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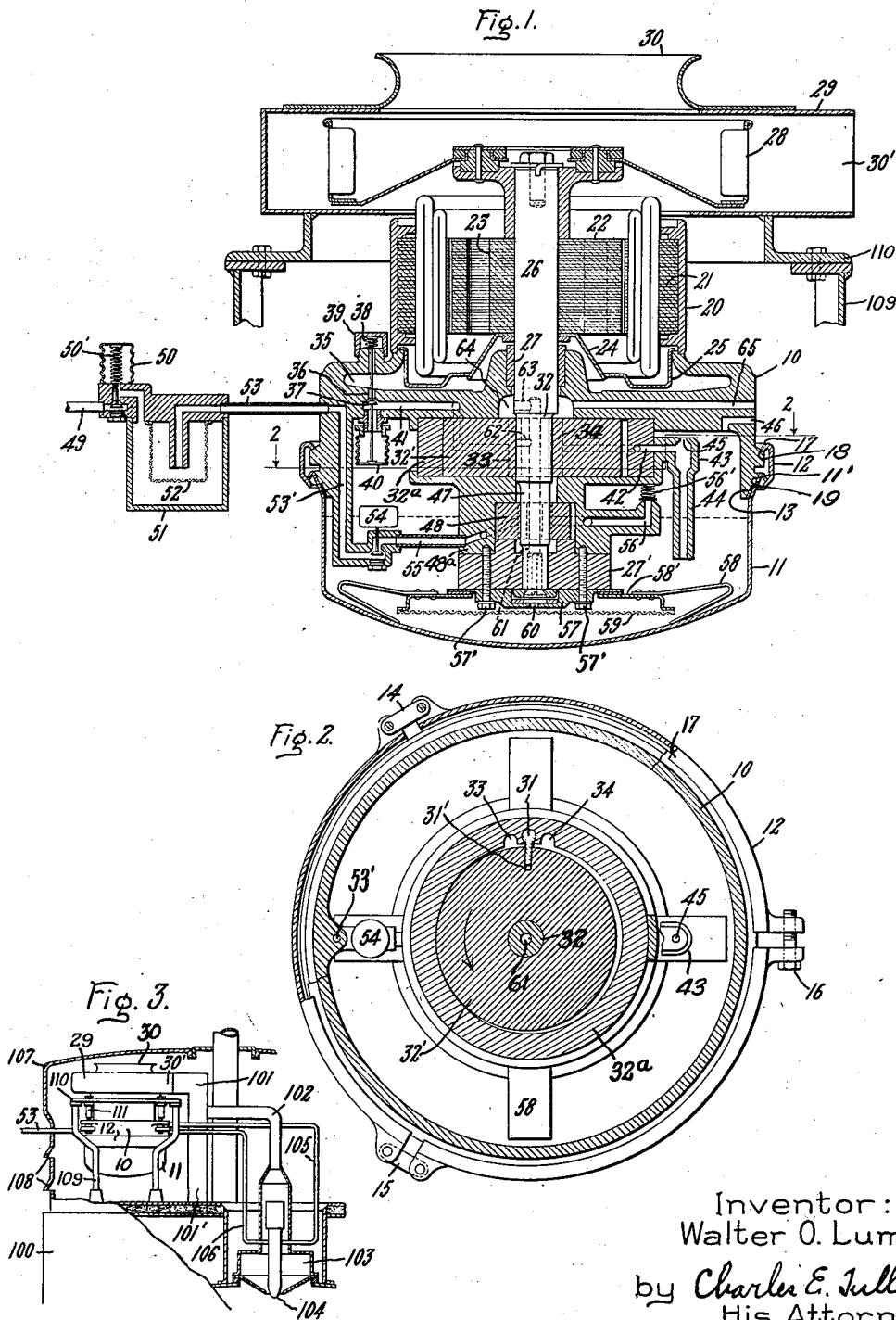
W. O. LUM

1,986,003

BLOWER COMPRESSOR UNIT FOR OIL BURNERS

Filed July 25, 1931

2 Sheets-Sheet 1



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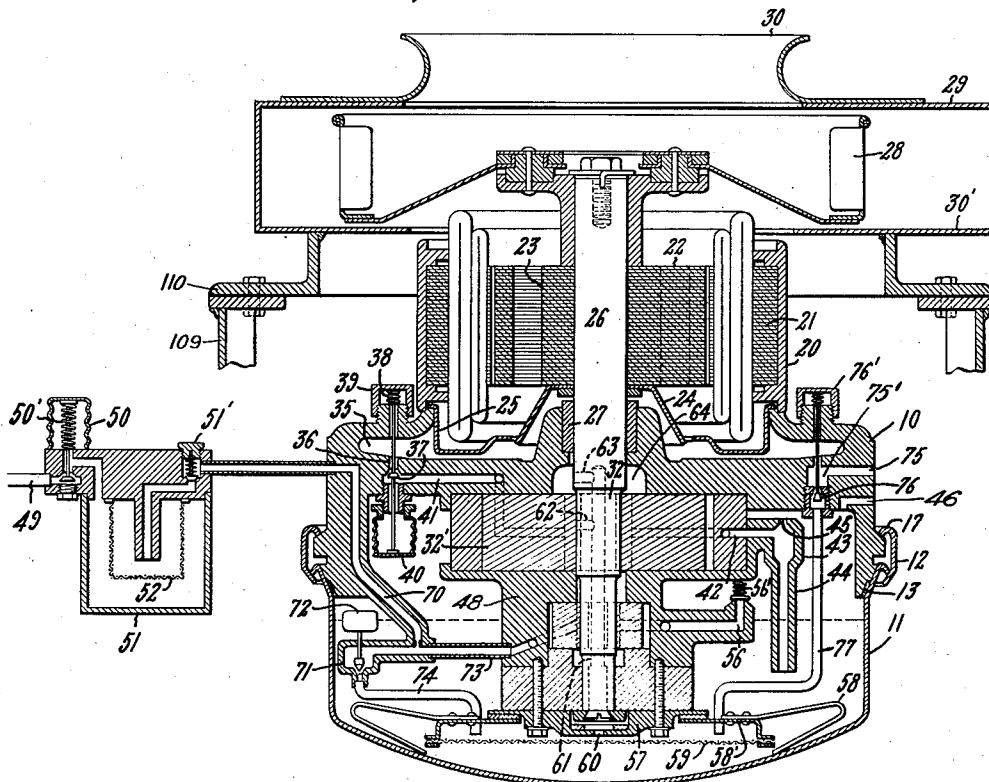
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2 Sheets-Sheet 2

