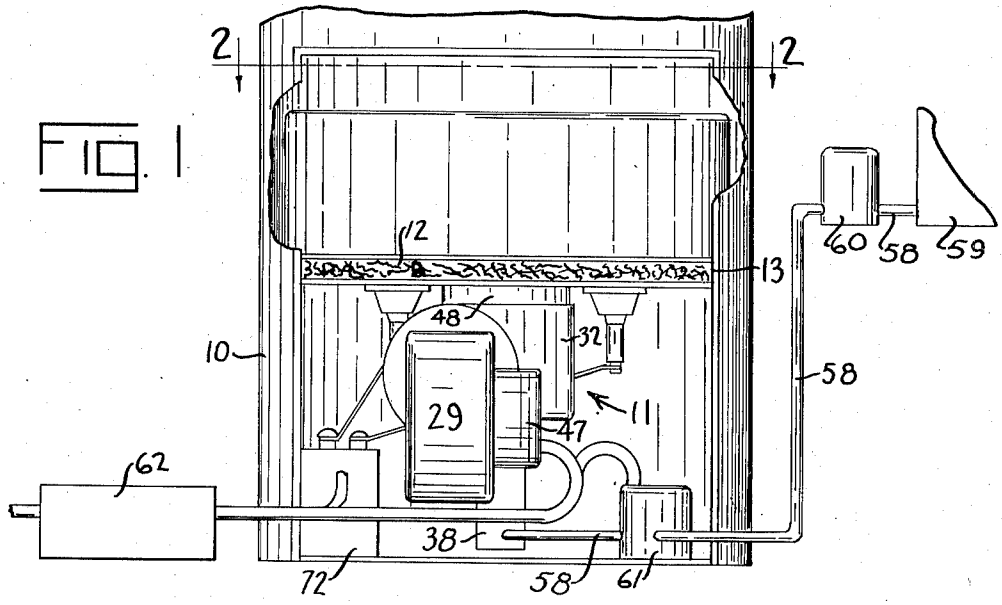
March 3, 1953 L. C. McKEE 2,630,166

HEARTH TYPE OIL BURNER WITH FLAME RIM IGNITION MEANS

Filed Dec. 24, 1947 2 SHEETS—SHEET 1

FIG. 1



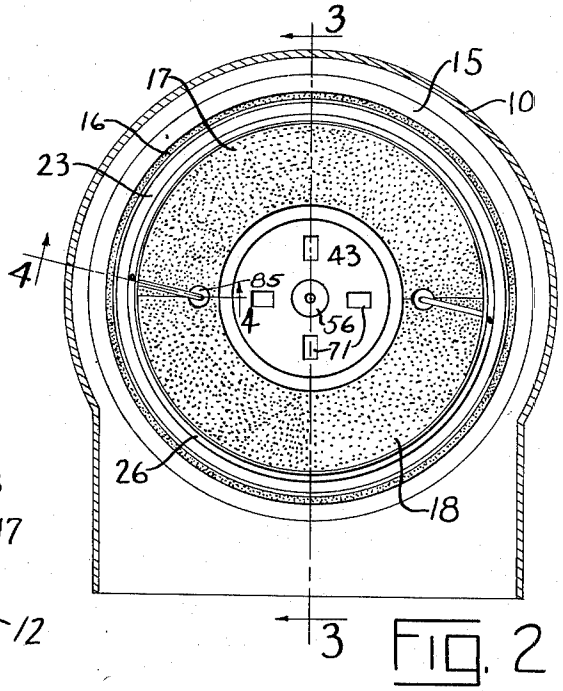
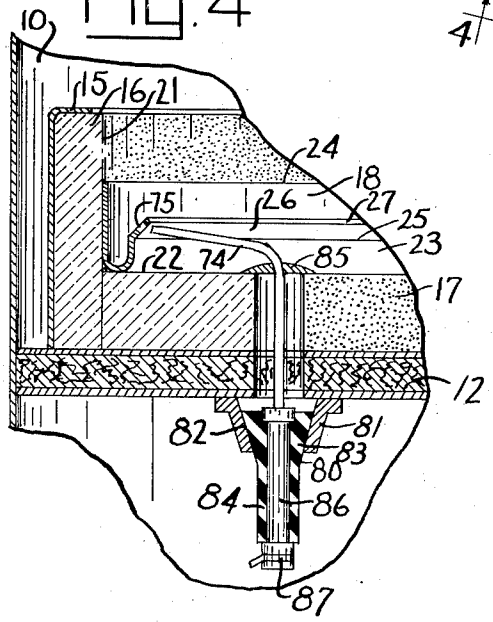


