of thin heat-resistant metal, which defines internally a combustion chamber 100.

A major portion of the structure 11 is double-walled, with an air space between the walls, and consists of an inner bowl 12 having around its outside a larger bowl 13 whose rim portion is inwardly turned and secured to the inner bowl as by welding. At the top of the structure 11, and secured thereto, is a funnel-shaped section 14 which constitutes a constriction of the inner side-wall 15 of the structure.

For supporting and rotating the structure 11, a circular frame is secured, as by welding, to the bottom wall of the outer bowl 13, with a stiffening disk 16 therebetween; the frame consisting of a pair of flanged plates 17 which are connected together in spaced relation by a plurality of riveted pins 18. The bottom plate of the frame is connected by a threaded fitting 19 to the shaft 20 of an electric motor 21; the male part of the fitting being pressed on the motor shaft.

Also secured to the motor shaft by the fitting 19 is an air-impeller or blower 22, and a flanged disk 23. Resting on the disk 23, and confined at its bottom end by the flange of the disk, is a thin-walled hollow cylinder 24 whose upper portion extends through central openings in the bottom walls of the bowls 12 and 13 and terminates adjacent the plane of the funnel section 14. Rotation of the cylinder 24 relative to its supporting disk 23 is prevented by a pin 25 secured to the disk and cooperating with a notch in the cylinder. The portion of cylinder 24 between the frame-plates 17 is apertured (for a purpose to be described) so that only narrow sections 26 of that portion of the cylinder remain. The top of cylinder 24 is closed by a disk 27 welded therein; and secured to this disk at its center is a button 28 for gripping when the cylinder is removed or replaced by raising or lowering.

Supported by the cylinder 24 is a circular inverted cup-like structure, generally indicated at

30, whose top wall 31 has an opening through which the cylinder-button 28 freely protrudes. The open end of the cup 30 is flared as indicated at 32, and an intermediate circular portion 33 of the side wall of the cup is reduced in diameter so that it has a snug fit with the cylinder. The cup can be removed by lifting it from the cylinder, and means (conventional, but not shown) are provided for preventing relative rotation of these parts. Likewise, the cylinder 24 can be removed by merely lifting it from the supporting disk 23. Welded to the outside of the cup is a skirt 34 which forms an annular duct around the cup, the duct being in communication with the interior of cylinder 24 by way of a plurality of openings 35 and 36 in the side wall of the cylinder and of the cup, respectively.

The side wall of the cup 30 is formed to provide (immediately below its reduced portion 33) a plurality of lateral recesses 37, the recesses as illustrated being four in number and separated by four narrow longitudinal ribs 38 (see Fig. 2). The recess-defining inner surfaces of the cup taper inwardly in a downward direction so that the recesses 37 become progressively shallower toward the open end of the cup.

Pressed in the hollow of the motor shaft 20 is a tube 40, closed at its top and having adjacent thereto four radial openings in which short tubes or jets 41 are pressed. Around the tube 40, and threaded on the motor shaft, is a hollow cylindrical member 42 which is closed at its top and has radial openings (in register with the jets 41) in which tubular members or long jets 43 are fixed; the ends of the short jets 41 being spaced from the cylindrical member 42. The openings in member 42 for the tubular members 43 are enlarged at their inner ends to form cavities 44 (Fig. 2) separate from each other. Through the wall of cylinder 24 are four elongated openings 45; this cylinder and the cup 30 being so oriented that the centers of the openings 45 and of the upper parts of the cup-recesses 37 are aligned with the long jets 43, which likewise are aligned with the short jets 41 and the radial openings of tube 40.

The rotary structure described above is supported solely by the shaft 20 of the electric motor 21, which is provided with a thrust bearing (not shown) suitable for the purpose. The motor 21 is mounted in one end of an elongated sheet-metal air-duct, generally indicated at 50, which is rectangular in cross-section and comprises a top wall 51, a bottom wall 52, and an intermediate wall 53 which divides the air-duct into an upper section 54 and a lower section 55. The burner structure is mounted in a furnace jacket 56 with one end of the air-duct 50 extending exteriorly thereof.

