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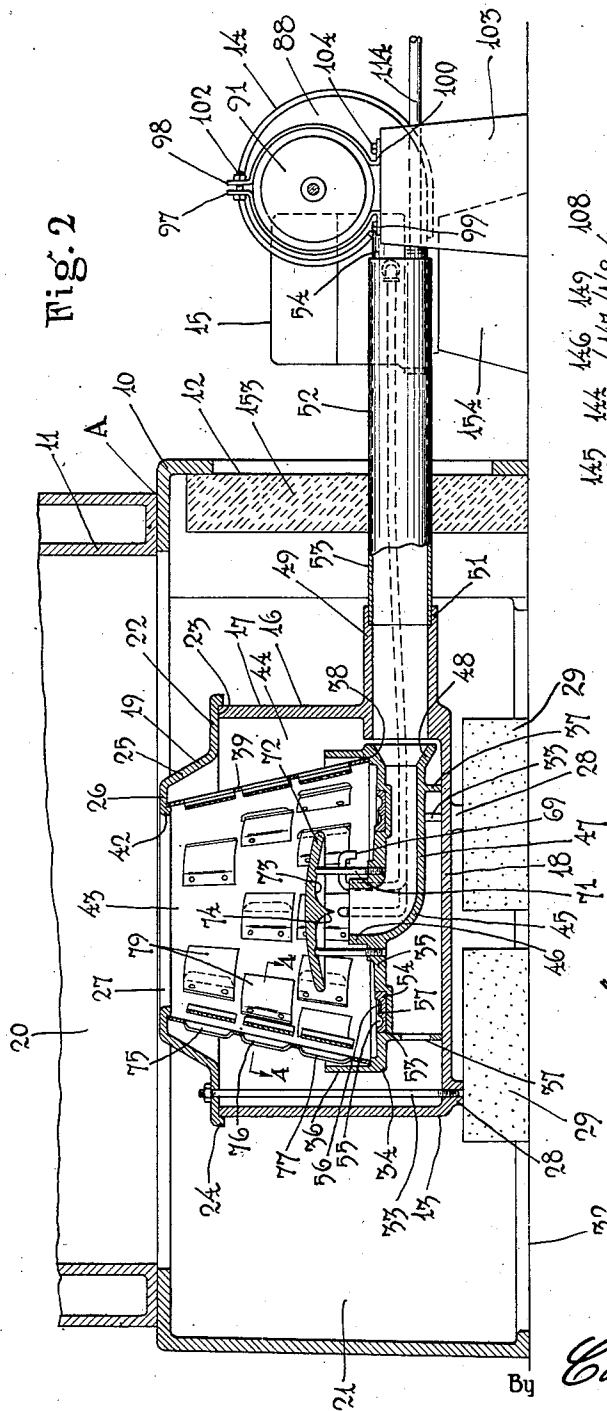
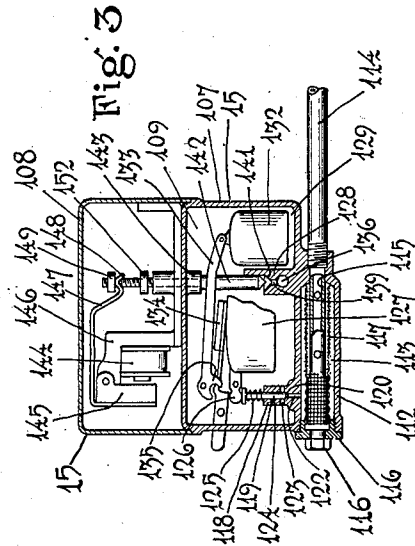
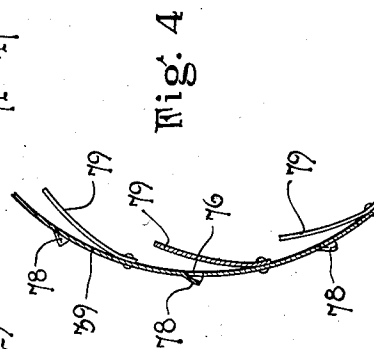
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OIL BURNER