FIG. 2

FIG. 4



INVENTOR
LAIRD C. McKEE
BY
G. H. Braddock
ATTORNEY

March 3, 1953 L. C. McKEE 2,630,166

HEARTH TYPE OIL BURNER WITH FLAME RIM IGNITION MEANS

Filed Dec. 24, 1947 2 SHEETS—SHEET 2

FIG. 3

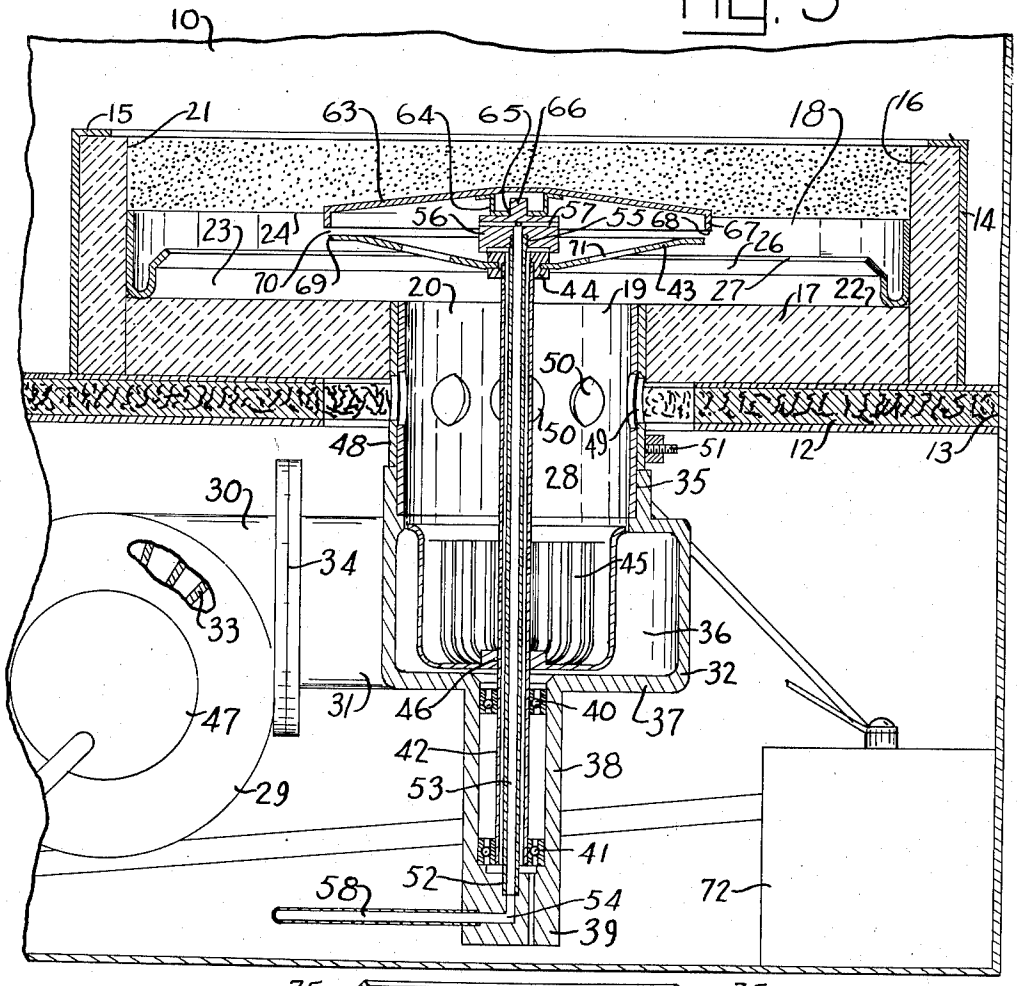
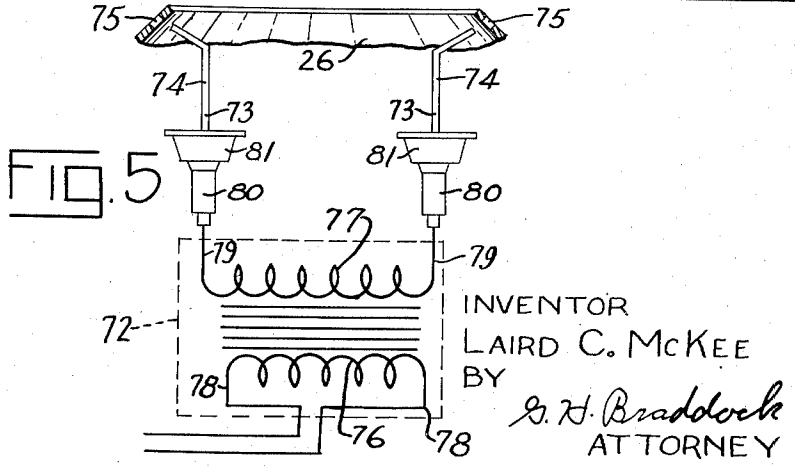


FIG. 5



INVENTOR
LAIRD C. McKEE
BY
G. H. Bradlock
ATTORNEY

Patented Mar. 3, 1953

2,630,166

UNITED STATES PATENT OFFICE

2,630,166

HEARTH TYPE OIL BURNER WITH FLAME RIM IGNITION MEANS

Laird C. McKee, Minneapolis, Minn.