The electric motor 21 is encased in a jacket 57 and is secured to the bottom wall 52 of the air-duct, with the bottom wall of jacket 57 therebetween, by means of a threaded fitting comprising a cap 58. The space between the motor and jacket 57 is filled with lubricating oil by way of a pipe 59, connected to the jacket and extending through the lower section 55 of the air-duct, having a filling-cup 60 whereby the level of the oil (indicated by the lines 61) can be determined. Connected to the cap 58 is a pipe 62 which, it is to be assumed, leads to a source of fuel-oil whose pressure is such as to effect rise of the oil in tube 40 (by way of the bore or hollow 63 in the motor shaft) to a level slightly above the jets 41, 43; there being, of course, conventional valve means (not shown) in pipe 62 for controlling the rate of flow of fuel-oil.

Spaced around the upper part of motor 21 and its jacket 57 is a cylindrical duct 64 which is secured by its bottom to the dividing wall 53 of the air-duct and extends through an opening in the top wall 51 of the same into communication with the inlet or mouth 65 of blower 22. Around the blower is a circular casing 66 which is secured by its bottom wall 67, apertured to receive duct 64, to the top of the air-duct. The top wall 68 of the blower casing is closely adjacent the bottom of the burner structure 11 and has a clearance opening for the top frame-plate 17. Above the blower 22 is a plate 69, having a clearance opening for the lower frame-plate, which divides the casing 66 into an upper compartment 70 and a lower compartment 71.

Around the rotary structure 11, and supported by a plate 72 and layer of insulating material 73 fastened to the top of the blower casing, is a stationary structure which comprises three circular sheet-metal members. The inner one of these members is narrowly spaced from the burner 11 and consists of a short lower section 74 and an upper section 75 which extends slightly more than one-half the height of the burner. The middle circular member 76 is more widely spaced from the burner and rises well above it, and the outer member 77 forms the usual furnace structure. Mounted on the member 76 adjacent the rotary structure is a channeled casting 78 having a depression in its end wall for a ceramic member 79 which serves as a mount for an electric igniter element 80 of the glow type, which conveniently may be the 600-watt resistance coil commonly employed in domestic heating appliances.

Mounted in a housing 81 on the outer end of the air-duct 50 is an electric motor 82 having a crank and lever 83 connected to a hinged damper 84 which is cooperable with an opening 85 in the top wall of the air-duct; the motor having internal reduction gearing for slow operation of the damper and being so controllable as to effect alternate opening and closing of the same. A vent opening for the housing is indicated at 86. Through the back wall of the upper section 54 of the air-duct is another vent opening 87 whose flow capacity can be regulated by a slidable plate 88.

When the motor 21 is in operation, air is drawn by the blower 22 through an opening 89 at the outer end of the lower air-duct section 55, and openings 90 in the intermediate wall 53; all of the air before entering the blower-inlet 65 having to pass around the motor jacket 57 by way of the cylindrical duct 64. The air paths are indicated by arrows, and it is to be observed that while the arrows are shown only at the right side of the rotary structure to avoid crowding of the drawing, the flow is actually on all sides; the reference characters indicating the air-flow openings 90, and other such openings now to be described, being only at the left.

The air discharged by the blower can leave the compartment 71 by two paths: (1) into the upper compartment 70 through openings 91 in plate 69, and (2) downwardly into the upper air-duct section 54 through openings 92 in the abutting walls of the blower-casing and the air-duct.

From the compartment 70 there are three upward paths for the air: (1) between the frame-plates 17 to the interior of cylinder 24 through the apertures in the lower part of the same, (2) through openings 93 in plate 16 and the bot-

tom wall of the outer bowl 13 into the space between the same and the inner bowl 12, and (3) through openings 94 in the blower-casing top wall 68 into the annular space between the rotary structure and the inner circular members 74—75.

