Feb. 16, 1954 W. H. DE LANCEY 2,669,184

OIL BURNING APPARATUS

Filed March 31, 1949 4 Sheets-Sheet 1

Fig. 1.

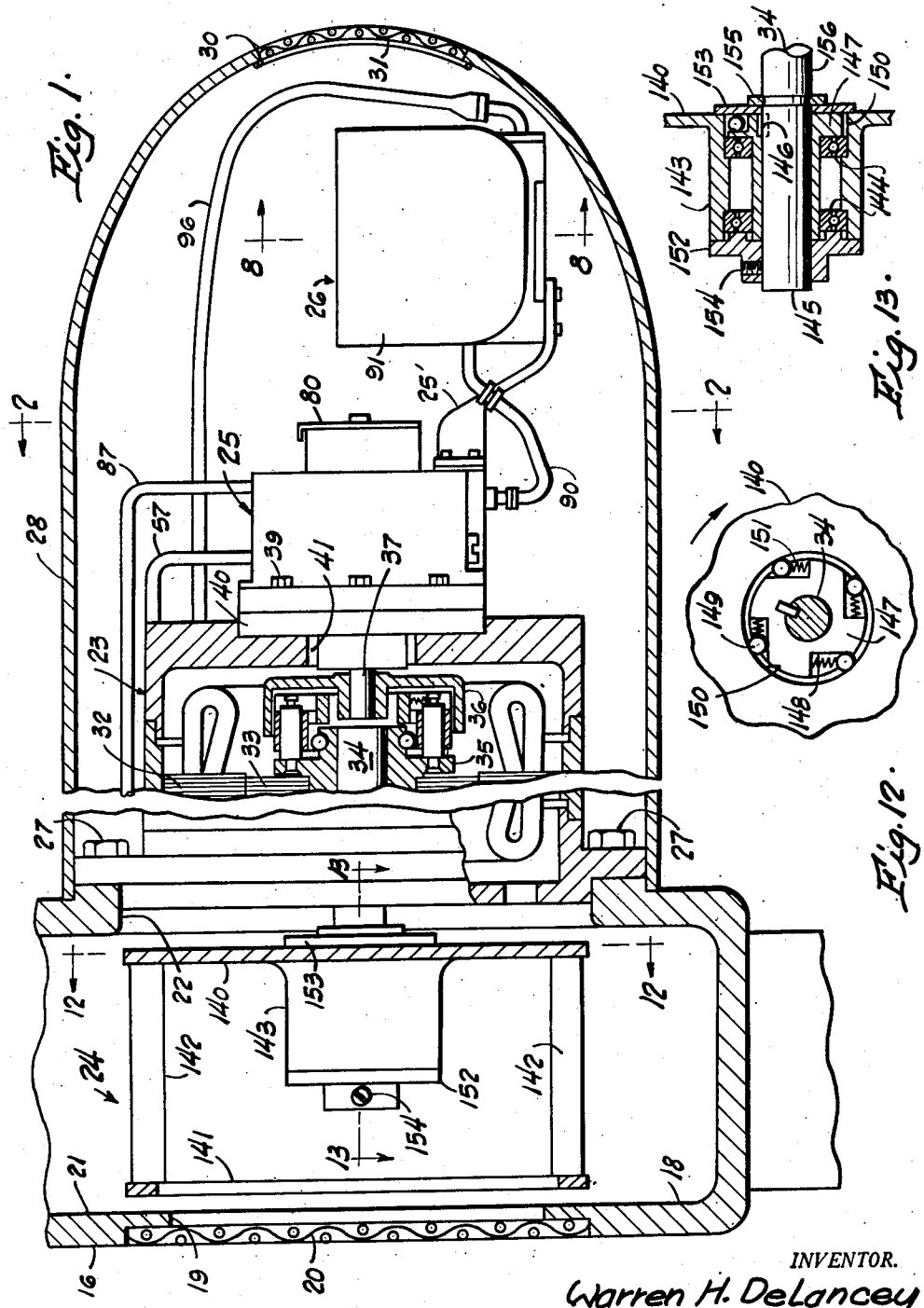


Fig. 13.

2 2

Fig. 12.

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OIL BURNING APPARATUS

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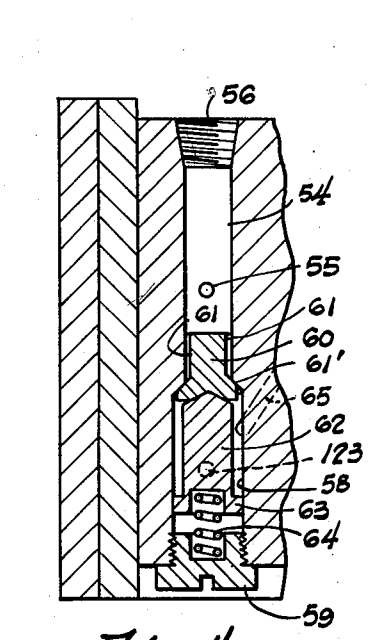


Fig. 4.

