June 23, 1936. W. H. DE LANCEY 2,045,178

ELECTRIC IGNITION FOR BURNERS

Filed March 7, 1935

Fig. 1.

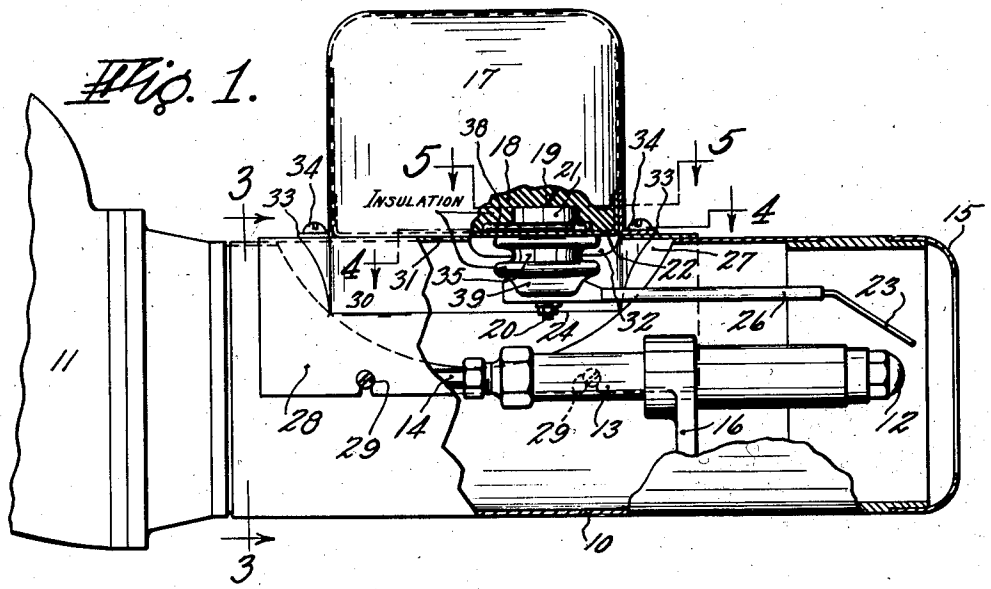


Fig. 2.

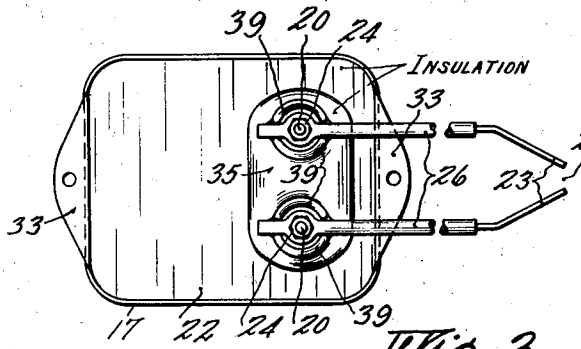


Fig. 6.

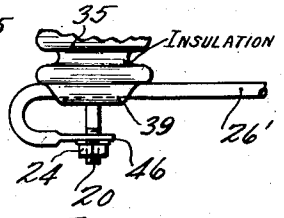


Fig. 4.

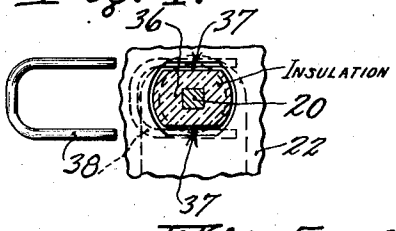


Fig. 3.

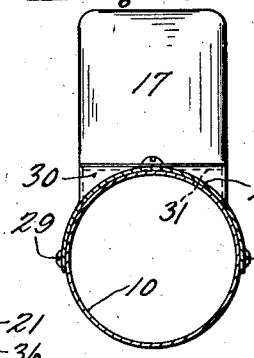


Fig. 7.

