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EIICHI TAKAHASHI

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ELECTRIC IGNITER FOR BURNERS

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Fig-1-

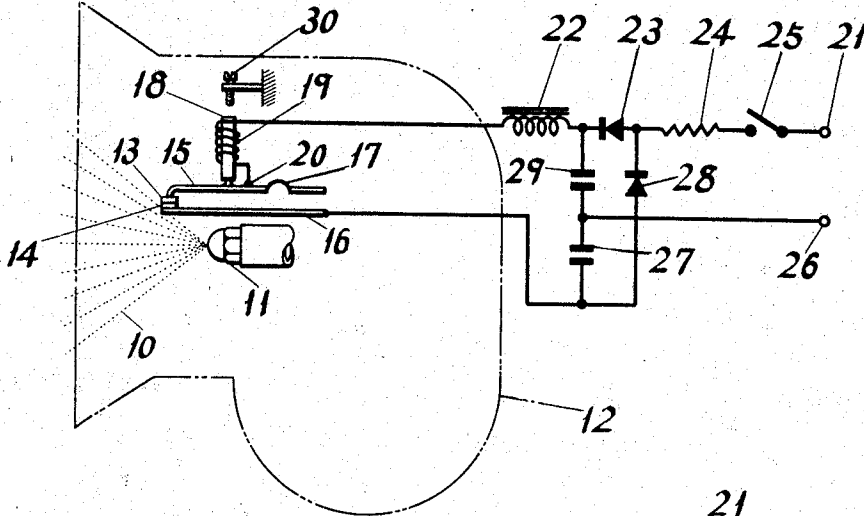


Fig-2-

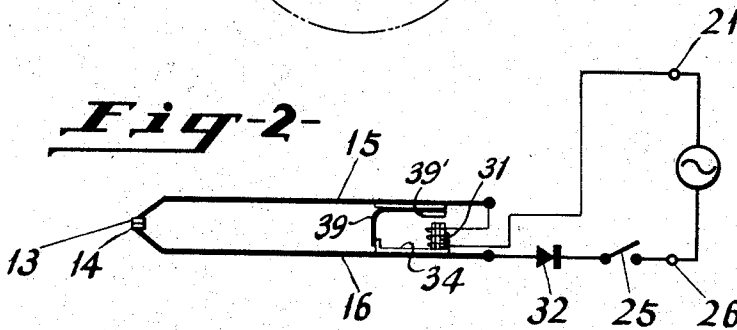


Fig-3-

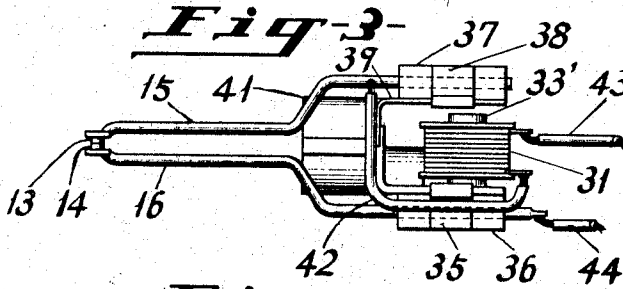


Fig-5-

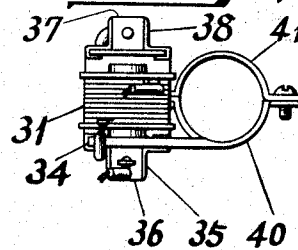
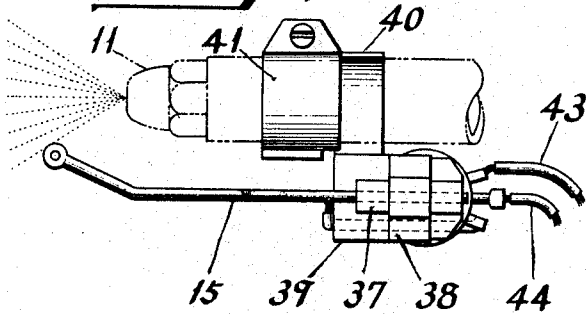


Fig-4-



INVENTOR
Eiichi Takahashi
BY Herman L. Gordon
Attorney

1

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ELECTRIC IGNITER FOR BURNERS

Eiichi Takahashi, Ota-ku, Tokyo, Japan, assignor to Corona Electric Works, Co. Ltd., Tokyo, Japan, a corporation of Japan

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5 Claims. (Cl. 317-93)

This invention relates to an electric igniter for burners fueled by combustible gas or oil.

Devices are known for producing an electric spark across the points of a sparking plug by supplying thereto a high-voltage, employing an ignition transformer. Such a high-voltage device requires inevitably a perfect insulation of the transformer and other parts in order to protect an operator from electric shock. Also, the plug tends to break due to the high-voltage and is apt to become dirty rather soon.

The present invention has for its object to remedy the above disadvantages. It has for its subject an electric igniter of the type in which a commercial power source is supplied, without using any transformer, to a pair of electrodes which are disposed in the fuel gas or a fine spray of fuel oil. The electric igniter according to the invention is characterized in that one of said electrodes is constructed to be moved by an electromagnet, when the igniter circuit is closed, to form an arc gap between these two electrodes.

Two forms of construction of an igniter according to the invention are shown, somewhat diagrammatically, by way of example in the accompanying drawings, in which:

FIG. 1 is a diagrammatic view of one form of electric igniter embodying the invention for igniting an oil burner;

FIG. 2 is a diagrammatic view of a modified form of igniter;

FIG. 3 is a side elevation of the igniter constructed practically in accordance with the second embodiment shown in FIG. 2;

FIG. 4 is a plan view of the igniter shown in FIG. 3; and

FIG. 5 is a rear elevation of the igniter of FIG. 3.

