March 17, 1936. E. J. LATTNER 2,034,686

FLUID FUEL BURNER

Filed Sept. 24, 1932

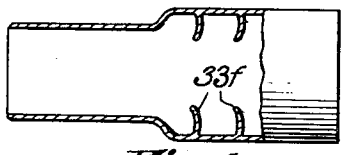


Fig. 4.

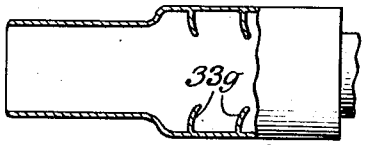


Fig. 5.

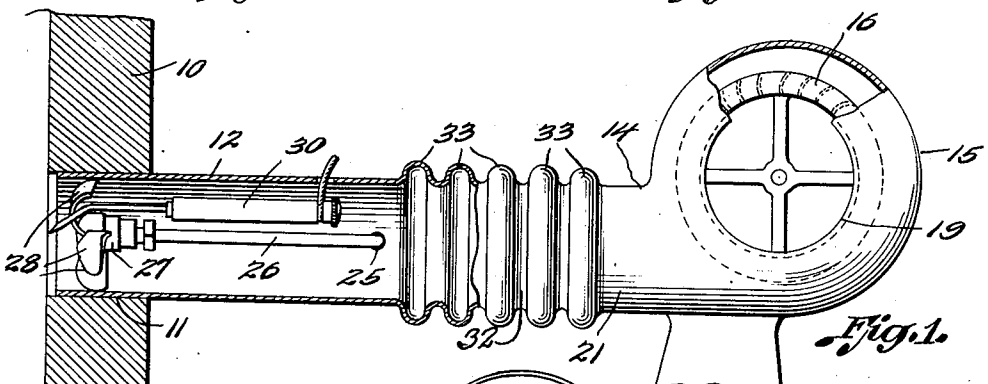


Fig. 1.

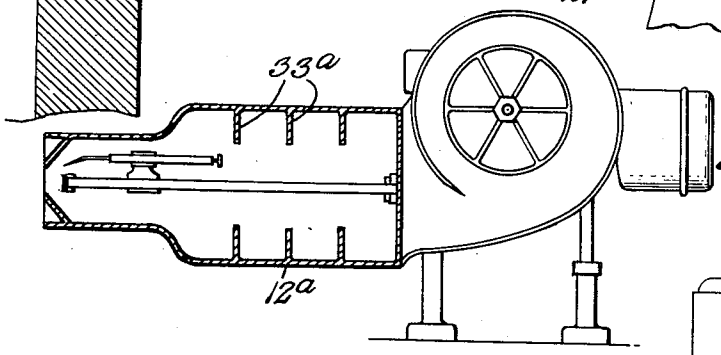


Fig. 3.

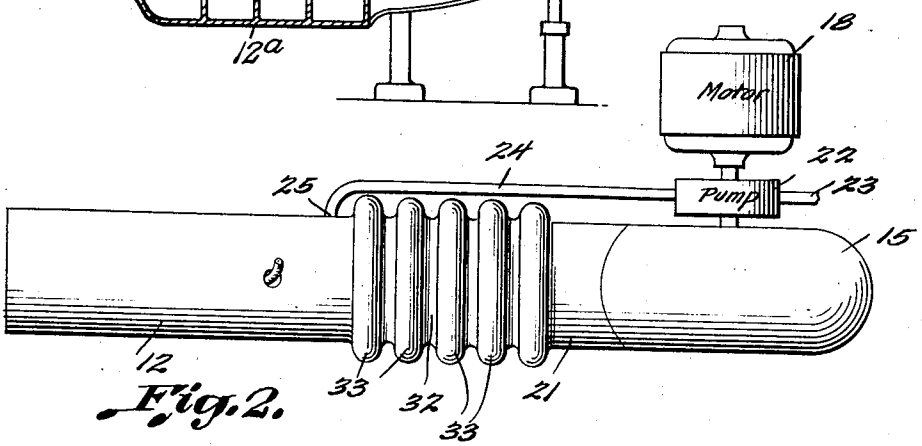


Fig. 2.

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FLUID FUEL BURNER

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4 Claims. (Cl. 158—76)

This invention relates to liquid fuel burners and particularly to that type of burner using such liquid fuel as distillate, fuel oil, kerosene, or the like and in which the oil is atomized and mixed with a blast of air delivered into the furnace by suitable air circulating means.

It is a general object of the present invention to provide improvements in such types of burners which increase the effectiveness and economy of operation, improve the flame distribution and color, and very materially reduce the noises resulting from the operation of such burners.

Other and further features and objects of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawing and following specification, wherein is disclosed a single exemplary embodiment of the invention, with the understanding, however, that such changes and variations may be made therein as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawing:

Figure 1 is a side elevation, partly in vertical section and partly in elevation, of an oil burner constructed according to the present invention.

Figure 2 is a plan view thereof; and

Figures 3 to 5 show various modifications of applicant's invention.

In oil burners of the type referred to as "jet", "blast", "nozzle", or "blower" types as distinguished from the rotary type, the fuel and air are mixed by atomizing the liquid fuel under pressure from a nozzle usually disposed within a tube or conduit through which air at fairly high velocity is delivered. The air and oil are thus mixed or carbureted and ignited for burning within the furnace. In order to obtain the best possible type of flame, it is essential that the air issue from the blast tube surrounding the fuel nozzle at substantially uniform velocities throughout the cross-section of the air conduit, which is quite large in diameter relative to the oil nozzle, for otherwise there will be an uneven mixing of the air and fuel, and the flame will contain portions resulting from the combustion of a lean mixture, other portions resulting from the combustion of an over-rich mixture, and probably portions resulting from combustion of a proper mixture.