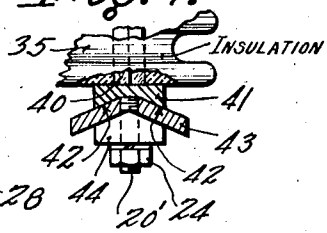
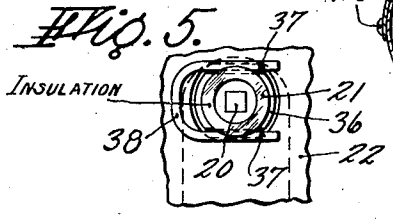


Fig. 5.



INVENTOR
WARREN H. DE LANCEY
BY Clapin & Neal
ATTORNEYS

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ELECTRIC IGNITION FOR BURNERS

Warren H. De Lancey, Springfield, Mass., assignor to Gilbert & Barker Manufacturing Company, West Springfield, Mass., a corporation of Massachusetts

Application March 7, 1935, Serial No. 9,817

10 Claims. (Cl. 175—115)

This invention relates to improvements in electrical ignition means for burners,—such for example as oil burners.

A common type of oil burner involves a conduit through which air flows to mix with the fuel emitted from a nozzle located near the delivery end of said conduit. The ignition electrodes are located within this conduit with their spark terminals disposed near the nozzle. Necessity demands that the ignition transformer be located remote from the nozzle and preferably outside the conduit. Therefore, it is usual to provide in the air conduit a support for the electrodes, together with insulating tubes mounted on the electrodes and passing through the support, and to connect the rear ends of the electrodes by wires to the high tension terminals of the transformer. The air is usually forced through said conduit by a fan or blower, which usually takes in air from the cellar, where more or less dust and dirt is present. The air, to a certain extent, is thus laden with dust and, after the burner has been in service for some time, a substantial deposit of dust and dirt will accumulate on the parts within the conduit, clinging to and becoming caked on such parts because of the greasy film with which they become coated. The tubes which insulate the electrodes from the support, sometimes carry on top a substantial accumulation of a dust or dirt and oil mixture, which extends over onto the electrodes and tends to destroy the effectiveness of the insulators for their intended function,—causing substantial leakage losses of the high tension current.

This invention has for one object to overcome the above difficulty by mounting the transformer so that its high tension terminals, with their associated insulating means, extend into the air conduit, preferably into the upper portion thereof, and by fixing the electrodes near their rear ends directly to said terminals and insulating means, so that the electrodes are supported solely from said terminals and means, and all other supports, insulators and connecting wires are eliminated.

Another object of the invention is to provide improved means for preventing relative movement between the electrodes, such as would cause a variation in the length of the spark gap, in cases where the electrodes are, as here, connected directly to the high tension terminals. The usual separate insulators, one for each such terminal, which may under some circumstances turn in the transformer casing to a limited extent, are merged into a single insulating block to which both electrodes are clamped. Thus, even if the block does turn in the transformer casing, it will not cause relative movement between the electrodes.

Another object of the invention is to provide improved means for holding the electrodes in place on the insulator block and preventing turning movement of either about the axis of the high-tension terminal bolts to which they are connected.

These and other objects will best appear as the detailed description proceeds and they will be pointed out in the appended claims.

The invention will be disclosed with reference to the accompanying drawing, in which:

Fig. 1 is a fragmentary elevational view, partly in section, of an oil burner embodying the invention;

Fig. 2 is a bottom plan view of the ignition unit, shown apart from the burner;

Fig. 3 is a small-scale, cross sectional view taken on the line 3—3 of Fig. 1;

Figs. 4 and 5 are fragmentary sectional plan views taken on the lines 4—4 and 5—5, respectively, of Fig. 1;

Fig. 6 is a fragmentary elevational view showing a modification in the electrode fastening means; and

Fig. 7 is a fragmentary sectional view showing a second modification in said fastening means.

Referring to the drawing; there is shown in Fig. 1, a portion of an oil burner having an air conduit 10, through which air is forced by a suitable blower, indicated in part at 11, and a nozzle 12, to which oil is supplied by suitable piping indicated in part at 13 and 14. The oil issues from nozzle 12 in a spray and the air flowing through conduit 10 is directed into the spray to mix therewith by a deflector 15 of any suitable type. A bracket 16 serves to support the pipe 13 from conduit 10 and hold the nozzle 12 centralized with respect thereto.