From the interior of cylinder 24 the air passes into the combustion chamber 100 by two paths: (1) through the openings 45 and downwardly between the cylinder and the side wall of cup 30, and (2) through the openings 35 and 36 downwardly through the annular duct defined by skirt 34.

From the space between the inner and outer bowls 12, 13 the air (supplied thereto by way of openings 93) has three paths: (1) into the combustion chamber 100 through the openings 95 in the inner bowl adjacent cylinder 24, this air being deflected laterally by a plate 96 between the openings 95 and the open end or rim 32 of cup 30 and secured to the bottom wall of the bowl by small spacers 97 so as to minimize conduction of heat between these parts, (2) into the combustion chamber adjacent its top by way of a circumferential row of openings 98, and (3) to the space outside the rotary structure by way of a row of openings 99 in the outer bowl and in the same plane as the openings 98. The openings 98 and 99 are conveniently of the same size but the openings 98 are then more numerous, there being in a practical embodiment of the invention 45 of the openings 98 and only 6 of the openings 99.

The blower 22 is of such construction that its air-impelling capacity is in excess of the requirements of the oil-burner under all conditions, so that part of the air passing from the blower to compartment 71 is vented to atmosphere by way of the openings 92, upper air-duct section 54, opening 87, and openings 85 and 86 when damper 84 is open. By this arrangement all of the air drawn into the blower, by way of the lower air-duct section 55 and the cylindrical duct 64, is effective for cooling the electric motor 21.

In operation, the burner structure 11 is rotated at high speed by the motor (conveniently, 1550 R. P. M. when the diameter of structure 11 is about six inches) so that fuel-oil supplied to the short jets 41 (by way of pipe 62, bore 63 of the motor shaft and tube 40) is projected by centrifugal force from these jets into the cavities 44 (Fig. 2) and long jets 43, whence it is projected by centrifugal force into the recesses 37 of cup 30. The air entering the cup 30 through openings 45 mixes with the oil in the recesses and carries it to the rim 32 of the cup from which the mixture is projected by centrifugal force toward the side wall 15 of the inner bowl 12 in the form of a spray which, when ignited by means hereinafter to be described, burns within the combustion chamber 100 to produce a rotating fire therein and at the top or open end of the chamber.

One important feature of this invention resides in the arrangement whereby the fuel is projected from the rim of the cup 30 substantially uniformly in all directions toward the sides of the combustion chamber despite such eccentricity of the parts as may result in normal manufacture.

This arrangement depends primarily on the small diameter of tube 40 and the shortness of the inner jets 41 which form radial outlets for the oil from that tube. In an actual embodiment of the invention, substantially identical with

that shown in the drawing, the radius of the jets 41 is approximately $\frac{3}{16}$ inch; the dimensions of the parts as shown in Fig. 2 being only slightly less than those in the actual embodiment (the scale of Fig. 1 being 1:2.25). Due to the shortness of the jets 41 the rotary velocity of the oil particles at the outlets of these jets is low, and the centrifugal force acting on them is correspondingly low; the oil therefore being projected in substantially equal amounts from each of the jets 41. If, on the contrary, the jets 41 were relatively long, the centrifugal force (which is proportional to the square of the velocity) would be great enough to cause most of the oil to be projected from only one or two of the four jets in the event that the supply tube 40 and the jets 41 were not exactly concentric; the effect being similar to that produced in connection with an unbalanced flywheel.

The oil projected, through space, from the inner jets 41 is collected by the respective cavities 44 (Fig. 2) so that it passes into the associated long jets 43 and is projected therefrom, through the openings 45 in cylinder 24, into the individual adjacent recesses 37 in the inner side surface of cup 30. Inasmuch as the oil is thus supplied at equal rate to each of these recesses, the lateral projection of the oil (or oil-air mixture) from the rim of the cup is hence substantially uniform in all directions.

The reservoirs formed by the deepening of the recesses 37 at their upper ends contribute to the proper admixture of the oil with the air entering through the openings 45 adjacent the reservoirs.

