

April 2, 1929.

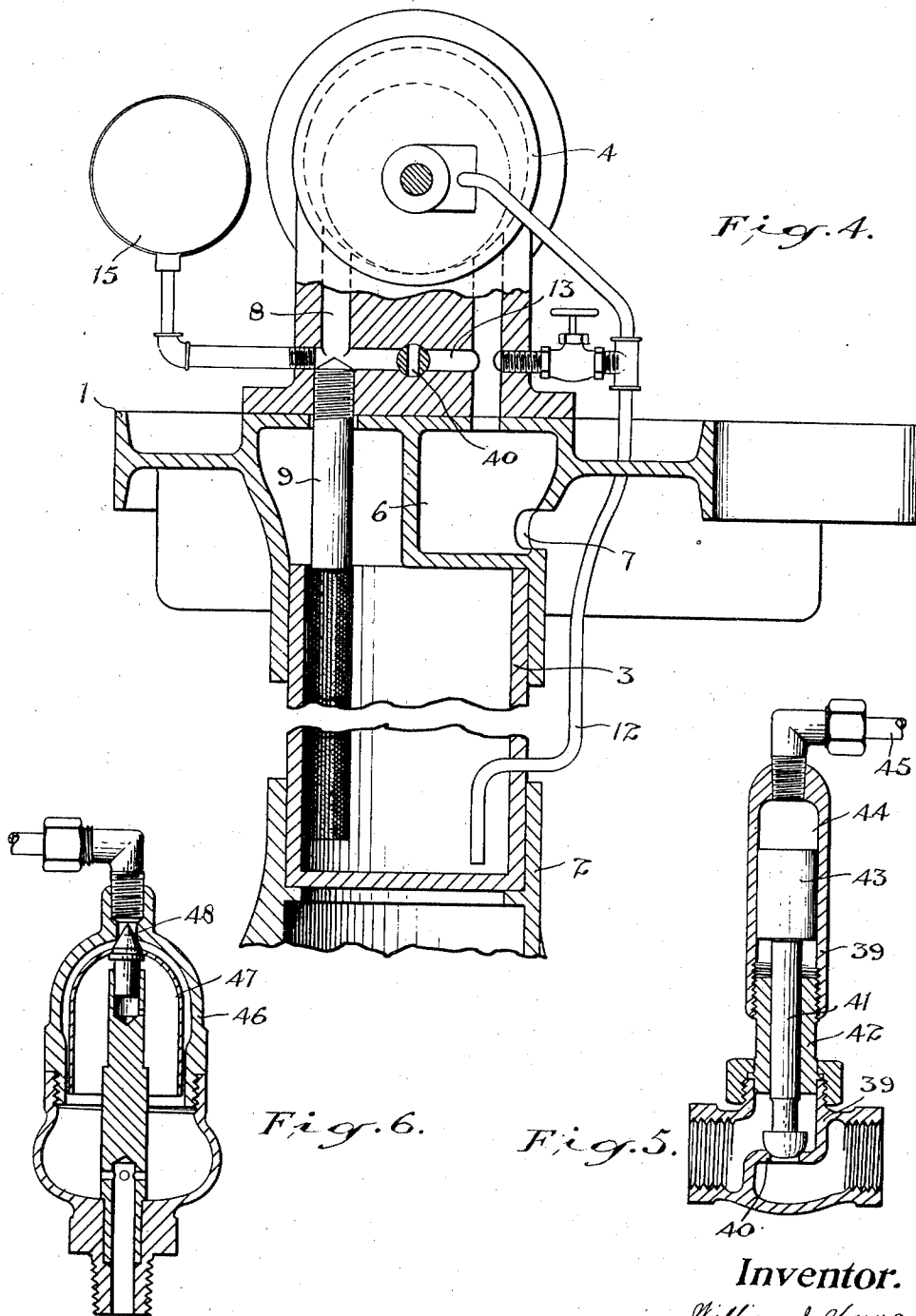
W. J. YOUNG

1,707,340

OIL BURNER

Filed Nov. 30, 1925

3 Sheets-Sheet 2



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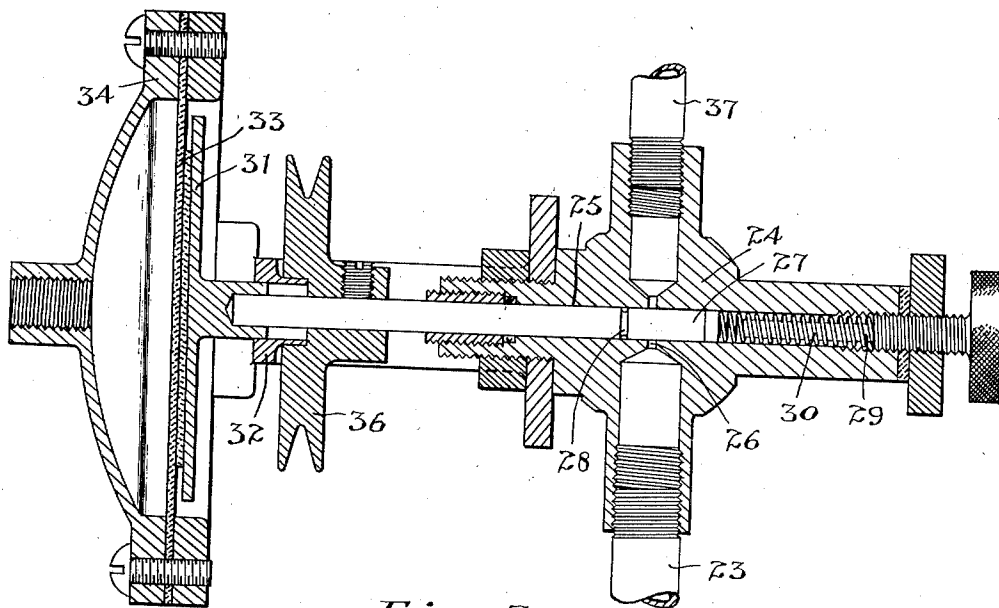


Fig. 7.

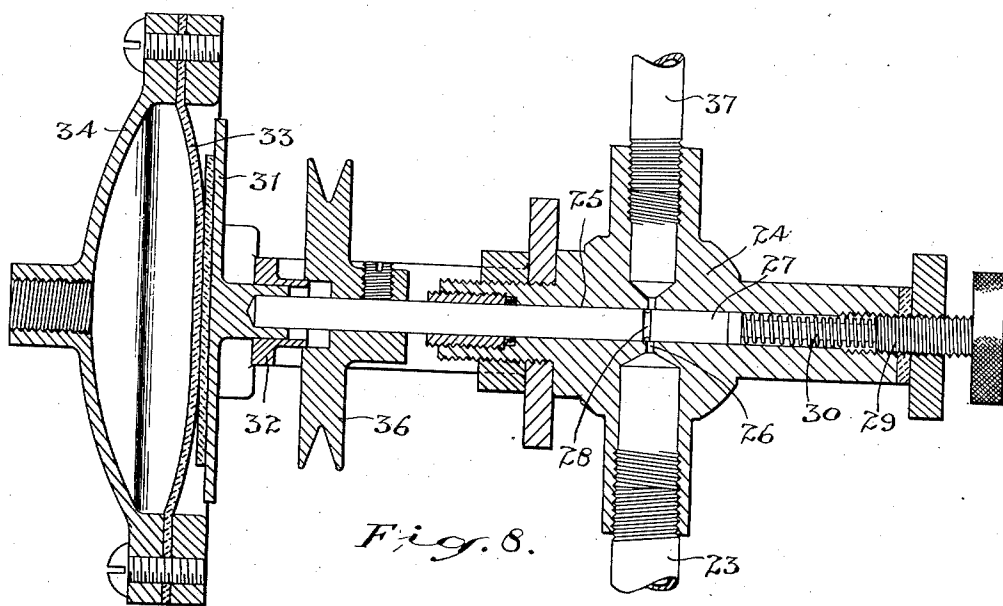


Fig. 8.

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UNITED STATES PATENT OFFICE.

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OIL BURNER.

Application filed November 30, 1925. Serial No. 72,313.

The principal objects of this invention are, to provide a simple, economical and effective means for feeding oil in an atomized condition in a uniform flow to a furnace.

5 A further object is to provide a construction of apparatus in which the operating parts will be thoroughly lubricated and in which complete circulation of the oil will be maintained.

10 The principal features of the invention consist in the novel construction and arrangement of parts, whereby the flow of oil to an atomizing nozzle is controlled by the actuation of the air pump and the lubrication of the pump and its operating connections is also governed by the pressure of the pump.

In the drawings, Figure 1 is a plan view of the complete apparatus.

Figure 2 is a side elevational view.

20 Figure 3 is an end elevational view from the side A of Figure 2.

Figure 4 is an enlarged end elevation of the air pump with a vertical section through the supporting frame and standard, disclosing the intake and outlet passages of the pump.

Figure 5 is an enlarged vertical sectional view of the pressure control valve of the fuel.

30 Figure 6 is a vertical sectional view of the vapor relief valve.

Figure 7 is an enlarged longitudinal sectional view through the fuel oil feed control, the section being on the line 7-7 of Figure 1.