The invention does not depend on the use of a burner of any particular type or construction and is capable of use in any burner in which the fuel, whether liquid, gaseous or otherwise, can be ignited electrically. The aforesaid illustration and description is, therefore, intended to serve merely as an illustrative example of one of many forms of burners in which the invention may be embodied.

The invention is directed to an ignition unit, comprising a suitable transformer to the high tension terminals of which the ignition electrodes are directly connected and from which they are entirely supported. As herein shown, the trans-

former includes a metal case 17, within which the transformer coils are housed, being embedded in insulating material 18. The high tension wires, one of which is shown in Fig. 1 at 19, are connected to terminal bolts 20 which pass through suitable insulating members 21, fixed in the lower wall 22 of case 17. The spark electrodes 23 are connected, one to each bolt 20, by nuts 24. They extend forwardly a substantial distance in conduit 10 and terminate, as shown in Fig. 1, closely adjacent the nozzle 12 and, as shown in Fig. 2, their free terminal ends converge to form a spark gap 25 of proper length. Because the electrodes need to be of substantial length, they are provided with body portions 26 of substantial cross sectional area in order to afford the necessary rigidity.

The ignition unit described may be supported from the burner in any suitable way, which will admit of the electrodes being positioned in proper relation with the nozzle 12 and avoid the use of electrode supports and insulators therefor other than those provided on the transformer. As one example, the conduit 10 is provided with an an opening 27 in the upper portion of its cylindrical wall, which is normally closed by a cover plate 28 having semi-cylindrical end portions (Fig. 3) to fit and engage the cylindrical wall of conduit 10. This cover is secured in any suitable way, as by the screws 29, to conduit 10. Intermediate its ends, this cover is formed with a hollow upstanding part 30, closed at its upper end by a wall 31 except for an opening 32 (Fig. 1) large enough to permit the insertion of the electrodes and insulating support into the conduit 10. The bottom wall of the casing 17 rests on wall 31 and seals the opening 32. The casing has lugs 33 which are held by screws 34 to wall 31. Thus, the electrodes are supported in the air conduit solely by the insulating means which are associated with the high tension terminals of the transformer. Any other suitable means for supporting the transformer from the burner so as to secure the same result may be used, as desired.

According to a preferred feature of the invention, both electrodes are supported from a single insulating block, such as 35 (Fig. 2), of which the members 21 are integral parts, and each electrode is held to this block in some suitable way to prevent it from turning about the axis of its bolt 20. The object sought for is to prevent relative movement between the two electrodes, such as might cause variations in the length of the spark gap 25. Heretofore, each high tension terminal, such as the bolt 20, has had a separate insulator. If either insulator could turn at all in wall 22, then the electrodes, if mounted directly on said insulators, could turn the one relatively to the other. By interconnecting the two high tension terminals by a single insulator, such as 35, a turning of the insulator in wall 22 cannot effect relative turning movement of the electrodes and cause a variation in the length of the spark gap 25.

The insulator 35 may be secured to wall 22 in any suitable way. As shown, it has the two spaced parts 21 which pass through said wall, and each of these parts is secured to wall 22 in the same way heretofore used for securing the separate insulators formerly used. Each of the parts 21 are of circular cross sectional shape (Fig. 5) and the portion 36 which connects them to block 35 is of the shape shown in Fig. 4. Portion 36 has two parallel sides 37 and the distance between them is less than the diameter of part 21 (Fig. 5). Each portion 36 passes loosely through an opening in wall 22 of corresponding shape and there has to be clearance, such as that shown in Fig. 4, between each part 36 and the walls of the opening in which it is received. Consequently, the part 36 can turn to a limited extent about the axis of its bolt 20. Each part 21 is held frictionally to wall 22 by a U-shaped wire clip 38 (Figs. 4 and 5), the parallel legs of which engage the parallel sides 37 of portion 36 and are frictionally held between the wall 22 and the shoulders formed by the diametrically opposite portions of part 21 which overlie the sides 37. The clips 38 are supposed to, and usually do, draw the outer part of the insulator tightly against the outer face of wall 22. The point is, however, that the fastening means depends on a frictional engagement of parts and this, therefore, will permit the parts 36 to be turned in their respective holes if enough pressure is applied. Now, when an electrode is fastened directly to the insulator, it serves like a lever, making it easier to turn the insulator. A thoughtless or careless workman may take hold of the electrodes near their outer ends, and cause a movement of one of the parts 36 in its hole, in case separate insulators are used for each high tension terminal. This might cause one electrode to be moved toward or away from the other and alter the adjusted length of spark gap 25. However, by interconnecting the two parts 36 by an integral outer part 35 and fastening the electrodes to this outer part, a turning of the parts 36 in their respective holes cannot effect a relative movement of the electrodes.