Referring now to the drawings in further detail, FIG. 1 illustrates an igniter constructed in accordance with the invention, being operated to ignite the fine spray of fuel oil 10 emerging from the nozzle 11 of an oil burner 12. Disposed within the spray 10 are two electrodes 13 and 14 which are supported by arms 15 and 16, respectively. One of the electrode-arms, that is the electrode-arm 15 is held resiliently by a spring plate 17 secured to structural parts of the device. The electrode 13 is urged, by the spring plate 17, toward the other electrode or stationary electrode 14 so that these electrodes are normally connected.

The movable electrode-arm 15 is provided with a plunger-core 18 extending through a solenoid 19. A coil end of the solenoid 19 is connected to the movable electrode-arm 15 at 20. The other end of the solenoid 19 is connected to an input terminal 21 through an inductance coil 22, rectifier 23, a protective resistor 24 and an operating switch 25 connected in series. Another input terminal 26 is connected with the stationary electrode-arm 16 through a condenser 27. A second rectifier 28 comprises the so-called voltage doubler circuit together with a second condenser 29.

Reference character 30 indicates a stopper which serves to adjust the extent of the movement of the plunger-core 18, that is to say it defines the electrode gap between the electrodes 13 and 14 when the solenoid 19 is energized.

In operation, a commercial A.-C. power source is connected to the input terminals 21, 26. When the operating switch 25 is closed, the A.-C. electric current is fully rectified and fed to the series circuit comprising the inductance coil 22, solenoid 19, movable electrode-arm 15, mov-

2

able electrode 13, stationary electrode 14 and stationary electrode-arm 16.

Then, the energized solenoid 19 drives the core 18 to move into the solenoid 19 until the core 18 abuts against the stopper 30. When this occurs the swing motion of the movable electrode-arm 15 derived from the upward motion of the core 18 pulls up the electrode 13 from contact with the electrode 14. In this instance, the counter electromotive force, i.e., the electromotive energy which has been stored in the inductance coil 22 and the solenoid 19 discharges as a high-frequency electric current between two electrodes 13 and 14 and produces an arc therebetween. This arc discharge serves to ignite the spray of fuel oil 10 emerging from the burner nozzle 11.

The second form of construction of igniter shown in FIGS. 2 to 5 is similar to the first and only differs therefrom by the fact that the inductance coil 22 is omitted. For this reason the movable electrode-arm 15 is not provided with the plunger-core 18 but an electromagnet is fixed to the stationary electrode-arm 16. The coil 31 of the electromagnet acts as an inductance coil by itself. The input A.-C. electric current is half-wave rectified by a rectifier 32.

The adjusting means for defining the arc gap may be identical with the corresponding part of the igniter shown in FIG. 1. But, the particular stopper 30 may be eliminated from the device. In this latter form of construction, the magnet coil 31 is secured, together with the core 33' thereof, to the base plate 34 to which is fixedly connected, by a bracket 35, the support 36 of the stationary electrode-arm 16 (see FIGS. 3 and 5). At the same time, the movable electrode-arm 15 is held by a support 37 which is fixedly mounted, by a bracket 38, on a L-shaped spring plate 39 with an armature 39'. The vertical end portion of the spring plate 39 is secured to the base plate 34. The electrode-arm supports 36 and 37 are made of insulating materials. In assembling this igniter, the distance of the armature 39 from the magnet core end 33' is suitably adjusted to limit the armature's motion downward that is to determine the gap between the electrodes 13 and 14.

Extended from the base plate 34 is a bracket 40 having a ring 41 to support the burner nozzle 11. Reference character 42 indicates a lead wire connecting one of the coil ends of the magnet coil 31 to the movable electrode-arm 15. Lead wires 43 and 44 are to connect the other coil end of the magnet coil 31 and the stationary electrode-arm 16 with the input terminals 21 and 26, respectively.

The operation of this second form of construction is therefore same with the first, that is to say by closing the operating switch 25, a pulsating D.-C. electric current is fed to the series circuit comprising the movable electrode-arm 15, movable electrode 13, stationary electrode 14 and stationary electrode-arm 16. When the armature 39 is held by the magnet core 33', the self-inductance of the magnet coil 31 causes an arc to discharge across the gap between the electrodes 13 and 14. Then the arc discharge ignites the spray of fuel oil 10 emerging from the burner nozzle 11. This second form of construction has more advantages than the first by reason of the simplification of the device.

What I claim is:

1. In a fuel burner ignition device, fixed support means, a fuel injection nozzle mounted on said support means, a first electrode rigidly secured to said support means and having a contact point adjacent said nozzle, a spring plate having a first arm secured to said fixed support means and having a magnetic second arm, a second electrode secured on said magnetic second arm and having a contact point normally engaging said first-named contact point under the biasing force of said spring plate, an

3

electromagnet mounted on said fixed support means in a position to exert an attractive force on said magnetic second arm opposing said biasing force and sufficient to separate the contact points responsive to the energization of said electromagnet, a pair of terminal means adapted to be connected to a source of current, and circuit means connecting the winding of said electromagnet and said electrodes in series between said terminal means.

2. The ignition device of claim 1, and wherein said spring plate is substantially L-shaped.

3. The ignition device of claim 2, and wherein said first arm is substantially perpendicular to said second electrode and said magnetic second arm extends substantially parallel to said second electrode and in the opposite direction from said first-named contact point relative to the point of securement of said first arm to the fixed support means.

4. The ignition device of claim 3, and wherein the electromagnet is mounted between the electrodes subjacent said magnetic second arm.

5. The ignition device of claim 4, and wherein said

4

electromagnet is provided with a core extending substantially perpendicular to and terminating adjacent said magnetic second arm.

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RICHARD M. WOOD, *Primary Examiner*.

20 V. Y. MAYEWSKY, *Assistant Examiner*.