Air, in addition to that entering the combustion chamber 100 by way of the open end of cup 30, is supplied to the chamber by three other paths: (1) downwardly through the annular duct formed by skirt 34, (2) through the openings 95 in the bottom of the inner bowl, and (3) through the openings 98 in the side wall of the inner bowl adjacent the upper end of the chamber.

The air flowing downwardly through the annular duct (path 1) improves combustion by penetrating to the interior of the fire. The air passing through the openings 95 (path 2) is heated by contact with the deflecting plate 96 which, after the burner is in full operation, becomes red-hot due to its exposure to the fire in the chamber and to the fact that it is so mounted as to minimize loss of heat by conduction, so that this air has but little cooling effect on the fire, and because of its addition less relatively-cold air need be introduced by way of the mouth of the cup. The air passing into the combustion chamber near its open end through openings 98 (path 3) serves to substantially complete combustion within the chamber; the temperature of this air being raised to a high degree by heat received from the side wall 15, which heat otherwise would be lost to the exterior of the rotary structure, so that the double-wall arrangement of the structure serves as a very effective thermal insulator.

It will be observed that some of the air passing between the double walls can escape to the exterior of the rotary structure by way of the openings 99 (whose function is to be described), but, as was previously mentioned, there are relatively few of these openings. Still another path for air from the blower is by way of openings 94 and the annular duct formed by the circular members 74—75; this air passing upwardly around the outside of the rotary burner and serving as a forced supply of secondary air.

Another important feature of this invention re-

sides in means for starting the fire in the burner, which means will now be described: With the structure rotating at normal speed, fuel-oil is permitted to flow through pipe **62** so that it is discharged from the mouth of cup **30** in the form of a spray of liquid oil which upon reaching the side wall **15** ascends the same, the wall being tapered slightly outwardly, as shown, to facilitate the ascent of the oil. Upon reaching the openings **98** the oil is projected therethrough, the centrifugal force acting on the oil being so great that its outward passage is impeded only slightly by the air entering the chamber through these openings. The oil then in the space between the double walls of the structure is projected therefrom by centrifugal force through the openings **99** into the outside space defined by the circular member **76** and wherein the igniter element **80** is located. It is to be assumed that the igniter had already been brought to glow temperature, under the control of manual or automatic means, so that the oil is quickly ignited. The fire thereby produced outside the rotary structure is effective, after a period of about 10 seconds, to initiate combustion within the structure by igniting vapors rising from the open end of the same.

When the fire within the rotary structure is well established (in 1–2 minutes) the production of fire in the outside igniting-space ceases due to the fact that the oil mixture projected from the mouth of the cup **30** is then in a burning condition well before any of it can reach the side wall of the structure, so that obviously none of it can pass through the side-wall openings **98—99**. There is very little deterioration of the igniter element in use, since it is out of the path of flame issuing from the interior of the burner structure and is subjected only for brief periods to the outside flame, the temperature of which is relatively low. The electric igniter is not essential, since the igniting flame can be started in the outside space by other means, for example, simply by a piece of burning paper.

In high-fire operation of the burner, the oil is supplied at high rate and the damper **84** is closed so that all of the air from the blower, other than that vented to atmosphere through the adjustable opening **87**, passes to the burner. To produce a still-higher fire, the opening **87** is fully or more-nearly closed and the rate of supply of oil increased proportionately. After the fire has been burning for about five minutes and all of the parts have reached high temperature, if it is desired to produce a low-fire condition the supply of oil can be throttled down to a rate about one-sixth that required for high-fire, and the supply of air correspondingly reduced by opening damper **84** (to the position shown in the drawing) so as to vent to atmosphere more of the air discharged by the blower.