Application December 24, 1947, Serial No. 793,735

4 Claims. (Cl. 158—4)

1

This invention has relation to an oil burner.

The present application is a continuation in part of my pending application Serial No. 733,497, for an Oil Burner, filed March 10, 1947, now abandoned, and includes features and characteristics of construction which are improvements over the disclosure of said application and over the prior art.

An object of the invention is to provide an oil burner wherein complete atomization of the oil will be accomplished within the atmosphere of a combustion chamber of the oil burner before the oil has had opportunity to strike any bounding or defining surface of said combustion chamber, and ignition and burning of the atomized oil will occur in a protected annular space of the combustion chamber in surrounding relation to a location of entry to said combustion chamber of oil and air for accomplishing its atomization.

With the above objects in view, as well as others which will appear as the specification proceeds, the invention comprises the construction, arrangement and combination of parts as now to be fully described and as hereinafter to be specifically claimed, it being understood that the disclosure herein is merely illustrative and intended in no way in a limiting sense, changes in details of construction and arrangement of parts being permissible as long as within the spirit of the invention and the scope of the claims which follow.

In the accompanying drawings forming a part of this specification,

Fig. 1 is a fragmentary front elevational view of a furnace casing having an open front, the view also disclosing, more or less diagrammatically, an oil burner made according to the invention as when applied to use in said furnace casing;

Fig. 2 is a horizontal sectional view of the furnace casing, taken on line 2—2 in Fig. 1, disclosing the oil burner in top plan and with parts omitted;

Fig. 3 is an enlarged vertical sectional view, taken as on line 3—3 in Fig. 2;

Fig. 4 is a detail sectional view, taken on line 4—4 in Fig. 2; and

Fig. 5 is a diagrammatic view of a transformer and a circuit including electrodes of the oil burner.

With respect to the drawings and the numerals of reference thereon, 10 denotes the casing of a furnace of ordinary or preferred construction, and 11 represents an oil burner made according to the invention. In the disclosure as made, the furnace casing 10 includes an open lower front portion, and the oil burner 11 is situated within a lower part of said furnace casing.

2

A floor 12 of the oil burner is constituted as a horizontal wall rigidly supported, as at 13, upon a lower part of the cylindrical wall of the furnace casing. Said floor 12 desirably can be comprised as asbestos covered at its upper and lower sides with sheet metal.

The upper surface of the floor 12 supports a container constituted as an upstanding, annular element 14, in spaced, concentric relation to said cylindrical wall of the furnace casing 10, integral with an inwardly extending annular flange 15 at an upper portion of said upstanding, annular element 14. The container constituted as the annular element 14 houses an annular wall 16 which rests on the floor 12 of the oil burner, and, in the disclosure as made, said annular wall 16 is comprised as absorbent refractory material. An annular floor 17 of a combustion chamber 18 of the oil burner, of refractory material as shown, rests upon said floor 12 and is snugly situated within a lower portion of the annular wall 16. A circular opening 19, arranged centrally in the annular floor 17, contains a vertical hollow cylindrical member 20 which is concentric with the upstanding, annular element 14 and projects downwardly through and to position below the floor 12 of the oil burner. The upper end of the element 20 terminates flush with the upper surface of the annular floor 17. In the illustrated embodiment of the invention, said annular floor 17 is disposed in a horizontal plane.

An outer surface of the annular wall 16 is engaged against an inner surface of the annular element 14, and an upper surface of said annular wall is engaged against a lower surface of the annular flange 15. An inner cylindrical surface 21 of the annular wall 16 is concentric to said annular element 14, and an upper flat marginal surface 22 of the annular floor 17 is in contiguous relation to the inner surface 21 of said annular wall 16.

A flame rim 23 of the oil burner is constituted as a metallic annular trough resting upon the upper flat marginal surface 22 of the annular floor 17 in adjacent or contiguous, concentric relation to the inner cylindrical surface 21 of the annular wall 16. The upper edge 24 of an outer annular wall of said flame rim or annular trough 23 terminates at about the midheight of

the portion of the inner cylindrical surface 21 above the annular floor 17, and the upper edge 25 of an inner annular wall of the flame rim or annular trough terminates at elevation below that of said upper edge 24. This construction gives a portion of the flame rim 23 a substantially J-shaped configuration in radial cross section. Said inner annular wall of said flame rim or annular trough 23 merges at said upper edge 25 into an upstanding and inwardly extending annular flange 26 of said flame rim and said flange 26 constitutes an intermediate electrode. The flame rim or annular trough 23 is in spaced, surrounding, concentric relation to the hollow cylindrical member 20, and, as disclosed, said flame rim or annular trough extends above the annular floor 17.

