Feb. 14, 1933. W. R. KIEFER 1,897,310

OIL BURNER

Filed Jan. 25, 1930

Fig. 1

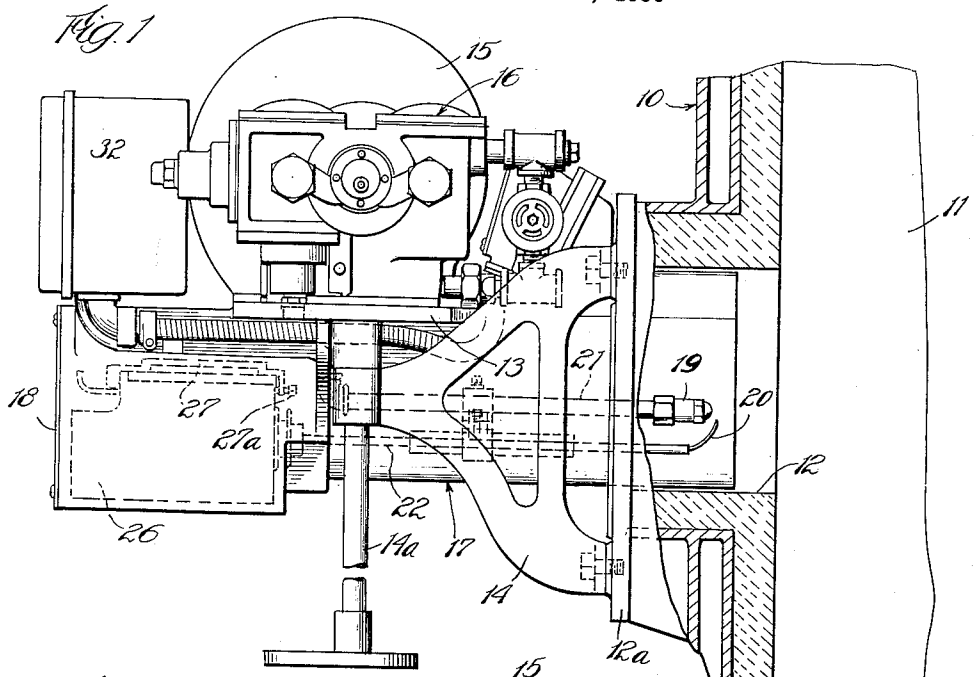


Fig. 2

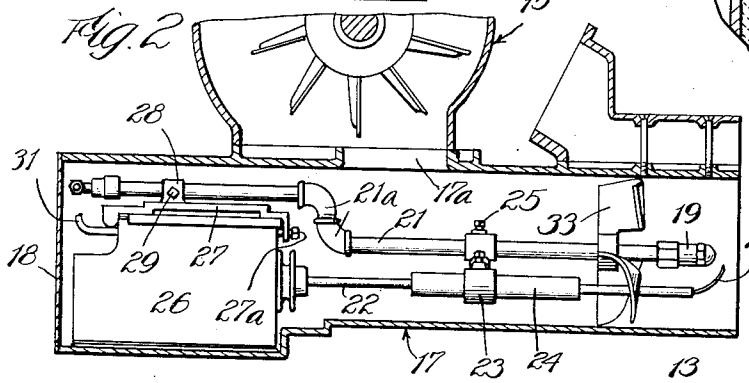


Fig. 4

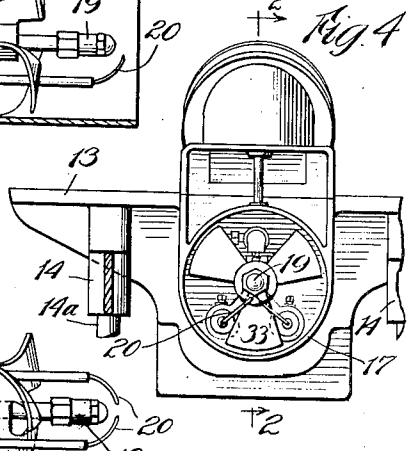
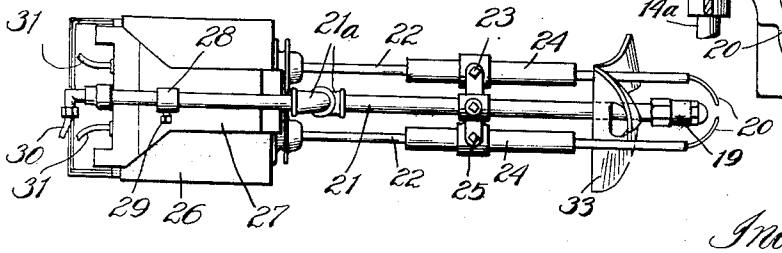


Fig. 3



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UNITED STATES PATENT OFFICE

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OIL BURNER

Application filed January 25, 1930. Serial No. 423,303.

The invention relates generally to oil burners and more specifically to the type of oil burners wherein an electric spark ignition device is employed in connection with a fuel spray.

The general object of the present invention is to provide an improved and simplified oil burner wherein the parts are supported in a compact unit of such a nature that the various parts are more readily accessible than in prior burners of this character.

In oil burners of this type, the fuel spray and the electric spark ignition means must, of course, be supported close to and in communication with the combustion chamber of the furnace and it has been found that when these parts are mounted in accordance with prior practice it is quite difficult to remove them from their operative positions. Another object, therefore, of the present invention is to provide an oil burner in which the nozzle and ignition terminals are supported close to and in communication with the combustion chamber in such a manner that they may be conveniently removed, adjusted and replaced.

The fuel nozzle and the ignition terminals of an oil burner are the parts which require attention most frequently and another object of the present invention is to simplify and reduce the time required for inspection and adjustment of these parts through the provision of a novel unitary mounting for the nozzle and the terminals whereby these two elements may quickly and easily be removed from the burner in the same operation without destroying the operative relationship therebetween and without requiring a large number of mechanical or electrical connections to be broken.