Filed May 23, 1936

3 Sheets-Sheet 2



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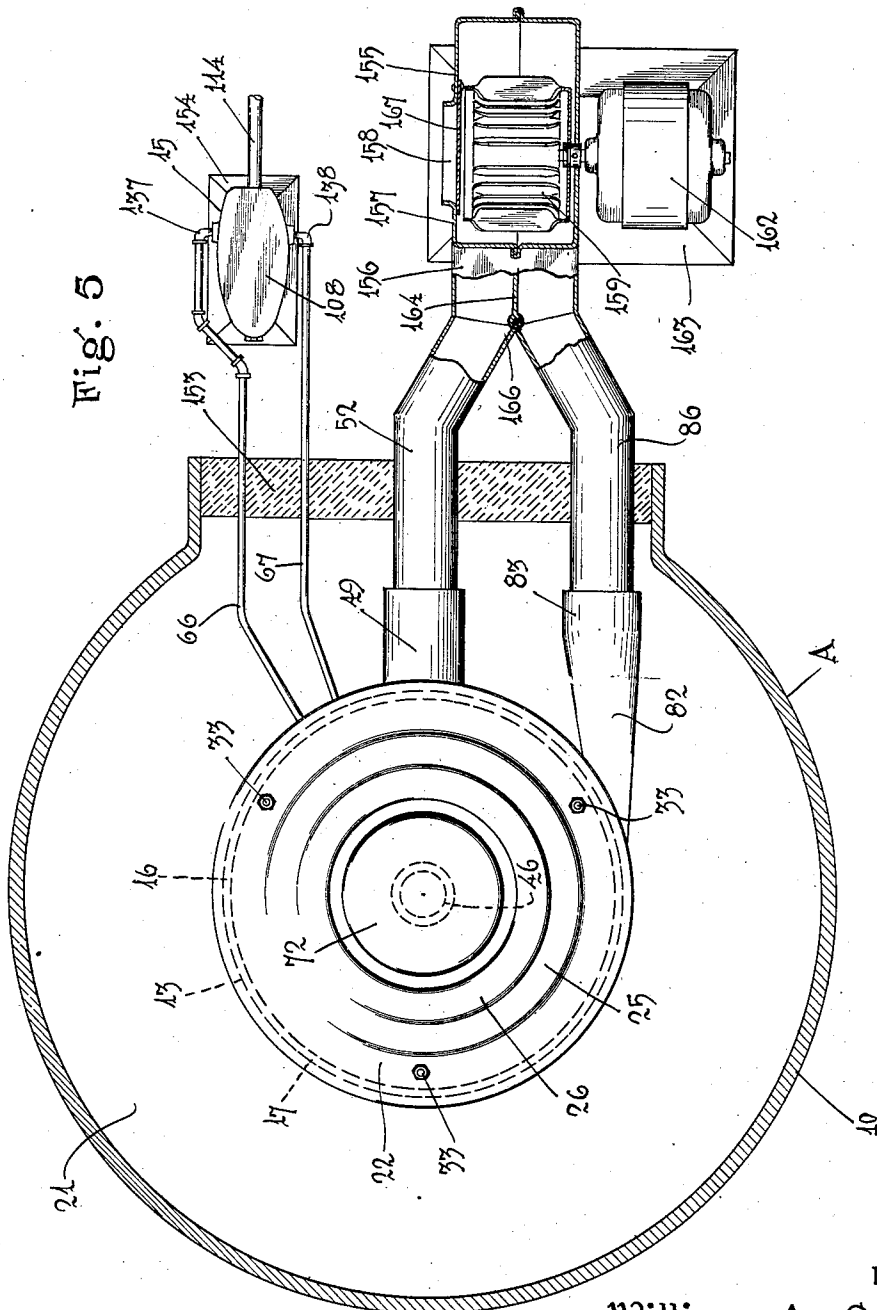
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UNITED STATES PATENT OFFICE

2,138,246

OIL BURNER

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Application May 23, 1936, Serial No. 81,414

1 Claim. (Cl. 158—92)

My invention relates to oil burners and has for an object to provide an oil burner in which combustion is procured in an extremely efficient manner.

