June 10, 1930. W. R. KIEFER 1,762,555

OIL BURNER

Filed Nov. 18, 1926

Fig. 1.

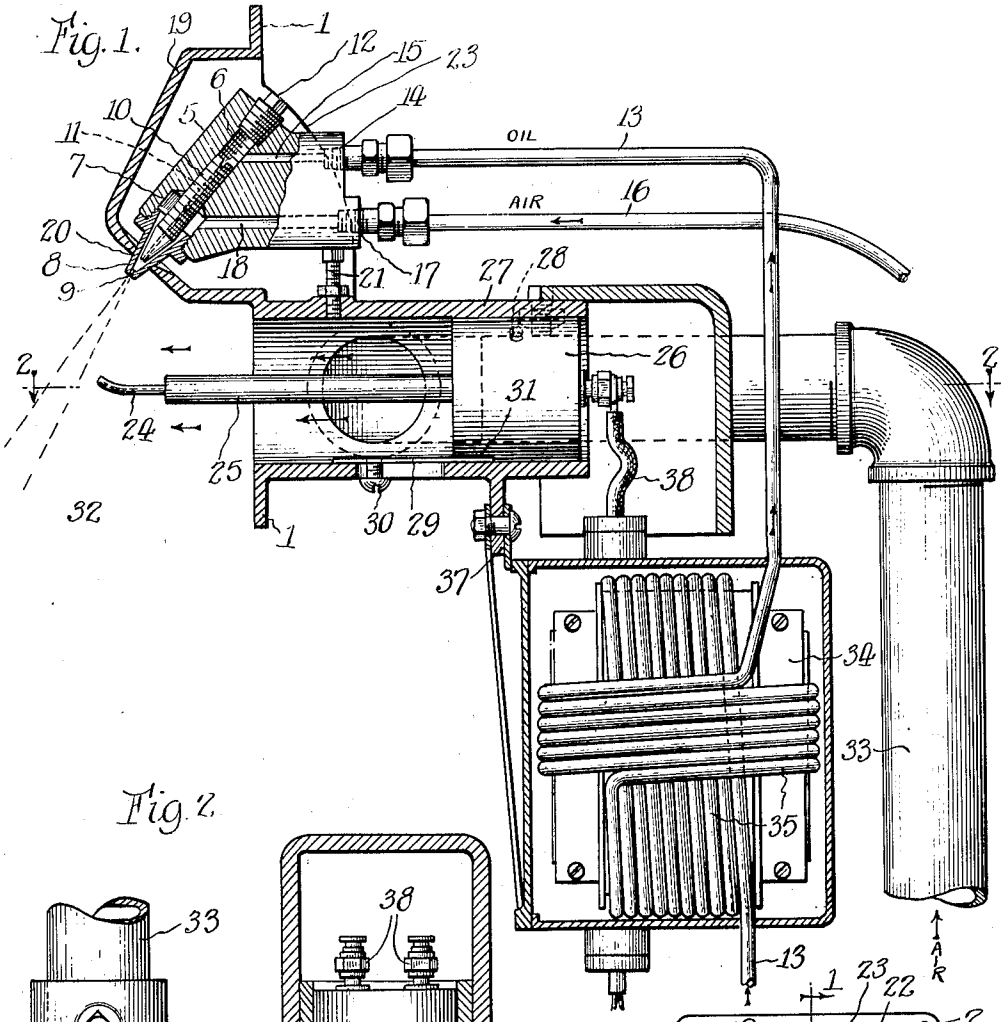
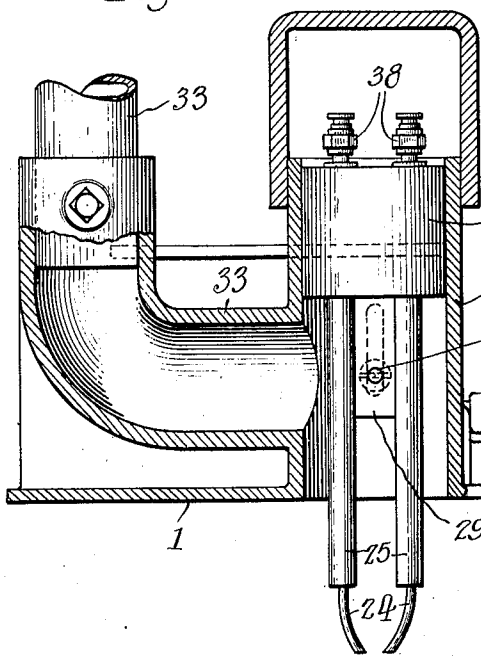


Fig. 2.



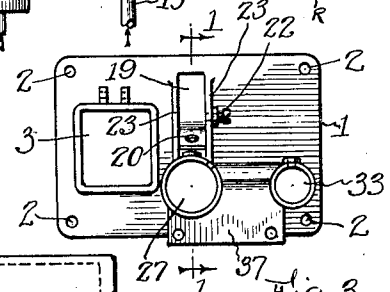


Fig. 3.