Fig. 4.



Inventor:
Walter O. Lum,
by Charles E. Tuller.
His Attorney.

UNITED STATES PATENT OFFICE

1,986,003

BLOWER COMPRESSOR UNIT FOR OIL
BURNERSWalter O. Lum, Schenectady, N. Y., assignor to
General Electric Company, a corporation of
New York

Application July 25, 1931, Serial No. 553,119

30 Claims. (Cl. 158—36.5)

My invention relates to liquid fuel burners, more particularly to improvements in the oil and air pumps and blower mechanism normally employed in oil burners.

5 In oil burners heretofore used the oil and air pumps and blower mechanism are as a rule separate units and necessitate the use of considerable space at the oil burner. Ordinarily no means are used for cleaning the air used for spraying the
10 liquid fuel and very little effort is made to provide means for effectively cleaning the oil which is supplied to the oil burner. The use of separate units for supplying the air and oil under pressure to the nozzle results in pulsations at the
15 nozzle which in turn cause roaring of the flame due to the interaction of the pressure between the oil and air at the nozzle. As a rule no means is provided for separating occluded air which causes an unstable flame from the oil. In the
20 usual oil burner the pressure of the air delivered to the nozzle varies with the speed of the air pump and no means is provided for maintaining the air pressure constant. The same is true of the pressure of the oil delivered to the nozzle. All these
25 features if not counteracted result in difficulties in the operation of the oil burner.

Hence it is a principal object of my invention to provide an improved self-contained oil burner unit comprising a blower, air compressor and oil
30 pump which will overcome the difficulties outlined above and in addition have these various elements in such cooperating and unified relation that they mutually increase the effectiveness and reliability of each other in construction, installation and
35 performance of their joint function of supplying clean oil and air under stabilized pressures to an oil furnace over long periods of time without appreciable noise, leaks, clogging, overheating or other troubles.

40 Another object of my invention is to provide an oil burner blower compressor unit which cleans the air and oil before delivery of the oil and air to the oil burner nozzle.

45 Another object of my invention is to provide an oil burner blower compressor unit of the above type in which the oil and air are maintained under a constant even pressure.

50 A further object of my invention is to provide a unit of the above type in which the unit is self-lubricating.

A still further object of my invention is to provide means for separating occluded air from oil being delivered to the burner.

55 These and other objects will appear hereinafter.

Briefly, the unit of my invention comprises a casing head forming a main chamber with a cover or casing in the form of a sump tank clamped thereto. On the top of the casing head and supporting a rotating blower fan is a motor mounted upon a vertical shaft extending through
5 the casing and into the sump. The motor used is an induction motor which is not subject to sparking. Mounted on the lower end of this shaft within the casing is an air compressor and an
10 oil pump which pump air and oil under pressure into the chamber and sump where the oil and air are maintained by automatic valves under even, constant pressure. The air is cleaned of dust and dirt by making use of the motor and a pair of
15 shields underneath said motor which cooperates to separate the dust and dirt from the air entering the compressor. The oil passes through an oil filter before reaching the oil pump and is again filtered before being forced upwardly through the
20 center of the shaft which has been drilled for this purpose in one modification or through a conduit in another modification to the discharge outlet of the compressor unit. A float valve regulates the oil level within the sump and a pressure valve
25 regulates or limits the air pressure within the chamber. The air leaves the unit by means of a second discharge passage. The drilled shaft also provides for lubrication of the bearings of the motor shaft and a vapor relief chamber is provided at the oil discharge opening from the shaft
30 or in the modification adjacent the end of the conduit for separating occluded air and vapor from the oil.

In the drawings, Fig. 1 shows a cross-section
35 of my blower compressor unit and Fig. 2 shows a section thereof taken on the line 2—2 of Fig. 1. Fig. 3 shows my invention applied to an oil burner boiler. Fig. 4 shows a cross-section of a modification of my invention.

40 Referring to the drawings, Fig. 1, the main chamber casing head 10 has clamped thereto by means of the segmental clamp 12 the cover or casing 11 which forms the oil sump tank. The segmental clamp 12 is made in sections and connected by means of links 14 and 15, as shown in
45 Fig. 2, which are held clamped to the casing by means of the screw 16. It will be noted that the clamp 12 is provided with a beaded rim 17 which engages an annular sloping projection 18
50 on the casing 10 and also has an turned bottom rim 19. The oil sump tank 11 is provided with a rim 11' bent at an angle greater than 90° as shown in Fig. 1 and cooperating with the bottom rim 19. The purpose of this construction is
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such that any tendency of the tank 11 to move down from the casing 10 when under pressure forces the rim of the sump tank against the main chamber casing 10, thereby causing a tighter joint. A gasket 13 is provided to supplement the fit of the tank to the casing 10 and to insure a tight joint. The clamp permits the sump tank and the screen 59 to be removed and cleaned when desired.