The features disclosed and claimed in the aforementioned copending applications Ser. No. 679,285 and Ser. No. 787,648, now Patent No. 2,563,763, September 25, 1951 include the means for impeding passage of the burning gases from the rotating combustion chamber, which means is constituted by the annular constriction **14** of the side wall **15** of the structure shown in the present drawing; as well as the inverted arrangement of the spray cup **30**. The present improvements over my previous arrangements reside mainly in: (1) the means for starting the fire, (2) the means for effecting uniform distribution of fuel in the combustion chamber despite such eccentricty of the parts as may occur in manufacture, (3) the means for introducing additional air to the chamber to improve or complete the combustion therein, and (4) the arrangement for circulating all of the air drawn into the blower in cooling relation to the electric motor

The specific embodiment of my invention herein shown and described is obviously susceptible of modification without departing from the spirit of the invention, and I intend therefore to be limited only by the scope of the appended claims.

I claim as my invention:

1. A rotary oil-burner, comprising: a hollow structure defining internally a combustion chamber, said structure having an end wall and a side wall generally-circular in cross-section, the structure being open at its end opposite the end wall; means for supplying fuel-oil to said chamber and air for combustion of the oil within the chamber; a motor for rotating said structure about the axis of its side wall at a speed such as to rotate the fire produced in the chamber by said combustion; there being an opening through said side wall of the structure, said opening being small relative to the opening defined by said open end of the structure; and means defining around the outside of said side wall a space where vaporized oil, passing thereinto through said side-wall opening when the structure is rotated, can be ignited to initiate said combustion.

2. A rotary oil-burner, comprising: a hollow structure defining internally a combustion chamber, said structure having an end wall and a side wall generally-circular in cross-section, the structure being open at its end opposite the end wall; means for supplying fuel-oil to said chamber and air for combustion of the oil within the chamber; a motor for rotating said structure about the axis of its side wall at a speed such as to rotate the fire produced in the chamber by said combustion; there being an opening through said side wall of the structure, said opening being small relative to the opening defined by said open end of the structure; and means for initiating said combustion, comprising an igniter element mounted outside said structure for igniting vaporized oil passing through said side-wall opening when the structure is rotated, said igniter element being out of the path of flame issuing from said open end of the structure when said combustion is established.

3. A rotary oil-burner, comprising: a hollow structure defining internally a combustion chamber, said structure having an end wall and a side wall generally-circular in cross-section, the structure being open at its end opposite the end wall; means for supplying fuel-oil to said chamber comprising a member within the chamber adapted to discharge the oil toward said side wall of the structure; means for supplying air to the chamber for combustion of the oil therein; a motor for rotating said structure about the axis of its side wall at a speed such as to rotate the fire produced in the chamber by said combustion; said side wall of the structure having an annular constriction, and there being an opening through said side wall at the side of said constriction toward said end wall of the structure, said opening being small relative to the opening defined by said open end of the structure; and stationary means defining around the outside of said side wall a space where oil, passing thereinto through said side-wall opening when the structure is rotated, can be ignited to initiate said combustion.

4. A rotary oil-burner as defined in claim 3,

and wherein said constriction is formed by an inwardly inclined portion of said side wall adjacent the open end of the structure.

5. A rotary oil-burner as defined in claim 3, and wherein the portion of said side wall adjacent said end wall of the structure inclines outwardly in a direction toward said constriction.

6. A rotary oil-burner, comprising: a hollow structure defining internally a combustion chamber, said structure having an end wall and a side wall generally-circular in cross-section, the structure being open at its end opposite the end wall; means for supplying fuel-oil to said chamber comprising a member within the chamber adapted to discharge the oil toward said side wall of the structure; means for supplying air to the chamber for combustion of the oil therein; a motor for rotating said structure about the axis of its side wall at a speed such as to rotate the fire produced in the chamber by said combustion; said side wall of the structure having an annular constriction, and there being an opening through said side wall at the side of said constriction toward said end wall of the structure, said opening being small relative to the opening defined by said open end of the structure; and means for initiating said combustion, comprising an igniter element stationarily mounted outside said structure for igniting oil passing through said side-wall opening when the structure is rotated, said igniter element being out of the path of flame issuing from said open end of the structure when said combustion is established.