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UNITED STATES PATENT OFFICE

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OIL BURNER

Application filed November 18, 1926. Serial No. 149,042.

This invention relates to oil burners and particularly to oil burners of the type in which the combustible mixture is sprayed into a combustion bowl or combustion space. For a disclosure of one form of oil burner of the type just mentioned, reference may be had to Patent No. 1,747,333, issued February 18, 1930 to Gustaf David Sundstrand.

The primary object of the invention is to make it possible to locate the ignition electrodes out of the path of the spray, this object being attained by providing means to direct a blast of air to the electrodes whereby to blow the arc into the path of the spray. My improved construction thus prevents the electrodes from becoming covered with a deposit of carbon.

A further object is to provide means for cooling the ignition transformer and for preheating the fuel oil.

Another object is to provide an electric spark ignition system for an oil burner wherein the parts of the ignition system are arranged so as to reduce to the minimum the radio interference caused by the high tension current in the secondary leads of the ignition system.

Further objects and advantages will become apparent as the description proceeds.

In the accompanying drawings,

Figure 1 is a vertical sectional view of an apparatus embodying the features of my invention, the view being taken approximately in the plane of dotted line 1—1 of Fig. 3.

Fig. 2 is a view taken in the plane of dotted line 2—2 of Fig. 1.

Fig. 3 is a detail front view of the plate or casting which closes the opening through which coal is introduced into the ordinary house-heating furnace.

The invention will be herein described as it is customarily applied to an ordinary domestic furnace originally intended to burn coal or other solid fuel, but it will be understood that the invention is not limited in all its aspects to such use.

As indicated in the Sundstrand Patent No. 1,747,333, a combustion bowl is placed within the furnace in or near the region normally occupied by the grate bars. Means is provided to supply air under low pressure to said bowl to support combustion. Means is also provided to spray a combustible mixture of oil and air into or toward the combustion bowl, said spraying means comprising a nozzle which is supported just inside the furnace by means of a rectangular plate or casting which is substituted for the door that normally closes the opening through which coal is introduced into the furnace. The plate or casting referred to is shown in Fig. 3 and is designated 1. It is rigidly secured in position by means of bolts extending through openings 2. In said plate is an inspection opening 3 which is normally closed by a hinged door 4.

The nozzle structure comprises a body 5 having a bore 6, the lower portion of the bore being enlarged to form a chamber 7. To the lower portion of the body 5 is secured a nozzle or funnel 8 which has a screw-thread engagement with the lower portion of the walls of the chamber 7. In the inner end of the funnel 8 is a discharge orifice 9. The walls of the bore 6 are screw-threaded to receive an adjusting screw 10, the lower end of which is tapered to correspond with the interior taper of the nozzle 8. The screw 10 is adjusted so as to leave an annular space between the conical end of the screw and the nozzle 8. An axial duct 11 extends from one end to the other of the screw 10. The upper end of the bore 6 is normally closed by means of a screw plug 12, which plug may be removed when it is desirable to adjust the screw 10 or clean out the parts.

Fuel oil under pressure is supplied through a tube 13 which is connected to the body 5 at 14 and communicates with a passage 15 which communicates with the bore 6 at a point between the adjusting screw 10 and the screw plug 12.

Compressed air is supplied through a tube 16 which is connected to the body 5 at 17 and communicates with a passage 18 that extends to the chamber 7.

It will be seen that oil supplied through the pipe 13 will enter the bore 6 and thence flow through the duct 11 and out through the nozzle 8; and that the compressed air

admitted through the pipe 16 will flow through the annular space between the nozzle 8 and the screw 10 and, mingling with the oil, will be discharged through the orifice 9.

The nozzle structure just described is supported and protected from excessive heat by means including an air jacket comprising a chamber or wall 19 which is preferably formed integral with the plate 1 and projects from the inner side of said plate. The outer side of the chamber 19 is open to the atmosphere, as indicated in Fig. 3. The body 5 is adapted to extend into the chamber 19, there being a "foundry fit" between the vertical sides of the body 5 and the vertical side walls of said chamber. The funnel 8 extends into an opening 20 in the inner lower portion of the chamber 19. The body 5 is supported within the chamber 19 by means of the funnel 8 and an adjusting screw 21 on which the outer end of the body rests. In adjusting the body 5 so as to discharge the spray at the proper angle, the body fulcrums on the nozzle 8 within the opening 20. After the body 5 has been set in position to direct the spray to the proper point in the combustion bowl (not shown), the body 5 is secured in such position by means of a set screw 22 (Fig. 3) extending through a web 23 which forms a forward extension of the side wall of the chamber 19.

As shown in Fig. 1, the nozzle body 5 does not completely fill the chamber 19, there being a space below, behind and above the nozzle body so as to permit air to flow by convection from the lower portion of the chamber 19 up and out through the upper portion thereof. The flow of air thus obtained serves to protect the nozzle structure from the intense heat within the combustion chamber.