Vertically mounted upon the main chamber casing 10 is the electric motor 20 which is provided with a stator 21 and a rotor 22. The motor is of the induction type and hence not subject to sparking which would be extremely dangerous in such a unit. The rotor 22 has the axial air passages or openings 23 extending therethrough which open up into the chamber below the rotor to admit air thereto. The rotor is mounted upon the vertical motor shaft 26 which rotates in the bearing 27 and the bearing block 27' at the bottom end of the shaft. The rotor has attached thereto just below the rotor a conical shield 24 which cooperates with the shield 25 in a manner to be described later for cleaning the air which is delivered to chamber 35 and thence to the compressor unit.

Mounted upon the shaft 26 at the upper end thereof is the blower fan 28 which is housed in the casing 29 provided with the intake opening 30 and the exhaust opening 30' through which the blower furnishes combustion air to an oil burner as shown in Fig. 3.

The shaft 26 is provided with the reduced portion 32 which it will be observed is eccentric with respect to the shaft 26. Mounted upon portion 32 of the shaft is the compressor pump element 32' which delivers compressed air to the main pump chamber. The reduced portion 32 of the shaft rotates with respect to the pump element 32' causing the pump element 32' to have a movement resulting in approach of the element toward the pump walls in such a manner that the point of minimum clearance travels around the inner periphery of the annular pump housing 32a in a counter-clockwise direction as shown by the arrow in Fig. 2 as the shaft 26 rotates in a counter-clockwise direction. The compressor pump element 32' is provided with a slot 31' with which the pivotal member 31 cooperates to prevent rotation of element 32'. The compressor pump is provided with the inlet 33 and the outlet 34 which is connected to the exhaust passage 42 as shown by dotted lines in Fig. 1 which in turn is connected to the oil and air separator 43 provided with the oil delivery passage 44 and the air port 45.

It will be observed that the casing 10 is provided with the chamber 35 in which the annular shield 25 is mounted. At the left-hand side of this chamber 35 is an inlet opening 36 which has slidably mounted therein a valve 37 provided at one end of its stem with a spring 38, the compression of which can be adjusted by means of the screw collar 39. The other end of the valve stem cooperates with a metallic bellows member 40. This valve opens and closes the port 36 in response to pressure changes within the compression chamber. Leading from this port 36 is the air intake passage 41 shown partly in section in Fig. 1 and which leads to the air intake passage 33 of the compressor pump as shown in Fig. 2. The air under pressure is delivered from the separator 43 to the compression tank and from there it passes through the discharge passage 46, conduit 106, to the oil burner

nozzle 104 (see Figures 1 and 3). The bellows member 40 is filled with oil and this acts as a dash-pot to prevent chattering of the valve.

The operation of the air compressor pump is as follows:

The air enters the intake passage 33 in the pump housing as the pump element 32' moves its point of minimum clearance around the periphery of the pump housing from the position shown in Fig. 2. The air trapped between the element 32' and the annular pump housing 32a as far as the discharge passage 34 is forced through the discharge passage 34 as the point of minimum clearance of element 32' moves in a counter-clockwise direction from the intake port to the discharge port 34. Air at the same time is drawn through the intake port 33 and this second charge of air is in a similar manner forced around the inside of the pump housing as the point of minimum clearance of element 32' moves in a counter-clockwise direction. This operation is repeated so that air is continuously pumped into the compression chamber.

A second reduced portion 47 of the shaft 26 which portion is offset and carries thereon the oil pump element 48 which is similar in construction and has the same operation as the compressor pump element 32'. The path of the oil into the compressor unit is through the conduit 49 which directs oil to the trap 51 provided with the filtering screen 52. A valve attached to a metal bellows 50 and having a spring 50' resiliently opposed to the bellows controls the valve opening to the trap 51. When the pressure in the trap 51 falls below atmospheric due to demand thereon the metal bellows collapses and opens the valve port to permit more oil to enter the trap. The oil after being filtered by the screen passes into the conduit 53 and into the compressor casing which is provided with the passage 53'. This passageway is controlled by a float-operated valve 54 which is controlled by the oil level and from this passage 53' the oil is directed to the oil pump housing 48a by means of the conduit 55. The oil is discharged into the compression chamber and sump tank through conduit 56, the opening of which is controlled by means of the spring pressed valve 56' which opens when the pressure builds up in the conduit 56. After being delivered to the oil sump the air pressure upon the oil surface forces the oil through the filtering screen 59 which is supported by means of the ring member 58' to which are attached the resilient springs 58 which support the screen ring against the bottom of the bearing 27'.

