March 30, 1943. B. L. GALUMBECK 2,315,412

DUAL FLAME OIL BURNER AND CONTROL SYSTEM THEREFOR

Filed April 17, 1942

Fig. 1

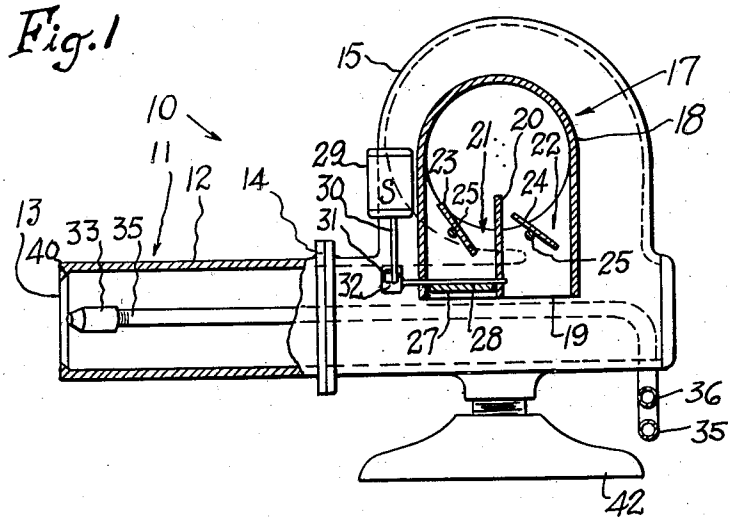
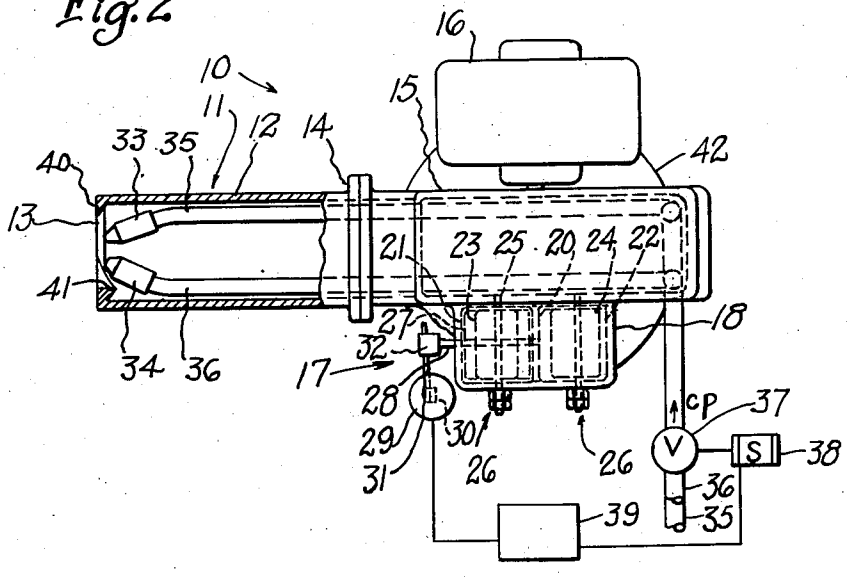


Fig. 2



INVENTOR.
B. L. Galumbeck
BY
Louis Schumacher, Atty.

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DUAL FLAME OIL BURNER AND CONTROL SYSTEM THEREFOR

Bennie L. Galumbeck, New York, N. Y.

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4 Claims. (Cl. 158—76)

This invention relates to oil burner installations and has particular reference to devices used for the heating of homes and other buildings.

One object of the invention is to provide a device of the character described having improved control means for the air supplied to an oil burner which is capable of discharging one or more streams of fuel oil for constant heating requirements and also to meet peak load conditions.

Another object of the invention is to provide such an oil burner installation wherein improved means afford a simplified and accurate setting to suit buildings having different heating characteristics which are to be met under the constant and peak load conditions referred to.

Another object of the invention is to furnish an oil burner of the atomizing type having a plurality of oil nozzles at the burner orifice, the nozzles and the orifice being so coordinated in a fixed manner as to afford a proper distribution of air flow regardless of whether oil is being fired at one or both of the orifices with consequent change in the volume of air supplied.

Other objects and advantages of the invention will become apparent as the specification proceeds.

With the aforesaid objects in view, the invention consists in the novel combinations and arrangements of parts hereinafter described in their preferred embodiments, pointed out in the subjoined claims, and illustrated in the annexed drawing, wherein like parts are designated by the same reference characters throughout the several views.

