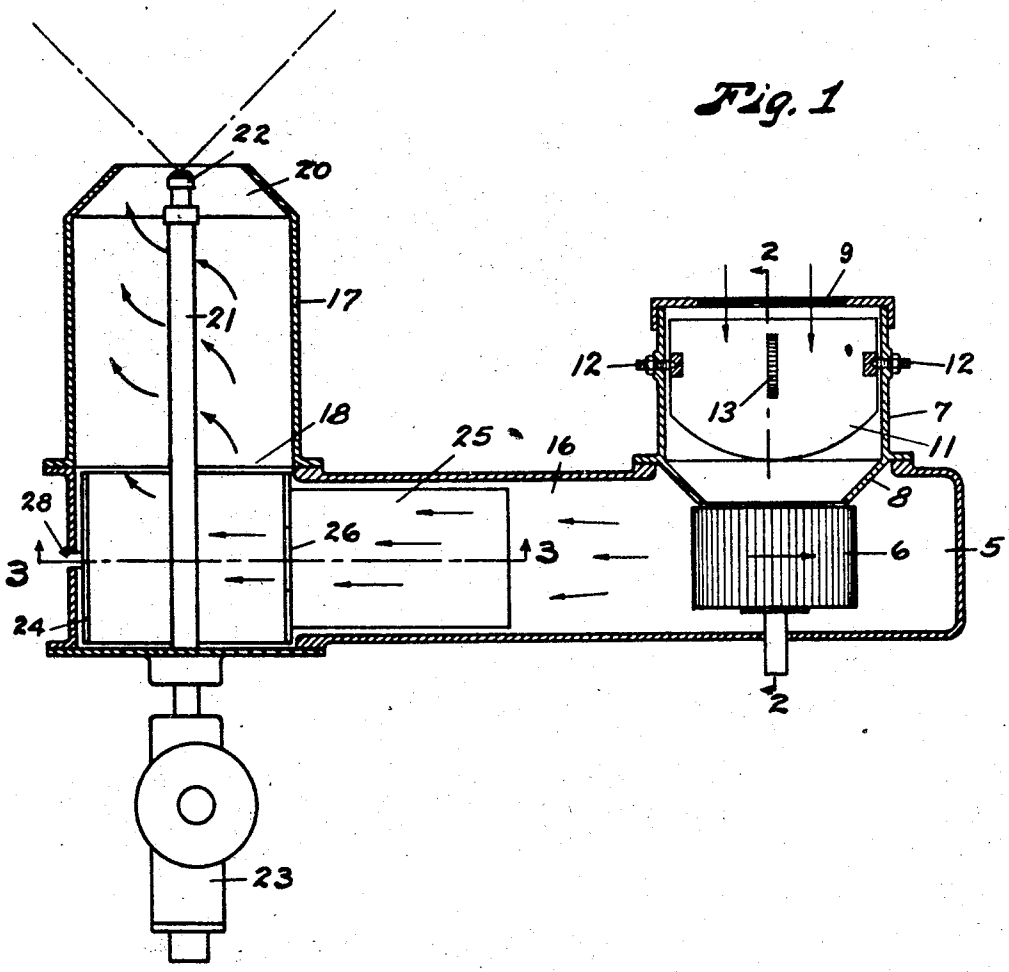
Sept. 10, 1940. L. L. FINNIGAN 2,214,246

