July 19, 1932. B. B. ZAHNER 1,867,934

OIL BURNER

Filed Feb. 18, 1929 2 Sheets-Sheet 1

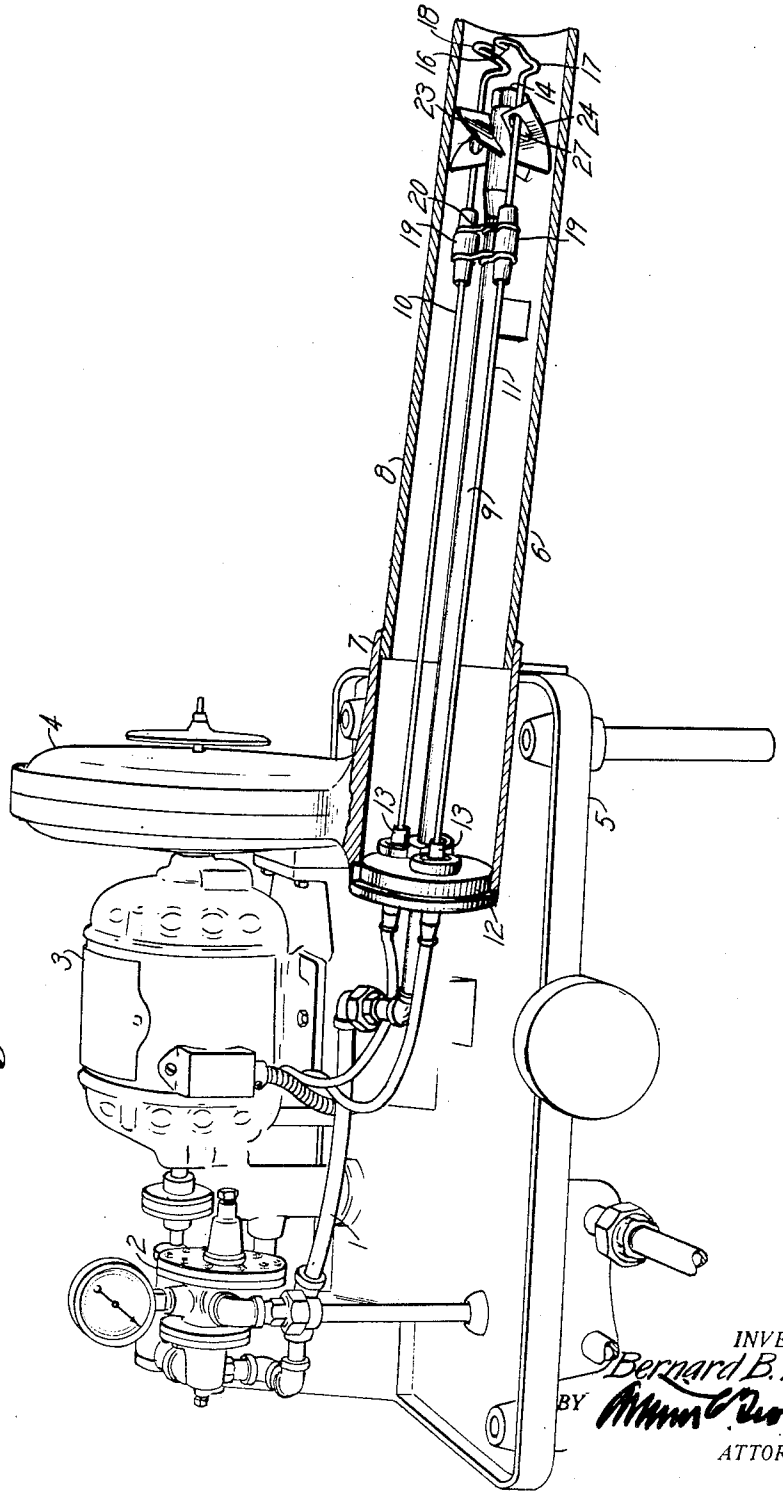


Fig. 1.

