Sept. 17, 1940. J. L. O'BRIEN 2,215,272

OIL BURNING APPARATUS

Filed July 9, 1938 2 Sheets-Sheet 1

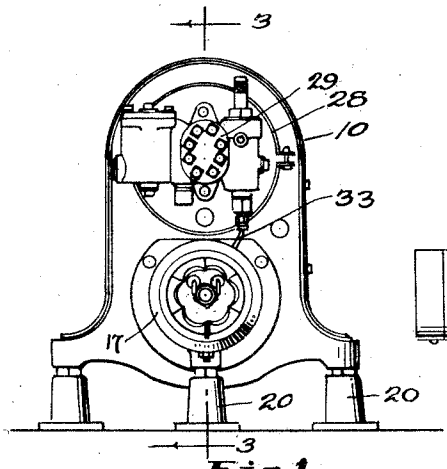


Fig. 1

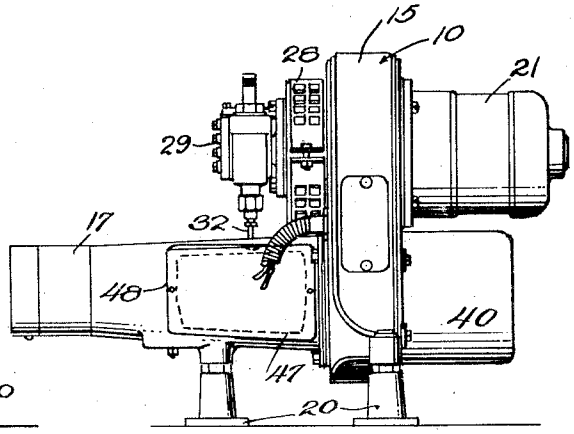


Fig. 2

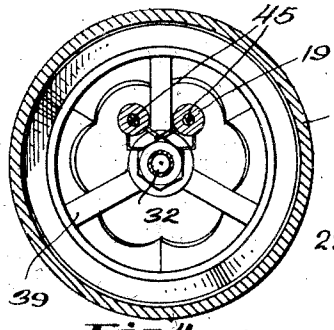


Fig. 4

Fig. 3

INVENTOR
James L. O'Brien
BY
Donald B. White
ATTORNEY

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OIL BURNING APPARATUS

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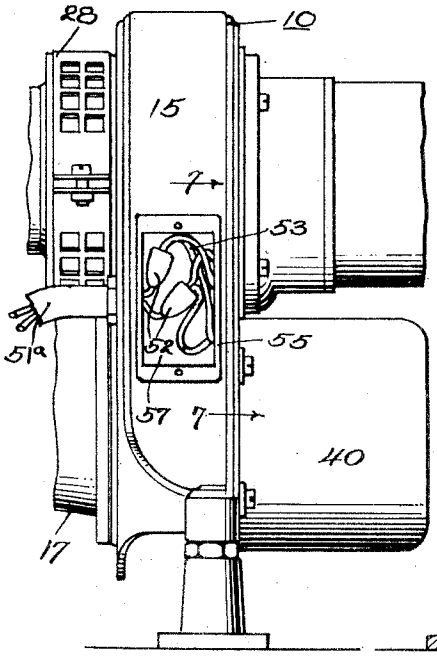