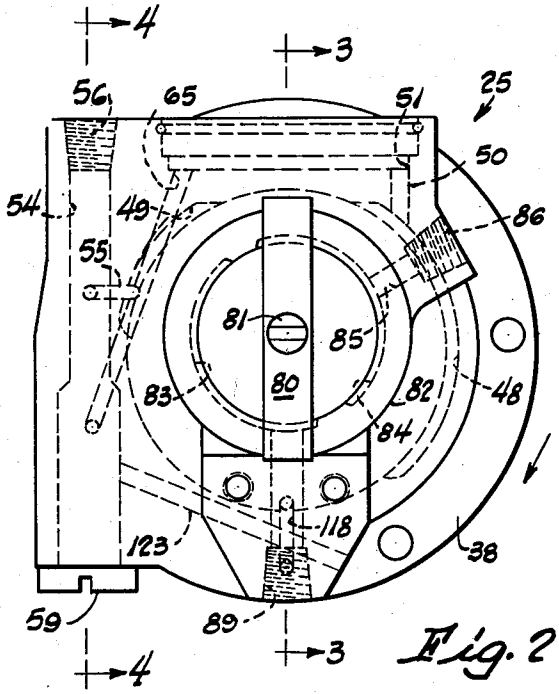


Fig. 2.

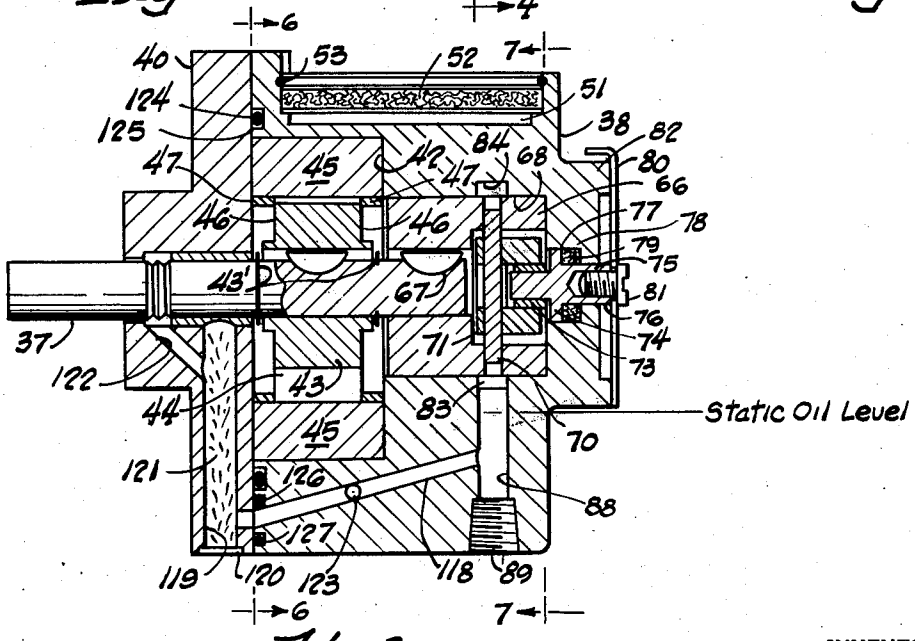


Fig. 3.

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OIL BURNING APPARATUS

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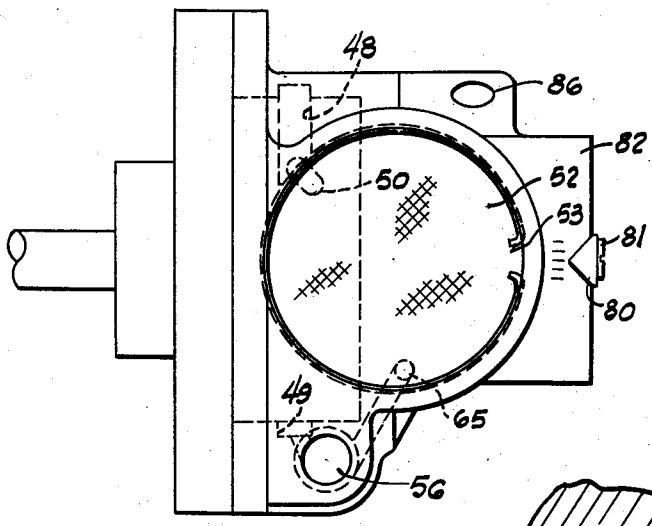


Fig. 5.

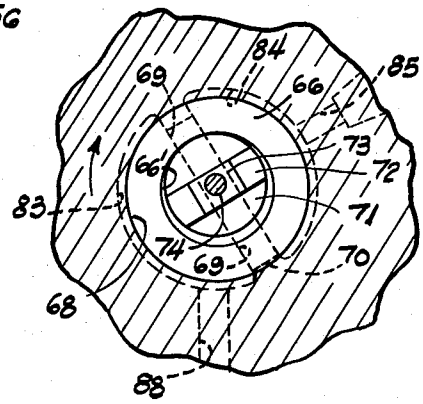


Fig. 7.

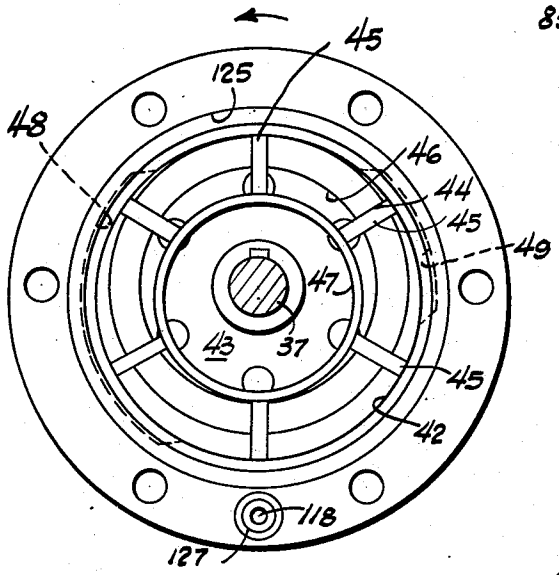


Fig. 6.