INVENTOR.
Bernard B. Zahner
BY
ATTORNEY

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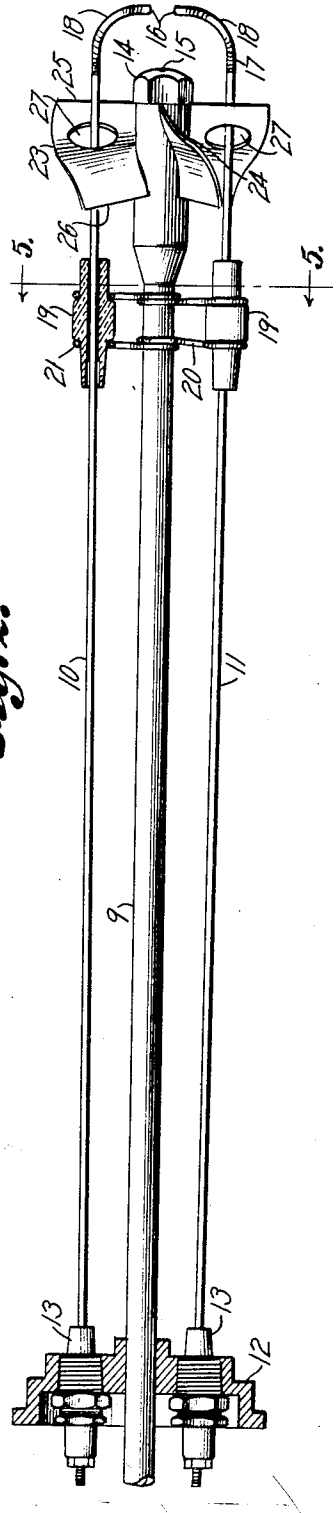


Fig. 2.

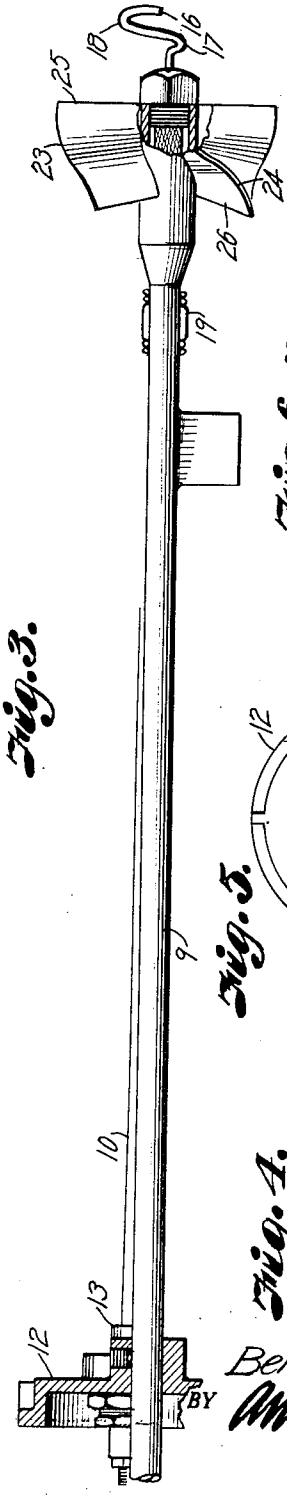


Fig. 3.

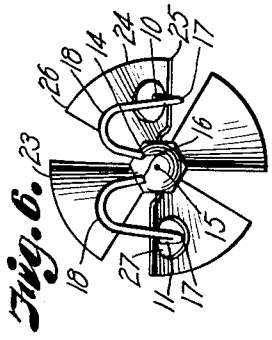


Fig. 6.

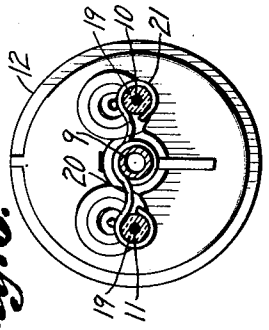


Fig. 5.

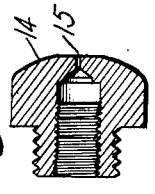


Fig. 4.

