

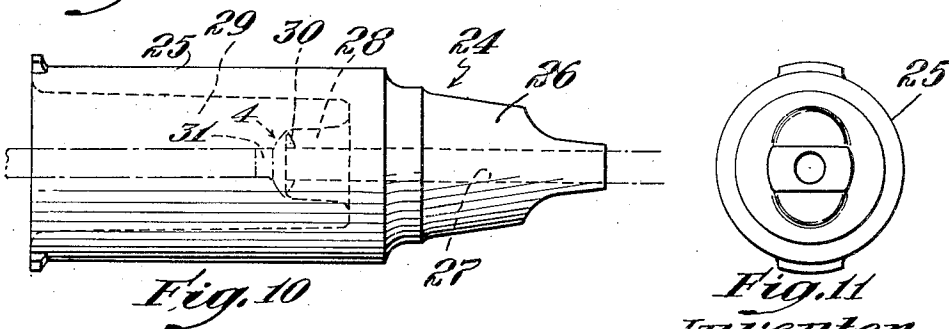
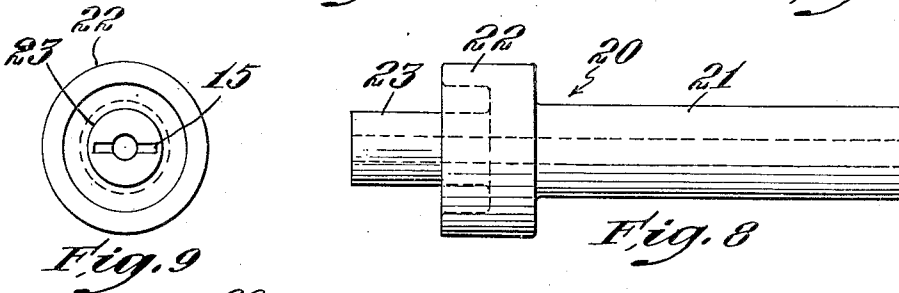
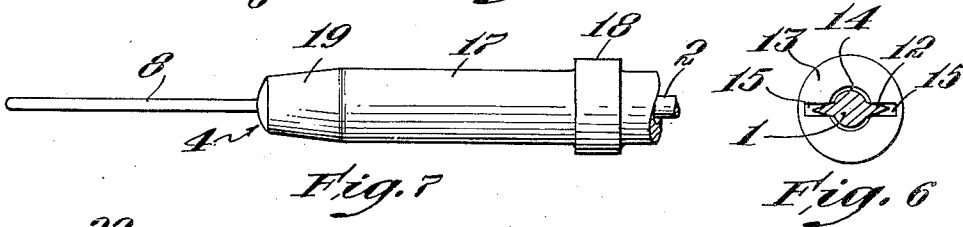
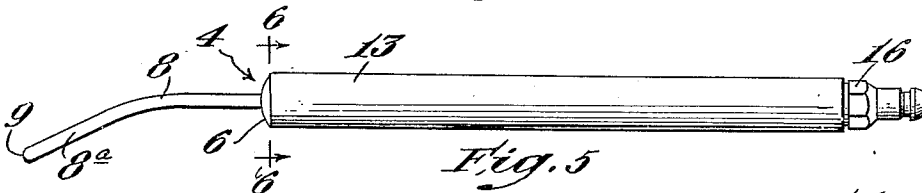
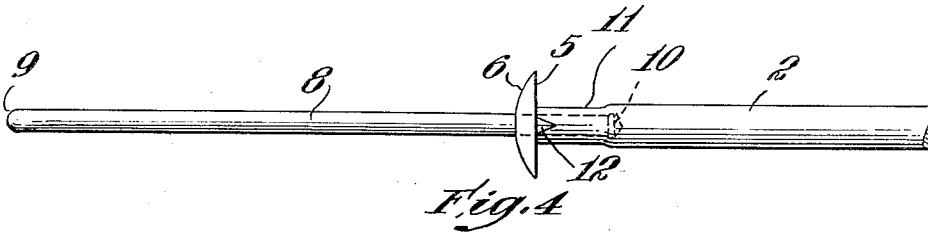
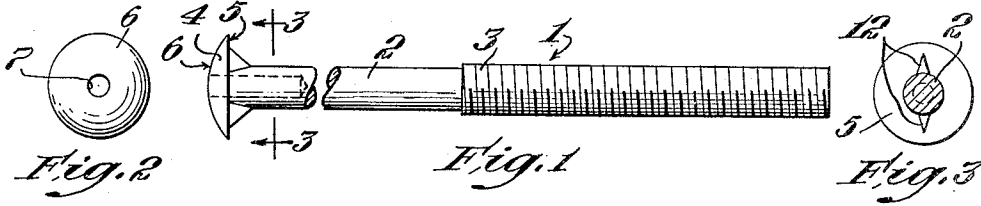
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IGNITER

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This invention pertains to oil burners, and more especially to an improved igniter for such a burner.

