

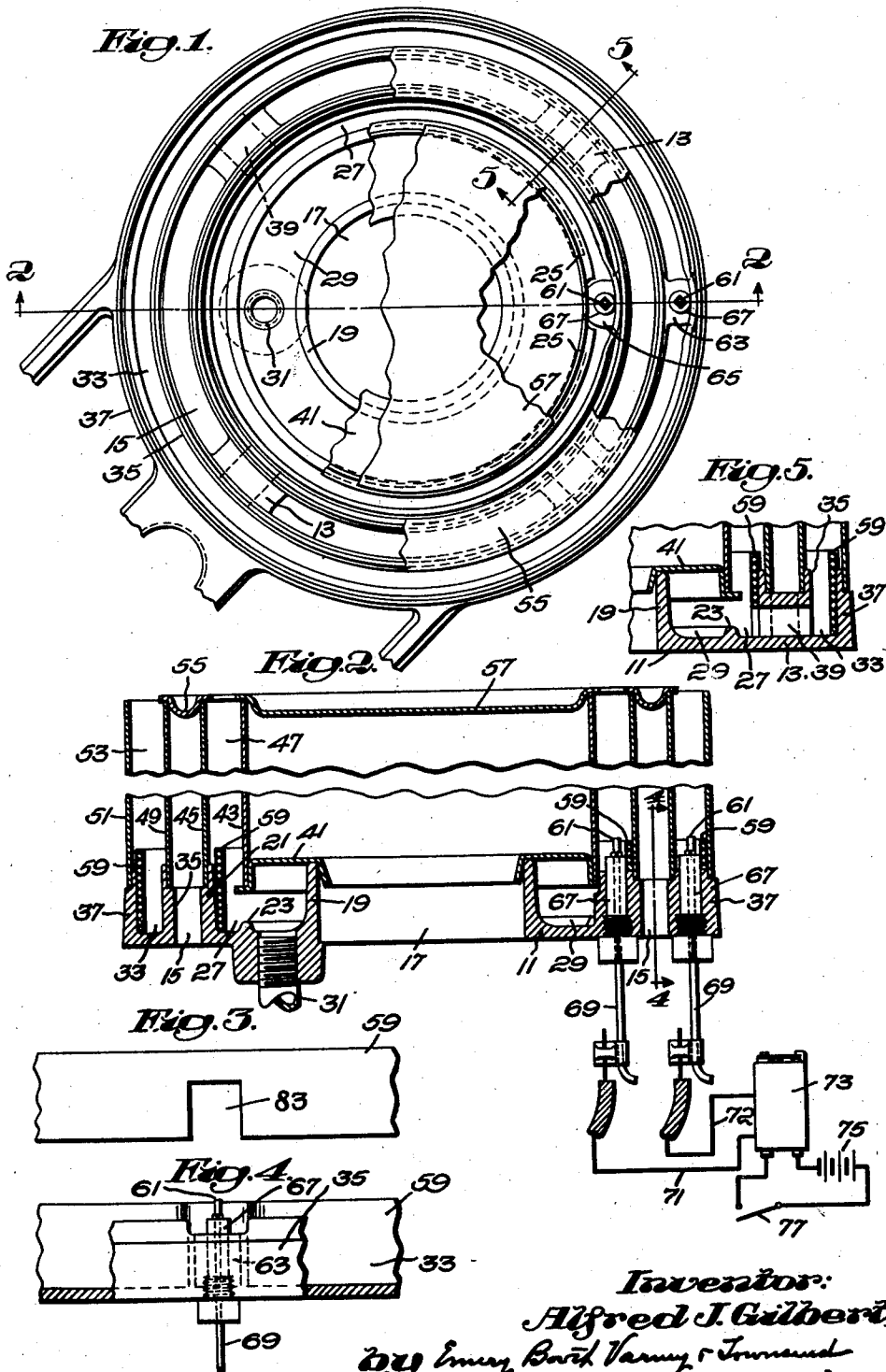
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A. J. GILBERT

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LIQUID FUEL BURNER

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Inventor:
Alfred J. Gilbert,
by Emory Brock Varnum & Townsend
Attys

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LIQUID FUEL BURNER

Alfred J. Gilbert, Windsor, Conn., assignor to
The Silent Glow Oil Burner Corporation, Hart-
ford, Conn., a corporation of Connecticut

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6 Claims. (Cl. 158—81)

This invention relates to burners and more particularly, though not exclusively, to what are commonly termed combustion tube burners to which liquid fuel (for descriptive purposes referred to as oil) is admitted and therein vaporized, the ascending fuel vapor being burned in an overhead combustion chamber to which air is supplied through combustion tubes which herein are in the form of perforated tubular walls.

