

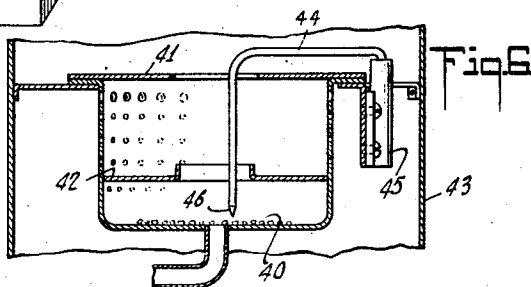
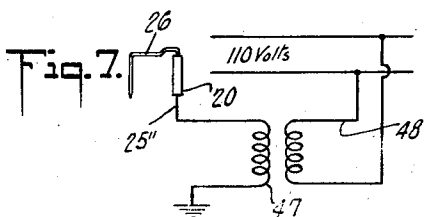
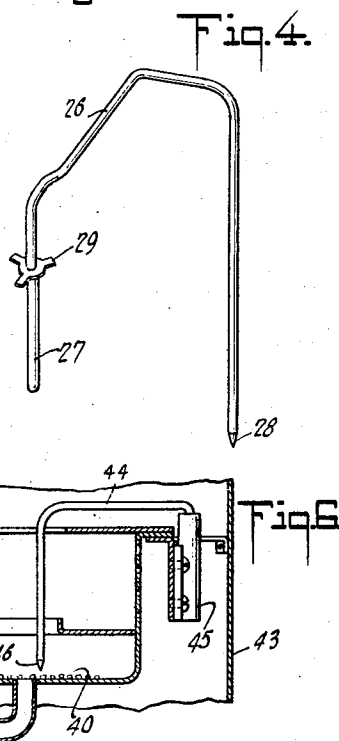
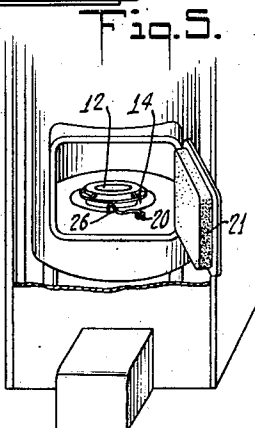
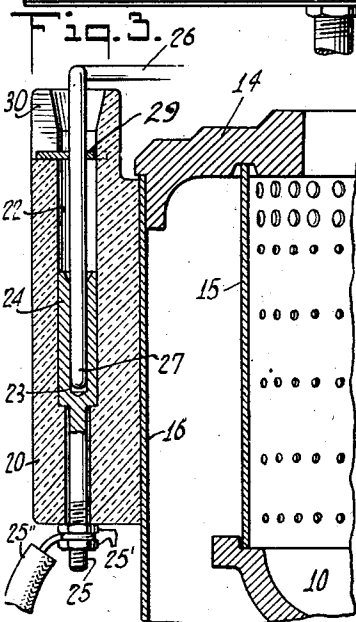
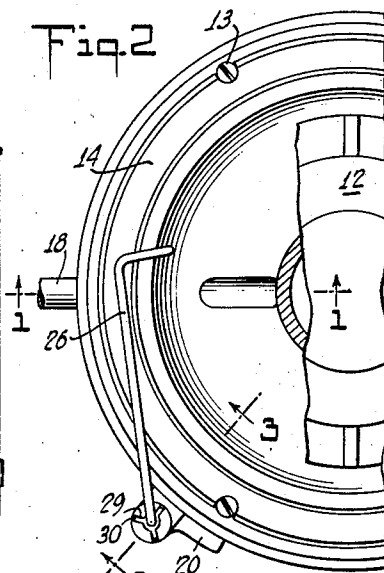
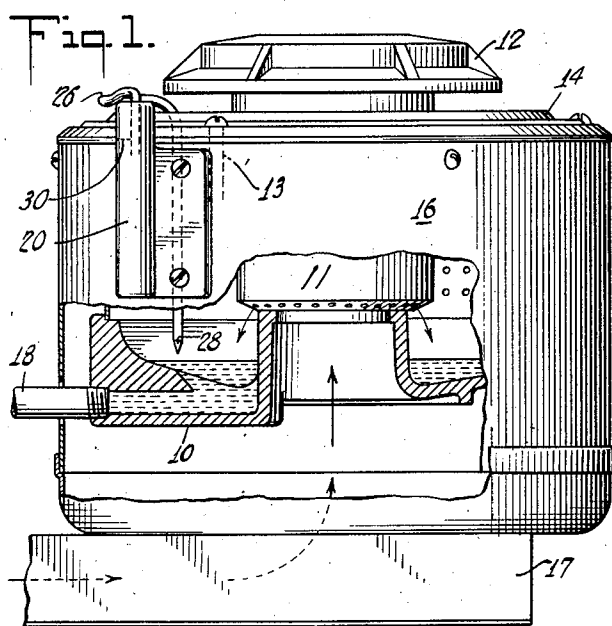
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IGNITION MEANS FOR LIQUID FUEL BURNERS