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OIL BURNING APPARATUS

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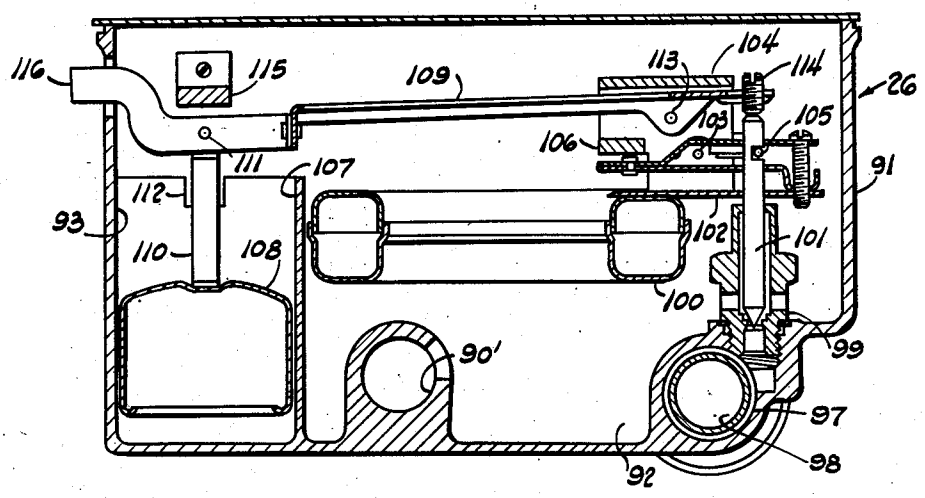


Fig. 8.

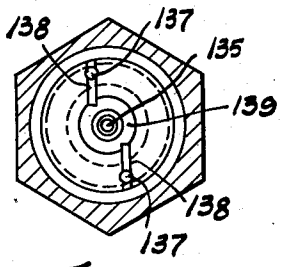


Fig. 10.

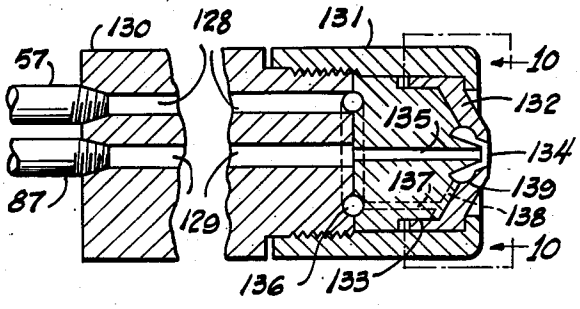


Fig. 9.

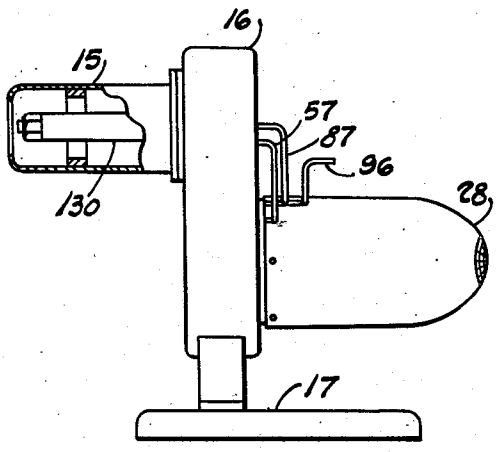


Fig. 11.

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UNITED STATES PATENT OFFICE

2,669,184

OIL BURNING APPARATUS

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Application March 31, 1949, Serial No. 84,505

3 Claims. (Cl. 103—4)

1

The present invention relates to air-atomizing oil burning apparatus which are sometimes referred to as low pressure type burners. Such burners require primary and secondary supplies of air for facilitating the proper combustion of the fuel, and they are generally adapted to consume oil at a low rate in the amount per hour, so that they may be employed with small size heaters for domestic house and hot water heating and the like apparatus. When so employed, burners of this type usually consume substantially less than one gallon per hour.

A primary object of the present invention is to provide an improved oil burning apparatus of the above described type which, although adapted to utilize a nozzle with a relatively large orifice, is, at the same time, so constructed that it will efficiently consume fuel at a low rate in the amount per hour.

A further object of the present invention is to provide an air-atomizing type burner with a fuel supply system which will require no valve means for controlling the flow of fuel from the fuel pump to the burner nozzle.

A still further object of the present invention is to provide an oil burning apparatus of the above described type which is so constructed that it will be most inexpensive of manufacture and upkeep.

Yet another object of the present invention is to provide a burner of the above described type with means whereby the secondary flow of air will be continued long after the primary air flow and the flow of fuel to the nozzle has ceased, thereby to insure that the burner blast tube and the furnace itself will be properly purged of any and all residual fuel fumes.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will readily be understood by those skilled in the art.

In the drawings,

Fig. 1 represents a sectional elevational view of a portion of an oil burning apparatus embodying the present invention.