5 Another object of my invention resides in providing an oil burner in which a certain amount of air is first mixed with the fuel and in which additional air is thereafter mixed with the fuel in a manner to procure thorough admixture of fuel
10 and air.

An object of the invention resides in providing an oil burner in which a central chamber circular in cross section and open at one end is provided and in which oil is introduced into the
15 chamber at the end thereof opposite the open end and in which air is introduced at the same end of the chamber and caused to travel axially with respect thereto, and in which auxiliary air is caused to enter the chamber substantially tangentially thereof and to circle within the chamber and to mix with the fuel mixture formed
20 therein.

A feature of the invention resides in constructing the central chamber in the form of a truncated cone in which the opening is at the smaller end of the cone and in which the primary air and oil is introduced into the chamber at the larger end thereof.

25 Another object of the invention resides in providing a case having an annular partition therein forming within the case the central chamber and an annular chamber encircling the central chamber.

30 An object of the invention resides in introducing the oil and primary air into the central chamber at the lower end thereof and in directing air into said annular chamber and causing such air to enter the central chamber substantially tangentially of said partition and to circle
40 within the same.

A feature of the invention resides in the specific construction by means of which the air directed into the annular chamber is caused to enter the central chamber and to circle within the
45 same.

Another object of the invention resides in providing a tray within the case cooperating with said partition to form the chambers therein.

50 An object of the invention resides in providing in said tray an annular recess and in disposing within said recess an oil ring having an oil groove therein.

A feature of the invention resides in directing
55 the air entering the lowermost portion of said

central chamber over said oil groove to vaporize the oil within the same.

A still further object of the invention resides in providing two dams extending across said groove and in delivering oil at different rates of
5 flow to the two pockets formed in said groove by means of said dams.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.
10

In the drawings:

Fig. 1 is a sectional view partly in plan of a portion of a furnace illustrating an embodiment
15 of my invention installed therein and showing a portion of the oil burner in section.

Fig. 2 is a vertical sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view of the control mechanism shown in Fig. 1.
20

Fig. 4 is a fragmentary plan sectional view of the partition of the invention taken on line 4—4 of Fig. 2.

Fig. 5 is a view similar to Fig. 1 showing a
25 modification of the invention.

For the purpose of illustrating the application of my invention, I have shown in the drawings a portion of a boiler which is indicated by the reference numeral A. This boiler includes an ash pit section 10 and a combustion chamber section 11, both constructed in the customary manner. Since the invention may be applied to any type of boiler and since the details of construction of the boiler A form no feature of the invention, only so much thereof has been shown as is needed
35 to illustrate the application of my invention thereto. The combustion chamber section 11 is provided with a combustion chamber 20 and the section 10 is constructed with an ash pit chamber 21. The ash pit section 10 is further provided
40 with an opening 12 serving as an ash door opening which communicates with chamber 21. In the installation of my invention the closure for said opening is removed and has not been shown in the drawings.
45

The invention proper consists of an air supply chamber 13, air impelling means 14 and a control mechanism 15. These various parts will now be described in detail.

The air supply chamber 13 comprises a case 50 16 preferably cylindrical in form having a cylindrical wall 17 and a bottom 18 integral therewith. The case 16 is provided with three legs 28 which rest upon bricks 29 or other suitable supports disposed upon the floor 32 of the room in which
55

the boiler is installed. This case is open at the top and is adapted to be partially closed by means of a collar 19 which has a flange 22 resting upon the upper edge 23 of the cylindrical wall 17 of said case. A lip 24 formed on the edge of the flange 22 engages the outer surface of the wall 17 and holds the collar 19 centered upon said wall. Collar 19 is constructed with a frusto-conical wall 25 which extends upwardly from the flange 22 and which merges into another flange 26 extending inwardly from said wall. This flange is constructed with an opening 27 which is concentric with the cylindrical wall 17 and through which the fuel mixture and products of combustion pass from the air supply chamber 13 and into the combustion chamber 20 of the boiler A. The collar 19 is held attached to the case 16 by means of bolts 33 which extend through said collar and case and which are screwed into the legs 28.