Another object is to provide an improved oil burner construction wherein the length of secondary leads between the transformer and the ignition points is reduced to the minimum so as to avoid the creation of an undue amount of radio interference.

The above and other objects are attained in the present embodiment through the provision of a substantially straight draft tube or conduit having one end adapted to extend into the opening in the combustion chamber and the other or outer end closed by a removable plate, air and oil supply pumps positioned laterally of the draft tube, a transformer within the outer end of the conduit adapted to be removed therefrom after the plate has been removed, rigid ignition leads connected to and projecting inwardly from the transformer, a rigid fuel supply pipe extending inwardly through the draft tube and carrying a fuel nozzle on its inner end, and means adjustably connecting the fuel supply pipe to the transformer and to the ignition means so as to form a rigid assembly consisting of the nozzle, the ignition terminals and the transformer, which assembly may be removed and replaced as a unit.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawing, in which,

Figure 1 is a side elevational view of an oil burner embodying the preferred form of the invention, the burner being shown in operative relation to the combustion chamber of a furnace.

Figure 2 is a fragmental vertical sectional view taken along the line 2—2 of Fig. 4.

Figure 3 is a plan view of the ignition and fuel nozzle assembly.

Figure 4 is an elevational view of the main frame and draft tube of the burner, the view being taken from the right hand side of the burner as shown in Fig. 1.

For purposes of disclosure, the preferred form of the invention is illustrated in the drawing and will hereinafter be described in detail as applied to a particular form of oil burner, but it is to be understood that this disclosure is not intended as a limitation of the invention to this type of burner, it being contemplated that various changes might be made by those skilled in the art to adapt the invention to other types of burners. The scope of the invention is defined by the appended claims.