The nozzle structure and the mounting therefor which have been above described are claimed in the applicant's copending application Serial No. 282,521 filed June 4, 1928.

Ignition is preferably effected by means of an electric spark. In the embodiment herein shown, I provide terminals 24 fixed to the inner ends of two posts 25, the outer ends of which posts are carried by a porcelain block 26. Said block is secured in the outer end of a short conduit 27 preferably formed integral with the plate 1 and opening upon the inner face of said plate. The porcelain block 26 is held in place by a set screw 28 (Fig. 1). In order that the block 26 may be restored to proper position after removal, I provide a gage or stop 29 adjustably secured within the conduit 27 by means of a screw 30, the outer end of said gage lying within a recess 31 in the block.

The posts 25 extend through the conduit 27 and support the terminals so that the inner ends thereof are adjacent to the cone of spray 32 discharged from the nozzle. Air is supplied to the conduit 27 at a point inwardly of the porcelain block through a conduit 33. It will be seen that the conduit 27 directs a blast of air along the terminals 24 so as to lengthen the arc and thus cause it to extend into the cone of spray. While any preferred construction may be employed, I prefer to use a fan to cause a relatively low-pressure flow of air through the conduit 33; said conduit may be connected to the conduit that conducts air to the combustion bowl.

For the sake of certainty of ignition, it is preferable that current be supplied to the terminals 24 continuously during the operation of the burner. By reason of such continuous use the transformer 34 which supplies high-tension current to the terminals becomes hot. In order to cool the transformer and preheat the fuel oil, the tube 13 through which oil is supplied to the nozzle is coiled about the transformer in any suitable manner, as, for example, as shown at 35 in Fig. 1. The casing 36 that contains the transformer coils and the coils of the fuel tube is filled with an insulating compound (not shown). As indicated in Figs. 1 and 3, the transformer is attached to a flange 37 on the conduits 27 and 33. 38 are the wires that connect the transformer to the posts 25.

The construction herein disclosed increases efficiency of operation and makes for durability. The air jacket prevents trouble from clogging of the nozzle by burned oil. The nozzle is readily accessible from the outside of the furnace when adjustment or cleaning becomes desirable. The air blast issuing from the conduit 27 cools the ignition terminals and renders it possible to locate the terminals outside of the direct path of the spray, thus preventing the terminals from becoming fouled with carbon. The preheating of the oil increases the combustibility of the mixture and makes possible the use of a heavier grade of oil.

It will be noted that the fuel nozzle, the igniter and the transformer are carried by the plate 1 and form a compact unit. Furthermore, the location of the transformer in this position makes possible the use of short secondary leads from the transformer to the ignition device and thus serves to cut down the radio interference induced by the high tension currents in the secondary leads.

It will also be apparent that when such a construction is used, the secondary leads from the transformer may be more easily protected so as to prevent the possibility of persons being injured by the high voltage which passes through these secondary leads.

I claim as my invention:

1. In an oil burner, a plate adapted to close the fuel opening of a furnace, a fuel nozzle supported by said plate in position to direct a spray of combustible mixture downwardly, an igniter supported by said plate below

said nozzle in position to ignite the spray, a transformer supported by said plate adjacent to said igniter, and a fuel supply tube arranged adjacent to said transformer to utilize the heat generated in the transformer for preheating the oil, said tube being connected to said nozzle.

2. In an oil burner, a conduit, an insulating block closing one end of said conduit, posts on said insulating block, terminals carried by said posts, said posts extending longitudinally within said conduit and supporting said terminals beyond the end of the conduit, and a conduit connected with the first mentioned conduit inwardly of said insulating block for causing a flow of air longitudinally of said posts and terminals.

3. In an oil burner, a plate adapted to close the fuel opening of a furnace, a fuel nozzle supported on said plate and directed inwardly thereof, an electric spark igniter supported by said plate adjacent to the path of a spray of fuel from said nozzle, and a transformer having a secondary coil with leads connected to said igniter, and means supporting said transformer on said plate immediately adjacent to said igniter whereby to minimize the length of the secondary leads between said transformer and said igniter.

4. In an oil burner, a unitary ignition assembly comprising in combination, a plate adapted to be secured on a furnace wall in closing relation to an aperture formed therein, a pair of spark terminals mounted on said plate and projecting inwardly therefrom, a transformer having secondary leads connected to said spark terminals, and means supporting said transformer on the outer side of said plate adjacent to said spark terminals whereby to minimize the length of said secondary leads.

5. In an oil burner, the combination of a plate adapted to be secured on a furnace wall in closing relation to an aperture formed therein, a pair of spark terminals mounted on and projecting through said plate, a transformer having secondary leads connected to said spark terminals outside of said plate, and means connected to said plate and arranged to support said transformer adjacent to said spark terminals so as to minimize the length of said secondary leads.

In testimony whereof, I have hereunto affixed my signature.

WILLIAM RAY KIEFER.