AIR CONTROL MEANS FOR OIL BURNERS

Filed Feb. 20, 1937

Fig. 1



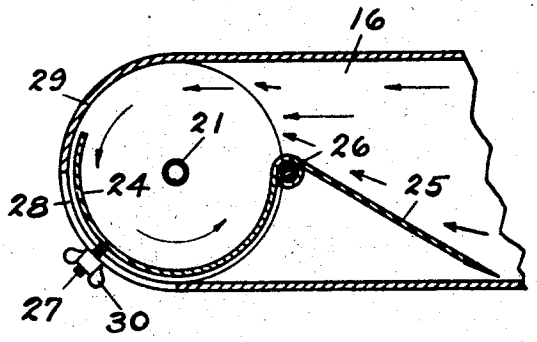


Fig. 3

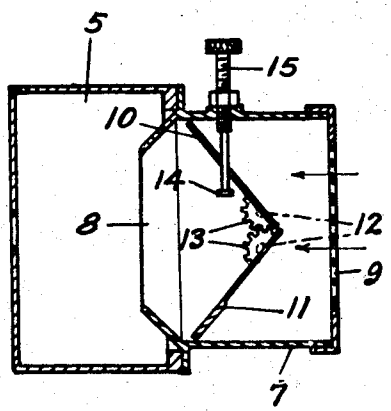


Fig. 2

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AIR CONTROL MEANS FOR OIL BURNERS

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3 Claims. (Cl. 158—76)

This invention relates to air control means for oil burners and the primary object of this invention is to provide simple and efficient means for completely controlling the supply of air to an oil burner so that maximum efficiency as respects the air conditions in the burner is obtained.

Another object of the invention is to provide efficient air shutter means in connection with an air inlet to a fan or blower, which air shutter means is adapted to regulate the amount of air admitted to the fan when the fan is in operation and further adapted to close the inlet to the fan when the said fan is not in operation, thereby preventing a gravity circulation of cold air through the heating plant with which an oil burner is connected when the oil burner is not operating.

Another object of the invention is to provide shutter means of this nature which will always close against a gravity circulation of air but will open with very slight resistance when subjected to the forced circulation produced by a driven fan.

Another object of the invention is to provide novel and efficient turbulence control means in connection with an oil burner air delivery conduit and blast tube, which turbulence control means is constructed so as to impart a whirl or rotary movement to the air delivered through the blast tube and is adjustable to vary the amount of such whirl or rotary movement, thus making it possible to direct the rotating air into the oil spray in the most efficient manner and at the same time making it possible to vary the distance beyond the end of the blast tube at which combustion takes place, thus preventing overheating and fouling of the end of the blast tube, atomizer nozzle, ignition electrodes and walls of the furnace adjacent these parts.

Other and more specific objects of this invention will be apparent from the following description taken in connection with the accompanying drawing.

In the drawing Figure 1 is a view in horizontal section of oil burner air control means constructed in accordance with this invention.

Fig. 2 is a vertical sectional view substantially on broken line 2—2 of Fig. 1, showing the air shutter means used in connection with the fan inlet, the fan being omitted.

Fig. 3 is a fragmentary view in vertical section substantially on broken line 3—3 of Fig. 1, showing the turbulence control means.

Like reference numerals designate like parts throughout the several views.

Referring to the drawing 5 designates a fan housing within which is mounted a fan 6 of the type used for supplying air to oil burners. An air inlet conduit 7 is positioned adjacent one end of the fan 6 substantially co-axially with said fan and provided with a convergent end portion 8 through which air is drawn by suction to the fan. The outer end of the air inlet conduit preferably has a screened air inlet opening 9. Two shutter members 10 and 11 are positioned one above another and pivotally mounted within the air inlet conduit 7 for swinging movement on horizontal axes. The pivots 12 for these shutter members are parallel and horizontal and positioned one above another. The shutter members 10 and 11 are preferably flat plates. If the air inlet conduit 7 is cylindrical then the shutter members 10 and 11 are preferably rounded on their non-pivoted ends, as shown in Fig. 1. These shutter members 10 and 11 are positioned so that their straight edges are substantially horizontal and parallel and substantially midway between the top and bottom of the conduit 7. In Fig. 2 these shutter members are shown in closed position. Obviously suction of the fan 6 will move these shutter members toward each other opening air passageways between the edges of these shutter members and the walls of the air inlet conduit 7. The two shutter members are operatively connected with each other by two enmeshed gear segments 13 which are coaxial with the pivots 12. The gear segments 13 provide a connection by which the weights of the two shutters, if said weights were equal and equally distributed, would be substantially balanced as respects each other and the torque, due to gravity, exerted by one shutter member would always substantially offset the torque, due to gravity, exerted by the other shutter member. However, to provide for the closing of said shutter members when the fan 6 is stopped, and no forced draft or suction is being exerted on said shutter members, I preferably make the lower shutter member heavier than the upper shutter member. This difference in weight is just enough to cause the shutter members to overcome any pressure which may be produced by a gravity circulation of the air and move to a closed position as soon as the fan is stopped. This provides for automatically shutting off all gravity circulation of cold air through the fan housing into the heating plant when the fan is not operating. A stop member 14, adjustable by screw means 15, is provided for limiting the opening movement of the shutters 10 and 11. This makes it possible to vary the area of the opening through which air passes to