INVENTOR.
Bernard B. Zahner.
BY
ATTORNEY

Patented July 19, 1932

1,867,934

UNITED STATES PATENT OFFICE

BERNARD B. ZAHNER, OF KANSAS CITY, MISSOURI

OIL BURNER

Application filed February 18, 1929. Serial No. 341,020.

My invention relates to oil burners and more particularly to electrical ignition elements in hydrocarbon burning devices, the principal objects of the invention being to assure continuous discharge of sparks in the path of a hydrocarbon spray.

In oil burners employing electrical ignition means, combustion of hydrocarbon fuel particles on the terminals of the electrodes tends to cause deposit of carbon and ultimate bridging of the gap between the same, whereby the circuit is closed between the terminals and the production of sparks is prevented.

The formation of carbon is promoted in the ordinary structure of oil burners by the tendency of spray particles to collect on the ends of the electrodes and pass toward the spaced points, the drops so collected being sufficiently large to resist the dispersing and igniting influences of air currents and sparks.

Further objects of my invention, therefore, are to dislodge liquid drops and carbon particles that may be formed on the terminals or adjacent thereto, and to provide for the removal of collected drops from the outer ends of the electrodes whereby substantially continuous spark production is made possible and liquid fuel is prevented from interfering with the operation of the igniting means.

Electric current at high voltage must be passed through the electrodes to jump the gap between the terminals and ignite the sprayed fuel, and relatively heavy wires must therefore be employed to carry the current. These wires are relatively rigid even under the influence of the spray delivered under pressure from the fuel supply line and the current of air provided for producing a combustible mixture and impelling the mixture to the point at which heat is used.

A further object of my invention is therefore to enable the air current and spray to vibrate the electrodes so that carbon and liquid deposits will be shaken from the electrodes.

In accomplishing these and other objects of my invention I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of an oil burner and operating apparatus equipped with my invention, a tubular housing being broken away to reveal the invention.

Fig. 2 is a plan view of the fuel supply pipe and elongated electrodes, supporting means and vibration-limiting means being shown in section.

Fig. 3 is a plan view partly in vertical section of the fuel supply line and support.

Fig. 4 is a detail central sectional view of the fuel supply nozzle.

Fig. 5 is a cross section of the fuel supply line, electrodes and electrode-retainers on the line 5—5, Fig. 2.

Fig. 6 is a front elevational view of the nozzle, and electrodes, and the deflectors.

Referring in detail to the drawings:

1 designates a liquid fuel supply line, 2 a pump for delivering fuel under pressure, 3 a motor adapted to actuate both a pump and a fan 4 for impelling air to combine with the fuel to form a combustible mixture and discharge the mixture as more particularly described, all being supported on a stand 5 which may be located at a desired position for suitable relation with an object to be heated, for example a furnace.

In ordinary practice the stand is positioned closely adjacent the door of the furnace and a relatively short fuel discharge pipe mounted in a housing extends into the furnace door and electrodes are provided to ignite the oil and air.

I provide a relatively long housing 6 including a portion 7 secured to the stand and a portion 8 extending a desired distance toward the object to be heated, and an elongated fuel discharge pipe 9 extending in the housing. The radically elongated housing and fuel pipe are provided to permit the installation of my novel electrode wires 10 and 11 in combination with oil burning elements of well known character. The pipe and electrode wires are mounted in a base 12 mounted on the stand and extend therethrough, the wires being relatively rigidly

supported in the base openings by insulator bushings 13.

The wires 10 and 11 must be relatively of large diameter to carry a current at high voltage for igniting the oil, and are sufficiently large and stiff so that they will extend horizontally and substantially parallel to the supply pipe without further support than the insulator bushings 13, but because of their length will be elastic and tend to vibrate under relatively slight influences.

The outer end of the fuel discharge pipe is provided with a nozzle 14 having a relatively small axial opening 15, and the terminal points 16 of the electrodes are positioned in spaced relation in front of the nozzle so that spray delivered through the nozzle and mixed with air delivered from the fan will be ignited by sparks jumping the gap between the terminals.