Fig. 6

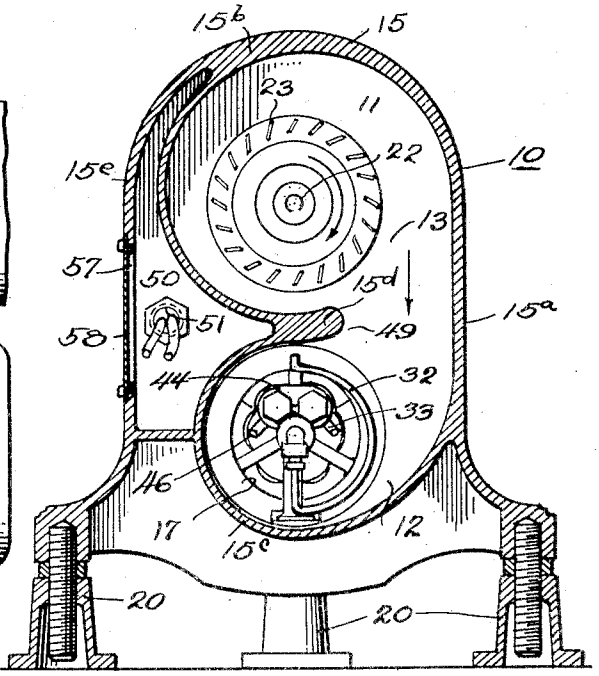
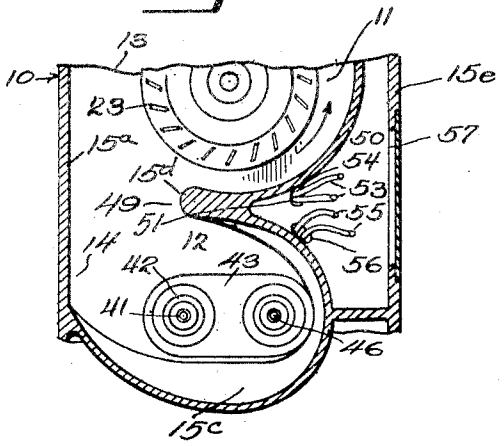


Fig. 5

Fig. 7



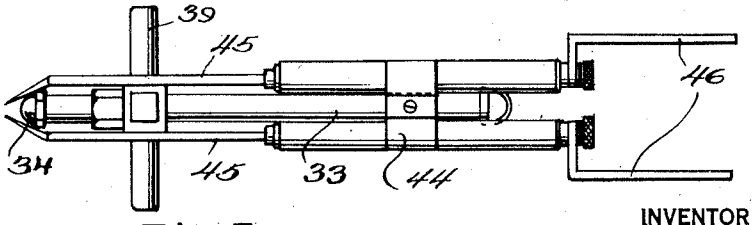


Fig. 8

INVENTOR
James L. O'Brien
BY
Donald B. Waite
ATTORNEY

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UNITED STATES PATENT OFFICE

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OIL BURNING APPARATUS

James L. O'Brien, Cleveland, Ohio, assignor to Cleveland Steel Products Corp., Cleveland, Ohio, a corporation of Ohio

Application July 9, 1938, Serial No. 218,403

1 Claim. (Cl. 158—76)

This invention relates to oil burning apparatus and more particularly to oil burning apparatus of the pressure atomization type.

One of the objects of the present invention is to provide an oil burning apparatus of the pressure atomization type of such new and improved design that the air entering the blast tube is caused to spiral and violently whirl against the inside wall thereof to insure highly efficient delivery of combustion supporting air and to provide for an exceedingly quiet fire.

Another object is to provide an oil burning apparatus of the pressure atomization type with a blast tube of such improved design as to accelerate velocity of and to effect placement of the combustion supporting air in such shape and location as to cause intimate mixing of the air and oil streams at the point of discharge from the blast tube.

Another object is to provide means in an oil burning apparatus of the pressure atomization type to retard deceleration of the combustion supporting air throughout the coasting period of the fan on shut down whereby to minimize vibrations and pulsations which frequently occur in conventional oil burners.

Another object is to provide means whereby movement of the combustion supporting air through the center of the blast tube is negligible whereby the atomized oil issuing from the burner nozzle is enveloped in a rotating cone of air.

Another object is to provide an oil burner of compact arrangement in which all parts thereof can be easily assembled or removed from the assembly.

A further object is to provide an oil burner of the pressure atomization type with new and improved means for easily assembling and connecting the electric ignition electrodes with the ignition transformer entirely within the burner structure whereby to eliminate wiring connections exteriorly of the burner assembly.

With the above and other objects in view, the present invention consists in certain features of construction and combination of parts to be hereinafter described with reference to the accompanying drawings and then claimed.

In the drawings which illustrate suitable embodiments of the invention;

Figure 1 is a front end view of the oil burning apparatus looking toward the burner nozzle and blast tube discharge end.

Figure 2 is a side view of the burner shown in Figure 1.