Figure 1 is a view in side elevation with parts removed and in section showing an installation embodying the invention.

Figure 2 is a similar plan view thereof, but also schematically showing certain other of the automatic control features.

The advantages of the invention as here outlined are best realized when all of its features and instrumentalities are combined in one and the same structure, but, useful devices may be produced embodying less than the whole.

It will be obvious to those skilled in the art to which the invention appertains, that the same may be incorporated in several different constructions. The accompanying drawing, therefore, is submitted merely as showing the preferred exemplification of the invention.

Referring in detail to the drawing, 10 denotes an oil-burner installation embodying the invention. As applied to the heating of homes and similar buildings, such structures must be simple, inexpensive and foolproof, and yet afford a relatively high degree of efficiency. Preferably such a system should be operative constantly, instead of intermittently. The intermittently fired system wastes heat because it is necessary to reheat the boiler and its water at frequent intervals; also substantial discomfort results even aside from thermostat limitations, because the temperature of the building continues to fall during the reheating of the boiler and pipes. These results can be avoided by a dual flame burner, affording a normal rate of firing for normal or constant load, and a peak rate of firing for maximum load conditions as in the event of an unusual cold spell, or in quickly bringing up the temperature of the house in the morning. As distinguished from the normal constant firing, the added rate of firing caused by a second oil nozzle is intermittent.

The device 10 may be exemplified by an atomizing oil burner 11 having a tubular body 12 forming at one end an orifice 13 at which the mixture of air and atomized oil issues to burn in the combustion chamber of the boiler. At its other end, as at 14, the burner is connected to the outlet of a source of air pressure such as a rotary blower 15 of any well known type. The latter may be driven by a constant speed motor 16, which is the least expensive for this type of installation. Connected to the inlet of the blower housing is a device 17 adapted to effect a combined control and setting for the dual flame burner.

The device 17 may comprise a casing 18 having an upper portion coaxial with the blower inlet and a lower portion open preferably at the bottom 19 to tend to exclude dirt and dust. The lower portion may have a plurality of passages, such as those formed by a generally central wall 20 extending clear across the casing 18 and being desirably integral therewith. The resultant passages 21, 22 are provided with individual closures or valves, such as the butterfly plates 23, 24, the supporting rods 25 of which may be journaled in opposed walls of the casing 18. The arrangement may be such that the air flow through each of the passages 21, 22 may be adjusted by these valves which can be individually set as by suitable locking their rods 25. For this purpose, the rods may project from the casing 18 for convenience in turning the valves, and a locking means 26 may comprise nuts and locknuts for each rod to maintain the same in set position.

Provided in one of the passages of the casing 18 is an additional like valve or plate 27 fixed on

a rod 28 journaled in opposed walls of the passage 21, for example along an axis at right angles to that of either rod 25. But unlike the valves 23, 24, the valve 27 is not locked but is opened on peak load and closed during normal constant load. Hence a portion of the rod 28 may project from the casing 18 to be operated by any suitable control means such as a solenoid 29. The plunger 30 of the latter may have a link 31 slidably engaged with a yoke or knuckle 32 that is fixed on the valve rod 28. When the solenoid is deenergized the weight of parts may move the valve 27 to closed position; when energized, the valve is moved to open position.

The valves 23, 24, and 27 cooperate with the dual flame oil burner 11, exemplified as by a plurality of spaced nozzles such as 33, 34 having individual oil pipes 35, 36. In addition to other controls that may be provided, the pipe 36 may have a valve 37 controlled by a solenoid 38. The solenoids 29 and 38 may be operated by any suitable control 39 schematically shown, and adapted to be responsive to steam pressure or temperature or to the temperature in the house in any well known manner. Accordingly, the control 39 may cause both solenoids 29 and 38 to be operated simultaneously to open the valves 27 and 37 to permit air to flow through the passage 21 and oil to flow through the pipe 36 to the nozzle 34. It will be understood that oil may flow continuously through the pipe 35 to the nozzle 33 subject, if desired, to such automatic house temperature or steam pressure controls as may be provided.