The annular flange or intermediate electrode 26 of the flame rim is constituted as a continuous circular member of flat metal. The upper edge 27 of said annular flange or intermediate electrode 26 terminates at elevation considerably below the upper edge 24 of the outer annular wall of said flame rim or annular trough.

The internal surface of the vertical hollow cylindrical member 20 bounds or defines a vertical air conveying conduit 28 in communication with the combustion chamber 18.

A blower casing 29 of the oil burner, suitably and conveniently rigidly supported in the furnace casing 19, includes an air outlet 30 which opens to an air inlet 31 of a propeller casing 32 of said oil burner. The blower casing 29 houses a blower 33 and includes inlets for air, and the air outlet 30 from said blower casing is suitably and conveniently connected, as at 34, to the air inlet 31 of said propeller casing 32. An annular portion of the propeller casing 32 is supported, as at 35, upon the lower annular end of the vertical cylindrical member 20 in such manner that an air conveying conduit 36 of said propeller casing is in contiguous relation with the vertical air conveying conduit 28, and a lower portion of the propeller casing 32 is covered by a closure wall 37 integral with said propeller casing. The construction and arrangement are such that an open ended, otherwise enclosed horizontal air conveying conduit, comprised as the air outlet 30, the air inlet 31 and the air conveying conduit 36, is provided between the blower casing 29 and the vertical air conveying conduit 28. The connections between the air outlet 30 and the air inlet 31, and between the propeller casing 32 and the vertical hollow cylindrical member 20 of course are airtight.

The closure wall 37 integrally supports a tubular element 38 which extends vertically downwardly from said closure wall axially of the vertical hollow cylindrical member 20 and is closed at its lower end by a horizontal wall 39 integral with said hollow tubular element 38.

Spaced apart, upper and lower bearings, denoted 40 and 41, respectively, in the tubular element 38 between the closure wall 37 and the horizontal wall 39, rotatably support the lower end portion of a hollow post 42 which extends axially upwardly through the vertical hollow cylindrical member 20 in spaced relation to its interior surface and terminates at about the elevation of the upper edge 27 of the annular flange or exterior electrode 26, and a substantially horizontal spinning disc 43, of metal as disclosed, has its central portion 44 supported upon the upper end of the hollow post 42 so that said spinning disc and hollow post will be rotated as a unit when the hollow post is rotated in a manner to be made clear. The peripheral portion of the spinning disc 43 slants slightly upwardly from the central portion 44. Said spinning disc is of diameter somewhat greater than the diameter of the vertical hollow cylindrical member 20, and the periphery of the spinning disc is at elevation above the elevation of the upper edge 27 of the annular flange or intermediate electrode 26 and below the elevation of the upper edge 24 of the outer annular wall of the flame rim or annular trough 23.

The air conveying conduit 36 through the propeller casing 32 contains propeller means or blades 45 for driving the spinning disc 43, which propeller means or blades are situated in the path of travel of air from the blower 33 and are rigidly secured, as at 46, upon and to the hollow post 42.

Air forced from the outlet 30 in response to operation of an electric motor 47, rigid with the blower casing 29, for driving the blower 33 is adapted to actuate the propeller means or blades 45 to cause said hollow post 42 to be rotated thus to cause the spinning disc 43 to be rotatably actuated, and the construction and arrangement are such that the blower forced air will travel to the combustion chamber 18, by way of the vertical air conveying conduit 28, there to accomplish atomization of oil in a manner to be made plain.

A cylindrical sleeve 48, snugly, rotatably situated in the annular opening 19 upon the vertical hollow cylindrical member 20 at the location of the floor 12, between said vertical hollow cylindrical member and the annular floor 17, includes spaced apart apertures 49 adapted to be adjusted relative to apertures 50 through the vertical hollow cylindrical member 20 thus to provide adjustable air outlet means from the vertical air conveying conduit 28. The adjustable air outlet means which the apertures 49 and 50 provide is for controlling the amount of air permitted to pass to the combustion chamber 18 when the blower 33 is driven in response to operation of the electric motor 47. A set screw 51 is for fastening the cylindrical sleeve 48 in fixed relation to the vertical hollow cylindrical member 20.

The horizontal cylindrical wall 39 rigidly supports, as at 52, the lower end portion of a vertical oil pipe 53 which is situated within and in slightly spaced relation to the hollow post 42. A port 54 in said horizontal wall 39 is in communication with the lower end of the oil pipe 53, and the upper end of said oil pipe rigidly supports, as at 55, a cap 56 having a plurality of substantially horizontal oil outlets 57 spaced circumferentially about said cap 56 and communicated with by the oil pipe 53. The oil outlets 57 are situated above the spinning disc 43, and the construction and arrangement are such that oil made to flow from said outlets 57 will be deposited to inner portions of the upper surface of said spinning disc.