35 Figure 8 is a view similar to Figure 7 showing location of the parts when the air controlling pressure is applied.

In the use of fuel oil in the heating of the domestic type of furnace many problems are presented which differ materially from the use of oil as a fuel in commercial plants where the constant attendance of an operator is depended upon and where steam is available for use.

40 In domestic heating the apparatus is required to function automatically and spasmodically as a continuous application of heat is not required in the ordinary installations.

The present apparatus has been devised to meet these erratic demands, the construction of apparatus herein shown consisting of a table 1 supported upon a hollow standard 2, the upper end of which is provided with a closed chamber 3 adapted to contain a quantity of lubricating oil.

55 Above the chamber 3 is located the air

pump 4 which is preferably a direct driven non-pulsating rotary compressor. The intake passage of the compressor 4 leads upwardly from its base communicating at the bottom with a chamber 6 formed in the standard 2, 60 said chamber having an air inlet orifice 7 and forming an expansion chamber which has the effect of eliminating the suction noise of the pump.

The discharge passage 8 of the compressor 65 leads into the closed chamber 3 in the standard through the pipe 9 which has a screen at the lower end—to prevent the more or less atomized lubricating oil from being blown out of the chamber through the air discharge. 70 The compressed air is conducted from the top of the chamber 3 through an air pipe 10 to the atomizing nozzle 11.

The oil contained in the chamber is thus retained under the pressure of the compressor 75 discharge.

An oil tube 12 leads from the bottom of the chamber 3 upwardly to the bearings of the air pump and said pump and the parts connected thereto are maintained under a pressure feed. 80

A branch from the tube 12 leads into the intake passage of the pump and a supply of oil is picked up by the inflowing air to lubricate the pump chamber and the working parts. The structure of the pump is of a suitable 85 rotary type.

A cross passage 13 is arranged between the intake and outlet of the pump and a valve 40 is arranged therein to regulate the discharge pressure of the pump. 90

A suitable gauge 15 is connected to the discharge passage.

The fuel oil is supplied through a pipe 16 to a filter chamber 17 from which it is pumped through the pipe 18 by the oil pump 19 which 95 is driven through suitable gear connections with the air pump 4, the air pump being driven by a suitable motor 20 directly connected with the shaft thereof.

The oil pump discharges through a pipe 100 21 to a pressure chamber 22 and the oil feeds from the bottom of this chamber upwardly through a pipe 23 to a control valve 24.

The body of the valve 24 is formed with a horizontal cylindrical passage 25 intersecting 105 the reduced passage 26 at the upper end of the pipe 23.

A cylindrical valve 27 is slidably and rotatably arranged in the passage 25 and is provided with an annular groove 28 of sub- 110

stantially the same width as the passage 26. The valve may be moved longitudinally to completely close the passage 26, or it may be moved to open said passage any desirable degree.

An adjusting screw 29 is arranged at one end of the valve passage 25 and is adjusted to form a positive stop to control the amount of opening of the passage 26.

A spiral spring 30 encircles the inner end of the adjusting screw 29 and engages the end of the valve to close the valve.

The outer end of the valve 27 has secured thereon a disc 31, the hub of which is slidably mounted in a bearing 32 and said disc engages a flexible diaphragm 33 secured to a casing 34. The casing 34 is connected with the air discharge pipe 10 by means of a branch pipe 35.

The spring 30 holds the valve 27 in position to close the passage 26 while the machine is not operating but upon the commencement of operation the pressure from the air pump flows through the branch pipe 35 into the diaphragm casing 34 and distending the diaphragm operates the valve, moving it to its open position against the stop 29 and holds it open as long as the air pump continues to operate.

The valve 27 is rotated in order to ensure the uniform flow of oil through the passage 26, the rotation being effected by a suitable connection with the shaft of the oil pump, being here shown in the form of a belt 35' extending around a pulley 36 mounted on the valve. The belt allows the valves to reciprocate freely.

The arrangement of a reciprocating valve operated against a spring pressure to maintain the valve open by means of pressure of air thereagainst, is a very important feature, as the oil cannot flow to the burner by siphoning or by accumulated pressure in tanks, or elsewhere, while the rest of the apparatus is at rest.

The oil from the oil pump passes into the pressure chamber and from the pressure chamber to the valve control and when the valve 27 is opened the oil flows through the passage 26 to the pipe 37 leading to the burner nozzle 11 connected to the air pipe 10.

The nozzle 11 is in the form of a helix and the oil pipe 37 is connected into the axis so that the air is directed into a whirling jet from the nozzle and carries the axially directed stream of oil out with it, thus effecting a very thorough atomization of the oil and as both the oil and air supply are constant and uniform, there will be no surging and there will be a very uniform flame produced.

