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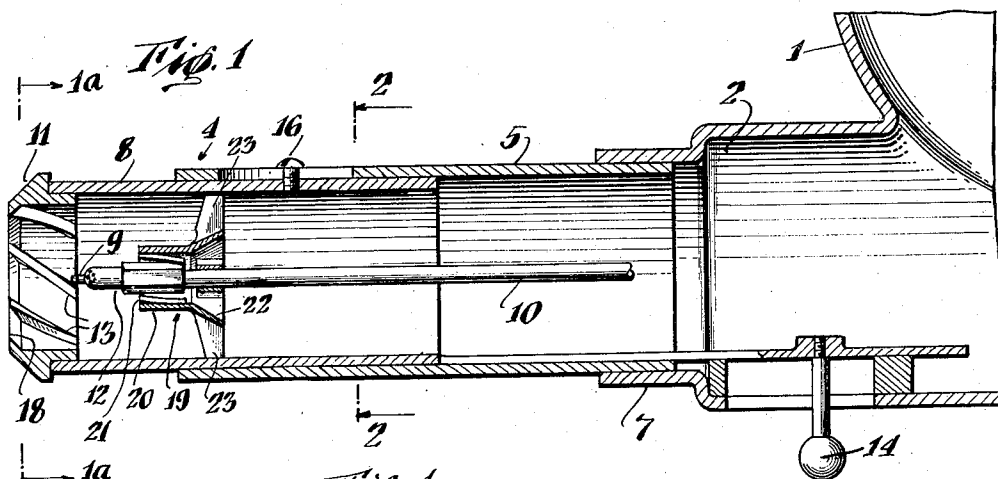
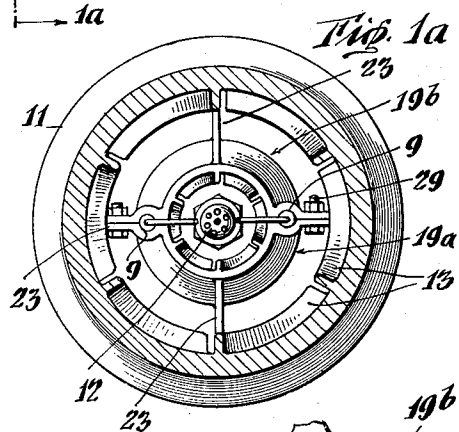
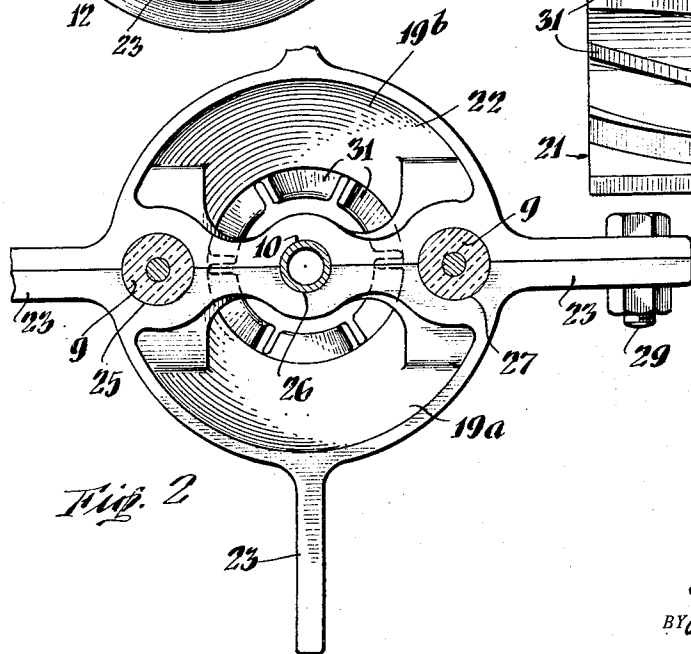
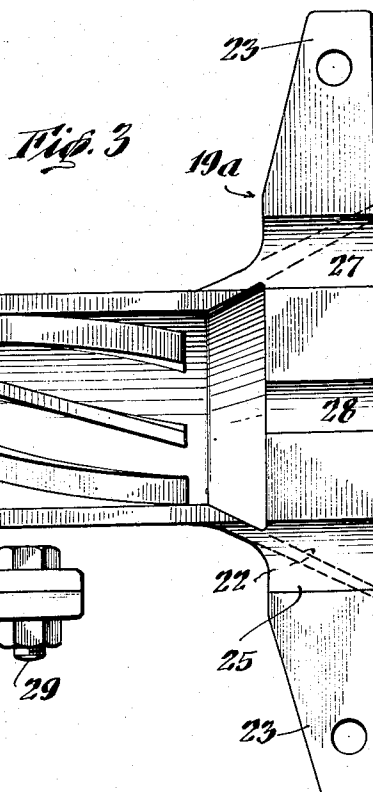
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AIR DIRECTING MEANS FOR GUN TYPE OIL BURNERS