One object of the invention, among other things, is to provide an igniting, spark device of a simplified and compact arrangement through which the initial lighting of the burner may be had by means of an electric spark.

This and other objects of the invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawing:

Fig. 1 is a plan view of a burner embodying one form of the invention, certain parts being partially broken away;

Fig. 2 is a central, longitudinal section of the same burner, taken on the line 2—2 in Fig. 1, the intermediate portions of the combustion tubes being broken out;

Fig. 3 is a side elevation of a portion of the wick, showing the recess at a point adjacent the sparking electrode;

Fig. 4 is a partial sectional elevation of the base on the line 4—4 in Fig. 2; and

Fig. 5 is a detail in sectional elevation on the line 5—5 in Fig. 1.

Referring to the drawing and to the embodiment of the invention which is here submitted for illustrative purposes, the burner is provided with a base 11 in the form of a casting having an outer, generally annular portion and an inner, concentric, annular portion, connected one to the other by a series of webs 13 and providing for an annular air admission space 15 between the two annular members of the base, interrupted only by the webs.

As indicated in Fig. 1, the base may be formed integrally with or attached to a similar or duplicate base member, one of the two burner structures only being herein shown. The inner annular member is provided with a central air admission opening 17 surrounded by an upstanding ring-like flange 19, the outer edge of the inner member also having an upstanding ring-like flange 21 spaced from but concentric with the flange 19, the flanges 19 and 21,

together with the connecting bottom wall of the base casting, forming a relatively wide annular compartment or channel, on the bottom of which is provided a raised lip 23 extending completely around the channel except for a short distance on one side (right in Fig. 1), where it is cut away or removed to form an opening 25, the raised lip separating the channel into an outer fuel space defined by the channel 27, and an inner vaporizing space 29 between the lip 23 and the flange 21. Oil is adapted to be delivered to the vaporizing space 29 by the pipe connection 31 opening through the bottom wall of the space in the part thereof opposite to the opening 25 in the lip 23.

The outer annular member of the base casting presents an outer fuel channel 33 formed between the upright spaced flanges 35 and 37, the outer fuel channel being of lesser radial width than the space between the flanges 19 and 21 but approximately the same as that of the fuel channel 27 between the flange 21 and the lip 23.

The outer fuel channel is connected to the inner fuel channel by means of the supply ducts 39 formed in the webs 13 so that free circulation of liquid or vaporized oil supplied from the vaporizing space takes place through both fuel channels.

The top of the vaporizing chamber 29 is closed by a removable annular cover plate 41 formed preferably of sheet metal, such as chromium steel, the inside edge of the plate having a down-turned flange to seat upon the upper edge of the base flange 19 with a preferably close fit. The walls of the cover plate extend outwardly, and herein also downwardly, over the vaporizing compartment and over the annular lip 23, but are spaced vertically from the latter to provide an annular space through which vaporized oil may pass directly over the lip, between the latter and the cover plate, into the space above the channel 27.

Above the lip 23 the plate has a downwardly extending flange provided with an out-turned lip on which there is supported a perforated sheet metal cylinder 43 constituting the inner one of the combustion tubes. A similar, larger, concentric cylinder 45 is removably seated on the outer shouldered edge of the flange 21, so that there is provided between the two cylinders an elongated combustion chamber 47 aligned with and constituting an extension of the underlying fuel channel 27. The two concentrically spaced, perforated, sheet metal cylinders 49 and 51 are likewise removably seated on the inner and outer shoulders, respectively, of the flanges 35 and 37,

providing between them the combustion chamber 53 having a relation to the outer fuel space 33 similar to that of the combustion chamber 47 to the fuel space 27.

5 It will be understood that the perforations in the walls of the cylinder may be of any size, shape or arrangement to provide suitable air admission openings for the combustion chambers and are preferably distributed throughout the
10 entire surface thereof.