Figure 3 is an enlarged longitudinal section of the burner taken approximately on the line 3—3 of Figure 1.

Figure 4 is a transverse section of the blast tube taken approximately on the line 4—4 of Figure 3.

Figure 5 is a transverse section taken approximately on the line 5—5 of Figure 3.

Figure 6 is an enlarged fragmentary side elevation of the burner.

Figure 7 is a fragmentary transverse section taken approximately on the line 7—7 of Figure 6, and

Figure 8 is an enlarged plan view of the electrode and burner nozzle and oil tube assembly.

Referring to the accompanying drawings in which like numerals refer to like parts throughout the several views, the oil burner apparatus shown in the embodiment of the present invention, includes a casing 10 having a fan chamber 11, and a plenum chamber 12 provided by spaced front and rear walls 13 and 14, respectively, and a continuous connecting wall 15, of the casing 10. The casing 10 is provided with an air outlet 16 in its front wall 13 through which air from the plenum chamber 12 is discharged. Secured to the front wall 13 coaxial with the outlet 16 is a blast tube 17, the blast tube being provided at its discharge end with an air diffuser 18 having overlapping spiral vanes 19.

The burner is supported on adjustable supports 20 connected with the casing 10 and blast tube 17.

Secured to the rear wall 14 of the casing 10 is an electric motor 21 having its shaft 22 extending into the fan chamber 11 and carrying a fan 23 of the peripherally bladed type.

The casing 10 has an air inlet 24 through the front wall 13 substantially coaxial with the fan 23, and adjacent this inlet is an air inlet chamber 25 defined by a cylindrical wall 26 having inlet apertures 27 therein which are adjustable in size by means of an adjustable apertured band 28 surrounding the wall 26.

Secured to the side of the inlet chamber 25 is an oil pressure pump 29 having its shaft 30 extending through the inlet chamber and connected at 31 with the motor shaft 22.

The pump outlet is connected by means of an oil conduit 32, extending through the blast tube 17, with the rear end of the oil supply tube 33, which has a nozzle 34 at its front end. The oil supply tube 33 is supported on a bracket 35 having a threaded portion 36 extending through an elongated opening 37 in the bottom portion of the blast tube 17, a nut 38 being provided to ad-

justably secure the bracket 35 to the blast tube 17. The front end of the tube 33, adjacent the nozzle 34, is additionally supported by a three legged bracket 39, the legs of which have slidable engagement with the inside wall of the blast tube 17.

Secured to the rear wall 14 adjacent the plenum chamber 12 is an ignition transformer 40 having an electrical connection with a pair of tubular contact elements 41, parallel to the axis of the blast tube, each of which is mounted within a tubular insulator 42. The insulators 42 are mounted within an opening 43 in the rear wall 14 of the casing 10.

Secured to the bracket 35 by means of a clamp 44 are a pair of ignition electrodes 45 and secured to the electrodes are rigid longitudinally extending connectors 46, the free ends of which have sliding engagement within the contact elements 41.

The blast tube 17 is provided at one side with an assembly opening 47 through which the oil supply tube and electrode assembly is inserted. In doing this the assembly is merely inserted longitudinally through the opening 47 until the rigid connectors 46 are within the same and then moved rearwardly to slide the connectors 46 within the contact elements 41, after which the threaded portion 36 is inserted through the elongated opening 37, then the assembly is moved longitudinally to adjust the nozzle position with respect to the air diffuser, and finally the nut 38 is threaded on the portion 36 and tightened.

The opening 47 is normally closed by means of a cover plate 48 secured to the blast tube 17.

Referring to Figures 5 and 7, it will be noted that the connecting wall 15 of the casing 10 is of curvilinear shape except for one side portion 15*a*, it having curvilinear upper and lower end portions 15*b* and 15*c*, respectively, which at the side opposite the straight side portion 15*a* continue and join with each other at that side of the plane passing through the axes of the air outlet and inlet openings 16 and 24, respectively, nearest the wall portion 15*a* but spaced therefrom to provide a communicating passageway 49 between the fan and plenum chambers 11 and 12, respectively.