Filed July 1, 1947

2 Sheets-Sheet 1



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AIR DIRECTING MEANS FOR GUN TYPE OIL BURNERS

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2 Sheets-Sheet 2

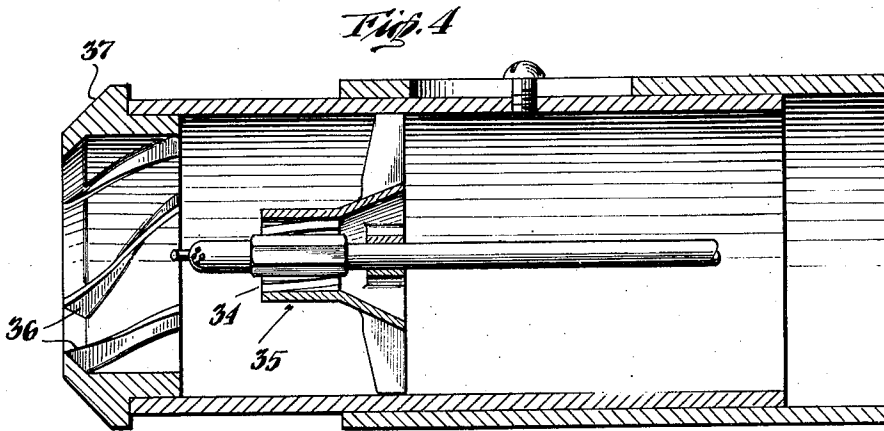
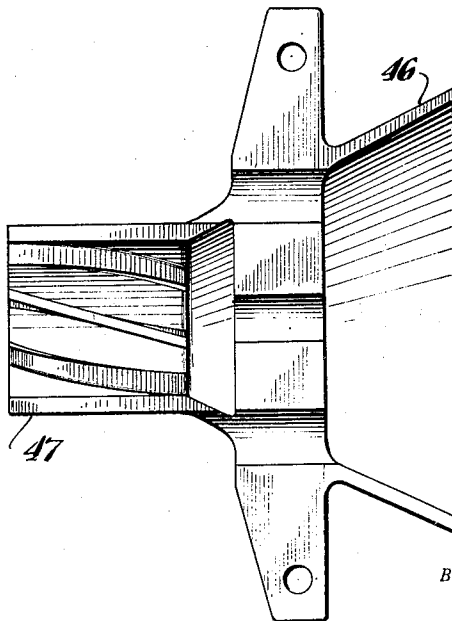


Fig. 5

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AIR DIRECTING MEANS FOR GUN
TYPE OIL BURNERSMurray Walshin, New York, N. Y., assignor to
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Application July 1, 1947, Serial No. 758,353

3 Claims. (Cl. 158—1.5)

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The present invention relates generally to oil burners of the type utilized extensively in the heating of homes, factories, etc., and more particularly to an improvement adapted for use with oil burners of the type disclosed in my pending application Ser. No. 735,007, filed in the United States Patent Office on March 15, 1947.