Fig. 2 represents, on an enlarged scale, an end view of an air and fuel pump unit, which view is taken substantially along the line 2—2 of Fig. 1.

Fig. 3 represents a sectional view of the air and fuel pump unit taken substantially along the line 3—3 of Fig. 2.

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Fig. 4 represents a sectional view of an air valving unit which is taken substantially along line 4—4 of Fig. 2.

Fig. 5 represents a top plan view of the air and fuel pumping unit which is disclosed in Figs. 2 and 3.

Fig. 6 represents a sectional view taken substantially along the line 6—6 of Fig. 3.

Fig. 7 represents a sectional view taken substantially along the line 7—7 of Fig. 3.

Fig. 8 represents, on an enlarged scale, a sectional view taken substantially along the line 8—8 of Fig. 1.

Fig. 9 represents, on an enlarged scale, a fragmentary longitudinal sectional view of the atomizing nozzle employed in the present burner.

Fig. 10 represents a sectional view of the burner nozzle taken substantially along the line 10—10 of Fig. 9.

Fig. 11 represents, on a small scale, a side elevational view showing an oil burner unit in which the present invention is embodied.

Fig. 12 represents a sectional view taken substantially along the line 12—12 of Fig. 1.

Fig. 13 represents a sectional view taken substantially along the line 13—13 of Fig. 1.

Referring particularly to Figs. 1 and 11, there is disclosed an oil burner apparatus in which the present invention is incorporated. This burner apparatus includes an air conduit or blast tube 15 leading from the outlet portion of an air-supply housing 16. This housing 16 is mounted, in turn, upon a base member 17 which is adapted to rest upon a floor surface and support the entire burner assembly.

The housing 16 has a fan chamber 18 which is provided at one side thereof with an aperture 19, through which air may gain entrance into the chamber. This opening may be covered by a filter screen 20. Air is adapted to be delivered from the fan chamber 18 to a plenum chamber 21 and then out through the blast tube 15. When in use, the oil burner apparatus is positioned so that the discharge end of the blast tube 15 extends into the firebox or combustion chamber of a furnace.

As may be particularly noted in Fig. 1, the chamber 18 is provided with a wall opening 22 in which is mounted an electric motor which is generally designated by the numeral 23. It will be understood that this motor has a centrifugal type fan 24 secured at one end portion thereof, and an air and fuel pumping unit 25 secured at the other end thereof. Secured upon the right-hand end portion of the air and fuel pumping unit 25, by means of bracket 25', is a float valve apparatus generally designated by the numeral

26. From this, it is to be understood that the elements 23, 24, 25 and 26 are all secured together so as to form an unitary structure which may be readily applied to or dismounted from the casing 16 as a single unit. Bolts 27, 27 are threaded into the casing 16 so as to maintain the motor, along with its above noted auxiliary elements, in a proper position, and an enclosure shell 28 may be suitably connected with the casing 16 so as to cover the motor 23 and such auxiliary elements. The right-hand end portion of the shell 28 is provided with an opening 30 in which is secured a filter screen 31 which functions to filter air which is drawn into the above noted fuel and air pumping element 25 in a manner as will be hereinafter described.

The present electric motor includes the usual stator and rotor elements 32 and 33. The stator 32 may be connected to a suitable source of power by means of conventional conductors which are not disclosed herein. Secured to the rotor 33 is a rotor shaft 34 which has secured thereupon a plate 35 which forms the driving portion of a centrifugal or speed-responsive clutch, the driven portion of which is designated by the numeral 36. This centrifugal clutch is of a conventional design, and the driven member 36 thereof is secured directly upon the distal end of an air and fuel pump shaft 37. Such a clutch is shown in my Patent No. 2,364,132, granted December 5, 1944.

Referring particularly to Figs. 1, 3, and 5, the present air and fuel pump unit 25 comprises a substantially cylindrical housing 38 which is secured by means of bolts 39 to a mounting or end plate 40. This mounting plate 40 is secured by suitable bolts, not herein shown, to the right-hand end portion of the motor casing, so that the shaft 37 of the unit 25 may project through an opening 41 formed within the motor housing. It is to be understood that the shaft 37 is disposed coaxially of the motor shaft 34 and as hereinabove noted, the distal end portion of the shaft 37 is connected to the motor shaft by means of a speed-responsive clutch.

The air pump disposed within the unit 25 is of the positively-acting displacement type, and to receive this pump, the housing 38 is provided at its left-hand portion with a cylindrical recess 42 which is normally closed over by means of the mounting or end plate 40. This cylindrical recess 42 is located eccentrically of the pump shaft 37 and has disposed therein and coaxially of the shaft, a pump rotor 43. This rotor 43 is provided with a series of radial slots 44, 44, each one of which is adapted to receive a sliding blade 45. The outer edges of these blades engage the inner peripheral wall of the recess 42 so as to produce a pumping action. As may be particularly noted in Fig. 3, the end faces of the rotor 43 have annular recesses 46, 46 in each side thereof so as to receive rings 47. The ends of each blade 45 rest upon the outer peripheral surface of these rings, and are thereby held with the outer edge of each in contact with the inner peripheral surface of the recess 42. Snap rings 43', 43' recessed within the shaft 37 prevent the shaft 37 from shifting lengthwise of the casing 38. Inlet and outlet ports 48 and 49, respectively, are formed as arcuate grooves in the inner end wall of the recess or pump chamber 42. Air enters the spaces between these successive blades from port 48, and is carried in a clockwise direction, as viewed in Fig. 2, and discharged into port 49. Those skilled in the art will readily appreciate that this particular pump construction is generally old and well-known and thus, a more detailed description of the pump is not deemed necessary.