Oil burners provided with automatic electrical ignition usually employ an igniter comprising an elongate conductor housed in a refractory insulating tube, customarily of porcelain or other ceramic material, and joined at one end to a spark terminal made of a metal or alloy which is highly resistant to fusion and oxidation. Customarily the conductor has an enlargement of one kind or another, near its junction with the spark terminal, which bears against one end of the insulating tube, and is provided at its other end with a nut designed to be tightened against the opposite end of the insulating tube so as firmly to hold the conductor and spark terminal in operative position. Frequently this nut is also shaped to receive a conductor for the conduit which supplies current.

The insulating tubes are made in a variety of standard shapes and sizes, according to the make of oil burner with which they are to be used. As customarily furnished to the trade, the conductors, with their terminal points, are specially shaped and dimensioned for use with these differently shaped insulating tubes, and it is thus necessary for a person engaged in the installation and repair of such apparatus to keep on hand a large stock of such conductors in various sizes. One object of the present invention is to provide a combined conductor and igniter point or sparking electrode capable of use in insulating tubes of a variety of shapes and sizes.

The firm and permanent union of the hard infusible and relatively expensive spark terminal with the softer, less expensive conductor, presents a problem which has not heretofore been simply and effectively solved, and a further object of the present invention is to provide simple and effective means for joining these elements permanently and in good electrical conducting relation.

One difficulty frequently encountered in the operation of oil burner igniters results from the tendency of carbon to impregnate the more or less porous insulating material and to condense near the relatively cool end of the insulating tube from which the spark terminal or sparking electrode projects. Any roughness, angularity or projection (such for instance as the edges of a nut, washer, or the like) at this part of the apparatus, constitutes a focal point at which condensation of carbon begins. When carbon once starts to build up at such a point, it continues

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to form very rapidly and eventually may form a bridge for the high tension current causing a short circuit and thus interfering with proper operation of the igniter. Likewise, impregnation of the tube substance with carbon lessens its effectiveness as an insulator. A further object of the invention is to provide an igniter designed to protect the end of the tube from impregnation by carbon and so shaped as to avoid any salient point at the end of the insulating tube at which condensation of carbon may start, thus inhibiting or at least delaying the deposition of carbon.

Usually the terminal point is bent out of alignment with the axis of the conductor member and thus it is necessary to prevent rotation of the conductor within the insulating tube in order that the terminal point may always be properly located. The present invention contemplates the provision of interengaging elements on the conductor member and insulating tube, such that when the conductor member is properly installed, relative rotation of the conductor and tube is positively prevented. Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the drawings, wherein

Fig. 1 is a side elevation, partly broken away, and to large scale, illustrating a preferred form of conductor member in accordance with the present invention;

Fig. 2 is an elevation of the left-hand end of the conductor shown in Fig. 1;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary side elevation showing the left-hand end portion of the conductor of Fig. 1, with a spark terminal point united thereto;

Fig. 5 is a view, to smaller scale, of a complete igniter, including the insulating tube, the conductor and spark terminal of the present invention, and a nut for uniting the parts in assembled relation;

Fig. 6 is a section on the line 6—6 of Fig. 5;

Fig. 7 is a view generally similar to Fig. 4, but illustrating an insulating tube of a different shape;

Fig. 8 is a side elevation of an insulating tube of a further shape;

Fig. 9 is an end elevation of the tube of Fig. 8;

Fig. 10 is a side elevation of an insulating tube of still further form; and

Fig. 11 is an end elevation of the tube of Fig. 10.