A removable, annular cover plate 55 is provided with its edges resting on the tops of the sheet metal cylinders 45 and 49 to close the top of the annular air space therebetween, and a disk-shaped closure 57 with its edges resting on the
15 upper edges of the cylinder 43 is similarly provided to close the top of the central air chamber, leaving, however, annular openings in the tops of the two combustion chambers 47 and 53 for the
20 escape of the products of combustion.

A burner of this type is commonly started by igniting an oil saturated wick 59 in the form of a flat, fabricated strip comprising a fire resisting material such as asbestos reinforced interiorly
25 by copper wires threaded through it and forming a loosely woven mat, the strip being cut so as to rest in the fuel space with its upper edge entered into the overhead combustion chamber. In the illustrated burner, two such wicks are shown,
30 one located in the outer fuel groove resting against the flange 37 and the other in the inner fuel groove against the flange 21.

When the burner is to be started, oil is admitted through the pipe 31 and enters the vaporizing space 29, flowing to the opposite side thereof, whence it passes through the opening 25 in the lip 23 into the fuel channel 27 and thence
35 through the ducts 31 into the outer fuel channel 33, penetrating the bottom edges of the wicks and saturating the bodies thereof. The wicks being then lighted, the burner begins to heat, and when the required vaporizing temperature is reached the liquid oil becomes vaporized in the vaporizing
40 space 29 and combustion is carried on to an increasing degree independently of the wick, and finally completely, through the oil vapor passing from the vaporizing chamber beneath the edge of the cover plate into the outer combustion chamber 53, the inner wick being cut away where
45 it obstructs passage to the ducts 39.

To ignite the wick electrically, while other metallic parts of the structure might be utilized, herein the copper wire reinforcement in the wick 59 provides electrical conductors and is made to
55 serve as a sparking electrode grounded to the base, a part of the wick being fixedly held in spaced relation to a complementary sparking electrode 61 mounted in the base and preferably in the fuel channel thereof immediately adjoining
60 the wick.

For this purpose the base has formed in the fuel channel 27 a raised boss 63, and likewise in the fuel channel 33 a similar boss 65, the top of each boss extending slightly above the adjoining tube-supporting shoulder of the flange or flanges, the upper part of the lip of each flange
65 35 and 37 which extends above the boss being cut away at or adjoining the boss 63, and that of the flange 21 where it adjoins the boss 65, so to provide a locating recess for a portion of the wick,
70 as will more fully appear.

The sparking or ignition electrodes 61 are held each in an upright bushing 67 of porcelain or other heat resisting insulating material which is
75 threaded into and through the bottom of the base

from below and extends upwardly through its respective boss 63 or 65 sufficiently above the latter to insulate the electrodes from the base, the electrodes 61 projecting from the top of the bushing in closely spaced relation to the top of the adjoining wick and to the ends of the copper wires embedded therein.

Each electrode 61 has a terminal 69 extending from the end of the bushing below the base, the terminal for one electrode being connected to a conductor 71 and that for the other electrode to a conductor 72, the conductors being included in a circuit of any suitable nature for producing the necessary spark. While this circuit might be so arranged as to place the two electrodes in parallel through a return circuit connected to the base, herein the electrodes are arranged in series relation so that when one igniting spark is produced at either wick, a similarly effective igniting spark is simultaneously produced at the other wick and the lighting of both wicks assured.

Herein such circuit is indicated merely in conventional diagrammatic form and comprises a spark or transformer coil 73 having its primary connected to a battery 75 and controlled by the switch 77, one terminal of the coil secondary being connected to the conductor 71 and the opposite terminal to the conductor 72. On the closure of the switch 77 a high tension circuit is completed, the current passing through one electrode 61 and the adjacent spark gap to the copper wires of the adjoining wick which have electrical contact with the base, thence through the base to the copper wires of the companion wick, and to the companion electrode 61 through the intervening gap, thereby causing a spark to jump from each electrode 61 to its adjacent wick and to light each of the wicks, if the latter have been previously saturated with oil.

The wick (see Fig. 3) is cut away or recessed at 83 so as to fit over the boss, and the portion of the wick overlying the boss (as will be seen from Fig. 1) bears directly against the side of the insulating bushing 67, where it is held in fixed, definite relationship to the electrodes 61 between the bushing and the adjoining combustion tube when the latter is slipped into place.