An oil supply connection 58 leads from a tank 59 for oil to the oil burner by way of a regulating device 60 for keeping pressure of oil constant at said oil burner and a solenoid controlled valve 61 for cutting on and off the oil supply. The regulating device 60 and the solenoid controlled valve 61 are ordinary equipment of oil burners of the present general character. The oil supply

connection 58 opens to the port 54 in the horizontal wall 39.

A safety device of the oil burner includes a control mechanism (not shown) housed in a box 62 adjacent the furnace casing 10. The construction and arrangement will be such that when ignition of the oil fails to occur, the safety device will cause the oil burner system to be shut down. Safety devices of the type employed by the applicant are ordinary equipment of oil burners of the present general character.

A protector hood of the oil burner, designated 63, is supported upon an upper portion of the cap 56 in spaced and overlying relation to the spinning disc 43. A bracket 64, disposed centrally of and secured to the lower surface of said protector hood, includes a body portion engaged against said cap 56 and having an opening 65 in which a protuberance 66 extending upwardly from the cap is snugly situated. The protector hood 63 is constituted as a concavo-convex member having its concave side adjacent the spinning disc 43 and including a downwardly extending skirt portion 67 situated at elevation slightly above and in close surrounding relation to said spinning disc. The lower edge 68 of the skirt portion 67 is spaced upwardly and outwardly from the annular peripheral edge 69 of the spinning disc to provide a relatively narrow annular passageway 70 between said skirt portion and said spinning disc. Stated otherwise, the concave surface of the protector hood 63 overlies the spinning disc 43 in spaced relation thereto and the skirt portion 67 terminates in slightly spaced, surrounding, concentric relation to said spinning disc about as disclosed in Fig. 3 of the drawings. The protector hood 63 and the bracket 64 desirably can be of metal.

The spinning disc 43 includes apertures 71 situated in spaced relation to both the central and peripheral portions of said spinning disc and arranged in circumferentially spaced relation. As disclosed, there are four apertures 71 situated substantially midway between the center and the periphery of the spinning disc and arranged at 90 degrees apart. The apertures 71 are for permitting passage of air upwardly through said spinning disc.

A transformer for the oil burner, suitably and conveniently supported in the furnace casing 10, is represented by 72.

A pair of rod electrode assemblies are each denoted 73. Each of the assemblies 73, 73 is of construction as to be set forth and includes a rod electrode 74. The annular flange of intermediate electrode 26 includes openings 75 situated diametrically opposite each other, and the rod electrodes 74, 74 are situated at the interior sides of said openings 75, 75 in properly spaced relation to the openings 75 to insure that arcs will occur, between the intermediate and rod electrodes in response to energization of the rod electrodes 74, 74.

The transformer 72 includes a primary 76 and a secondary 77. As shown, the secondary 77 is of insulated construction, but could be of the type having its electric midpoint grounded. Wires 78, 78 from a source (not shown) of electrical energy constitute opposite leads of the primary 76, and wires 79, 79 constitute opposite leads of the secondary 77 which extend to the interior igniting devices 73, 73.

Said rod electrode assemblies can be of substantially duplicate construction. Each includes, in addition to the rod electrodes 74, a body member 80 of insulating material, porcelain as disclosed, supported in a metal container 81 rigid with the lower surface of the oil burner floor 12. Each metal container 81 is situated beneath vertically alined openings in said floor 12 and the annular floor 17 and provides an open ended, downwardly tapering socket defined or bounded by an internal surface, or surfaces 82 of the metal container. The insulating body 80 of each assembly is constituted as a tubular element including an upper, downwardly tapering portion 83 snugly, slidably situated in a corresponding metal container 81 and a lower cylindrical portion 84 which extends downwardly below said corresponding metal container. The openings in the annular floor 17 for the rod electrodes 74 are covered by disc elements 85 through which said rod electrodes pass. A conductor 86, extending through and rigidly fixed in a hollow portion of each body member or tubular element 80, includes an upper end portion integral with a corresponding rod electrode 74 and a lower end portion to which a corresponding lead from the secondary 77 is connected, as at 87.