It is preferable to dispose the oil tubes 35, 36 relatively closely to the side walls of the burner tube 12, since maximum air flow occurs at the center of a pipe or orifice. However, at the orifice 13, the nozzles 33, 34 are relatively close to the center so that they shall be completely surrounded by the stream of air to assure a completely atomized flow of oil well mixed with the air. Such a mixture is quite essential especially with the small combustion chambers of household boilers. If the valve 27 is closed, and only the nozzle 33 is firing, the reduced flow of air more readily envelops the stream of atomized oil. In order to further direct this reduced flow of air to the nozzle 33, and to accomplish this without moving parts, the orifice 13 has been modified to afford a reduced coefficient of friction at the nozzle 33 and an increased coefficient of friction at the nozzle 34. For this purpose, the orifice adjacent to 33 is formed with an outwardly tapered part as at 40 and with a reentrant edged part as at 41. Each of the parts 40 and 41 may extend for about one-half the circumference of the orifice 13, and as shown, the part 41 may be gradually reduced toward the nozzle 33. Thus the reduced flow of air will tend to be deflected toward the nozzle 33 to form a uniform firing mixture of air and oil. But if both nozzles are firing, with the valve 27 open, the greatly increased flow of air will not be materially affected by the parts 40 and 41, the only difference being that there will be a little more turbulence of air flow near the nozzle 34 due to the part 41. Such increased turbulence will be of advantage in facilitating a better mixing of the oil with the larger volume of air.

The device 10 may be made up as a compact unit supported as on a pedestal 42.

The operation of the device 10 will now be briefly described. In designing an installation for a given house, the normal and peak requirements are computed. The nozzles 33 and 34 are then selected accordingly. Now the system is tested, firing first the nozzle 33 alone, with the valve 27 closed, and the valve 24 is adjusted and locked in a position to pass the proper amount of air for the most efficient combustion. Then both nozzles 33 and 34 are fired, the valve 27 being open, and the valve 23 is set and locked in a position to pass the proper amount of air for perfect combustion. The device 10 is now in condition for regular use. With the change in the seasons, it may be desirable to reset the valves 23 and 24. The construction disclosed has the advantage of great flexibility and easy and reliable setting for different seasons and for homes having different heating characteristics. For example, the device 10 may be identical for various houses and may have sufficient capacity for a substantial range of heating requirements so that only the nozzles 33 and 34 need be changed or selected according to the computed heating requirements of the particular house. When the valve 27 is closed, a saving in motor current results, because the blower 15 is throttled at its inlet and is operating at reduced capacity.

I claim:

1. A device including a burner having a conduit open at one end to form a discharge orifice and having an air inlet spaced from the orifice for receiving air, two pipes having individual nozzles at said orifice, whereby oil can be supplied to the burner through one or both of said pipes, a source of air under pressure connected to said air inlet, and means for controlling the volume of air supplied by said source to the burner, including a casing having a plurality of air passages therein, individual manually settable valves for said passages, means for adjustably setting said valves, a control valve for only one of said passages, and means for automatically opening and closing the control valve independently of the adjustment of the settable valves, so that air may be supplied to the burner through one or both of said passages according as one or both of said nozzles are firing.

2. A device including an oil burner of the mechanical atomizing type including an air conduit having a discharge orifice, two oil discharging nozzles at the orifice of the conduit, one or both of said nozzles being operative at will, the different nozzles being near different sides of the orifice, the orifice having portions providing substantially different coefficients of air discharge at said different sides so that if only one nozzle is ejecting oil, the correspondingly reduced stream of air will tend to flow toward that side of the orifice nearest to the oil ejecting nozzle.

3. A device including an oil burner of the mechanical atomizing type including an air conduit having a discharge orifice, two oil discharging nozzles at the orifice of the conduit, one or both of said nozzles being operative at will, the different nozzles being near different sides of the orifice, the orifice having portions providing substantially different coefficients of air discharge at said different sides so that if only one nozzle is ejecting oil, the correspondingly reduced stream of air will tend to flow toward that side of the orifice nearest to the oil ejecting nozzle and means for increasing and for reducing the flow of air to the burner according as oil is being ejected by one or both of said nozzles.

4. A device including an oil burner of the mechanically atomizing type having a tubular air

conduit provided with a discharge orifice and two oil ejecting nozzles one or both of which are operative at will, and means for controlling the flow of air to the burner including a casing having a plurality of air supply passages communicating with said conduit, means responsive to a condition that is to be maintained for closing one of said passages when fuel is being ejected from only one of the nozzles and for opening said passage when fuel is being ejected from both of said nozzles, the other passage being permanently open, manually settable valves in said passages independent of said means for controlling the volume of air passing therethrough, and means for locking said valves in set position, said nozzles being located near different sides of the burner orifice, the burner having portions for providing substantially different coefficients of friction adjacent to the different nozzles so that when the volume of air is reduced, the stream of air tends to flow mainly through that part of the orifice which is nearest to the operating nozzle.

BENNIE L. GALUMBECK.