In the exemplary form herein illustrated the invention is applied to a burner in which all of the various parts are mounted in a compact unit which may be supported in

front of a furnace 10 to supply fuel and air to the combustion chamber 11 of the furnace through an opening 12 in the forward wall thereof. The unitary mounting for the parts is herein provided by a laterally extended frame 13 (Figs. 1 and 4) which may be supported in front of the opening 12 by brackets 14 (only one herein shown) secured to the furnace on opposite sides of the opening 12 and projecting outwardly from the furnace so that the frame may be mounted on the outer ends of the brackets. When the brackets 14 cannot be employed or do not provide sufficient support, a standard 14^a may be placed beneath each end of the frame 13 so as to rest on the floor and support the frame.

On the central portion of the frame 13, a blower of air pump 15 is mounted which is adapted to be driven by a motor (not shown) mounted on the frame 13 on one side of the blower. On the other side of the blower a combined fuel pump and filter device 16 is mounted so as to be driven from the shaft of the blower. Air from the blower 15 is conducted to the combustion chamber 11 through a draft tube 17, carried by the frame 13 and having its inner end projecting into the opening 12 in the forward wall of the furnace. About the draft tube 17, the opening 12 is closed by a plate 12^a secured to the wall of the furnace. The draft tube 17 is, in the present instance, positioned directly beneath the blower 15 and has an aperture 17^a in the upper side thereof communicating with the blower.

The fuel spray means and electric ignition means are, in accordance with the present invention, mounted in the draft tube 17 and in order that they may be readily removed from and replaced in their operative positions, the draft tube is substantially straight and extends through the frame 13 so as to project outwardly beyond the blower 15. The outer end of the draft tube 17 is closed by means of a plate 18 detachably secured thereto. Thus when the plate 18 has been removed an opening is provided in the draft tube alined with the axis of the tube so that a nozzle 19 and ignition terminals or points 20 may be moved through the outer end of the draft tube to and from their operative positions (Fig. 1) adjacent to the combustion chamber 11.

Since the nozzle 19 and the ignition terminals 20 are practically inaccessible when they are in their operative positions in the draft tube 17, they are arranged so that relative adjustment thereof may be made before the parts are placed in the draft tube. To this end the nozzle 19 and the spark terminals 20 are preferably secured to each other so as to permit of relative adjustment and are arranged so that the assembly thus provided may be removed from the draft tube 17 as a unit through the outer end of the tube. The mounting of the nozzle 19 and terminals 20 is materially simplified by providing a substantially rigid fuel supply pipe 21 and a pair of substantially rigid secondary leads or conductors 22, both the conductors and the pipe being adapted to extend longitudinally through the draft tube 17. By this arrangement flexible secondary connections are avoided and a potential source of trouble thereby eliminated. The pipe 21 carries the fuel nozzle 19 at its inner end while the spark terminals 20 are mounted on the inner ends of the conductors 22 and to maintain the two terminals and the nozzle in a predetermined relation to each other, the conductors and the pipe are rigidly but adjustably connected together at longitudinally spaced points. One of these connections is provided by a transverse bar 23 having suitably spaced apertures therein through which the conductors 22 and the pipe 21 extend. Insulators 24 are positioned about conductors 22 within the apertures in the bar 23 and suitable fastening screws 25 are positioned in the bar 23 so that the pipe and the conductors may be secured against longitudinal movement relative to the bar.

It has been found that the high tension current in the secondary leads of an oil burner ignition system creates undesirable radio interference and in order to reduce such interference to the minimum, the secondary leads must be made as short as possible. This is accomplished in the present embodiment by mounting a transformer 26 in the enlarged outer end of the draft tube 17 so that the outer ends of the rigid conductors 22 may be directly and rigidly connected to the transformer. By this arrangement the secondary leads as well as the transformer are enclosed so as to avoid possible injury of the operator by the high tension current.