The oil then passes through the opening 60 in the cap 57 attached by screws 57' to the lower bearing 27' of the motor shaft 26. The oil passes up through the drilled oil feed 61 in the shaft 26 and is discharged through opening 63 into the vapor relief chamber 64. Oil for lubricating the air compressor pump is discharged through the opening 62. From the chamber 64 the oil is discharged to the oil burner nozzle 104 through the passageway 65, and conduit 105. Any air which has been occluded in the oil rises to the top of the vapor relief chamber due to the reduced pressure in the vapor relief chamber and is forced up between the motor shaft and the bearing 27 from where the air joins the incoming air through the motor. Any oil which seeps through the bearing 27 is thrown by the centrifugal action of the motor to the shield 24 from which the oil is thrown against the shield 25

and into the chamber 35 of the casing 10. This oil returns to the pump with the incoming air through the air inlet 36.

other foreign particles passes upwardly through the port 45 in the oil separator and thence out through the discharge passage 46. Most satisfactory operation can not be obtained without the separator. Thus the air which is delivered to the oil burner nozzle reaches the nozzle free from dust and dirt and any oil or other foreign particles which may have reached the intake of the compressor pump.

Referring to Fig. 3, the blower compressor unit is seen mounted on the top of the oil burner boiler 100. A ring 110 is rigidly supported on top of the boiler 100 by means of the feet 109. The blower housing 29 is mounted on the ring 110 and supported thereby. Thus it will be noted that all parts shown in Fig. 1 except the fan housing 29 and legs 109 are carried by the main casing head 10. This main casing head 10 is resiliently suspended from the ring 11 by means of the suspension members 111. Thus all of the moving elements of the device are carried by the resilient support 111. The main casing 10 with all of the elements which are attached thereto as shown in Fig. 1 including the electric driving motor 20 and all of the air compressor and oil pump elements are resiliently suspended from the ring 110' by means of the suspension members 111. This suspension reduces the noise due to any vibration the compressor unit might have during operation. The unit is enclosed in a casing 107 on top of the boiler and air is admitted to the casing through the louvers 108 and the oil supplied by means of the conduit 53. The exhaust 30' of the blower is connected by means of the conduits 101 and 102 to the casing 103 surrounding the oil burner nozzle 104. This supplies some of the secondary air necessary for the flame. The remainder of the air passes through the conduit 101' to the lower part of the combustion chamber. Oil leaves the compressor unit by means of the conduit 105 to the nozzle 104 and the air is delivered by means of the conduit 106 to the oil burner nozzle.

The operation of my invention is as follows: When the motor 20 is energized the rotor 22 rotates the blower fan 28 which takes in air through the opening 30 formed in the top of casing 29 and discharges the greater part of it through the opening 30' to the oil burner apparatus as described above. A small part of the air after passing through the impeller blades of fan 28 is delivered to the intake of the compressor pump passing through the space beneath the blower fan or impeller 28 and down through the openings 23 in the rotor of the motor cooling the motor as it passes through the openings. A vortex is created in the space beneath the blower fan or impeller 28 by the rotating rotor and fan which prevents large particles of dust from following the air to the rotor. The air is then delivered to the enclosed space between the underside of the motor and the top of the casing head 10 and from this space the air passes between the rotating oil shield 24 and the stationary oil shield 25. The comparatively high velocity vortex in the space between the top of the motor and the blower fan tends to prevent dust from following air through this space. In the chamber 35 below the stationary shield is the intake 36 of the air compressor. In this chamber any dust remaining in the air will be trapped in the oil which has entered this chamber from the vapor relief chamber as described above and passes through the compressor intake 36. The air together with the small amount of oil which has found its way into the chamber 35 then passes through the conduit 41 into the pump intake 33 through the pump and to the exhaust passage 42 to the oil and air separator 43. The particles of oil and foreign matter pass downwardly through the conductor 44 into the oil sump and the air free from oil and

Although the compressor pump is continuously operated and although the amount of air delivered to the oil burner nozzle may be varied the pressure within the compression chamber is maintained relatively constant by means of the bellows-operated valve. When the pressure within the chamber rises above a predetermined limit the bellows 40 collapses and the valve 37 is closed against the action of the spring 38 the compression of which can be adjusted for various pressures within the compression chamber. When the pressure within the chamber again reaches a predetermined value the valve again opens permitting air to again enter the chamber and thus maintaining the pressure within the tank at a predetermined value.

The oil in reaching the oil pump comes from the conduit 49 and is discharged into the trap 51 provided with a filtering screen 52. The valve 50 which is bellows operated renders the oil pump self-priming, that is when the pump is deenergized the pressure within the compression chamber becomes equalized with the pressure outside of the compression chamber and the valve 50 closes to maintain an oil seal so that oil will not siphon from the storage tank. From the trap 51 the oil passes through the conduits 53, 53', the valve 54, through the conduit 55, through the pump 48, thence to the discharge passage 56 to the check valve 56' which operates to open when the pressure in the discharge passageway builds up, and thence to the oil sump 11. If and when the oil level rises to a predetermined limit the float-operated lever closes valve 54 and thereby prevents the oil pump from pumping any more oil into the oil sump.

The pressure on the surface of the oil within the oil sump forces the oil up through the drilled shaft 26, as heretofore described, for lubricating the motor shaft 26 by means of passage 62 and for delivering the oil through the discharge passage 63 to the vapor relief chamber 64 from which it passes out of the discharge passage 65 to the oil burner nozzle 104 through pipe 105 as shown in Fig. 3. As has been heretofore described occluded air passes up between the shaft and the upper bearing 27 and is discharged into the chamber 35 from which it passes to the compressor pump 32'.

Due to the fact that the oil and air are delivered to a common chamber the pressures are equalized and pulsations due to the interaction of the pressures common in many oil burners are prevented.