Within the case 16 is mounted a tray 34. This tray is constructed with a bottom 35 and a rim 36 extending upwardly therefrom. Tray 34 is also provided with three legs 37 which issue from the bottom 35 and which rest upon the bottom 18 of case 16 and hold said tray supported in spaced relation to said bottom. The tray 34 is of lesser diameter than the inner diameter of the circular wall 17 and is centrally disposed within said wall so that the rim 36 is uniformly spaced throughout its extent from the wall 17. At the corner between the rim 36 and bottom 35 of tray 34 is an annular recess 38. An annular partition 39 rests upon this recess and extends upwardly to the flange 26 of collar 19. A lip 42 encircling the opening 27 in said collar engages the uppermost portion of the partition 39 and holds the same in proper relation with respect to the tray 34 and case 16. Partition 39 is frusto-conical in form as shown and is arranged with its smaller end uppermost. This partition forms in conjunction with the tray 34 a central chamber 43 and in conjunction with said case an annular chamber 44 encircling said central chamber. The central chamber 43 serves as a mixing and combustion chamber and communicates with the combustion chamber 20 in boiler A through the opening 27 in the collar 19.

Air is directed into the chamber 43 centrally thereof by means of an elbow 45 formed in the tray 34 and provided with an axially disposed nozzle 46 extending into chamber 43. The elbow 45 is also provided with a duct 47 which extends horizontally up to the rim 36 of said tray and terminates in a funnel 48. The elbow 45 is preferably cast integral with the tray 34, as shown.

Air is directed into the case 16 and through elbow 45 by means of a nipple 49 which is cast integral with the circular wall 17 of case 16 and which extends outwardly therefrom. This nipple is open at its ends and the inner end thereof is disposed in direct alignment with the funnel 48 so that air passing through said nipple is directed into the elbow 45 and discharged vertically upwardly therefrom through the nozzle 46. Nipple 49 is recessed as indicated at 51 to receive a conduit 52. Conduit 52 is constructed with two telescoping sections 53 and 53 which slide relative to one another and which serve a purpose to be subsequently more fully described. Section 53 extends outwardly through the ash pit opening 12 and outwardly beyond the boiler where the same is connected to the air impelling means 14 previously referred to.

In the bottom 35 of the tray 34 is constructed an annular recess 53 in which is mounted an oil ring 54. This oil ring is provided with two annular grooves 55 and 56 separated by a ridge 57. The ridge 57 is somewhat lower than the marginal portions of said ring and the bottom of the groove 56 is slightly elevated above the bottom of the groove 55 so that oil directed into groove 56 may overflow over the ridge 57 and into groove 55. The oil ring 54 is preferably constructed of some material which readily transmits heat such as brass, copper or aluminum so that said ring becomes easily and quickly heated and thereby effectively vaporizes the fuel directed into the grooves 55 and 56. Extending across the two grooves 55 and 56 are two dams 58 and 59 which divide the groove 55 into companion pockets 62 and 63 and the groove 56 into companion pockets 64 and 65. The pockets 62 and 64 are considerably smaller than the pockets 63 and 65 and consequently hold less oil than the latter pockets which serve a purpose to be presently more fully described. Oil is fed into the pockets 64 and 65 of groove 56 by means of two fuel pipes 66 and 67. These pipes are connected to the control mechanism 15 and extend through the cylindrical wall 17 of case 16 at an elevation below the bottom 35 of tray 34. These pipes also extend up through the bottom 35 of said tray inwardly of the oil ring 54 and are provided with downwardly directed discharge spouts 68 and 69 best shown in Fig. 1. These spouts are so disposed that the oil leaving the same passes directly into the groove 56. The spouts are arranged one on each side of the partition 39 so that the spout 68 discharges into pocket 64 and spout 69 discharges into pocket 65. By means of the control mechanism 15 the rate of flow of oil through the pipes 66 and 67 is regulated so that the proper amount of oil is delivered to the fire pot at all times.

