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VAPORIZING TYPE BURNER WITH RESISTANCE IGNITER

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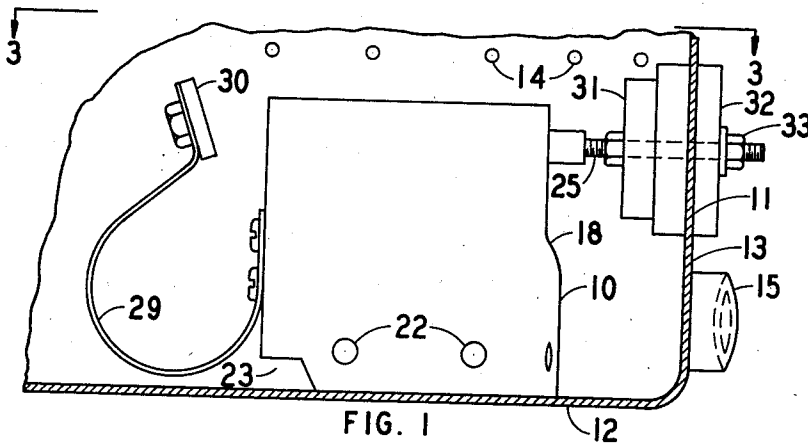


FIG. 1

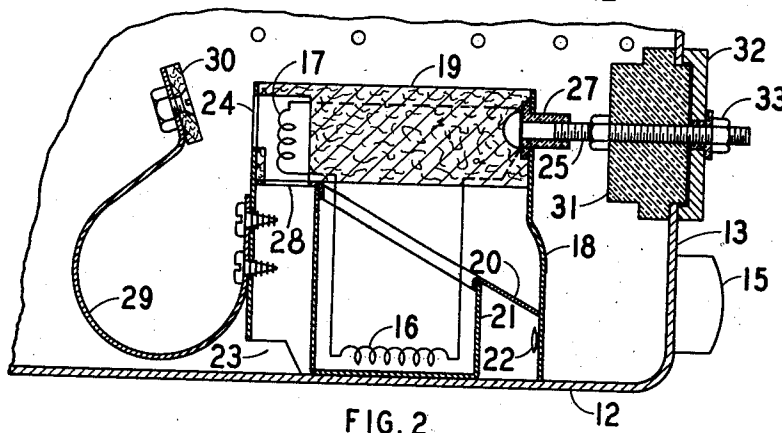


FIG. 2

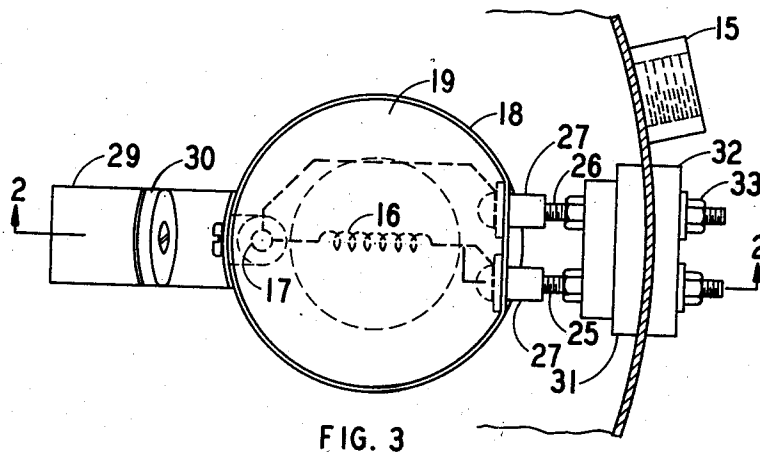


FIG. 3

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VAPORIZING TYPE BURNER WITH
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3 Claims. (Cl. 158—91)

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This invention relates to fuel ignition devices for burners of the type including a container having a bottom wall into which liquid fuel flows during combustion.