This construction keeps the wick, or that portion of it presented to the spark gap, in a fixed, definite position with relation to the electrode 61, assuring a spark gap of unvarying length. Furthermore the electrodes are fixedly secured within the walls of the base as an integral part thereof and, with the wick, are maintained in the required relationship without the use of extraneous or attached parts requiring external adjustment or application or interfering in any manner with the ready application or removal of the combustion tubes.

In starting the burner, the oil is admitted to the base, and when the wicks have become saturated, the switch 77 is closed to produce a spark, and on the resultant lighting of the wick the switch is again opened and the burner allowed to heat up under the action of the wick until vaporization of the oil takes place, after which the burner operates under the oil vapor generated in the heated vaporizing space 29.

While I have herein shown and described for the purposes of illustration one specific embodiment of the invention, it is to be understood that extensive deviations may be made therefrom and various modifications employed in respect to the mechanical construction of the parts and the type

of burner to which the device is applied, all without departing from the spirit of the invention.

I claim:

1. A combustion tube burner having a base provided with an open-top fuel channel, a wick therein, spaced combustion tubes supported on the base and forming a combustion chamber above said channel, means to admit fuel to said channel, a raised boss in the channel, said wick being recessed to overlie said boss, and electrical ignition means for the burner comprising a sparking electrode mounted in the boss and extending above the same and in igniting relation to the wick, and an insulating body for said electrode insulating the latter from the base and extending above said boss to present a bearing surface for the overlying portion of the wick and to maintain the latter in a definitely spaced relation to the electrode.
2. A combustion tube burner having a base provided with an open-top fuel channel, a wick therein formed of a fire resisting material having electrical conductors incorporated therein, spaced combustion tubes supported on the base and forming a combustion chamber above said channel, means to admit fuel to said channel, and electrical ignition means for said burner comprising a sparking electrode and an insulating bushing for the same mounted in and insulating the same from the base, said bushing extending through the base from below into the fuel channel to present the electrode at the bottom of the combustion chamber, said bushing providing a bearing against the wick to hold the latter in such definitely spaced relation to the electrode as to maintain a spark gap between the electrode and the wick.
3. A combustion tube burner having a base provided with an open-top fuel channel, a wick therein formed of a fire resisting material having electrical conductors incorporated therein, spaced combustion tubes supported on the base and forming a combustion chamber above said channel, means to admit fuel to said channel, and electrical ignition means for said burner comprising a sparking electrode mounted in the base and an insulating body for the electrode insulating the electrode from the base and adapted to hold the wick in such definitely spaced relation to the electrode as to maintain a spark gap between the electrode and the wick.

4. A combustion tube burner having a base provided with a plurality of fuel channels, a wick in each channel formed of a fire resisting material having electrical conductors incorporated therein, spaced combustion tubes forming combustion chambers one over and communicating with each fuel channel, a spark electrode for igniting the fuel in each combustion chamber, means for passing current simultaneously through said conductors to create igniting sparks for each combustion chamber, and means for maintaining each of said electrodes and wicks in such definitely spaced relation as to provide a spark gap between the electrode and the wick.

5. A combustion tube burner having a base provided with an open-top fuel channel, a wick therein formed of a fire resisting material having an electrical conductor incorporated therein, spaced combustion tubes supported on the base and forming a combustion chamber above said channel, means to admit fuel to said channel, electrical ignition means comprising a spark electrode in said combustion chamber insulated from the walls of the base and in sparking relation to said wick, and means in said fuel channel bearing against the side of the wick to hold the bared edge thereof in definitely spaced relation to said electrode and to maintain an uninterrupted spark gap of substantially fixed length between the electrode and the bared edge of the wick, said arrangement providing a return path through the conductor in said wick for the current discharged from said electrode.

6. A combustion tube burner having a base provided with an open-top fuel channel, a wick therein formed of fire resisting material having an electrical conductor incorporated therein, spaced combustion tubes supported on the base and forming a combustion chamber above said channel, means to admit fuel to said channel to saturate the wick, electrical ignition means comprising a spark electrode in said combustion chamber and insulated from the walls of the base, and an insulating body in the channel bearing against the side of the wick to hold the latter in definitely spaced relation to said electrode to provide a spark gap between the electrode and the wick, the conductor in said wick providing a return path for the current discharged from said electrode.

ALFRED J. GILBERT.

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