In Fig. 4 is shown a modification of my blower compressor unit. The intake to the oil pump differs from the construction shown in Fig. 1. Oil enters the unit from the trap 51 by means of the passage 70 and to the intake of the pump by means of conduit 73 and finds its way into the sump in the same manner as in Fig. 1. A casing 71 provided with a valve is attached to the conduit 73. It will be seen that as the oil level rises above a certain point the float 72 opens the valve in casing 71 so that the conduit 74 opens into the intake conduit 73. When this level is reached by

the oil, oil is not taken from the supply but is merely circulated through the unit, that is, oil is by-passed through the pump by means of the arrangement shown. Oil is not taken from the supply until the level of the oil in the tank falls to a position such that the valve in the casing 71 closes.

In this modification the oil for the nozzle does not pass up through the shaft 26 as in Fig. 1. A conduit 77 is provided extending to the bottom of the sump tank above the screen 59. The exhaust passage 75 is provided with the valve 76 which may be adjusted by means of the cap member 76' to adjust the rate of flow through the exhaust passage from the sump. A small vapor release chamber 75' is provided in the exhaust passage 75 above the valve 76 as shown. While the oil is passing through chamber 75' any small air bubbles occluded in the oil rise and separate therefrom. Clearance is provided around the valve stem to the chamber 35 in the casing 10. The clearance in the drawings is exaggerated for the purpose of illustration. This clearance has several functions. It permits occluded air in the oil being fed to the oil burner nozzle to escape to the chamber 35 along with any oil that might leak past this clearance in a manner as described in connection with the apparatus shown in Fig. 1. This oil is sufficient to lubricate the air compressor and is returned to the sump in the same manner as in the case of the structure shown in Fig. 1. Another purpose of this clearance is to provide a siphon break. Thus if for some reason the valve within the nozzle which may be of any suitable form (not shown) for controlling the oil outlet should fail to close or a break occurs in the line between the exhaust passage 75 of the compressor unit below the level of the oil within the sump tank, unless some means is provided for breaking the siphon action the oil will siphon into the oil burner combustion chamber during periods of shutdown. During such shutdown periods the pressure within the sump chamber is quickly equalized with the outside pressure through the air outlet 46 as well as through the air inlet valve 37 which immediately opens when the pressure is reduced. Thus although the air pressure on the oil is relieved, a siphoning action through the pipe 77 might occur except for the siphon breaking action due to the clearance around the stem of valve 76.

The lubrication in this modification of my invention is obtained in the same manner as in the structure shown in Fig. 1 through the shaft 26. The chamber 64, however is not connected with the exhaust passage of the burner. The sole purpose of this chamber is to provide an oil seal for the tank to prevent leakage of air therefrom and thus maintain the pressure within the tank. Any oil which finds its way past the bearing 27 is returned to the oil sump in a manner similar to the action of the structure shown in Fig. 1.

It will be noted that the trap 51 is provided with a valve 51' for closing the exhaust from the trap. This valve performs the function of preventing siphoning back from the sump of the compressor unit should a break occur in the trap 51 or the supply line 49 between the oil supply and the trap.

The operation of the modification shown in Fig. 4 is very similar to that of Fig. 1. The only difference is that the oil is by-passed through the pump when the level within the sump tank exceeds a predetermined degree. Further, the oil instead of passing up through the shaft to the oil burner nozzle passes up through the conduit 77 to the exhaust passage 75, the amount of oil passing

through the oil burner nozzle being regulated by means of the valve 76.

It will thus be seen that I have provided a compact blower compressor unit which is easily balanced and which is provided with permanent automatic lubrication. I have also provided in my device a unique method of providing air free from dust and oil and oil free from air and which will insure proper combustion at the oil burner nozzle. I have also provided automatic means for maintaining the pressure within the compression chamber even and constant and for insuring a constant oil level within the oil sump. My unique clamping ring insures an air-tight and oil-tight seal between the casing head 10 and the oil sump tank 11 which telescopes over the oil and air pumps and can readily be removed for cleaning the strainer 59. These various features render my blower compressor unit a vast improvement over other devices heretofore used for the operation of oil burners.

The embodiment of the invention illustrated and described herein has been selected for the purpose of clearly setting forth the principles involved. It will be apparent, however, that the invention is susceptible of being modified to meet the different conditions encountered in its use, and I therefore aim to cover by the appended claims all of the modifications within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An oil burner compressor unit having a pressure tank, a motor vertically mounted on the top of said tank, a shaft driven by said motor extending into said tank through the top thereof, bearings for said shaft, pumping means having operating parts mounted on and driven by said shaft for pumping air and oil under pressure into said tank, one end of said shaft extending below the level of the oil in said tank and having passages therein for supplying oil to said pumping means and said bearings for lubricating the same, the pressure in said chamber forcing oil through said passages.

2. An oil burner compressor unit including a pressure equalizing tank, a motor vertically mounted on the top of said tank and having a shaft extending within said tank through the top thereof, a pressure sealing chamber in the top of said tank through which said shaft extends, oil and air pumps having operating parts operatively connected to said motor by said shaft for pumping oil and air under pressure into said tank, the end of said shaft within said tank extending below the level of the oil in said tank and having passages extending therethrough from said oil to said chamber, the pressure in said tank forcing oil through said passages in said shaft to said chamber for providing an oil seal for said pressure tank around said shaft.

3. An oil burner compressor unit having a pressure equalizing tank, a motor vertically mounted on top of said tank and having a shaft extending within said tank through the top thereof, oil and air pumps having operating parts operatively connected to said motor by said shaft for pumping oil and air under pressure to said tank, said shaft extending below the level of the oil in said tank and having passages extending therethrough from said oil, one of said passages extending to said air pump, a pressure sealing chamber in the top of said tank through which said shaft extends and said chamber being con-

5 nected with another of said passages in said shaft, the pressure in said tank forcing oil through said passages in said shaft to said compressor for lubricating the same and to said chamber for providing an oil seal for said pressure tank around said shaft.