In the combustion of fuel from "blast" type burners, and in fact from all burners, there is a certain undesirable noise probably due to the rapid flame propagation and augmented by any pulsations in the delivery of the fuel and air. This flame noise, whatever its cause, is largely muffled within the furnace but escapes, in many cases, through the air conduit and the air inlet to the blower. Whether this noise is conducted through the air stream or the material of the blast tube or both is not wellknown.

In accordance with the present invention, the blast tube is so constructed as to eliminate the difficulties enumerated above by causing a substantially uniform air velocity and pressure distribution throughout the cross-section thereof and by retarding and substantially preventing the transmission of the flame noises through or over the blast tube to the exterior of the furnace. In addition the noise of the air in passing at high velocity through the blast tube and probably due to pulsations resulting from the fan construction and operation is practically eliminated.

Referring now to the drawing, there is disclosed a simple form of oil burner adapted to be used in conjunction with a furnace, one wall 10 of which is shown as provided with an aperture 11 into which closely fits the end of a blast tube or air conduit 12 forming part of the oil burner. This tube is preferably of circular cross-section and extends from the furnace to the discharge end 14 of some suitable form of air delivery mechanism, preferably a rotary or centrifugal blower 15 having a fan or rotor 16 provided with blades. Such a blower is driven by the electric motor 18, and the casing thereof is provided with an air inlet 19 at one side, through which air is drawn by the suction of the rotor, brought up to a relatively high velocity and discharged tangentially into the inlet end 21 of the blast tube 12.

Preferably driven by the same motor is some form of device for delivering the fuel under pressure, such as the pump 22 on the motor shaft, intermediate the blower and the motor. This pump receives oil from a suitable source, through the inlet pipe 23, and discharges it through the tube 24 which passes inwardly at 25 through the wall of the blast tube and extends centrally thereof as at 26 to a nozzle 27 suitable for atomizing or spraying the oil into the furnace. Some oil burners are provided with fins or vanes 28 surrounding the oil nozzle and adapted to give the air issuing around it a swirling or rotating action in order to better commingle the atomized oil and the air to promote carburetion and combustion. Ignition apparatus, which forms no part of the present invention, is shown at 30 for igniting the oil and air mixture, when the burner starts up, for burning in the furnace

The blast tube, through a portion of its length,

is corrugated as at 32 preferably by means of circumferential bulges or ridges 33 entirely without the circumference of the normal cross-section of the tube, thereby not restricting its air delivering capacity. These corrugations may be considered as means to equalize the air pressure and velocity throughout the cross-section of the tube, for there is never a uniform velocity or pressure in the tube at the fan discharge owing to the operation of the fan rotor. It is probable that the eddies created by these corrugations are responsible for the equalization of the velocity and pressure throughout the tube. Furthermore these eddies, when carried along the tube, aid in the mixing of the oil and air.

Without attempting to explain further the operation of this corrugated section of the blast tube, it may be stated that practice has proven that it not only reduces the noise of the air passing through the tube, but it effectively prevents the return of the flame noises through the tube and their emission from the air inlet 19. When the burner is operated without such a corrugated section there is a decided noise of the flame at the inlet which is substantially entirely eliminated by the use of the present invention.

It will, of course, be understood that the form of that portion of the blast tube which is effective in improving the operation of the burner is subject to considerable variation and need not be corrugated but can be provided, for instance, with inwardly projecting fins, ribs, or the like, or any other configurations, the functions of which are to retard and eddy the air passing thereover to permit it to equalize in pressure and velocity before passing through the blast tube.

In Figures 3 to 5, inclusive, I have shown several configurations on the interior of a blast tube for retarding and eddying the air passing through the tube. In Figure 3 the cylindrical blast tube 12*a* has flat washer-like inwardly-projecting flanges 33*a* on its inner wall for eddying the air currents passing through the tube. In the device shown in Figure 4 the baffles 33*f* take the form of inwardly-projecting flanges similar to the flanges of Figure 3 but curved to present convex surfaces to the impinging air current. The device shown in Figure 5 has flanges 33*g* similar to the flanges 33*f* but curved to present a concave surface to the impinging air current.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In an oil burner, in combination, an air propelling means having an inlet from atmosphere, a fuel oil discharge nozzle for placement within a furnace, and a blast tube extending from said means to said nozzle, said tube being provided with circumferential baffle means to set up eddy currents in the air and to prevent the flame noise from passing through said tube and issuing through said inlet.

2. In an oil burner, in combination, means to deliver air into a furnace, an inlet for said means from atmosphere, means to discharge fuel oil in said furnace, a blast tube extending from said first named means into said furnace, said tube having a section thereof corrugated circumferentially to set up eddy air currents in said tube and to reduce transmission of sound through the tube.

3. The combination with a furnace, of an oil burner therefor, an air fan for said oil burner having an inlet from atmosphere, an oil pump therefor, a nozzle within the furnace and connected to the oil pump, an air blast tube extending into said furnace around said nozzle and leading to said fan, a portion of said tube being circumferentially corrugated without reducing the internal diameter thereof for setting up eddy currents in said tube and reducing transmission of sound through said tube.

4. In a liquid fuel burner, a blast tube, means for furnishing air under pressure to the blast tube, means for furnishing liquid fuel under pressure to the discharge end of the blast tube where it is mixed with the air flowing through the tube, and means comprising a plurality of baffles extending inwardly from and circumferentially entirely around the inner wall of said tube for setting up eddy currents in said tube and reducing transmission of sound through said tube.

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