During practical operation of the oil burner, the spinning disc 43 will be rotated at a relatively high rate of speed, in response to operation of the electric motor 47 causing the hollow post 42 to be rotated through the instrumentality of air driven past the outlet 30 from the blower casing 29 to the propeller casing 32 against the propeller means or blades 45, and the blower driven air which causes said propeller means or blades to be rotated will pass beyond said propeller casing into the combustion chamber 18 by way of the vertical air conveying conduit 28. At the same time, oil will continuously pass the outlets 57 at the rate desired, as permitted by the regulating device 60, and become deposited upon inner portions of the upper surface of said spinning disc 43. The oil deposited upon said upper surface of the spinning disc of course will be thrown centrifugally, with swirling motion making for turbulence, off of said spinning disc across the path of an annular column of air entering the combustion chamber 18 by way of said vertical air conveying conduit 28. Inasmuch as the spinning disc 43 slants slightly upwardly from its central portion 44, oil thrown centrifugally off of said spinning disc will be given an upward impetus as well as an outward impetus.

Portions of air which are forced upwardly through the air conveying conduit 28 will pass through the apertures 71 into the space between the spinning disc 43 and the protector hood 63, and the remainder of the air forced upwardly through said air conveying conduit 28 will be deflected by said spinning disc, acting as a baffle, so that the annular column of air will be directed along an upwardly and outwardly extending path traversing the area, above the annular floor 17, into which the oil is thrown centrifugally by the spinning disc 43. Said spinning disc will be rotated at a rate of speed sufficiently high to cause the oil to be thrown centrifugally off of the spinning disc, at substantially all points of its periphery, in the form of separate and independent small particles, and the annular column of air will be forced into the combustion chamber 18 in amount sufficient and at velocity high enough to cause each small particle of oil to become completely shattered upon being struck by said annular column of air. It has been found that violent turbulence occurs at the location in the combustion chamber where the swirling oil and

annular column of air are caused to meet, and the turbulence causes the oil to be completely and thoroughly atomized within the atmosphere of said combustion chamber before the oil has opportunity to strike against any of the bounding or defining surfaces of the combustion chamber. The portions of the annular column of air which are forced against the lower surface of the spinning disc 43 upon entry of said column into the combustion chamber will have the effect of or tendency toward keeping said spinning disc air-cooled, and the portions of the annular column of air which are directed to the space between the spinning disc and the protector hood 63 will traverse the oil flowing outwardly along said spinning disc, preclude passage of oil downwardly through the apertures 71, accomplish preliminary mixing of the oil and air and breaking up of portions of the oil and have the effect of or tendency toward cooling the spinning disc, said protector hood and the cap 56. The protector hood will preclude the deposit of dirt upon the upper surface of the spinning disc and upon the cap 56, cause air which enters the space between said protector hood and spinning disc to be deflected outwardly, assist in causing oil and air to be mixed, confine the air which passes upwardly through the apertures 71 to the general location of the oil flowing outwardly from the upper surface of the spinning disc and, in cooperation with said spinning disc, direct oil and air mixture to flow from the space between the protector hood and spinning disc by way of the annular passageway 70. The pressure of air passing upwardly through the apertures 71 will be sufficient to prevent the passage of oil downwardly through said apertures.

There constantly will be atomized oil commingled with air existent as a mist in an annular area of the combustion chamber 18 above the annular floor 17, and said annular floor 17 will preclude settling of said mist to elevation below the zone of entry of the annular column of air.

Said annular column of air which enters the combustion chamber will cause the mist, or commingled atomized oil and air, to be steadily pushed or wafted radially outwardly of the spinning disc, toward and to the flame rim or annular trough 23. Inspection of the flame makes it conclusive that ignition and burning occur substantially wholly in a protected annular space of the combustion chamber directly above the flame rim or annular trough. The flame is of annular shape and seems to be confined to the general location or area of an annular space of the combustion chamber directly above said flame rim or annular trough. The mist, or commingled atomized oil and air, is invisible, and substantially the whole of the area of the combustion chamber above the portion of the annular floor 17 disposed interiorly of the flame rim or annular trough is spaced inwardly from the flame when the oil burner is in operation. The annular wall 16, the annular floor 17 and the flame rim or annular trough 23, in cooperation with each other, insure that burning will be confined entirely to the combustion chamber.

That complete and thorough atomization of the oil is accomplished, even when really heavy grades of oil are employed, is evidenced by the fact that arc producing means of nature as disclosed in Figs. 1, 2, 4 and 5 have proved in practice to be unfailingly operative to ignite the oil and air combustible fuel mixture at all times of starting up of the oil burner under varying conditions of use, and that burning of the oil and air combustible fuel mixture is substantially instantaneous and complete is evidenced by the fact that each time the oil burner is shut down, the flame becomes immediately totally extinguished. There is never any oil left burning, or to burn, at the annular space of the combustion chamber where burning normally occurs, or elsewhere, after any shutting down of the oil burner.

As hereinbefore stated, ignition is accomplished in response to arcing between the rod electrodes 74, 74 and the edges of the openings 75, 75 in the intermediate electrode 26. The defining surfaces of said openings 75, 75 are targets for electrical energy from said rod electrodes 74, 74, and vice versa, and said annular flange or intermediate electrode 26 provides a path through which electricity can travel between the spark gaps.