Referring to the drawings the numeral 1 designates an elongate conductor member, conveniently formed from a length of cylindrical

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steel rod and having a shank portion 2 and a screw-threaded portion 3 extending from one end a substantial distance, for instance a distance of the order of 1½ inches. At the other end of the shank portion 2 there is provided an enlargement or head 4. This enlargement is preferably circular, coaxial with the shank portion 2 and has a flat inner surface 5 perpendicular to the axis of the shank portion. In accordance with this invention the outer surface 6 of this head member 4 is smooth and free from edges, corners, or projections. For best results it is preferred to make this surface 6 of spherical curvature, the surface 5 intersecting this curved surface 6 and constituting a chordal plane of the spherical surface.

According to a preferred embodiment of the invention, that end of the conductor member having the head 4 is provided with an axial bore 7 (Fig. 1) extending inwardly from the outer surface 6 of the head to a substantial distance, for instance a distance of the order of ¾ of an inch. Initially the shank portion 2 is cylindrical and of substantially uniform diameter.

With this conductor member 1 there is associated a sparking point 8 of metal or metal alloy which is highly resistant to fusion and to corrosion from the action of the arc or spark emitted from its rounded tip 9. If desired, the opposite end of this sparking point 8 may be upset, as shown at 10, or otherwise formed to provide a slight enlargement, although this is not necessary. If such enlargement be provided it must be of such dimensions as to permit it to be pushed down into the bore 7 of the conductor 2. If this enlargement 10 is not provided, then it is preferred to have the external diameter of the sparking member 8 such as to permit the end portion of the member 8 to be pushed into the bore 7 with a snug sliding fit. After the end portion of the member 8 has been seated in the bore or socket 7, that part of the shank member 2 of the conductor which is adjacent to the head 4, is subjected to swedging pressure such as to reduce its external diameter, as shown at 11 (Fig. 4) and likewise to reduce its internal diameter so that it grips the member 8 with so firm a pressure that the member 8 can not be withdrawn from the bore 7. If the enlargement 10 be formed at the inner end of the member 8, this forms a positive lock between the parts after the swedging operation. Preferably this swedging operation is so carried out as also to form, at the inner face of the head 4, a pair of oppositely directed radial lugs or projections 12 (Fig. 3).

In Fig. 5 there is illustrated a simple form of insulating tube 13 designed to form a support for the conductor with its sparking point. This tube 13 may be of porcelain or other refractory insulating material and has a bore 14 (Fig. 6) of a diameter such as to permit the conductor 1 to be pushed into the tube 13 until the inner surface 5 of the head 4 of the conductor abuts the end of the tube 13. That end of the tube 13 which is to be engaged by the head 4, is provided with a pair of diametrically arranged recesses 15 extending outwardly from the bore 14 but stopping short of the peripheral surface of the tube 13, so that the peripheral surface at the end of the tube 13 is unbroken. In the assembly of the parts, the conductor is rotated until the projections or lugs 12 seat in the recesses 15 in the end of the tube 13. A nut 16 is then threaded onto the projecting threaded end of the conductor 1 and is tightened so as to bear against the oppo-

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site end of the tube 13, thus drawing the surface 5 of the head 4 into firm engagement with the end of the tube 13. The diameter of the head 4 of the conductor is preferably substantially equal to the external diameter of the tube 13, so that when the parts are assembled the curved surface 6 forms in effect a smooth spherically curved end for the tube 13, leaving no sharp edges or corners exposed. In use, the sparking terminal 8 is often bent out of alignment with the axis of the conductor 1 as shown at 8^a in Fig. 5 in order to bring its tip 9 in proper relation to the other parts of the oil burner. By the use of the interengaging projections 12 and recesses 15, relative rotation of the conductor and tube is prevented, and thus the proper retention of the tip 9 at the desired point during use is insured.

In Fig. 7, an insulating tube of somewhat modified construction is shown, this tube having the body portion 17 provided with an enlargement or boss 18 intermediate its ends, the body portion 17 being of an external diameter greater than the diameter of the head 4 of the conductor 2 which is housed within this tube. That end portion 19 of the tube which abuts the head 4 of the conductor is tapered so that its extremity is of the same external diameter as the head 4, thus again providing a smooth closure for the end of the tube.

In Figs. 8 and 9 a further form of tube is shown wherein the tube 20 has the elongate body portion 21, the annular flange portion 22 and the end portion 23, the latter being of the same external diameter as the head 4 of the conductor which is associated with the tube.