In order to impart and insure a violent spiral action to the air entering the blast tube through the plenum chamber outlet 16, the connecting wall 15 substantially throughout the curvilinear extent thereof defining the plenum chamber 12 inclines from the front wall 13 toward the rear wall 14 and inwardly toward the axis of the plenum chamber, as shown in Figures 3, 5 and 7.

Preferably, the angle of inclination is not constant but is at a maximum opposite that portion 15*d* of the connecting wall which separates the fan and plenum chambers and progressively decreases to a minimum at such portion 15*d*. The air enters the plenum chamber 12 through the passageway 49, as shown by the arrow in Figure 5, in a straight line path and strikes the curvilinear end portion and follows around the same and there passes through the outlet 16 into the blast tube 17.

It is to be noted that the blast tube 17 has a tapering reduction in diameter from the inlet end toward the outlet end thereof.

In operation, the combustion supporting air is given a spiral movement by the curvilinear wall of the plenum chamber which air is caused by the inclination of this wall outwardly toward the inlet end of the blast tube to enter the blast tube more at the inside wall than at the center thereof and to flow through the blast tube in a spiral path with a maximum velocity at the inside wall, the air movement through the center of the blast tube being practically negligible. The gradually tapering inside wall of the blast tube gradually accelerates the air velocity and the spiralling action is further increased by the spirally vaned diffuser at the discharge end, whereby the atomized oil discharging from the burner nozzle is enveloped in a rapidly whirling or rotating cone of air of accelerated velocity at the region where the oil and air are first brought together, instead of being carried out toward the back wall of the combustion chamber by a high velocity air stream emanating from the center of the blast tube as in conventional burners of the pressure atomization type. As a result, there ensues an intimate mixing of the atomized oil and combustion supporting air at the immediate region of discharge from the blast tube, and combustion is practically completed before impact against the back wall of the combustion chamber.

Another advantage is that throughout the coasting period of the fan, the tapering blast tube retards deceleration of the combustion supporting air, thereby allowing for complete combustion of the oil draining from the oil conduit extending from the pump to the nozzle during this period.

A further advantage is that the objectionable vibrations and pulsations, which frequently occur in conventionally shaped blast tubes which seek to control velocity and air placement with the use of diffusers, baffles, etc., is minimized.

The particular manner of air flow and discharge tends to materially increase the efficiency of operation and to materially aid in providing a quiet fire.

In order to provide for a balanced external appearance, it will be noted that a wall portion 15*e* parallel to the portion 15*a* is provided which forms a space 50. A conduit 51*a* containing the transformer wires for the motor and the ignition transformer is secured to an opening 51 in the front wall 13 through which the wires extend and are provided with connectors 52 within the space 50 to which the motor leads 53 extending through an opening 54 in the rear wall 14, and the transformer leads 55 extending through an opening 56 in the wall 14, are connected.

An opening 57 in the wall portion 15*e* is provided for access to the connectors 52, which opening is normally closed by a cover plate 58.

It is to be understood that various modifications of the structure shown and described may be made without departing from the scope of the appended claim.

What I claim is:

In an oil burner of the pressure atomization type having a fan housing provided with an air inlet and an air outlet, a motor driven fan within said housing and forcing combustion supporting air under pressure through said air outlet, a blast tube having an air inlet end secured to said housing coaxial with said outlet and a discharge end, a fuel nozzle located within said tube axially thereof, and a fuel pump for delivering oil under pressure to said nozzle, said blast tube progressively decreasing in diameter from said inlet end to said discharge end to impose an air pressure at said discharge end greater than at said inlet end whereby, upon cessation of operation of said fan and fuel pump, deceleration of the air velocity will be retarded during the

coasting period of said fan to support combustion of the oil draining from said nozzle, said housing having an air deflecting wall of curvilinear shape adjacent said outlet and extending longitudinally with respect to the axis of said blast tube for causing the air to spiral through said blast tube with greater velocity adjacent the wall thereof than at the center region thereof, whereby upon cessation of operation of said fan and fuel pump, the air due to its spiral movement and the retardation of the deceleration of its velocity will support combustion of the oil draining from said nozzle during the coasting period of said fan.

JAMES L. O'BRIEN.