In the operation of an oil burner, finely divided or "atomized" particles of fuel oil are burned in a furnace pot or chamber in the presence of air. It is desirable that the very small globules or particles of oil be thoroughly intermixed with the air so that a maximum amount of oxygen may combine with the oil to furnish as complete combustion of the oil as possible. In general, the better the intermixture of oil and air, the higher will be the combustion efficiency. Various expedients have been adopted for intermixing the oil and air in endeavoring to secure as high a combustion efficiency as possible.

The present invention aims to provide a new and improved means adapted to be associated with the air-conducting conduit or blast tube of an oil burner to bring about a more complete agitation or intermixture of oil and air and to achieve an increased combustion efficiency, as evidenced by higher carbon dioxide content in the products of combustion.

An object of the present invention is to provide a new and improved oil burner.

Another object of the invention is to provide a new and improved oil burner which is adapted to provide increased combustion efficiency.

Another object of the invention is to provide a new and improved means for increasing the combustion efficiency of an oil burner which is adapted to be incorporated with existing oil burners.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification.

Fig. 1 is a sectional view illustrating one form of the present invention;

Fig. 1a is a view along line 1a—1a of Fig. 1;

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1;

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Fig. 3 is a view showing the interior of one form of air-guiding means;

Fig. 4 is a fragmentary sectional view illustrating another form of the present invention;

Fig. 5 is a view showing the interior of a modified form of air-guiding means.

Referring more particularly to Fig. 1 of the drawings, there is shown a blower housing 1 adapted to contain the usual blower or impeller wheel (not shown) which may be driven by an electric motor; the blower or impeller draws air from the atmosphere and discharges it into the entrance portion 2 of a blast tube or air-conducting conduit designated generally by the reference numeral 4.

The air-guiding conduit 4 preferably comprises a cylindrical portion 5, attached in any suitable manner adjacent one end thereof to a flange or extension 7 of the blower housing, and a longitudinally adjustable portion 8 adapted to be suitably positioned to obtain a desired length of air-guiding conduit.

In use the air-guiding conduit projects into the furnace so that air which passes through the conduit may combine with oil from a conduit or pipe 10 to create a heating flame within the furnace pot or chamber.

The outer end of the blast tube extension 8 is preferably provided with a cone portion 11 having inwardly extending inclined guide vanes 13. The purpose of the guide vanes is to cause the air emerging from the blast tube to whirl about with a rotary motion to thereby create turbulence and effect a high degree of intermixture of air with fuel ejected from the nozzle 12 carried at the outer end of the fuel conduit 10.

The blast tube extension 8 is longitudinally adjustable with respect to the nozzle 12 so that an optimum condition of intermixture of fuel and air may be achieved and so that a flame of desired shape and proportions may be created within the furnace pot. A suitable adjusting lever 14 and locking screw or bolt 15 may be provided to facilitate making an adjustment of the blast tube extension 8 and to retain a setting, once obtained.

Adjacent the nozzle 12 and fuel conduit 10 are disposed a pair of spaced insulators through which project igniter leads and igniter points so that ignition of fuel ejected from the nozzle 12 may be obtained electrically upon creation of a spark adjacent the end of the nozzle.

As pointed out hereinbefore, it is most desirable for optimum combustion efficiency of an oil burner that the oil be broken up into very

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small globules and that this "atomized" oil be thoroughly intermixed with air so that a maximum amount of oxygen may combine with the oil, thus resulting in a maximum percentage of carbon dioxide and a minimum amount of carbon monoxide in the flue gases.

In the present invention this desirable combustion may be achieved by the combination with the above described parts of means of the type shown generally at 19 in Fig. 1 and more particularly in Figs. 2 and 3 of the drawings.

As shown in Figs. 1, 2 and 3, the means adapted to facilitate intermixture of air and oil comprises a pair of complementary members 19a and 19b which co-operate to form a relatively short tubular portion 20, a converging, flared, or funnel means or portion 22, and supporting or centering leg portions 23. The complementary parts 19a and 19b which comprise the air-guiding means 19 are each provided with recesses 25, 26, 27 adapted to receive and retain in centrally disposed position the oil conduit 10 and the adjacent insulators 9 through which extend the igniters. Constructing the air-guiding means 19 of separate complementary parts facilitates assembly thereof with the oil conduits and igniters. The complementary parts of the air-guiding means 19 may be retained together by suitable bolts or screws 29.