Air is admitted to port 48 by means of a passage 50 which is best disclosed in Figs. 2 and 5. The passage 50 leads from the port 48 to a generally circular recess 51 which, as best disclosed in Fig. 3, is covered over by means of an air filter 52. This filter is held in place by a snap ring 53 engaged in a groove in a peripheral wall of the recess 51. As hereinabove noted, the air may reach the recess 51 by way of the opening 30 provided in the covering shell 28.

The air outlet port 49 is connected to a discharge conduit 54 by way of a short passage 55 (see Figs. 2 and 4) and thus, the air under pressure is forced from the pump into the discharge passage 54.

Referring particularly to Figs. 1, 2, 4, and 5, it is to be understood that the upper portion of the air discharge passage 54 is threaded as at 56, so as to have connected thereto a tube 57 which, as will hereinafter be described, is adapted to conduct this primary source of air to and through the burner nozzle. The lower portion of the passage 54 joins an enlarged passageway 58, the lower portion of which is closed over by means of a threaded nut 59. Disposed within the lower portion of the passageway 54 is a valve 60 provided with four passageways 61. Cooperating with the valve 60 is a plunger 62 having an enlarged base portion 63 which slidingly engages the walls of the passageway 58. A spring 64 engages the nut 59 and the plunger 62 so as to bias both the plunger 62 and the valve 60 toward a valve seat 61', thereby normally to close the passageways 61. The lower end of the plunger 62 is disposed below the normal static oil level as will hereinafter appear, and thus forms a dash pot which prevents the plunger from chattering. Thus, air entering the discharge passage 54 through the conduit 55 is normally forced into the tube 57 so as to be supplied to the burner nozzle.

This primary air pumping unit has a capacity which is always greater than the burner requirements and thus, the pressure of the air supplied, will tend to build up, to the extent that it will overcome the pressure of the valve biasing spring 64 so that the air within the passageway 54 will by-pass the valve 62 and enter the lower passageway 58, from which point it will escape from the housing 38 by way of an inclined escape conduit 65. This latter conduit 65 connects the passageway 58 with the air receiving recess 51 so as properly to relieve the pump, during the normal operation of the burner. As soon as the excess pressure has been relieved, the valve 60 will again be forced upwardly by its spring 64 so as to close off the passageways 61, and thereby force all of the air from the pump to be delivered to the burner nozzle.

The oil pump comprises a rotor 66, the left-hand end portion of which is secured to the drive shaft 37 by means of a key 67. This rotor is mounted in and coaxially of a cylindrical chamber 68 formed within the right-hand end portion of the housing 38. It is to be particularly noted that the chamber 68 communicates directly with the air pump chamber or recess 42. A hole extends diametrically through the annular wall of the rotor 66, forming two cylinders 69, 69. A single piston 70 extends diametrically of the rotor and is slidingly engaged in each of the cylinders 69, 69. Fixed to the piston intermediate its ends is a cylindrical member 71 which lies within an open cylindrical recess portion 66' of the rotor

and may, by adjustment, be positioned eccentrically or coaxially of the rotor. In the outer end face of the member 71 is a diametrical slot 72 which slidably receives a rectangular block 73. Engaged in this block 73 is a round pin 74 which is fixed eccentrically of and on the inner end of a stem 75, the right-hand end portion of which is mounted coaxially of the shaft 37 and within an aperture 76 provided in the right-hand end portion of the housing 38. From this, it will be understood that by turning the stem 75, the axis of the pin 74 may be moved into various positions of eccentricity relative to the axis of the pump rotor 66. This adjustment will, of course, vary the capacity of the pump from zero, when the pin axis is disposed coaxially of the rotor, to maximum, when the pin axis is disposed at its greatest degree of eccentricity relative to the rotor.

The stem 75 is provided intermediate its end portions with a flange 77 which is slidingly received within an opening 78 so as to prevent, in cooperation with packing material 79, the escape of oil through the opening 76 of the housing 38. An indicator arm 80 is carried upon the distal end portion of the stem 75 by means of a screw 81, and this indicator arm cooperates with suitable indicia marked upon a boss 82, so as to indicate the degree of adjustment of the stem 75. The entire stem may be adjusted by a manual movement of the arm 80.

As the rotor 66 rotates clockwise, as viewed in Fig. 7, the outer end of one of the cylinders 69 (the lower one) will communicate with the pump inlet port 83, which takes the form of an arcuate groove disposed within the rotor housing 68. As the rotor turns, the lower cylinder draws out from its piston, creating a partial vacuum to draw in oil and fill the cylinder. At the same time, the other cylinder, which had previously been filled, is brought into communication with the outlet port 84 formed similarly to the port 83, but on the opposite side of the rotor 66. As the rotor turns, the upper cylinder moves in on its piston to force out the oil into the outlet port 84. The outlet port 84 is connected by a radial passage 85 to a threaded aperture 86 which opens at the outside of the casing 38, for the purpose of having connected thereto an oil delivery tube 87.

The oil inlet port 83 is connected directly with a vertically disposed oil supply passage 88 which leads to a threaded aperture 89 which opens out at the lowermost portion of the housing 38, so as to be connected with an oil supply tube 90 which functions to connect the pump with the above-noted float valve device 26 (see Fig. 1).