It is, of course, necessary to mount the electrodes on the block 35 in such a way as to prevent them from turning. Several illustrative examples of means for securing this result have been shown. In Fig. 2, the electrode rod 26 is perforated near one end to receive bolt 20 leaving portions which project radially in opposite directions from the perforated part. Such portions are received between two flanges 39 formed on the insulator 35 and held by such flanges against turning. An alternative is shown in Fig. 7. Here the stud 20', which passes through the insulator and has a square section 40 to engage in a correspondingly shaped hole in the insulator, has a head 41, the outer face of which is provided with a diametrically-disposed recess having walls 42 converging toward the insulator. The perforated portion 43 of the electrode rod is formed to fit the walls 42 and is held thereto by nut 24 through the intermediary of the special washer 44. In Fig. 6, the electrode rod 26' is held by flanges 39, as in Fig. 2, but the rear end of the rod is extended and bent in a half circle backwardly to provide a portion 46 which underlies the centrally perforated portion in the body portion of the rod. The bolt 20 passes through the last named portion, as well as portion 46 and the nut 24 acts against the portion 46 only. The rod is thus held against the insulator 35 under the spring pressure of its backwardly bent portion. This scheme of fastening the electrode to block 35 is less liable to crack the block when nut 24 is tightened. Also, if one picks up the unit by either electrode rod 26' as a handle, there is a chance for it to yield relatively to the insulator and thus avoid cracking the same.

The operation of the oil burner and its ignition means is as usual, and need not be described here.

It will be seen that the invention provides for the elimination of the usual wires or cables which

connect the electrodes to the high tension terminals of the transformer, and of the supports and associated insulators usually employed for the electrodes in the air conduit **10**. Not only is there a saving in expense by the elimination of such parts but there is the more important saving of the leakage losses in the high tension current which frequently ensue from the use of the parts herein eliminated. The electrodes are supported directly from and solely by the high tension terminals and associated insulators of the transformer. They are devoid of insulators other than the insulator block on the transformer. Preferably, also, the insulators are mounted to extend downwardly into the air conduit, so that dust and dirt will not become so deposited on the insulator or electrodes as to cause the leakage losses that often occur when the usual practice is followed. Dust and dirt will drop from the lower portion of the insulator block, whereby if the arrangement were reversed and the insulators entered through the bottom of the conduit **10**, dirt would accumulate and become caked on the insulator. The transformer is also mounted out of the way so that it cannot be detrimentally affected by conditions existing in tube **10**. For example, should oil enter the tube it would accumulate in the lower portions of the tube and therefore the transformer is kept away from such location.

The invention, as above described in detail, also overcomes a difficulty hitherto experienced in cases where electrodes were secured directly to the high tension terminals and their separate insulators. Slight movements of these insulators in the transformer casing were possible under certain conditions and one electrode could therefore move with its insulator relatively to the other. The relative movement, even though slight at the point of connection of the insulators to the transformer casing, was magnified because of the length of the electrodes at the spark gap. By fastening each electrode to the same insulating block, movement of the block cannot cause relative movement of the electrodes.

What I claim is:

1. In a burner, an air supply conduit, a nozzle to supply fuel to the air flowing in said conduit, an ignition transformer including a casing together with high tension terminals and insulators therefor, said terminals and insulators extending outwardly from the casing and into said conduit, and spark electrodes fixed directly to said terminals and insulators and extending forwardly in said conduit and terminating adjacent said nozzle, said electrodes being supported solely by said terminals and insulators.