the fan 6 and provides means for varying the amount of air supplied to the oil burner. The shutters 10 and 11 offer slight resistance in opening and will occupy the maximum open position permitted by stop member 14 when the fan is operating.

The fan housing 5 has an air delivery conduit 16, preferably of rectangular cross section, extending outwardly therefrom. This air delivery conduit 16 is provided with a semi-cylindrical outer end portion 29. A blast tube 17 is positioned at right angles to this air delivery conduit and communicates with the semi-cylindrical outer end portion thereof through an opening 18. The outer end portion of the blast tube 17 is provided with a convergently tapered portion 20. A pipe 21 of an oil burner is positioned substantially axially of the blast tube 17 and an oil atomizing nozzle 22 is provided on the end of the pipe 21, preferably at substantially the location of the convergent portion 20 of the blast tube. The pipe 21 extends transversely through the air delivery conduit 16 axially of the curved or semi-circular end portion 29 and is connected, external to the conduit 16, with means 23 by which a supply of oil for combustion purposes is controlled.

The turbulence control means comprises a semi-cylindrical shell 24, positioned within the rounded end portion 29 of the air delivery conduit 16 and movable rotatively therein into various angular positions. A deflector plate 25 is positioned within the air delivery conduit 16. One end of the deflector plate 25 rests on the bottom of the air delivery conduit 16 and the other end of said deflector plate 25 is connected by pivot means 26 with one edge portion of the semi-cylindrical shell 24. A stud bolt 27 is secured to the shell 24 and extends outwardly through a slot 28 in the semi-cylindrical end 29 of the air delivery conduit 16, providing means whereby the shell 24 may be rotatively adjusted. A wing nut 30 is provided on the stud bolt 27 to lock the shell 24 in any desired adjusted position.

Adjusting the shell 24 rotatively raises or lowers the pivoted end portion of the deflector plate 25 and in so doing varies the incline of said deflector plate. The position of this deflector plate 25 determines the direction of flow of the major portion of the air moving toward the blast tube. By raising the pivoted end portion of the deflector plate 25 the main body of air is caused to take a more tangential path as respects the curved end portion 29 and shell 24 and a more rapid and violent whirl is imparted to this body of air as it moves spirally toward the blast tube 17. Also the raising of the pivoted end of the deflector plate 25 restricts the area of the opening between the pivoted end portion of said deflector plate 25 and the top wall of the conduit 16, thus increasing the velocity of this air at the same time that its rotary motion is increased and providing greater turbulence. Lowering the pivoted end portion of the deflector plate 25 permits the main body of air to move in a less tangential direction and more nearly toward the axis of the semi-cylindrical end portion 29 of the shell 16, thus imparting less whirling movement to the main body of air and at the same time providing a greater area of opening between the pivoted end portion of the deflector plate and the top wall of the housing and reducing the velocity of the air. This reduces the turbulence of the air at the point of discharge. The deflector plate 25 does not control or substantially vary the amount of air supplied to the oil burner, the amount of air being determined by the capacity of the fan 6 and the adjustment of the shutter members 10 and 11. The discharge head developed by the fan 6 is sufficient to overcome any restriction of area that is brought about by any particular adjustment of the deector plate 25 necessary to obtain the desired turbulence or whirl.