The air entering the chamber 43 through nozzle 46 is directed against a spreader 72. Spreader 72 is disposed centrally within the chamber 43 and in spaced relation to the uppermost portion of the nozzle 46 and is so held by means of a number of posts 71 which are screwed into the bottom 35 of tray 34. The spreader 72, is constructed with an arcuate surface 73 upon the underside thereof and with an inverted conical center 74 which causes the air impinging upon the surface 73 to spread outwardly and to be deflected downwardly over the uppermost surface of the oil ring 54 and across the two grooves 55 and 56 therein. In operation the ring 54 is maintained hot by combustion in the fire pot 13 and the oil discharged upon the same vaporizes. The air leaving the spreader 72 mixes with the fuel vapor thus formed and rises upwardly as will be hereinafter more fully described.

In the operation of my improved oil burner, the oil vapor is first mixed with the air entering chamber 43 through nozzle 46 and is thereafter further mixed with air introduced substantially tangentially through the partition 39, which latter air is caused to circle within the chamber 43 and thoroughly intermixed with the previously formed mixture of air and oil. This is accomplished as follows: In the partition 39 are formed three sets of vertically arranged slots 75, 76 and 77 which are disposed in three circles, one above the other, said slots extending along elements of the conical partition 39. Within certain limits the number of slots may be varied, though I have found that highly efficient results are produced by utilizing 75

six slots for the upper row, eight slots for the intermediate row and twelve slots for the lower row. The partition 39 is preferably constructed of sheet metal and the slots 75, 76 and 77 are preferably formed by striking out the metal of said partition and bending the same outwardly to form spiral deflectors 78 at each slot. The air is caused to travel circularly in the annular chamber 44 and the deflectors 78 serve to direct the air so traveling through the slots 75, 76 and 77 and into the chamber 43. The air on entering said chamber travels substantially tangentially. To procure circular movement of the air within said chamber a number of baffles 79 are employed, there being one baffle for each of the slots 75, 76 and 77. These baffles are attached to the partition 38, upon the interior thereof and extend spirally inwardly therefrom as best shown in Fig. 4. The air entering the chamber 43 through the slots 75, 76 and 77 mixes with the fuel mixture already formed within said chamber and causes the fuel to be uniformly distributed throughout the entire mixture, thereby causing extremely effective combustion. By the rotation of the air entering chamber 43 through slots 75, 76 and 77, the flame is kept away from the partition 39 and collar 19 so that combustion is maintained in the center of the chamber 43 and in the combustion chamber 20. This heats the spreader 72 and the oil ring 54. The air entering chamber 43 through nozzle 46 being itself extremely hot through engagement with spreader 72 assists in further vaporizing the fuel as the fuel is picked up in the passage of the incoming air across the oil ring 54. Air is directed into chamber 44 by means of an air nozzle 82 best shown in Fig. 1. This nozzle is of substantially the entire height of the wall 17 of case 16 and terminates at its outer end in a circular nipple 83. This nipple similar to the nipple 49 is constructed with a recess 84 which receives a section 85 of a telescoping conduit 86. The discharge passageway 87 in nozzle 82 is substantially tangential with respect to wall 17 so that the air directed into said chamber circles within the said chamber in the direction shown by the arrow. The rotary motion imparted to the air by means of nozzle 82 causes the air passing through the slots 75, 76 and 77 as previously explained to circle in the central chamber 43 and to function in the manner described.