This float valve device 26 functions to supply oil to the oil pump and, at the same time, to maintain the static level of the oil within the conduit 88 at a height which is below the confines of the pump at all times. In this connection, reference may be had to Fig. 3 wherein this static oil level is indicated. By thus maintaining the oil below the confines of the oil pump, it will be understood that upon rotation of the pump shaft 37, the air pump will be immediately effective to cause a primary supply of air to flow to and through the burner nozzle. However, since the supply oil is maintained within the conduit 88 at a point substantially below the confines of the oil pump, it will be understood that a definite time interval will elapse before the oil pump is effective to draw the oil up through the conduit 88 and to supply the same to and through the burner nozzle. In view of this situation, it will be manifest that whenever the present oil burner apparatus is made operative, the primary source of air will always be supplied to and through the burner nozzle before any oil reaches the latter and thus, proper combustion will always result. Also, it will be appreciated that whenever the pump shaft 37 stops, there will be no tendency for the oil from the supply source to work its way through the pump and towards the burner nozzle, for the static level of the oil within the passage 88 is always maintained below the confines of the pump. Furthermore, since the entire oil pumping apparatus is located at a point below the level of the burner nozzle, there will be no tendency for the nozzle to be supplied with oil, once the pump shaft 37 has ceased to rotate.

The above noted float valve device 26 is best illustrated in Figs. 1 and 8 which disclose this device as comprising a hollow open top casing 91. Referring particularly to Fig. 8, it is to be understood that this casing has formed therein a float chamber 92. In operation, oil flows from a supply tank, not herein shown, by way of a tube 96 which may be connected to an opening 97 formed within the lower portion of the casing 91. This opening 97 may be provided with a cartridge type strainer 98 through which the oil must pass before reaching an inlet valve 99. Oil entering the casing 91 by way of the valve 99, will collect within the float chamber 92 and will ultimately raise a float member 100 which will be effective to shift a needle valve 101 downwardly so as to prevent the upward passage of oil through the inlet valve 99. More specifically, the float member 100, upon raising, will turn a trip lever 102 which is pivoted by means of a pin 103 upon a stationary bracket 104, thereby to swing the right-hand end portion of the trip lever 102 downwardly. It is to be particularly noted that the trip lever 102 carries a pin 105 which engages an opening in the needle valve 101 so as to lower the latter, thereby closing off the inlet valve 99. The float member may be welded or otherwise secured to the trip lever 102. The above noted delivery tube 90 is connected directly to the chamber 92, as at 90', so as to deliver the oil to the conduit 88 of the oil pump casing. The float valve device is so located relative to the oil pump by means of the bracket 25 that the static level of the oil is always maintained at a height as indicated best in Fig. 3.

If desired, a magnetic counterbalance 106 may be carried by the bracket 104 for effectively reducing the weight of the float 100, as the latter approaches the magnet and this action results in a more constant level of oil in the chamber 92. Thus, the above float valve apparatus will be effective to maintain within the pump supply conduit 88, a constant static level which will be disposed at all times a substantial distance below the confines of the oil pump.

Still referring to Fig. 8, the present float valve device may be provided with a secondary chamber 107 within which is provided a secondary float 108. This float 108 is pivotally connected to one end of a yoke 109 by means of a rod 110 and a pin 111. In the event that the float 100 should not function properly, the oil within the chamber 92 will spill into the secondary chamber 107 by way of a notch 112 so as to raise the float 108, thereby to raise the left-hand end of the yoke 109 which is pivoted to the bracket 104 by means of a pin 113. This movement of the yoke 109 will be effective to force the needle valve 101 downwardly to its closed position through

the medium of a screw 114. Actually, when the left-hand end of the yoke 109 moves into the field of a second magnet 114, the needle valve 101 will be snapped into its closed position where it will remain until the second float 108 is manually reset by means of a hand lever 115 which projects from the yoke 109. Thus, this second float 108 with its yoke 109, functions as a safety mechanism which will operate only in the event that the main portion of the float mechanism fails to operate properly. The particular construction details of the above noted float valve mechanism do not form a part of the present invention and thus, they have been described only in sufficient detail so that a complete understanding of the functioning of the present invention may be appreciated.

Referring again to Figs. 2, 3, and 4, it is to be noted that the oil supply conduit 88 has communicating therewith an inclined conduit 118, the lower portion of which opens out of the bottom of a vertically disposed conduit 119 formed within the end plate 40. The bottom of the conduit 119 is closed over by means of a plug 120, while the upper portion thereof is exposed to a portion of the pump shaft 37. Disposed within the conduit 119 is a wick 121 which functions to conduct oil from the passage 118 to the shaft 37 for the purpose of lubricating the same. Such lubricating oil will, of course, work its way toward the left-hand end portion of the shaft 37, and in order to prevent this oil from finding its way into the motor casing, there is formed a return duct 122 which functions to collect this oil and return the same to the wicking 121.