7. A rotary oil-burner as defined in claim 6, and wherein said constriction is formed by an inwardly inclined portion of said side wall adjacent the open end of the structure.

8. A rotary oil-burner as defined in claim 6, and wherein the portion of said side wall adjacent said end wall of the structure inclines outwardly in a direction toward said constriction.

9. A rotary oil-burner, comprising: a hollow structure defining internally a combustion chamber, said structure having an end wall and a side wall generally-circular in cross-section, the structure being open at its end opposite the end wall; means for supplying fuel-oil to said chamber; a member within the chamber for receiving and discharging said oil, said member being carried by said structure and arranged in coaxial and spaced relation to said side wall, the member having a discharge rim in a plane adjacent said end wall of the structure; means for supplying to the chamber air for combustion of said oil; a motor for rotating said structure about the axis of its side wall at a speed such that the oil is projected by centrifugal force from said rim toward said side wall and is thereby atomized, so that it burns within the chamber when ignited; said side wall of the structure having an annular constriction, and there being an opening through said side wall at the side of said constriction toward said end wall of the structure, said opening being small relative to the opening defined by said open end of the structure; stationary means defining around the outside of said side wall a space for receiving atomized oil passing thereinto through said side-wall opening when the structure is rotated; and an igniter element mounted in said space for igniting the oil therein to initiate said combustion, said igniter element being out of the path of flame issuing from said open end of the structure when said combustion is established.

10. A rotary oil-burner as defined in claim 9, and wherein the portion of said side wall adjacent said end wall of the structure inclines outwardly in a direction toward said constriction.

11. A rotary oil-burner, comprising: a hollow structure defining internally a combustion chamber, said structure having an end wall and a side wall generally-circular in cross-section, the structure being open at its end opposite the end wall; a cup carried by the structure within said chamber, said cup being arranged in coaxial and spaced relation to said side wall and so that its rim is in a plane between the planes of said end wall and said open end of the structure; the inner surface of the side wall of said cup being formed to provide a plurality of recesses therearound; means for supplying fuel-oil to said cup comprising means carried by the structure for supplying the oil to the individual ones of said recesses; and a motor for rotating the structure about the axis of its side wall at a speed such that the oil supplied to said recesses is projected by centrifugal force from the rim of the cup toward the side wall of the structure.

12. A rotary oil-burner as defined in claim 11, and wherein said cup is positioned so that its open end faces said end wall of the structure.

13. A rotary oil-burner as defined in claim 11, and wherein said means for supplying the oil to said recesses comprises means arranged coaxially within the cup and in spaced relation to the side wall thereof.

14. A rotary oil-burner, compriisng: a hollow structure defining internally a combustion chamber, said structure having an end wall and a side wall generally-circular in cross-section, the structure being open at its end opposite the end wall; a cup carried by the structure within said chamber, said cup being arranged in coaxial and spaced relation to said side wall and so that its rim is in a plane between the planes of said end wall and said open end of the structure; the inner surface of the side wall of said cup being formed to provide a plurality of recesses separated by ribs extending generally longitudinally of the cup side-wall; means for supplying fuel-oil to the interior of said cup comprising an oil-supply tube carried by the structure and arranged coaxially within the cup in spaced relation to the side wall thereof, said supply tube having a plurality of radial openings directed respectively in the directions of said recesses; and a motor for rotating the structure about the axis of its side wall at a speed such that the oil is projected by centrifugal force from said supply-tube openings into the individual ones of said recesses and passes therefrom around the rim of the cup toward the side wall of the structure.

15. A rotary oil-burner as defined in claim 14, and wherein said cup is so positioned that its open end faces said end wall of the structure.

16. A rotary oil-burner as defined in claim 14, and wherein the parts of said recesses at their ends away from the rim of the cup are of increased capacity, and said supply-tube openings are directed toward said parts.

17. A rotary oil-burner as defined in claim 14, and including a plurality of radial tubular members carried by the structure and interposed between each of said supply-tube openings and the respective ones of said recesses, said tubular members being spaced from said supply tube and said cup side-wall and adapted to facilitate transfer of the oil from the supply tube to the recesses.