2. In a burner, an air supply conduit, a nozzle to supply fuel to the air flowing in said conduit, an ignition transformer including a casing mounted outside said conduit together with high tension terminals and insulators therefor extending outwardly from the casing and downwardly into the upper portion of said conduit, and spark electrodes fixed directly to said terminals and insulators and extending forwardly in said conduit and terminating adjacent said nozzle, said electrodes being supported solely by said terminals and insulators.

3. In a burner, an air supply conduit, a nozzle to supply fuel to the air flowing in said conduit, an ignition transformer including a casing mounted outside said conduit together with high tension terminals and insulators therefor extending outwardly from the casing and downwardly into the upper portion of said conduit, and spark electrodes fixed directly to said terminals and insulators and extending forwardly in said conduit and terminating adjacent said nozzle, said electrodes being supported solely by said terminals and insulators and devoid of insulators other than said transformer insulators.

4. In a burner, an air supply conduit, a nozzle to supply fuel to the air flowing in said conduit, an ignition transformer including a casing together with high tension terminals and a single insulating block mounted on said casing and through which both of said terminals extend, said block and terminals extending into said conduit, and spark electrodes both mounted on said block and connected one to each of said terminals, said electrodes extending forwardly in said conduit and terminating adjacent said nozzle.

5. In a burner, an air supply conduit, a nozzle to supply fuel to the air flowing in said conduit, an ignition transformer including a casing together with high tension terminals and a single insulating block mounted on said casing and through which both of said terminals extend, said block and terminals extending into said conduit, and spark electrodes both mounted on said block and connected one to each of said terminals, said electrodes extending forwardly in said conduit and terminating adjacent said nozzle and being supported solely from said block and terminals.

6. In a burner, an air supply conduit, a nozzle to supply fuel to the air flowing in said conduit, an ignition transformer including a casing together with high tension terminals and a single insulating block mounted on said casing and through which both of said terminals extend, said block and terminals extending into said conduit, spark electrodes both mounted on said block and connected one to each of said terminals, and means for preventing each electrode from turning about the axis of its terminal, said electrodes extending forwardly in said conduit and terminating adjacent said nozzle and being supported solely from said block and terminals.

7. In a burner, an air supply conduit, a nozzle to supply fuel to the air flowing in said conduit, an ignition transformer including a casing together with high tension terminals and a single insulating block mounted on said casing and through which both of said terminals extend, said block and terminals extending into said conduit, spark electrodes both mounted on said block and connected one to each of said terminals, and means on said block for preventing each electrode from turning about the axis of its terminal, said electrodes extending forwardly in said conduit and terminating adjacent said nozzle and being supported solely from said block and terminals.

8. In a burner, an air supply conduit, a nozzle to supply fuel to the air flowing in said conduit, an ignition transformer including a casing together with high tension terminals and a single insulating block mounted on said casing and through which both of said terminals extend, said block and terminals extending into said conduit, spark electrodes both mounted on said block and connected one to each of said terminals, and means on each terminal for preventing each electrode from turning about the axis of its terminal, said electrodes extending forwardly in said conduit and terminating adjacent said nozzle and being supported solely from said block and terminals.

9. In a burner, an air supply conduit, a nozzle to supply fuel to the air flowing in said conduit,

an ignition transformer including a casing together with high tension terminals and a single insulating block mounted on said casing and through which both of said terminals extend, said block and terminals extending into said conduit, spark electrodes both mounted on said block and connected one to each of said terminals, and means for clamping each electrode under spring pressure against said block, said electrodes extending forwardly in said conduit and terminating adjacent said nozzle.

10. In a burner, an air supply conduit, a nozzle to supply fuel to the air flowing in said conduit, an ignition transformer including a casing together with high tension terminal bolts, a single insulating block mounted on said casing and through which both said bolts extend, said block and bolts extending into said conduit, electrodes one for each terminal bolt, each electrode having a body portion engaging said block and a portion bent backwardly into substantially parallel relation with said body portion, each said bolt passing through the body portion and backwardly bent portion of its electrode, and a nut on each bolt bearing against the backwardly bent portion of its electrode and acting to hold the body portion thereof under spring pressure against said block.

WARREN H. DE LANCEY.