When the air-guiding means 19 is assembled with the oil-conducting conduit 10 and the igniter insulators 9, the outwardly extending supporting legs 23 are adapted to rest against the walls of the blast tube extension 8 to maintain the oil conduit in centrally disposed position with respect to the air-guiding conduit or blast tube. The outwardly extending legs 23 are preferably not fixedly secured to the blast tube extension 8 but rest against the inner walls thereof so that desired longitudinal adjustment of the tube extension 8 may be readily made without first necessitating release or detachment of the air-guiding means 19.

The interior of the substantially cylindrical portion 20 of the air-guiding means 19 is shown provided with inwardly extending vanes or ridges 31. As shown in Fig. 1, the vanes 31 are inclined in the same general direction as the vanes 13 of the end cone 11 but they need not necessarily be at the same angle of inclination as the angle of the end cone vanes 13.

The Fig. 1 showing of the relative spacing or positioning of the end cone 11 with respect to the air-guiding means 19 is merely illustrative. The air-guiding means 19 may be positioned within the blast tube 4 at such position as will contribute to maximum combustion efficiency. The actual dimensions or spacing of the parts may be obtained by checking the operation of the burner in actual usage and making suitable positioning of parts.

When a burner of the type illustrated in Fig. 1 is in operation, air is forced by the blower through the air-guiding conduit 4. A portion of the air stream enters the funnel means or portion 22 of the air-guiding means 19 and proceeds through the cylindrical portion 20 thereof. Other portions of the air stream may pass through the tube 4 outwardly of the air-guiding means 19. That is, the latter air stream portions may pass through the substantially annular area intermediate the exterior of the funnel means or portion 22 and the interior of the blast tube.

Air which passes through the air-guiding portion 19 tends to increase its velocity in moving

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through the relatively short cylindrical portion 20 and, upon striking against the inwardly directed vanes or ridges 31, the air stream is given a whirling or rotary motion. The rotary motion is enhanced due to the fact that the air which passes through the cylindrical portion 20 tends to momentarily speed up while in that portion.

The outer end 21 of the cylindrical portion 20 may be disposed adjacent the end cone 11 so that air emerging from the end 21 of the air-guiding means 19 strikes the inclined vanes 13 of the end cone after passing only a short distance along the blast tube 4. The vanes 13 of the end cone 11 subject the moving air to an additional whirling or rotary effect, which enhances the rotary movement effected by the vanes 31 of the air-guiding member 19. As a result, air passing through the air-guiding conduit 4 is subjected to two separate and distinct rotation-effecting means and is caused to whirl rapidly.

It is believed that the combination of the relatively short cylindrical portion 20 and the converging or funnel means or portion 22 of the air-guiding means 19 provide a venturi effect which speeds up that portion of air passing through the air-guiding means. Air which passes through the venturi-like air-guiding means 19, and which is set into rotary movement thereby, tends to throw itself centrifugally outwardly on emerging from the open end 21 of the air-guiding means. Outwardly thrown air emerging from the air-guiding means 19 mixes with what may be loosely referred to as a "cylinder of air" which passes over the exterior of the air-guiding means 19 intermediate this member and the interior of the blast tube 4. The hurling of the air outwardly from the open end 21 of the air-guiding means into the moving outer "cylinder" of air creates a high degree of turbulence adjacent the nozzle 12 and the very small globules of oil emerging from the nozzle 12 are picked up and thoroughly intermixed with air during movement thereof toward the outlet end 18 of the blast tube 4. As pointed out hereinabove, the agitated and intermixed air and oil are given a further whirling or rotary motion by the vanes 13 of the end cone 11. As a result, oil globules are picked up and thrown around in such manner as to be thoroughly intermixed.