As will be clear from the drawings, the rod electrodes 74, 74 extend generally outwardly of the combustion chamber 18 and are set at oblique angle relation in a horizontal plane to lines extending radially of said combustion chamber. Also, the openings 75, 75 are below the elevation of the upper edge 27 of the annular flange or intermediate electrode 26, as well as below the annular path of fuel oil thrown off of the spinning disc 43, in the path of a lower part of the annular column of air which enters the combustion chamber from the vertical air conveying conduit 28. The mist of commingled atomized oil and air passes outwardly of the spinning disc due to combined action of the oil thrown from the spinning disc and the upwardly and outwardly moving column of air coming from the hollow cylindrical member 20. A portion of this oil-air mixture passing close to the top of the annular flange 26 is deflected downwardly thereby to a position between the upstanding outer wall and the upstanding inner wall of the annular flange of the flame rim 23. The construction and arrangement will be such that portions of said annular column of air will be wafted past the arcs between rod electrodes 74 and the openings 75, 75 and through the openings 75, 75 and cause said arcs to be blown through these openings to ignite the mist which is between the upstanding outer wall of the flame rim and the annular flange. This flame spreads almost instantaneously to the entire annular burning area. That igniting flames are produced at the locations as set forth is clearly apparent from inspection of the oil burner while in operation, and the magnitude of the flame is considerable.

The insulating annular wall 16 and the annular floor 17 constitute means effectively separating and isolating the electrical system, including the secondary 77 and the rod and intermediate electrodes, for accomplishing ignition of the combustible fuel-air mixture from the oil burner casing and floor. Stated otherwise, the annular flange or intermediate electrode 26 is not grounded. Instead, said annular flange or intermediate electrode and the rod electrodes are in a circuit which is separated and isolated from metallic parts of the oil burner and furnace casing. Thus, the possibility of arcing, save between the electrodes, is effectually eliminated. The arc or spark gaps between said electrodes are in a single electrical circuit, and flow of electrical energy in the igniting system of the application

necessitates the occurrence of arcs or sparks at both arc or spark gaps.

The annular wall 16, of absorbent material to be capable of picking up oil should there be failure of ignition when starting up of the oil burner is intended, is constructed to be a non-conductor of electricity even though it may, at some time or other, contain more or less absorbed oil. To this end said annular wall includes a myriad of cavities at its surface and elsewhere for precluding the occurrence of a continuous film of oil across the surface of or a continuous path of oil across the body of the annular block. Any oil absorbed by the annular insulating block of refractory material will become dissipated by heat immediately upon heating up of the oil burner.

The construction and arrangement are such that the upper, downwardly tapering portions of the insulating body members or tubular elements 80 of the rod electrode assemblies 73 will be slid upwardly upon and relative to the internal surfaces of the metal containers 81 providing tapering sockets in response to expanding action of said body members or tubular elements due to heat. Thus, said metal containers 81 constitute means supporting the body members or tubular elements 80 for adjustable movement without breakage upon becoming expanded. At the same time, the interior igniting devices are assembled with the oil burner floors 12 and 17 in such manner as to cause said floors to be perpetually closed at the locations of said interior igniting devices, it being obvious that the body members or tubular members 80 will slidably move downwardly by gravity in response to contracting action due to loss of heat.

What is claimed is:

1. The combination with an oil burner having an annular flame rim, an upright annular wall spaced outwardly therefrom, and means for causing oil and air to be mixed into an atomized mixture and distributed between said flame rim and said annular wall, of an ignition apparatus comprising an intermediate electrode consisting of an upper portion of said flame rim, said intermediate electrode having a pair of openings therethrough, a pair of rod electrodes each spaced inwardly from said intermediate electrode and having an end thereof radially alined with one of said openings therethrough, means for applying electrical potential to the rod electrodes to cause electrical energy in the form of arcs to pass between said ends of said rod electrodes and the periphery of the openings through said intermediate electrode, means for causing air to pass through said openings toward said upright annular wall to cause said arcs to be partially carried through said openings to position between said upright annular wall and said annular flame rim.