Still referring to Figs. 2, 3, and 4, it is to be particularly noted that the oil and air pumping units are disposed within cavities 68 and 42 formed within the housing 38, which cavities are directly adjacent each other, so that the left-hand end portion of the pump rotor 66 is directly exposed to the cavity 42. From this, it will be readily appreciated that some of the oil within the oil pump unit will find its way into the cavity 42, thereby to lubricate the air pump. However, in the course of time, this lubricating oil will accumulate within the cavity 42 and should be removed so as to prevent the air pump from delivering oil to the burner nozzle. In order to so remove this lubricating oil from the casing 42, the lower portion 58 of the air discharge conduit 54 is provided with a conduit 123 (see Figs. 2 and 4), the lower end portion of which is connected to the conduit 118 (see Fig. 3). From this, it will be understood that during the operation of the present apparatus, the air pump will tend to discharge its excess lubricating oil into the vertical discharge passageway 54 by way of the air outlet port 55. The air will, of course, pass upwardly within the discharge conduit 54 so as to be delivered to the burner nozzle, but the lubricating oil will condense within the passage 54 and accumulate in and about the valve 60. Thus, whenever the air pressure within the discharge conduit 54 exceeds a predetermined value, the valve 62 will shift downwardly against the force of its biasing spring 64, thereby to bleed off the air in a manner as hereinabove noted. Of course, as soon as the valve 62 is so open, the accumulated oil will drain through the valve seat 60 and into the lower portion 58 of the air discharge conduit, to the end that it will find its way into the conduit 123 which will deliver the same back to the oil supply. Since, as hereinabove noted, the capacity of the air pump is greater than the normal air requirements of the nozzle, the valve 62 will be opened and closed at frequent intervals, so that it will be impossible for undue quantities of lubricating oil to collect within the upper portion of the air discharge conduit 54. From the above, it will be appreciated that the particular air and oil pump construction herein disclosed is most advantageous, for it is not only simple in construction, but it is entirely self-lubricating, and, at the same time, requires no complex packing instrumentalities so as to prevent the escape of oil from the housing 38.

In order to prevent any of the lubricating oil from finding its way from the cavity 42 and past the adjacently disposed faces of the housing 38 and the end wall 40, there is provided between these two faces an annular gasket 124. This gasket is placed in an annular recess 125 formed within the end face of the housing 38. A similar but smaller annular gasket 126 is provided within an annular recess 127 which encircles the passageway 118.

The air and oil discharge ports 56 and 86 of the supply unit are respectively connected by pipes or tubes 57 and 87 to passages 128 and 129 (see Fig. 9) in a member 130. This member comprises a nozzle-carrying unit which is mounted within the blast tube 15 in the usual manner. Fastened to the forward end of the member 130, as by a cap 131 screwed on to the body, is a nozzle unit 132 having a frusto-conical outer end and a member 133 having a complementary shaped part to engage said end and having a nozzle orifice 134. The nozzle body has a central oil discharge passage 135 communicating directly with the passage 129. Formed within the abutting end of the bodies 130 and 133 is an annular passageway 136 receiving air from the passage 128 and discharging it through two longitudinal passages 137. The passages 137 connect one with each of two slots 138 (Fig. 10), the inner ends of which open tangentially into a whirl chamber 139 formed between the meeting frusto-conical parts and surrounding the frusto-conical end of the oil nozzle. Air entering through slots 138 is whirled around in the chamber and issues from the nozzle in a whirling stream surrounding the oil stream. As hereinabove noted, the present apparatus is so devised that upon the rotation of the pump shaft 37, air will be first directed to and through the burner nozzle before any oil is delivered thereto, so as to insure a proper initial combustion of the oil when it finally arrives at the nozzle.

As hereinabove noted, the motor shaft 34 extends through the left-hand end portion of the motor casing so as to have mounted upon the distal end portion of the shaft, the fan 24 which is adapted to supply a secondary source of air to the burner. This secondary source of air, as described hereinabove, is delivered through the blast tube 15 and about the outside of the burner nozzle to insure sufficient combustion of the oil within the furnace combustion chamber. As hereinabove mentioned, the present invention contemplates the provision of an overrunning clutch between the fan 24 and the motor shaft 34, so that the fan may continue to rotate long after the motor has been completely deenergized.

The fan itself is of a conventional design and comprises a circular back plate 140, a front ring 141, and a plurality of blades 142 which are secured between the ring 141 and the back plate 140. Referring particularly to Figs. 12 and 13, it is to be understood that the back plate 140 is pro-

vided with a hollow hub portion 143 which is mounted upon a pair of spaced ball-bearing members 144, 144 which are, in turn, mounted upon a sleeve 145 secured to the shaft 34, as by means of a key 146.

One end portion of the sleeve 145 has formed thereon part of an overrunning or one-way clutch which includes a cylindrical disk 147. About the peripheral portion of the disk 147, there is provided a series of ball-receiving seats 148. Each of these seats is adapted to house a single hardened ball 149 which is normally biased into engagement with a hardened cylindrical wall surface 150 formed within the back plate 140. Coil springs 151 may be provided for biasing the balls 149 outwardly. From the above, it will be understood that the wall surface 150 of the back plate 140 functions in conjunction with the disk 147 and the balls 149 to form a complete overrunning clutch. Referring particularly to Fig. 12, it will be understood that whenever the sleeve 145, with its disk 147, rotates in a clockwise direction, each of the balls 149 will be forced into engagement with the back wall surface 150, to the end that the entire fan unit 24 will be rotated in synchronism therewith. However, in the event that the shaft 34 is decelerated, it should be clear that the fan 24, due to its momentum, will tend to continue its rotation unimpaired by the drag of the sleeve 145, by reason of the fact that such relative rotation between the fan and the disk 147 will force the balls 149 out of effective engagement with the cylindrical surface 150.