The vanes 31 of the air-guiding means 19 and the vanes 13 of the end cone 11 are preferably at the same angle of inclination so as to impart the same general direction to the air, but they may be at slightly different angles of inclination.

In Fig. 4 there is illustrated a modified form of the present invention wherein the vanes 34 of an air-guiding means 35 and the vanes 36 of an end cone 37 are inclined in opposite direction to those illustrated in Fig. 1. That is, the vanes of the air-guiding member and the end cone may be inclined to the right or to the left so as to impart either a right-hand or left-hand rotation to the air which passes through the blast tube and emerges from the end thereof. Here again, the inclinations of the vanes 34 and 36 may be at the same or slightly different angles with respect to each other.

While the inclinations of the vanes of an air-guiding member and the vanes of an end cone could be in opposite directions with respect to each other, such is not generally desired since the opposite rotations might tend to cancel each other. Air whirled in one direction by the vanes of an interiorly located air-guiding means will be whirled in an opposite direction by the vanes

of an end cone. It is, therefore, generally preferred to have the vanes of both an air-guiding means and an end cone inclined in the same general direction so that air will be rapidly whirling upon emergence from the blast tube. Where inclined guiding vanes are utilized solely on an end cone air will also be given a rotary motion by the vanes alone.

In Fig. 5 there is illustrated a further modified form of the invention wherein an air-guiding means is provided with an enlarged or extended funnel means or conical air-concentrating portion 46. The enhanced funnel-effect provided by this form of the invention tends to direct a greater portion of air through the cylindrical throat portion 47 of the air-guiding means, and its use may be desired in some instances.

It will be seen that the present invention provides a new and improved oil burner and air-guiding means adapted to create an enhanced turbulent effect. The increased turbulence effects more thorough intermixture of air with the small globules or atomized oil so that each globule of oil may be provided with a maximum quantity of oxygen.

The percentage of carbon dioxide present in flue gases is an indication of the combustion efficiency and it has been found in actual operation that the use of an air-guiding means such as described hereinabove effects a desirable increase in the carbon dioxide contained, and a consequent decrease in the carbon monoxide content.

While the air guiding means or device of the present application is shown and described particularly with reference to its incorporation in a complete oil burner, it is readily adapted for incorporation in and use with oil burners not presently provided with such means.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. In an oil burner of the class described, the combination of an outer tube for guiding a stream of air forced therethrough, relatively short funnel means located within and spaced from interior walls of said outer tube having a substantially uninterrupted interior surface for receiving and converging a portion of said air stream without rotation thereof and discharging it, and a relatively short and straight substantially tubular conduit in said outer tube and concentric therewith connected with the discharge end of said funnel means for receiving said discharged air, said conduit having inwardly projecting substan-

tially spiralled air-guiding vanes for imparting in said conduit whirling motion to the air stream passing therethrough.

2. In an oil burner of the class described, the combination of an outer cylindrical tube having an uninterrupted interior wall zone for guiding a stream of air forced therethrough, relatively short funnel means located within and spaced from interior walls of said outer tube at said uninterrupted zone having a substantially uninterrupted exterior surface and a substantially uninterrupted interior surface for receiving and converging a portion of said air stream without rotation thereof and discharging it, and a relatively short and straight substantially tubular conduit in said outer tube at said uninterrupted zone and concentric therewith connected with the discharge end of said funnel means for receiving said discharged air, said conduit having an uninterrupted exterior surface and having interior inwardly projecting substantially spiralled air-guiding vanes for imparting in said conduit whirling motion to the air stream passing therethrough.

3. Means for positioning within a blast tube of an oil burner of the class described to act upon an air stream being forced through said blast tube from an inlet to an outlet thereof, comprising an inlet funnel means having a substantially unobstructed interior and uninterrupted interior surface for receiving and converging a portion of said air stream, and a tubular conduit connected with the outlet end of said funnel means having therein inwardly projecting substantially spiralled air guiding vanes for imparting in said tubular conduit whirling motion to an air stream passing therethrough, and laterally extending legs carried by said means for supporting it within said blast tube.

MURRAY WALSHIN.

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