18. A rotary oil-burner as defined in claim 14,

and including a hollow cylindrical member carried by the structure and encircling said oil-supply tube, said cylindrical member being spaced from the supply tube and the side wall of the cup and having cavities in its inner surface registering with said supply-tube openings, and a plurality of tubular members each communicating with one of said cavities and projecting radially from the cylindrical member toward the individual ones of said cup-wall recesses.

19. A rotary oil-burner, comprising: a hollow structure defining internally a combustion chamber, said structure having an end wall and a side wall generally-circular in cross-section, the structure being open at its end opposite the end wall; means for supplying fuel-oil to said chamber and air for combustion of the oil within the chamber; a motor for rotating said structure about the axis of its side wall at a speed such as to rotate the fire produced in the chamber by said combustion; and means for supplying auxiliary air to said chamber comprising means forming with said side wall of the structure an annular space therearound and constituting the side wall of a double wall, there being openings through the inner one of the side walls adjacent the open end of the structure, and means for forcing air into the chamber through said space and said openings.

20. A rotary oil burner as defined in claim 19, and including means for directing said fuel-oil into the chamber adjacent the end wall of the structure.

21. A rotary oil-burner as defined in claim 19, and including means forming an annular constriction of said side wall between said auxiliary-air openings and the open end of the structure.

22. A rotary oil-burner, comprising: a hollow structure defining internally a combustion chamber, said structure having an end wall and a side wall generally-circular in cross-section, the structure being open at its end opposite the end wall; a cup carried by the structure within said chamber, said cup being arranged in coaxial and spaced relation to said side wall and so that its open end faces the end wall of the structure and is adjacent the same; means for supplying fuel-oil and air to the interior of said cup; a motor for rotating the structure about the axis of is side wall at a speed such that said oil is projected by centrifugal force from the open end of said cup toward the side wall of the structure and is thereby atomized so that it produces a rotating fire within the chamber when ignited; and means for supplying additional air to said fire comprising means on the outside of the cup for directing air, passing from the interior of the cup through an opening therein, in the general direction of the end wall of the structure.

23. A rotary oil-burner as defined in claim 22, and wherein said means for directing said additional air in the general direction of the end wall of the structure comprises means forming an annular duct around the side wall of said cup and secured thereto.

24. A rotary oil-burner, comprising: a hollow structure defining internally a combustion chamber, said structure having an end wall and a side wall generally-circular in cross-section, the structure being open at its end opposite the end wall; a cup carried by the structure within said chamber, said cup being arranged in coaxial and spaced relation to said side wall and so that its open end faces the end wall of the structure and is adjacent the same; means for supplying fuel-oil and air to the interior of said cup; a motor for rotating the structure about the axis of its side wall at a speed such that said oil is projected by centrifugal force from the open end of said cup toward the side wall of the structure and is thereby atomized so that it produces a rotating fire within the chamber when ignited; and means for supplying additional air to said fire through an opening provided in the end wall of the structure, said last-named means including a plate secured to the end wall of the structure in parallel spaced relation thereto, said plate being spacedly interposed between the open end of said cup and said end-wall opening, the rim of said plate being spaced from the side wall of the structure.

25. A rotary oil-burner as defined in claim 24, and wherein said plate is so mounted on said structure as to minimize conduction of heat therebetween.

WILLIAM R. RAY.

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Number	Name	Date
1,505,746	Stromquist	Aug. 19, 1924
1,640,081	Johanson	Aug. 23, 1927
1,643,436	Allerdice	Sept. 27, 1927
1,722,504	Morris	July 30, 1929
1,871,952	Chadwick et al.	Aug. 16, 1932
2,200,278	Johnston	May 14, 1940
2,202,822	Behrens	June 4, 1940
2,251,055	Howard et al.	July 29, 1941
2,355,897	Wyld	Aug. 15, 1944
2,507,006	Hammel et al.	May 9, 1950