In burners of the type mentioned fuel is admitted to the burner in liquid form. The liquid spreads out in a pool over the bottom of the burner or the bottom of a pan therein, where it is vaporized and burned. In order to light a cold burner the fuel must first be vaporized by heat and mixed with air before it will ignite. Ordinarily the fuel in such burners is ignited by dropping a piece of burning oily waste or the like into the burner or by inserting a lighted taper therein. That is inconvenient, so provision is made for maintaining a small pilot fire in the burner during the entire heating season regardless of whether heat is required or not. That eliminates the necessity for frequent relighting of the burner but it is wasteful of fuel.

In order to overcome those disadvantages ignition units, usually electrically operated, for permanent installation in the burner, have been devised but heretofore they have not been satisfactory. Their life is short because they soon become heavily coated with soot which short circuits the heating coils and causes them to burn out. Furthermore, they do not always operate satisfactorily in igniting the burners with which they are associated.

Accordingly, the principal object of the present invention is to provide a novel electrical ignition unit that is positive in action and long lived.

Another object is to provide an ignition unit in which the heating coil or coils are protected against deposit of carbon.

Another object is to provide an ignition unit which heats the bottom of the burner so as to more efficiently vaporize the fuel.

A still further object is to provide an ignition unit in which combustion occurs only momentarily during the ignition period.

These objects will more fully appear in the following specification when read in connection with the accompanying drawings, wherein—

Figure 1 is a fragmentary cross-sectional view of a pot type burner showing one form of the invention applied thereto;

Figure 2 is a cross-sectional view taken on substantially the line 2—2 of Figure 3;

Figure 3 is a fragmentary cross-sectional view of the burner taken on substantially the line 3—3 of Figure 1;

The ignition unit employs at least one heating element located within a housing; the heating

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coil is mounted in heat exchange relation to the bottom wall of the burner adjacent the fuel inlet; the housing is formed so as to admit fuel vapors and air into the bottom thereof and discharge them through an outlet near the top of the housing whereby to form what is in effect a chimney; and a heating coil, whether it be the one located close to the bottom of the burner or another heating coil, is located in the chimney so as to heat the fuel vapors to the point of ignition.

Referring now more in detail to the drawings, and particularly to Figures 1 to 3 thereof, it will be seen that an ignition unit 10 is mounted in a burner 11 of the vaporizing pot type. The burner may be of the type disclosed in Valjean Patent No. 2,186,156 granted January 9, 1940. The burner has a bottom wall 12 and a side wall 13 in which a plurality of air inlet openings 14 are formed. An inlet 15 for fuel is provided in the side wall adjacent the bottom.

The fuel ignition unit 10 comprises generally a pair of heating coils 16 and 17 and a housing therefor. The housing comprises a side wall 18 of sheet metal, a top 19, an annular ring 20 and a shell 21 for the heating coil 16. The side wall 18 is generally tubular and is open at its lower end. Adjacent the lower end are a number of holes 22 for the admission of air. A portion of the lower edge is cut away at 23 to admit liquid fuel, vapors and air to the housing. Adjacent the upper end of the housing is a hole 24 for the escape of air and vapors from the housing.

The top 19 is formed of some refractory insulating material such as asbestos fiber preferably moulded into place and completely closing the upper end of the tubular side wall.

The heating coils 16 and 17 are connected together in series relation and the leads therefrom are connected to a pair of terminal bolts 25 and 26. The terminal bolts pass through the side wall 18 and are insulated therefrom by insulating bushings 27. The leads from the heating coils are embedded in the top wall 19 by being moulded therein, and the coils are supported in the proper position within the housing by the leads.

Coil 16 is located adjacent the bottom of the housing and centrally thereof. Coil 17 is positioned adjacent the outlet opening 24. Coil 16 is of relatively great heating capacity, while coil 17 may be of smaller capacity. The temperature generated by the coil 17 should be above the ignition point of the fuel vapors.