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IGNITION MEANS FOR LIQUID FUEL
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5 Claims. (Cl. 158—91)

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The present invention relates to ignition means for liquid fuel burners of the vaporizing or pot type, and is more particularly directed toward electric ignition by means of spark producing apparatus.

The desire for electric ignition for such burners has arisen on account of objections to both gas pilot ignition which, while satisfactory, is expensive and not always available, and to ignition by oil pilot. The latter is readily available and may be operated to consume so little oil as to be inexpensive, but it is extremely difficult to control. If too high, carbonization is quite likely and overheating results, while, if too low, extinguishment of the flame may result, as, for example, by clogging of the orifice through which the oil flows.

To ignite the liquid fuel electrically it is necessary to get the source of electric heat near the fuel, or its vapors, and where the fuel is of the fuel oil type having high vaporization temperatures the heater coil or spark mechanism used have to be in the vaporizing zones, i. e., close to the liquid itself. With hot wire ignition the coil itself, as well as the lead in wires and insulation, are subject to rapid deterioration which results in short life and generally unreliable operation. Where spark ignition has been tried heretofore, various difficulties have arisen, the electrode and insulation being near the vaporizing zone becoming sooty and the discharge goes through the soot instead of the gap at the electrode. Capillarity of oil causes the electrode and insulator to be saturated with oil and foul or fail. High temperature causes deterioration of the insulation value of the porcelain so that the igniter becomes short circuited. Owing to the unreliability of electric ignition for vaporizing burners the art has very generally relied upon oil pilot operation as the lesser evil.

The present invention relates to electrical ignition means for vaporizing burners which has been found to overcome these objections and work entirely satisfactorily under severe operating conditions. According to the present invention ignition is accomplished by an electrode supported extraneous of the high temperature zones of the burner and extending into the combustion zone and close to the vaporizer. The tip of the electrode is maintained at proper sparking distance from the vaporizer and adjacent the vaporizer surface on to which oil flows, when the burner is to be operated. The spark transformer is preferably energized before the oil is allowed to flow into the vaporizer so that the spark op-

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eration can slightly preheat the adjacent portion of the vaporizer to facilitate vaporizing the fuel. The electrode is embodied in a comparatively large special heat resisting wire which passes through the combustion zone and is kept hot enough to reduce soot and carbon formation to a minimum. By using the large wire the oxidation which takes place is very slow and a long period of time is required for the electrode to be impaired by oxidizing and reoxidizing. By locating the insulating support or porcelain for the electrode outside the flame zone, the porcelain or insulator can be kept cool enough so as not to deteriorate or crystallize for a long period of time. The electrode by staying hot when the burner is on will accumulate only very little soot or carbon, and this burns off readily when the burner goes from high fire to off position.

A further object of the present invention is to arrange the ignition means relative to the burner proper so that it can be readily detached for inspection or replacement, preferably without the use of special tools.

Other and further objects will appear as the description proceeds.

The accompanying drawings show, for purposes of illustrating the present invention, two embodiments in which the invention may take form, it being understood that the drawings are illustrative of the invention rather than limiting the same.