10 4. An oil burner compressor unit having a pressure equalizing tank, a motor vertically mounted on the top of said tank and having a shaft extending within said tank through the top thereof, a bearing for said shaft adjacent said motor, an air compressor and an oil pump connected to be driven by said shaft for pumping air and oil into said tank under pressure, 15 outlet means in said tank for the oil and air, said oil outlet means extending adjacent to said shaft, a bearing for the end of said shaft supported within said tank, said shaft extending below the level of the oil in said tank, passages in said shaft for lubricating said bearings and said compressor and for feeding oil to said outlet means, the pressure in said tank forcing oil through said pas- 20 sages.

25 5. An oil burner compressor unit including a tank having an upper part and a lower part and providing a pressure equalizing chamber, a motor having a shaft extending vertically within said chamber through the top of said tank, a compressor and oil pump in said chamber having inlet means extending through a wall of said tank, said compressor and pump having movable parts connected to said shaft for pumping oil and air into said chamber under pressure, outlet means in said tank from said chamber for the oil and air, said oil outlet means extending 30 to said shaft, said shaft extending below the level of the oil in said chamber, passages in said shaft for feeding oil to said outlet means, a screen associated with the lower end of said shaft for straining the oil passing up through the passages in said shaft, the lower part of said tank maintaining said screen in position, the pressure in said tank forcing oil through said screen and passages, and a clamp for holding said upper 35 and lower parts of said tank together to form an air-tight fit.

40 6. An apparatus for supplying oil and air under pressure to an oil burner including an equalizing pressure tank, a motor vertically mounted on top of said tank and having a shaft extending through the top thereof, said shaft having a plurality of offset portions of successively smaller diameters extending within said chamber, an air compressor having a rotor mounted on one 45 of said offset portions, an oil pump having a rotor mounted on another of said offset portions, said compressor and oil pump pumping air and oil under pressure into said tank, said shaft having an end portion within said tank of smaller diameter than said offset portions and whereby 50 said shaft may be extended within or withdrawn from said tank through the top thereof in assembling or disassembling said compressor unit.

55 7. An oil burner unit including a casing providing a pressure chamber for oil and air, a motor mounted on said casing and having a shaft extending through a wall of said casing into said chamber, oil and air pumping means within said chamber operatively connected to said shaft for pumping oil and air under pressure into said chamber, a bearing for said shaft in said wall, means providing an oil seal for said bearing to prevent leakage of air from said pressure chamber, and means for returning the oil to said chamber which leaks past said bearing. 75

8. An oil burner unit including a casing providing a pressure chamber for oil and air and having a bearing extending vertically through the top wall thereof, a driving shaft extending through said bearing into said chamber, oil and air pumping means within said chamber operatively connected to said shaft for pumping oil and air into said chamber under pressure, said shaft having means for lubricating said bearing, an oil sealed chamber around said shaft to prevent leakage of air from said pressure chamber through the bearing, and means connected with said pumping means for returning the oil passing through said bearing to said chamber. 10

15 9. An oil burner unit including a casing providing a pressure chamber for air and oil, a motor having axially disposed air passages therein and vertically mounted on the top wall of said casing and having a driving shaft extending from the top and bottom thereof with the bottom end extending into said chamber, air and oil pumping means mounted within said chamber and connected to be driven by said shaft for pumping oil and air under pressure into said chamber, and a blower mounted above said motor and having 20 an impeller rotatably supported on the top end of said shaft and having a housing with an air inlet opening formed therein above said impeller and cooperating with said air passages of the motor to supply clean air from the vortex beneath said impeller downwardly through the motor to said pumping means. 25

30 10. An oil burner unit including a casing providing a pressure chamber for air and oil and having separate air and oil inlets and outlets therein, an electric motor having air passages therein and mounted on said casing over the said air inlet therein and provided with a shaft extending on opposite sides of the motor with one end of said shaft extending inside said chamber, air and oil pumping means mounted inside said casing in operative relation with said shaft and communicating with said air and oil inlets for pumping oil and air under pressure into said chamber, and a blower having an impeller drum closed at one side and rotatably supported on the 35 other end of said shaft and having a housing with an air inlet opening formed therein at the open side of said impeller drum and cooperating with said air passages of the motor to supply clean air from the vortex inside said housing adjacent the center of the closed side of said impeller drum through the motor to said air inlet in said casing. 40

45 11. An oil burner unit including a casing providing a pressure chamber for air and oil, and having separate air and oil inlets and outlets in said casing, a motor having axially aligned air passages formed therein and vertically mounted on the top wall of said casing and having a driving shaft extending from the top and bottom thereof with the bottom end extending into said chamber, air and oil pumping means mounted within said chamber and connected to be driven by said shaft and communicating with said oil and air inlets for pumping oil and air under pressure into said chamber, a bearing for said shaft in said top wall of said casing having an oil seal associated therewith to prevent leakage of the air from said pressure chamber, a blower having an impeller rotatably supported on the top end of said shaft and having a housing with an inlet opening formed therein above said impeller and cooperating with said air passages of the motor to supply clean air from the vortex beneath said impeller downwardly through the 50 55 60 65 70 75

motor to said air inlet, and means connected with said air inlet for returning the oil to said chamber which leaks past said bearings.