It is to be noted that the fan 24 is prevented from shifting longitudinally of the shaft 34 by means of a hub 152 and a washer 153. The hub is secured directly upon the end portion of the shaft 34 as by means of a set screw 154, while the washer 153 is retained in its proper position by means of a snap ring 155. This snap ring may be positioned within a groove 156 formed about the shaft 34 in the usual fashion. This washer 153 also functions as an end cover for one face of the above described clutch.

From the above, it will be appreciated that whenever the motor is energized, it will function immediately to rotate the fan 24 through the medium of the above described overrunning clutch, to the end that air will be supplied through the blast tube 15 to the furnace combustion chamber for the purpose of purging the same of all volatile gases before the oil burner ignition means are fired. After the motor, with its fan 24, reaches a predetermined speed, the centrifugal clutch will become effective to initiate movement of the air and oil pump shaft 37, so that the primary stream of air may be delivered to and through the burner nozzle. As hereinabove noted, the present apparatus is so designed that the oil supply will not be delivered to the nozzle until the primary air blast has been established within the nozzle. Thus, with the present invention, no fuel can ever be delivered to the furnace until an air blast has been established first about the outside portions of the nozzle and secondly, through the nozzle itself. Also, whenever the motor is deenergized, the shaft 37, by reason of the centrifugal clutch, will be disconnected from the motor, and due to the inertia of the oil pump will soon cease rotation, while the fan 24 will continue to rotate at a substantially high speed, due to the fact that it is mounted on antifriction bearings, and that the overrunning clutch functions to release the fan from the motor as soon as the latter tends to decelerate. Therefore, the motor and the air and oil pumps, during the deceleration period, place no drag upon the fan 24, and the latter is permitted to run unimpaired, so that it will be effective to maintain complete combustion until all the oil is consumed and thereafter, it will function to purge the furnace combustion chamber. In this latter connection, it will also be recalled that the oil pump is located below the level of the burner nozzle, and it is also provided with a supply of oil, the static level of which is located below the confines of the pump, so that as soon as the shaft 37 decelerates, the oil pump will be ineffective to supply any oil to the burner nozzle. Furthermore, with this construction, it will be impossible for any oil to leak from the oil pump to the burner. In the present oil burner unit, the oil delivery line 87 as well as the conduit 129 within the nozzle-carrying member 130 are inclined slightly so as to force the unconsumed oil to drain back to the oil supply whenever the oil pump is deenergized, thereby to prevent nozzle coking and to insure clean combustion. Of course, when this oil drains back to the oil pump unit, it will finally be delivered to the oil supply conduit 88, and as this conduit is connected with the float chamber 92, the static oil level will be slightly readjusted. Quite clearly, since the oil surface area of the chamber 92 is relatively large, this oil which drains back from the nozzle, will raise the normal static level of the oil within the conduit 88 a slight degree only.

I claim:

1. Apparatus for supplying air and oil to a burner comprising, a positively-acting displacement pump for supplying air, inlet and discharge conduits for said air pump, a pump for supplying oil, means providing fluid communication between the two pumps, whereby sufficient oil may enter said air pump for lubricating the latter, a by-pass conduit from said air discharge conduit to the outside of the pump for relieving the air pressure within such air discharge conduit, an oil-conducting conduit providing fluid communication between said air discharge conduit and the suction side of said oil pump thereby to return oil to said oil pump from said air pump, and a pressure-responsive valve means in said air discharge conduit for blocking off communication between said air discharge conduit and said by-pass and oil-conducting conduits, said valve means being movable to unblock communication between such conduits whenever the air pressure within said air discharge conduit reaches a predetermined value.

2. Apparatus for supplying air and oil to a burner comprising, a positively-acting displacement pump for supplying air, an inlet conduit and a substantially vertically disposed discharge conduit for said air pump, a pump for supplying oil, means providing fluid communication between the two pumps, whereby sufficient oil may enter said air pump for lubricating the latter, an upwardly inclined by-pass conduit leading from the lower portion of said air discharge conduit to the outside of the pump for relieving the air pressure within such air discharge conduit, an oil-conducting conduit communicating said air discharge conduit at a location below said by-pass conduit with the suction side of said oil pump thereby to return oil to said oil pump from said air pump, and a pressure-responsive valve means disposed within the lower portion of said air discharge conduit for blocking off communication between

such conduit and said by-pass and oil-conducting conduits, said valve means being movable to unblock communication between such conduits whenever the air pressure within said air discharge conduit reaches a predetermined value.

3. Apparatus for supplying air and oil to a burner comprising, a pump casing having a pair of directly adjacent intercommunicating rotor cavities therein, a positively-acting displacement pump including a rotor disposed in one of said cavities for supplying air, air inlet and discharge conduits for said air pump, a pump including a rotor disposed within the other cavity for supplying oil, the rotor of said oil pump being exposed directly to that cavity containing said air pump so as to supply a sufficient oil to said air pump for lubricating the latter, bypass means for bleeding air from said air discharge conduit thereby to relieve the air pressure within such air discharge conduit, means for returning the lubricating oil from the air discharge conduit to said oil pump, and a pressure-responsive valve within said air discharge conduit for connecting and disconnecting said last two mentioned means to and from said air discharge conduit as the air pressure within such conduit respectively rises above and falls below a predetermined value.

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