The outer ends of the electrode wires 10 and 11 are bent downwardly and upwardly adjacent the nozzle position to form depending elbows 17, the electrodes being bent upwardly, inwardly and downwardly to form loops 18 and bring the points 16 into proper spaced relation to provide the desired spark gap. The elbows and loops are formed as described to cause liquid particles collecting on the ends either to flow toward the terminal points and drop therefrom or to flow toward the elbows and depend therefrom. The elbows constitute a trap to prevent drops from passing rearwardly along the wires, and particularly the loops and elbows prevent any considerable amount of liquid fuel from collecting on the electrodes adjacent the points.

Insulator sleeves 19 are mounted on the electrode wires 10 and 11 and supported from the fuel pipe 9 adjacent the nozzle by resilient brackets 20 such as wires, the insulators being relatively loosely mounted in the loops 21 of the wire brackets and the electrode wires extending loosely in the insulators whereby the electrode wires are yieldingly supported but are permitted to vibrate under the influence of air impelled through the housing for dislodging carbon and liquid particles from the terminals.

Deflectors are mounted on the outer end of the fuel pipe adjacent the nozzle comprising a plurality of vanes such as 23 and 24, each preferably extending spirally on the fuel pipe and having forward ends 25 and rear ends 26 diverted in opposite directions with reference to the axis of the pipe, the vanes having the form of an S whereby air passing longitudinally in the housing will first be given a rotative motion and then will be diverted into a longitudinal direction for passage from the outer end of the housing.

The vanes 23 are positioned in the path of the electrodes and are provided with openings 27 through which the electrode wires pass, the openings being sufficiently large to permit the wires to vibrate without touching the vanes and also to permit a current of the air to pass over the electrodes to clean off any oil vapor that may collect thereon.

The form of the vanes further contributes to the discharge of hydrocarbon particles from the electrode wires by the air blast toward the terminals, since air passing over the perforate vanes is impelled into contact with the outer ends of the electrodes and tends to break up the liquid drops and discharge them into the path of the ignited fuel, thus promoting their vaporization and combustion.

In using the device the fuel is supplied in the usual manner and the air is impelled as usual in such devices through the housing. Because of the elongated character of the electrode wires, and their relatively loose support from the fuel pipe, the air current causes the electrodes to vibrate and dislodge liquid particles from the electrodes and thus prevent carbonization.

What I claim and desire to secure by Letters Patent is:

1. In combination with an oil supply nozzle, an air impeller and an electric circuit, electrodes having terminals adjacent the nozzle outlet and means including a base member relatively remote from the nozzle and a resilient member adjacent the nozzle for supporting the electrodes in the path of air from the impeller.

2. In combination with an air impeller and an electric circuit, an elongated fuel conduit having a nozzle at its outer end, a pair of elongated vibratory electrodes having spaced terminals adjacent the nozzle, means supporting the electrodes in the path of air from the impeller and means for supporting the terminal end portions of the electrodes including insulators having resilient mounting on the fuel conduit.

3. In an oil burner, a tubular housing, a fuel supply pipe extending in the housing, an electric circuit, a pair of elongated wires extending in the housing and comprising electrodes having terminals depending in the path of fuel discharged from the supply pipe, and air impeller for discharging air into the housing to vibrate the wires, and means including insulators having wire receiving openings of substantially greater diameter than the wires and supported from the supply pipe.

4. In an oil burner including a fuel supply pipe, an air impeller and an electric circuit, a pair of electrode wires extending parallel of the supply pipe and having downwardly curved portions to form drip stops, a tubular housing enclosing the pipe and electrode wires for conducting air from the impeller to the terminals of the pipe and electrodes, spirally directed vanes associated with the supply pipe and having openings therethrough for receiving the electrodes and passing por-

tions of the air into direct wiping contact with the curved portions of the electrodes to remove the oil collecting on the drip stops, a base member supporting the electrode wires at a point remote from the terminals, and insulators resiliently supporting said wires adjacent the spirally directed vanes to permit vibration of the wires upon operation of the air propeller for cooperation with the wiping action of the air in maintaining the drip stops free of oil.

In testimony whereof I affix my signature.

BERNARD B. ZAHNER.