12. An oil burner unit including motor driven oil and air pumping means for supplying oil and air under pressure to a burner and a centrifugal blower operatively associated with said pumping means and having an air inlet at one side thereof and separate air outlets, one communicating between the vortex at the other side of the blower and said air pumping means to supply clean air thereto and the other communicating with the periphery of the blower to supply the residue of uncleaned air to the burner.

13. An oil burner air and oil supply unit including motor driven oil and air pumping means for supplying oil and air under pressure to a burner, and a blower operatively associated with said pumping means and having a centrifugal impeller drum closed at one side and a housing provided with a central axial air inlet at the open side of said impeller drum and a main radial air outlet therefrom for supplying air to the burner and provided with an auxiliary central axial air outlet from the vortex at the said closed side of the impeller drum communicating with said air pumping means to supply cleaned air thereto.

14. An oil burner air and oil supply unit including a casing providing a pressure chamber for supplying oil and air under pressure to a burner, a motor driven oil and air pumping means mounted upon and connected to the casing for pumping oil and air under pressure into said chamber, and a centrifugal blower operatively associated with said pumping means and having an air inlet at one side thereof and separate air outlets, one communicating between the vortex at the other side of the blower and said air pumping means to supply clean air thereto and the other communicating with the periphery of the blower to supply the residue of uncleaned air to the burner.

15. An oil burner air and oil supply unit including a casing providing a pressure chamber for supplying oil and air under pressure to a burner, motor driven oil and air pumping means mounted upon and connected to said casing for pumping oil and air under pressure into said chamber, and a blower operatively associated with said pumping means and having a centrifugal impeller drum closed at one side and a housing provided with a central axial air inlet at the open side of said impeller drum and a main radial air outlet for supplying air to the burner and provided with an auxiliary central axial air outlet at the said closed side of the impeller drum communicating with said air pumping means to supply clean air thereto.

16. An oil burner unit comprising a casing head provided with an air inlet passage extending therethrough, oil and air pumping means mounted on one side of said casing head with the air pumping means in communication with said air inlet passage, a driving motor for said pumping means mounted on the other side of said casing to form an air chamber between the motor and the casing communicating with said air passage, a blower having an impeller mounted on the rotor element of the motor and a housing cooperating with the motor frame to admit air to one side of said impeller and conduct air from the vortex adjacent the other side of said impeller through the motor frame to said air chamber, and a casing surrounding said oil and air pumping means and connected to the casing head to form a closed

pump chamber for receiving the oil and air from said pumping means.

17. An oil burner air and oil supply unit including air and oil pumping means having an annular pump housing provided with heads at the top and bottom thereof and each head provided with a bearing and said top head extending beyond the periphery of the pump housing, an electric driving motor having a rotor provided with a shaft journaled in said bearings and a frame provided with means for mounting the frame on said top head concentrically around the rotor to form an air chamber communicating with said air pumping means, a blower having a rotor mounted on the upper end of the motor shaft and a housing cooperating with the motor frame to admit air to one side of the rotor and conduct air from the vortex at the other side thereof to said air chamber, and a tank telescoping over said pump housing and connected to the top head thereof to form a sump chamber for receiving the oil and air from said pumping means.

18. An oil burner air and oil supply unit including air and oil pumping means having an annular housing provided with heads at the top and bottom thereof each provided with a bearing and having the top head extending beyond the periphery of the housing, an electric driving motor having a rotor provided with a shaft journaled in said bearings in operative relation with said pumping means and a frame mounted on the top head to form an air chamber between the motor and the head with air supply passages extending through the motor to said chamber and air supply passages extending through the head from said chamber to said housing, a blower having a rotor drum open at the top and mounted at the upper end of the motor shaft and having a casing cooperating with the motor frame to enclose the rotor and conduct air from the vortex beneath said rotor to said air chamber, and a tank telescoping over said annular pump housing and connected to the top head thereof to form a sealed sump chamber surrounding said pump housing for receiving the oil and air from said pumping means and equalizing the pressure thereof.

19. An apparatus for supplying air and oil under pressure to an oil burner including a separable two-part tank having separate inlets and outlets for both oil and air provided in one part thereof with the oil outlet terminating adjacent the bottom of the tank and the air outlet terminating adjacent the top of the tank, air and oil pumping means mounted within the tank on said one part and connected with the air and oil inlets to discharge air and oil under pressure inside the tank, an electric driving motor mounted outside the tank on said one part and operatively connected with said pumping means, the equalized air and oil pressures within said tank acting to force the oil and air in said tank to said outlets.

20. An apparatus for supplying air and oil under pressure to an oil burner including a separable two-part tank having separate inlets and outlets for both oil and air in one part thereof with the oil outlet terminating adjacent the bottom of the tank and the air outlet terminating adjacent the top of the tank, air and oil pumping means mounted within the tank on said one part and connected with the air and oil inlet to discharge air and oil under pressure inside the tank, an electric driving motor mounted outside the tank on said one part and operatively connected with

said pumping means, an oil strainer mounted within said tank adjacent and in operative relation with said oil outlet, and clamping means for holding the parts of the tank together under pressure and for permitting the parts to be separated to clean said strainer.

21. An apparatus for supplying oil and air under pressure to an oil burner including a two-part tank having the bottom part thereof separable from the top part and having separate inlets and outlets for both oil and air in the top part thereof with the oil outlet terminating adjacent the bottom of the tank and the air outlet terminating adjacent the top of the tank, air and oil pumping means mounted within the tank on said top part thereof and connected with the air and oil inlets to discharge air and oil under pressure inside the tank, an electric driving motor mounted outside the tank on said top part thereof and operatively connected with said pumping means, an oil strainer mounted within the tank on said pumping means and disposed adjacent and in operative relation with said oil outlet, and clamping means for holding the parts of the tank together under pressure and for separating the parts to clean said strainer.