In Figs. 10 and 11 another form of insulating tube is illustrated, this tube 24 having a cylindrical hollow body portion 25 and an end portion 26 with an axial bore 27 extending inwardly from the end 26 and extending through a boss 28 projecting into the inner end of the chamber 29 in the part 25. The conductor as above described extends through the axial bore 27 and in this instance its enlargement 4 bears against the end of the boss 28, the latter having recesses 30 for the reception of the retaining lugs or projections. The sparking point in this instance is shown as butt-welded to a button 31 of the same diameter projecting from the curved surface of the enlargement 4—and extends through the chamber 29 and out from the end of the tubular portion 25.

While as above suggested the sparking point 8 is desirably secured to the conductor by a swedging operation, it is contemplated that it may be attached to the conductor by other means, for instance by arc welding.

While desirable embodiments of the invention have been illustrated and described by way of example, it is to be understood that the invention is broadly inclusive of any and all modifications falling within the terms of the appended claims.

I claim:

1. A combined conductor and sparking electrode for use in an igniter and comprising an elongate conductor element designed to be located within the bore of an insulating tube, the conductor having an enlargement at one end for engagement with one end of the tube and being screw threaded for a substantial portion of its length adjacent to its opposite end for the reception of a clamping nut engageable with the opposite end of the tube, the conductor having a bore extending inwardly from the outer surface

of said enlargement, a sparking electrode having an end portion seated in the bore in the conductor, the inner end of said end portion being enlarged in diameter, the conductor being swaged thereby to reduce its internal diameter between its enlargement and the enlarged end of the sparking electrode, thereby firmly and permanently securing the sparking electrode in place.

2. An igniter comprising an insulating tube having in one end substantially radial recesses extending from its bore outwardly but terminating short of the outer periphery of the tube, an elongate metallic conductor element designed to be located within the bore of the insulating tube, the conductor having an enlargement at one end and an axial bore extending inwardly from the outer surface of said enlargement, a sparking electrode having an enlarged end portion thereof located within said conductor bore and spaced inwardly from the inner surface of said enlarged end portion of the conductor, the conductor being swaged in the portion thereof between said inner surface of its enlarged end portion and the enlarged end portion of the sparking electrode thereby permanently to unite the sparking electrode and conductor, the inner surface of the enlarged end portion of the conductor having projections extending radially thereof and means for holding the tube and conductor in fixed assembled relation wherein said radial projections fit into said radial recesses to prevent relative rotation of the tube and conductor and the inner surface of said enlarged end of the conductor conceals the end of the insulating tube.

3. An igniter comprising an insulating tube having in one end substantially radial recesses extending from its bore outwardly but terminating short of the outer periphery of the tube, an elongate metallic conductor element designed to be located within the bore of the insulating tube, the conductor having an enlargement at one end and an axial bore extending inwardly from the outer surface of said enlargement, a sparking electrode having an enlarged end portion thereof located within said conductor bore and spaced inwardly from the inner surface of said enlarged end portion of the conductor, the conductor being swaged in the portion thereof between said inner surface of its enlarged end portion and the enlarged end portion of the sparking electrode thereby permanently to unite the sparking electrode and conductor, the inner surface of the enlarged end portion of the conductor having projections extending radially thereof formed from the metal of the conductor during the swag-

ing operation, and means for holding the tube and conductor in fixed assembled relation wherein said radial projections fit into said radial recesses to prevent relative rotation of the tube and conductor and the inner surface of said enlarged end of the conductor conceals the end of the insulating tube.

4. An igniter comprising an insulating tube having in one end substantially radial recesses extending from its bore outwardly but terminating short of the periphery of the tube, an elongate metallic conductor element designed to be located within the bore of the insulating tube, the conductor having an integral head at one end, said head having a smooth spherically curved outer surface, the conductor having an axial bore extending inwardly from the outer surface of said head to a point substantially beyond the plane of the inner surface of the head, a sparking electrode having one end portion located within said conductor bore, said electrode being smoothly cylindrical and extending substantially to the inner end of the bore, the conductor being swaged at that portion thereof which extends substantially from the inner surface of its head substantially to the inner end of the bore, thereby permanently to unite the conductor and a substantial length of the sparking electrode, swaging being confined to the part of the conductor which is at the inner surface of the head, the inner surface of said head having integral projections extending radially thereof, and means for holding the tube and conductor in fixed assembled relation with said radial projections fitting into said radial recesses to prevent relative rotation of the tube and conductor and the inner surface of said enlarged end of the conductor substantially concealing the end of the insulating tube.

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