Experience has shown that, if a whirling motion is imparted to a body of air which is being directed outwardly around an atomized jet of oil, a more intimate mixing of the air and oil is obtained and better combustion results. By governing or controlling the rate or violence of this whirl it is possible to secure the best results for different conditions and installations. Also, by varying the whirling motion imparted to this air, it is possible to vary the distance from the end of the atomizer 22 and convergent end 20 of the blast tube at which combustion takes place. This makes it possible to keep the point of combustion far enough away from the end of the blast tube, atomizer nozzle and electrodes to prevent fouling and overheating of these parts. Variations in the angle of inclination of the end of the blast tube affect the whirl required to secure the most efficient results.

The whirling motion of the air is created entirely by the deflector plate 25 and the semi-cylindrical parts 29 and 24 and the interior of the blast tube is unobstructed. The whirl of the air reduces the air pressure at the location of the atomizing nozzle 22 so that at this location there is not sufficient air to support combustion immediately adjacent the nozzle. This makes it possible to position the flame at any desired distance from the nozzle 22, as hereinbefore set forth.

The foregoing description and accompanying drawing clearly set forth what I now regard as a preferred embodiment of my invention but it will be understood that this disclosure is merely illustrative and that such changes in the device may be made as are within the scope and spirit of the following claims.

I claim:

1. In an oil burner, a cylindrical blast tube; a convergent discharge end portion on said blast tube; oil discharge nozzle means positioned to discharge atomized oil substantially centrally of said convergent discharge end portion of said blast tube; an oil supply pipe connected with said nozzle means; an air delivery conduit for air under pressure positioned at substantially right angles to said blast tube and communicating therewith; semi-cylindrical wall means at the end of said air delivery conduit in registration with the wall of said blast tube; and an inclined deflector plate adjustably mounted in said air delivery conduit terminating substantially flush with the wall of said blast tube and positioned to direct air substantially tangentially against said semi-cylindrical wall means, whereby a whirling motion is imparted to said air as said air passes into said blast tube.

2. In an oil burner, an air delivery conduit for air under pressure, said air delivery conduit having a semi-cylindrical end portion; an oil burner blast tube communicating with the semi-cylindrical end portion of said air delivery conduit and positioned at substantially right angles to said air delivery conduit; a convergent discharge end portion on said blast tube; oil discharge nozzle means positioned to discharge atomized oil substantially centrally of said convergent discharge end portion of said blast tube;

an oil supply pipe connected with said nozzle means; an inclined deflector plate in said air delivery conduit positioned to direct air substantially tangentially into said semi-cylindrical end portion of said air delivery conduit; and means for changing the inclination of said inclined deflector plate.

3. In an oil burner, an air delivery conduit for air under pressure, said air delivery conduit having a semi-cylindrical end portion; an oil burner blast tube communicating with the semi-cylindrical end portion of said air delivery conduit and positioned at substantially right angles to said air delivery conduit; a convergent discharge end portion on said blast tube; oil discharge nozzle means positioned to discharge atomized oil substantially centrally of said convergent discharge end portion of said blast tube; an oil supply pipe connected with said nozzle means; a semi-cylindrical shell member rotatively mounted in the semi-cylindrical end portion of said air delivery conduit coaxially of said blast tube; means supporting said semi-cylindrical shell member in adjusted angular positions; and an inclined deflector plate having one end portion positioned on the bottom of said air delivery conduit and the other end portion pivotally connected with one edge of said semi-cylindrical shell member and adjustable vertically by rotative adjustment of said shell member, said deflector plate directing air tangentially into the semi-cylindrical end portion of said air delivery conduit and imparting a whirl to the air entering said blast tube.

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