The enclosure of coil 16 is completed by the shell 21 which is in the form of a truncated cylin-

der closed at its lower end, and fastened to the annular ring 20. The closed end of the shell contacts the bottom of the burner. The annular ring 20 is inclined upwardly toward the outlet opening 24 and is flanged onto the upper end of the shell 21. The outer rim of the ring 20 engages the side wall 18 of the housing. Directly below the opening 24 and the coil 17 is an opening 28 in the ring. The opening 28 permits the passage of gases over the coil 17 and out through opening 24.

Attached at one extremity to the side wall 18 of the housing adjacent the opening 24 is a bimetal element 29. At the free extremity of the bimetal element is a disk or washer 30 of refractory material. Under certain conditions which will be more fully pointed out hereinafter, the element 29 bends toward the housing so that washer 30 covers the opening 24 and closes it.

The ignition unit is attached to the side wall of the burner by the terminal bolts 25 and 26 which pass through a block of insulating material 31 and an outer cap 32. The members 31 and 32 are clamped to the burner side wall by drawing up nuts 33 on the terminal bolts.

In operating the ignition element, current is turned on in the coils 16 and 17 and fuel is admitted through inlet 15. The bottom of the burner is heated by contact with shell 21 which in turn is heated by coil 16 to a temperature sufficient to vaporize some fuel. The air within the housing is also heated and rises by convection causing a circulation upward through the housing, and out through openings 28 and 24. This effect is that of a chimney. Air is drawn in through openings 22 and 23 and mixed with fuel vapors. Eventually the air and fuel vapors will form a combustible, in fact somewhat explosive, mixture which on contact with the coil 17 is ignited. The flame flashes back toward the surface of the oil and spreads outside of the housing. Several flashbacks or miniature explosions may occur before the fuel ignites outside of the housing. The fuel then continues to burn and the burner operates in the normal manner.

After fuel in the burner is ignited, insufficient air will enter the housing to support combustion because the air cannot get down to the bottom of the burner. Thus, combustion occurs within the housing only during the ignition period, and that but momentarily. Soot will not deposit on the unit, at least in any quantity.

To completely prevent soot inside, the bimetal element 29 and disk 30 close the opening 24 and stop the chimney effect through the housing as soon as the burner warms up and begins to operate normally.

From the foregoing it will be seen that the ignition unit has a heating element located within a housing and that the housing is formed to provide a chimney effect when the heating coil is hot, which sets up convection currents of fuel vapors and air, thereby mixing the same and forming a combustible mixture. After the fuel

in the burner is ignited and the burner is operating normally combustion occurs high enough in the burner so that air cannot pass downward and into the housing in any quantity and thereby cause combustion to occur in the housing. That eliminates formation of carbon deposits in the housing and on the heating coil.

The scope of the invention is indicated in the appended claims.

We claim:

1. In combustion apparatus including a vaporizing pot type burner having a bottom wall, a fuel ignition unit for the burner comprising an electrical heating element, a housing partially enclosing said heating element, said housing being formed to provide an air and fuel inlet adjacent the lower end and an outlet adjacent the upper end, said heating element having a portion in heat exchange relation with the bottom wall of the burner and another portion in close proximity to the outlet from the housing, and heat responsive means attached to said housing adjacent said outlet and movable under the influence of variations in temperature to open and close said outlet.

2. Fuel ignition means including a fuel receptacle having a bottom wall, an electrical fuel ignition unit therefor comprising a casing within the receptacle, said casing having a lower end in close proximity to the bottom wall and cooperating with said bottom wall to form a housing, said housing having a relatively large inlet opening closely adjacent to said bottom wall for the admission of fuel and air and a relatively small outlet opening wholly remote from said bottom wall, electrical heating and ignition means in the housing having a portion thereof adjacent the bottom wall and located in heat exchange relation therewith, and a shell cooperating with said casing to form a complete enclosure for the portion of said heating and ignition means adjacent the bottom wall of the receptacle.

3. Fuel ignition means as defined in claim 2 wherein said shell is in contact with the bottom wall of the receptacle.

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