A pipe 38 leading from the top of the pressure chamber 22 conducts the surplus oil pumped into the pressure chamber back to the supply.

In order that the pressure of oil in the pas-

sage 26 controlled by the valve 27 shall be maintained uniformly, the return to the supply through the pipe 38 requires to be checked and it is desirable that such checking of the return be in relation to the requirements of the burner, that is to say, if the air pressure to the burner is high the check against the return flow of the oil from the pressure chamber should be in proportion thereto.

In order to accomplish this result I provide a stop valve 39 with a central partition in which is arranged a valve seat 40 against which a valve closes against the oil pressure.

The stem 41 of the valve 39 slides in a guide 42 and a piston 43 operating in a cylindrical chamber 44 secured to the top of the guide bears against the stem 41 to hold the valve closed.

An air pipe 45 is connected to the top of the cylindrical chamber and this pipe leads from a branch from the pipe 35 leading from the main air pipe 10.

An air release valve 46 is provided in the overflow 38 and is provided with a bell float 47 carrying a valve 48 to close the outlet at the top against the escape of oil and allowing the escape of air from the top of the pressure chamber accumulated through the pumping action. The overflow from this valve is directed into a strainer 49 arranged below the pump and beside the pressure chamber, such strainer being connected back to the oil supply by a pipe 50.

A structure such as described is extremely simple. The electric motor may be controlled in any suitable manner, manually or automatically and when it is set in motion it operates the direct driven non-pulsating rotary air compressor which discharges into the closed oil chamber in the standard. The air is taken from the top of this chamber directly to the burner nozzle but the pressure in the chamber creates a pressure distribution of lubricating oil through the bearings of the compressor and the oil is returned to the chamber in the discharge so that the lubricating oil is not carried to the burner.

The pressure control of the fuel oil supply, by the operation of the diaphragm control valve 27, ensures the proper flow of air to the burner nozzle before the oil is released, consequently unatomized oil cannot flow from the burner and the maintenance of a pressure regulated by the air compressor against the return of the surplus oil ensures a constant pressure and therefore uniform speed of flow of the fuel oil to the burner as governed by the viscosity of the oil being burned.

It will be particularly noted that the fuel oil and atomizing air are conducted to the burner nozzle by entirely separate conduits and no atomizing of the fuel oil takes place in the air pump.

A machine constructed as herein described

is very simple in its operation and is very positive and dependable and can be manufactured and installed at a very reasonable cost.

What I claim as my invention is:—

5 1. An oil burner, comprising an air pump, a burner nozzle connected with the discharge from the air pump, an oil supply means for forcing oil at a constant pressure to the burner nozzle, means interposed between said forcing means and said burner nozzle and controlled by the pressure of discharge from the air pump for starting and stopping the flow of oil from said forcing means to the burner, a return oil conduit, a pressure regulating valve arranged in said return, and means connected with the air pump discharge and operatively connected with said valve for regulating the return of oil to the supply in proportion to the air pressure.

20 2. In an oil burner, an air pump, a burner nozzle, a conduit leading from the pump to said nozzle, a pump forcing fuel oil under pressure to said burner, a valve controlling the volume of flow of fuel oil to said burner, adjustable stop means for engaging said valve, a diaphragm operatively connected with said valve, a branch air line from the air supply to the burner connected to operate said diaphragm to force said valve into engagement with said adjustable stop means, and means connected with the air pump for controlling the effective pressure of said fuel oil flow from the pump to the burner.

35 3. An oil burner, comprising an air pump, a burner nozzle connected with the discharge

from the air pump, an oil supply, means for forcing oil at a constant pressure to the burner nozzle, means interposed between said forcing means and said burner nozzle and controlled by the pressure of discharge from the air pump for starting and stopping the flow of oil from said forcing means to the burner, a return oil conduit, a pressure regulating valve arranged in said return and adapted to yield with the pressure of the oil, a cylinder extending from said valve, a piston operating in said cylinder and connected with the valve stem, and a conduit connecting the outer end of said cylinder with the discharge from the air pump.

4. An oil burner comprising, an air pump, a burner nozzle connected with the discharge from said air pump, an oil supply, an oil pump connected with said oil supply and forcing oil under pressure to said burner nozzle, an oil shut-off valve arranged between said oil pump and burner nozzle, means for closing said valve, means actuated by the pressure of discharge from said air pump for holding said valve open, a return conduit leading from the pump side of said shut-off valve to the supply, a regulating valve arranged in said latter conduit and adapted to yieldingly close the same against the pressure of the oil, and means actuated by the pressure of discharge of said air pump for yieldingly holding said regulating valve to its seat.

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