The air impelling means 14 consists of two blowers 88 and 89 which are driven by an electric motor 91. These blowers and the motor 91 are mounted on a foundation 103 secured to the floor 32 in front of the ash pit opening 12. These blowers are provided with the usual inlets 93, outlets 94 and the other usual parts. Inasmuch as any type of motor driven blower such as is now well known in the art may be used the detailed construction thereof will not be described in this application. The outlets 94 are connected to the two conduits 52 and 86 and when the motor 91 operates, air is drawn through the inlets 93 and caused to flow through said conduits and into the chamber 43, as previously described. Adjustable closures 168 operating in conjunction with the inlets 93 control the flow of air from the two blowers to the oil burner.

The control mechanism 15 may be of any desired type and preferably of the type in which the oil may be fed to the burner at two different rates controlled by the room thermostat. With such control mechanism oil is fed to the pipes 66 and 67 at different rates, and the flow of oil to said pipes controlled by suitable valve mechanism

which is operated by the thermostat. When the thermostat calls for heat, oil flows through both pipes and the burner operates with a maximum size flame. When the thermostat calls for less heat the amount of oil flowing through pipe 67 is reduced so that the total oil to the burner is less. In such case the burner operates with a minimum size flame. In mild weather the pipe 67 may be completely shut off when the thermostat calls for less heat.

In the installation of the oil burner, the air supply chamber 13 is first placed and the inner sections of the conduits 85 and 52 mounted in the nipples 83 and 49. Pipes 66 and 67 are then run. The ash pit opening 12 is next bricked up as indicated at 153. Thereafter the foundations 154 and 103 are placed and the rest of the installation proceeded with. Due to the telescoping of the conduits 85 and 52, these foundations may be located wherever convenient and proper connections with the blowers 88 and 89 had by adjusting the sections of said conduits.

In Fig. 5 I have shown a modification of the invention. The oil burner illustrated in Fig. 5 is substantially identical with that shown in Fig. 1 and the corresponding parts have not been illustrated in detail. The parts shown have also been given the same reference numerals and the description thereof will not be repeated. This form of the invention differs from that shown in Fig. 1 in that a single blower 155 is used to furnish air to both of the air conduits 52 and 86. These conduits are brought together and connected to a single outlet 156 formed on the case 157 of blower 155. This blower has an inlet 158 and is provided with a rotor 159 driven by a motor 162. Motor 162 rests upon a foundation 163 the same as the foundation 103. The outlet 156 is constructed with a divider 164 which divides the air stream into two component parts, each directed into the respective conduits 52 and 86. This divider is pivoted as indicated at 166 so that the division of air into the two conduits 52 and 86 may be controlled at will. An adjustable closure 169 over the inlet 158 controls the volume of air delivered to the oil burner.

The advantages of my invention are manifest. With my invention any grade of oil may be effectively and efficiently burned. Complete mixing of the oil vapor with the air is procured so that little or no carbonization results. By the use of air streams as specified, the intense part of the flame is kept away from the structure of the fire pot so that injury to the same is prevented. My invention can be constructed at a reasonable cost. With my invention there are no moving parts except the motor and blower so that there is nothing to get out of order. With my invention uniform temperature can be procured. By properly adjusting the oil control valves only slight variations in flame size need be tolerated in changing from high to low flame and vice versa. In this manner, maximum efficiency is procured.

Changes in the specific form of my invention, as herein disclosed, may be made within the scope of what is claimed without departing from the spirit of my invention.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

In an oil burner, a case having an opening at the top, a tray at the lowermost portion of the case, an annular partition within said case forming in said case a central chamber communicating with said opening and an annular chamber encircling the central chamber, said tray having an

annular recess therein, an oil ring removably disposed within said recess and having an annular groove therein, two dams extending across said groove in spaced relation, means for delivering
5 fuel oil into said groove on one side of one of said dams and at a certain rate of flow, means for delivering fuel oil into said groove and on the other side of said dam and at another rate of flow,

means for directing air through said tray into said central chamber, means for directing the air entering said central chamber over the groove in said oil ring, means for directing air into said annular chamber, and passageways in said partition for directing the air entering said annular
8 chamber laterally into said central chamber.

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