2. In an oil burner, a combustion chamber formed by an upright annular confining wall and a floor, said floor having a central opening therethrough concentric with said confining wall, a metallic annular rim extending generally inwardly and upwardly from a lower portion of said confining wall, concentric therewith and terminating substantially below the top of said confining wall, said annular rim having an opening therethrough spaced from a top edge thereof, a rod electrode situated inwardly of and below the top of said annular rim to have an end thereof spaced from said rim in radial alinement with said opening, means for conveying electrical energy to said rod electrode and said annular rim to cause flow of electrical energy in the form of an arc between said rod electrode and said annular rim at the periphery of the opening therethrough, means for flinging oil outwardly from a central portion of said combustion chamber in a horizontal plane spaced slightly above the top of said rim and below the top of said confining wall, means for forcing air to flow upwardly into said central opening through said floor and outwardly and upwardly therefrom to cause a first portion of said air to pass between said oil flinging means and said annular rim and to cause a second portion of said air to pass through said opening in said annular rim to cause a part of said arc to be wafted through said opening to position between said rim and said confining wall, said oil flinging means and said air forcing means together being adapted to cause mixing of said oil and air into a combustible, atomized oil-air mixture in the area above the top of said annular rim, and said annular rim being so positioned as to cause a portion of said atomized oil-air mixture to descend between said rim and said confining wall.

3. In an oil burner, a combustion chamber formed by an upright annular confining wall and a floor, said floor having a central opening therethrough concentric with said confining wall, a metallic annular rim extending generally inwardly and upwardly from a lower portion of said confining wall, concentric therewith and terminating at a position substantially below the top of said confining wall, said annular rim having a pair of openings therethrough spaced from a top edge thereof, a pair of rod electrodes each situated inwardly of and below the top of said annular rim to have an end thereof spaced from said rim in radial alinement with one of said openings therethrough, means for conveying electrical energy to said rod electrodes to cause flow of electrical energy in the form of arcs between said rod electrodes and said annular rim at the periphery of each of the openings therethrough, means for flinging oil outwardly from a central portion of said combustion chamber in a horizontal plane spaced slightly above the top of said rim and below the top of said confining wall, means for forcing air to flow upwardly into said central opening in said floor and outwardly and upwardly therefrom to cause a first portion of said air to pass between said oil flinging means and said annular rim and to cause a second portion of said air to pass through said openings in said annular rim to cause a part of said arcs to be wafted through said openings to position between said rim and said confining wall, said oil flinging means and said air forcing means together being adapted to cause mixing of said oil and air into a combustible, atomized oil-air mixture in the area above the top of said annular rim, said annular rim being so positioned as to cause a portion of said atomized oil-air mixture to descend between said rim and said confining wall.

4. In an oil burner, an upright annular confining wall, a horizontally disposed flame rim J-shape in radial cross-section concentric with said confining wall and having an upwardly extending outer wall in contact with an interior surface of said confining wall and an upwardly extending inner wall spaced from and terminating at elevation below the top of said outer wall, an annular metallic flange integral with said inner wall, extending obliquely upwardly and

inwardly therefrom, terminating at elevation below the top of said outer wall and having a pair of openings therethrough spaced from the top thereof, a pair of rod electrodes each situated inwardly of and below the top of said annular metallic flange to have an end thereof spaced from said flange in radial alinement with one of said openings therethrough, means for conveying electrical energy to said rod electrodes to cause flow of electrical energy in the form of arcs between said rod electrodes and said annular metallic flange at the periphery of each of said openings therethrough, a disc shaped member supported in concentric relation to said confining wall for rotary movement in a horizontal plane passing above the top of said annular flange and below the top of said outer flame rim wall, means for depositing oil on said disc shaped member, a conduit concentric with and below said confining wall, means for forcing air upwardly through said conduit and upwardly and outwardly from the top thereof to cause a first portion of said air to pass between said disc shaped member and said annular flange and to cause a second portion of said air to pass through said openings in said annular flange to cause a part of said arcs to be wafted through said openings to position between said upwardly extending outer wall of the flame rim and said annular flange, means for rotating said disc shaped member at sufficiently high rate of speed to cause oil deposited thereon to be thrown centrifugally from said disc shaped member radially toward said confining wall, said disc shaped member, said means for rotating said disc

shaped member and said air forcing means together being adpated to cause mixing of oil and air into a combustible, atomized oil-air mixture in the area above the top of said annular flange, and said annular flange being so positioned as to cause a portion of said atomized oil-air mixture to descend between said upwardly extending outer wall of said flame rim and said annular flange.

LAIRD C. McKEE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,671,340	Bird	May 20, 1920
1,569,580	Scheminger	Jan. 12, 1926
1,931,083	Rodler	Oct. 17, 1933
2,027,699	Perdrisat	Jan. 14, 1936
2,039,937	Shroeder	May 5, 1936
2,067,097	Powers	Jan. 5, 1937
2,113,870	Beckett	Apr. 12, 1938
2,117,781	Wilson	May 17, 1938
2,130,471	Powers	Sept. 20, 1938
2,161,222	Beckett	June 6, 1939
2,161,436	Smith et al.	June 6, 1939
2,403,860	Heath	July 9, 1946
2,412,655	Shannon	Dec. 17, 1946
2,443,556	Fairbanks	June 15, 1948

FOREIGN PATENTS

Number	Country	Date
747,324	France	Mar. 28, 1933