In these drawings:

Figure 1 is a side elevational view with parts in section on line 1—1 of Figure 2 showing a pot type burner equipped with an ignition electrode;

Figure 2 is a fragmentary top plan view of the same with parts broken away to show interior construction;

Figure 3 is a fragmentary vertical sectional view on the line 3—3 of Figure 2;

Figure 4 is a perspective view showing the electrode detached;

Figure 5 illustrates the installation of the pot type burner with ignition electrode in a furnace;

Figure 6 is a fragmentary view illustrating a modified form of construction; and

Figure 7 is a simplified wiring diagram.

A vaporizer of a pot type burner is indicated in Figure 1 at 10. The vaporizer may be metallic or of ceramic material which becomes sufficiently conducting when wetted with oil or fouled with residual soot. This vaporizer supports an inner air distributor 11 and flame spreader 12. It is in turn supported by bolts 13 carried by an upper ring 14. Between the ring 14 and vaporizer 10 is

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a perforated cylinder or shell 15. The ring 14 is supported at the top of a cylindrical housing 16 which is in turn supported on the top of an air duct 17. Air for combustion is forced in through the air duct and up through the inner air distributor and the outer shell. Fuel is supplied to the vaporizer 10 through a pipe 18 connected to a constant level valve (not shown), this valve being designed to feed fuel into the vaporizer at a measured rate and may maintain a pool of fuel in the bottom of a vaporizer shaped as indicated in Figures 1-3 of the drawings.

An insulator 20 is secured to the side of the burner housing 16 preferably in a position to locate it adjacent the door 21 of the furnace in which the burner is to be installed, as indicated in Figure 5. As here shown the insulator 20 has a vertical shouldered opening 22 adapted to receive a shouldered contact 23 having an upwardly opening receptacle 24, and threads 25 at the lower end for nuts 25' by which a lead wire 25'' may be attached. An electrode 26 is preferably in the form of a piece of bent wire of heat resistant alloy. One end 27 of the wire is adapted to be received in the receptacle 24 of the fixed contact. The wire extends up above the insulator and above the top of the burner as will be obvious from the drawings. It is then bent so that it extends downwardly so that the lower end 28 is just above the surface of the vaporizer adjacent the outer edge of the pool of fuel. In designing the electrode care is taken to shape it so that it does not come near any other metallic part so that the narrowest gap is at the tip of the electrode near the vaporizer.

In order that the electrode may be properly positioned in the burner it is preferable to provide the insulator and the electrode with some registering apparatus which predetermines the position of the electrode. One form of such mechanism may include an asymmetric spider 29 carried on the electrode and adapted to fit into asymmetrically arranged slots 30 in the insulator.

Figure 6 shows a common form of vaporizing pot 40, an upper baffle 41 and lower baffle 42 both apertured as indicated. This burner is of the type designed for natural draft and is usually placed in a furnace or heater shell 43. The electrode 44 is supported on an insulator 45 somewhat similar to the one above described, and the tip 46 of the electrode is adjacent the bottom of the burner. The fuel supply pipe may be connected in at the center as shown or at the side. Such burners may or may not have a pool of oil and sometimes are supplied with granular or wick material to facilitate vaporization and accelerate flame propagation.

In the drawings the electrode is shown as extending from the top of the combustion chamber of the burner down nearly to the bottom as this makes it possible to support the electrode with no insulator near a heated zone and to remove the electrode upwardly. Where these advantages may be dispensed with the electrode may be passed laterally of the combustion chamber.

In the simplified wiring diagram of Figure 7 the wire 25'' leading to the electrode is connected to a sparking transformer 47 which is grounded to the burner structure. Current for the sparking transformer is supplied through the usual power mains by a switch diagrammatically illustrated at 48. The ignition switch, the oil supply from the constant level valve and the air supply from the blower, where one is used, are preferably controlled in sequence. When the room thermostat

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calls for heat ignition current is applied before the constant level valve permits enough oil to flow into the burner to fill the pool, and the blast of air for forced draft is supplied after the oil has flowed in and ignition has been accomplished. Where automatic operation in sequence is desired such control may be had through delayed action controls, such as shown and claimed in my application Serial No. 448,385 filed June 25, 1942, now matured into Patent No. 2,375,900, dated May 15, 1945.