As above mentioned, the conductors 22 and the fuel supply pipe 21 are connected together at longitudinally spaced points and one such connection is provided by the bar 23. The other connection is preferably provided by means which includes the transformer 26. For this purpose a bracket 27 is adjustably secured upon the top of the transformer by a screw 27^a and the outer end of the fuel supply pipe 21 extends through an apertured lug 28 formed on the bracket. A screw 29 in the lug 28 serves to secure the pipe 21 against longitudinal movement relative to the transformer. As herein shown, the fuel supply pipe 21 is formed in two sections connected by elbows 21^a in order that the fuel nozzle 19 may be positioned on the axis of the draft tube 17.

The transformer 26, the nozzle 19 and fuel pipe 21 and the conductors 22 and terminals 20 therefore form a unitary ignition and fuel supply assembly which may easily be removed from the draft tube 17. The sturdi-

ness and rigidity of the assembly may be increased materially by spacing the rigid conductors 22 and the pipe 21 laterally from each other so as to obtain somewhat of a truss action between these members and the transformer. Thus in the present embodiment the two conductors 22 are spaced laterally from each other in a horizontal plane beneath the plane of the pipe 21.

To permit the removal of the ignition and fuel supply unit from the draft tube 17, the outer end of the fuel supply pipe 21 is detachably connected to a flexible pipe 30 (Fig. 3) which extends from the fuel pump 16 while the transformer 26 is supplied with low tension current through wires 31 detachably connected thereto and extending from the main control mechanism (not shown) mounted in a control box 32 positioned above the outer end of the draft tube 17. Thus, when the pipe 30 and the wires 31 have been disconnected the ignition and fuel supply unit may be removed from the draft tube for inspection or repair. In order that the nozzle 19 may be more accurately positioned in the inner end of the draft tube 17 means is preferably provided for supporting the fuel supply pipe 21 at a point adjacent to the nozzle. This means in the present embodiment is in the form of an air deflector 33 mounted on the fuel supply pipe 21 adjacent to the nozzle and having a plurality of blades arranged to engage the sides of the draft tube 17 so as to center the nozzle therein and also to act as an air deflecting means to produce a swirling movement of the air as it passes into the combustion chamber.

From the foregoing it will be apparent that the invention provides an oil burner wherein the various elements may be arranged with an unusual compactness, and may be mounted quite close to a furnace, and that, not withstanding this compact arrangement, the ignition means and fuel nozzle may readily be removed for adjustment, repair or replacement. Furthermore, it will be seen that the assembly and mounting of the elements of the ignition means in the manner herein shown permits unusually short secondary leads to be employed whereby the creation of undue radio interference is avoided.

The use of a draft tube having a substantially straight portion which may be opened at its outer end also contributes to the production of an advantageous burner since it permits the removal of the ignition and fuel supply means from the burner assembly at a place easily accessible when the assembly is mounted in position on the furnace, which place, as illustrated, is the rear end of the draft tube, at which place the work of removal may be most easily performed.

It will also be evident that the structural make-up of the burner is materially simplified through the use of substantially rigid conductors and a rigid oil supply pipe spaced laterally from each other and adjustably connected at longitudinally spaced points.

I claim as my invention:

1. An oil burner having, in combination, an air pump, a fuel pump, a substantially straight draft tube connected to said air pump and having an inner end adapted to communicate with a combustion chamber and an open outer end, a plate for closing said outer end, a transformer positioned in the outer end of said draft tube, a pair of substantially rigid conductors attached to said transformer and extending longitudinally through said draft tube toward the inner end thereof, spark terminals on the inner ends of said conductors, a fuel supply pipe adjustably connected to said transformer and extending longitudinally through said draft tube toward the inner end thereof, a fuel spray nozzle on the inner end of said pipe, means adjustably connecting said conductors and said pipe at a point spaced inwardly from said transformer whereby the relative positions of said nozzle and spark terminals may be adjusted, and a deflector mounted on said fuel pipe adjacent said nozzle and engaging the sides of said tube to position said nozzle within said tube, said transformer, said fuel supply pipe, said nozzle, said conductors, and said spark terminals being withdrawable from the outer end of said draft tube as a unit.