22. An oil burner unit including a casing head having inlet and outlet passages for air and oil formed therein, a driving motor mounted on one side of the casing head with the motor shaft extending through the head, oil and air pumping means mounted on the other side of said casing head in operative relation with said shaft and having the inlets thereof communicating with said air and oil inlet passages, and a casing telescoping over said oil and air pumping means and connected to the casing head to form a closed sump chamber for receiving oil and air from said pumping means and equalizing the pressure thereof before discharge through said outlet passages.

23. An oil burner unit including a casing head provided with air and oil inlet and outlet passages terminating adjacent the edges thereof, an electric driving motor mounted on one face of the casing head with the motor shaft extending there-through, a bearing in the head for said shaft, oil and air pumping means mounted on the other face of said casing head in operative relation with said shaft and having a housing provided with oil and air inlets communicating with the said inlet passages formed in the casing head, and a tank telescoping over the housing of said oil and air pumping means and joined to said casing head to form a sealed sump chamber for receiving oil and air from said pumping means and equalizing the pressure thereof before discharge through said outlet passages.

24. An oil burner unit including an electric driving motor having separate frame and rotor elements, a casing head provided with means for mounting the motor frame and rotor elements in operative relation on one side thereof including a bearing for the rotor shaft and supporting means for maintaining the frame concentric therewith, said casing head having inlet and outlet passages for air and oil formed therein, oil and air pumping means mounted on the other side of said casing head in operative relation with said rotor of the motor and having inlets communicating with the said inlet passages formed in the casing head, said oil and air pumping means being provided with a bearing cooperating with said bearing in the casing head for rotatably supporting the rotor shaft of the motor, and a casing telescoping over said

oil and air pumping means and connected to the casing head to form a closed chamber for receiving the oil and air from said pumping means and equalizing the pressures thereof before discharge to said outlet passages.

25. An oil burner unit including a casing head provided with a shaft bearing extending vertically through the center thereof and provided with oil and air inlet and outlet passages formed therein, a driving motor vertically mounted on top of said casing head with the motor shaft extending through said bearing, pumping means for oil and air mounted on the bottom of said casing head in operative relation with said shaft and having a second bearing for the motor shaft and provided with inlets communicating with the said inlet passages, and a casing telescoping over said pumping means and detachably connected to the casing head to form a sealed sump chamber for the oil and air discharged from said pumping means with the said air outlet passage communicating with the air at the top of said sump chamber, said pumping means having a passage provided therein for connecting the said oil outlet passage with the oil at the bottom of said sump chamber.

26. An oil burner unit including a circular casing head provided with a shaft bearing extending through the center thereof and provided on one face thereof with a mounting flange concentric with said bearing, an electric motor having a frame adapted to be mounted on said flange and a rotor provided with a shaft adapted to be journaled in said bearing and extend through the casing head, oil and air pumping means having a stationary housing connected to the other side of said casing head and movable parts operatively connected to said shaft and provided with oil and air inlets communicating with the said inlet passages formed in the casing head, and a tank telescoping over said oil and air pumping means and removably connected to the periphery of the casing head to form a sealed sump chamber for receiving the oil and air from said pumping means before discharge thereof through said outlet passages.

27. An oil burner unit including a casing head provided with a bearing extending vertically through the center thereof and having separate inlet and outlet passages for air and oil formed therein, a driving motor mounted on top of the casing head with the motor shaft extending through said bearing and provided with means for supplying air through the motor to said air inlet passage, oil and air pumping means mounted on the bottom of said casing head in operative relation with said shaft and having air and oil inlets communicating with the said inlet passages in the casing head, and a tank telescoping over said oil and air pumping means and having its upper edge sealed to the casing head to form a closed sump chamber for temporarily receiving oil and air from said pumping means before discharge thereof through said outlet passages.

28. An oil burner unit including air and oil pumping means having an annular pump housing provided with heads at the ends thereof and each head provided with a bearing, one of said heads extending beyond the periphery of the pump housing and having a tank secured thereto to form a closed chamber surrounding the pump housing, said one head having air and oil inlet passages formed therein communicating with the interior of the pump housing and having air and oil outlet passages formed therein communi-

cating with the interior of said chamber, and an electric driving motor having a rotor provided with a shaft mounted in said bearings and a frame mounted on said one head in operative
5 relation with the rotor.

29. An oil burner unit including oil and air pumping means having an annular pump housing provided with a head at one end thereof extending beyond the periphery of the pump housing and having air and oil inlet and outlet passages formed therein, a pump driving motor mounted on said head, and a casing telescoping over said pump housing and connected to said head to form a closed sump chamber for receiving oil and air from said pump housing before
10 discharge thereof through said outlet passages.

30. An oil burner unit including air and oil pumping means having an annular pump hous-

ing provided with a head at one end thereof extending beyond the periphery of the housing, an electric driving motor for said pumping means mounted on said head to form an air chamber between the motor and the head, said motor having passages formed therein for supplying air to said chamber and said head having a passage extending therethrough for supplying air from the air chamber to the air pumping means in said pump housing said head having an oil inlet passage communicating with said oil pumping means and a tank telescoping over said pump housing and connected to said head to form a sump chamber for receiving oil and air, said
15 pumping means delivering oil and air to said sump chamber.

WALTER O. LUM.