Ignition is assisted by having the spark operate ahead of the oil so that some localized heating of the vaporizer takes place. The ignition spark is preferably continued over a long enough time to be sure that there is no likelihood of extinguishment of the flame. The portion of the electrode in the combustion chamber is heated very hot and there is almost no tendency for the accumulation of carbon or soot. Whatever accumulates is burned off when the fire is reduced from high fire. Whenever servicing of the ignition mechanism is necessary one can readily open the door of the furnace, as indicated in Figure 5, and reach in and pull out the electrode. The same or another electrode can readily be replaced with assurance that it will be in exactly the right position.

It is obvious that the invention may be embodied in many forms and constructions within the scope of the claims, and I wish it to be understood that the particular forms shown are but a few of the many forms. Various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

What is claimed is:

1. An electrically ignited vaporizing-type oil burner comprising a vaporizer having a bottom surface onto which oil flows to form a shallow pool from which it is to be vaporized and burned, an annular combustion chamber above the vaporizer, a high potential electrode, and an electrode support outside the outer wall of the combustion chamber and beyond the region of flame propagation, the electrode extending from the support above said wall of the combustion chamber and down through the entire length of the combustion chamber to terminate just above a portion of the vaporizer surface onto which the oil flows to form a spark gap for vaporization and ignition of the oil flowing thereon, the electrode and its support being in non-capillary relation with the surfaces wetted by the oil so that the sparking action takes place only between the electrode and the adjacent surface of the vaporizer.

2. The improvement in vaporizing type oil burners having a vaporizer with a bottom surface onto which oil flows to form a shallow pool, a cylindrical perforated shell extending upwardly from the periphery of the vaporizer to form a combustion chamber, and a cylindrical housing about the perforated shell, which comprises a high potential electrode insulatedly secured to the outside wall of the housing and extending above the housing across the top thereof and down through the combustion chamber and terminating just above a portion of the vaporizer surface onto which the oil flows to form a spark gap for vaporization and ignition of the oil flowing thereon, the electrode and its support being in non-capillary relation with the surfaces wetted by the oil so that the sparking action takes

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place only between the electrode and the adjacent surface of the vaporizer.

3. The improvement in a vaporizing oil burner having an annular vaporizing pot to receive liquid fuel, an inner air distributor above the pot to form an inner combustion chamber wall and provide air for combustion, and a perforated sleeve about the pot to form an outer combustion chamber wall and supply air for combustion, whereby the space between the distributor and sleeve may be maintained at a high operating temperature, which includes an ignition electrode having a relatively cool end supported outside the combustion chamber and a conducting rod extending down through the combustion chamber in non-capillary relation with surfaces wetted by the oil and to within sparking distance from the upper surface of the pot and subject to the flame in the combustion chamber whereby the portion of the electrode in the combustion chamber is maintained at high temperature during burner operation to avoid accumulation of soot and carbon residues.

4. In the operation of liquid fuel burners having a vaporizer over the bottom of which liquid fuel may flow and a sparking electrode above a portion of said vaporizer bottom, the method which comprises concurrently generating a spark between the electrode and the opposed portion of the vaporizer bottom to preheat said surface and allowing liquid fuel to flow slowly onto more remote portions of said vaporizer bottom and then onto the heated area for vaporization and ignition, and thereafter subjecting the electrode to the heat of combustion so that it is maintained heated to temperatures which avoid the accumulation of soot and carbon residues.

5. A pot type oil burner having a vaporizer having a bottom surface over which oil fuel is adapted to flow, a shell above the vaporizer to form a combustion chamber, the shell being perforated to admit air close to the fuel surface to facilitate combustion, and an ignition electrode

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supported remotely from and extraneous of the combustion chamber and extending in a generally inward direction to be over the combustion chamber and then extending downwardly through it to terminate adjacent said vaporizer bottom surface to form a spark gap for initial vaporization and ignition of the oil flowing thereon, the electrode within the combustion chamber being subjected to high temperatures during burner operation to prevent accumulation of soot and carbon residues and the electrode and its supports being in non-capillary relation with the surfaces wetted by the oil so that the sparking action takes place only between the electrode and the adjacent surface of the vaporizer.

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