2. An oil burner having, in combination, fuel and air supply means, a draft tube connected to said air supply means and having a substantially straight portion, the inner end of which is adapted to extend into the combustion chamber of a furnace, said tube having an opening therein spaced from said inner end and substantially alined with said straight portion, a transformer positioned in said draft tube and removable therefrom through said opening, a pair of substantially rigid conductors fixed to and in electrical connection with said transformer, said conductors extending in spaced relation to each other longitudinally through said tube substantially to the inner end thereof, spark terminals on the inner ends of said conductors, a fuel supply pipe adjustably connected to said fuel supply means, said pipe extending from said transformer longitudinally through said tube in spaced relation to said conductors, a nozzle carried by the end of said pipe, and means forming an insulated adjustable connection between said pipe and said conductors at a point spaced from said transformer, said transformer, said pipe and nozzle and said conductors and terminals being removable as a unit from said draft tube through said opening.

3. In an oil burner having fuel and air pumps, the combination of a draft tube having a substantially straight portion adapted

to extend into a furnace, said tube being connected to said air pump and having an opening therein substantially alined with said straight portion, a transformer in said tube adjacent to said opening and adapted to be removed from the tube through said opening, and a spray nozzle detachably connected to said fuel pump and mounted on said transformer, ignition terminals carried by said transformer adjacent to said nozzle, said terminals and said nozzle being relatively adjustable and being removable from said tube with said transformer.

4. An oil burner comprising, in combination, an air pump, an oil pump, a draft tube connected to said air pump and having a substantially straight portion the inner end of which is adapted to extend into the combustion chamber of a furnace, said tube having an opening therein spaced from said inner end and substantially alined with said straight portion, a transformer positioned in said tube and removable through said opening, a fuel spray nozzle detachably connected to said oil pump and adjustably mounted on said transformer, in spaced relation thereto so as to be positioned adjacent the inner end of said draft tube, ignition terminals connected to said transformer and supported thereby adjacent to said nozzle, and means connected to said nozzle and slidably engaging the sides of said tube adjacent to said nozzle to position the nozzle accurately in said tube, said terminals, said nozzle and said means being removable as a unit with said transformer.

5. In an oil burner having a draft tube with a substantially straight portion, the inner end of which is adapted to extend into a combustion chamber, said tube having an opening therein substantially alined with said straight portion, a transformer positioned in the outer end of said tube and removable through said opening, a pair of substantially rigid conductors rigidly connected to the inner side of said transformer so as to receive current therefrom, said conductors extending longitudinally through said tube and having spark terminals on their inner ends, and means arranged to support the conductors at points spaced from said transformer.

6. An oil burner having, in combination, fuel and air supply means, a draft tube connected to said air supply means and having a substantially straight portion, the inner end of which is adapted to extend into the combustion chamber of a furnace, said tube having an opening therein spaced from the inner end thereof and substantially alined with said straight portion, a transformer positioned in said tube, a pair of substantially rigid conductors fixed to and in electrical connection with said transformer, said conductors extending from said transformer longitudinally of said tube substantially to the inner end of the tube, spark terminals on the inner ends of said conductors, a fuel supply pipe detachably connected to said fuel supply means and mounted on said transformer, said pipe extending longitudinally of said tube, and a nozzle carried by said pipe adjacent said terminals, said transformer, said pipe and nozzle, and said conductors and terminals being removable as a unit from said draft tube through said opening.

7. In an oil burner having fuel and air supply means and a draft tube with an opening therein spaced from its inner end, the combination of a transformer positioned within said draft tube and spaced from the inner end thereof, spark terminals carried by said transformer so as to be positioned adjacent to the inner end of said tube, and a fuel nozzle detachably connected to said fuel supply means and carried by said transformer so as to be positioned adjacent to said terminals, said transformer, said terminals and said nozzle being removable as a unit from said tube through said opening.

In testimony whereof, I have hereunto affixed my signature.

WILLIAM RAY KIEFER.