ELECTRIC RESISTANCE WIRE IGNITER WITH A COOLING TERMINAL POSTS CONSTRUCTION

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ABSTRACT

A resistance wire igniter for a pilot light of a gas fuel burning apparatus including an electric current heated filament having molybdenum and portions tapered toward and fixed with a molybdenum disilicide central portion. Terminal posts construction for keeping the filament ends cool so that they will not oxidize.

1 Claim, 3 Drawing Figures
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BACKGROUND OF THE INVENTION

This invention relates to igniters for gas fuels or the like and, more particularly, to an igniter filament which has long life, high conductivity end portions and a high structural integrity. In the past, molybdenum wires have been coated with molybdenum disilicide to prevent oxidation at elevated temperatures when used as resistance heating elements. However, the protection has been found unsatisfactory. Moreover, the ends of the wires act as poor electric terminal connections because the molybdenum disilicide coating, which is very fragile, is not easily weldable or brazable and is only a fair conductor at the cooler joint. Still further, a solid piece of molybdenum disilicide cannot be easily bonded to a metal to provide electric terminals of a relatively high conductivity.

SUMMARY OF THE INVENTION

In accordance with the invention, the above-described and other disadvantages of the prior art are overcome by providing a wire igniter which decreases in diameter toward the midpoint along its length and has only a central portion of molybdenum disilicide. The tapered construction facilitates a strong bond between the relatively oxidizable molybdenum wire and the relatively non-oxidizable molybdenum disilicide central portion. Moreover, the wire conductors at each end of the central portion bare of the molybdenum disilicide and, thus, are particularly well adapted to act as electric terminals of a relative high conductivity. They have good metallic properties making electrical connection possible by a number of methods.

The method of the invention utilizes the step of treating only the central portion of a molybdenum wire to convert it to a molybdenum disilicide.

It is also an outstanding feature of the invention that elongated tube-like terminal posts are provided to keep the molybdenum ends cooler and below their oxidation temperature so as to maintain good electrical contact therewith.

Another feature of the invention resides in the fact that portions of post interiors are spaced from the ends of the molybdenum to act as heat radiators to keep the said ends cool. The spaced portions may be tube-like and extend toward one another along the length of the filament at the ends of the posts.

The above-described and other advantages of the invention will be better understood from the following description when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, which are to be regarded as merely illustrative:

FIG. 1 is a longitudinal sectional view of an igniter constructed in accordance with the present invention;

FIG. 2 is a perspective view of pilot light apparatus in which the igniter is used, and

FIG. 3 is a top plan view, partly in section, of an alternative embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1, an igniter 10 is shown including end portions 11 and 12 of molybdenum bonded to a central portion 13 of molybdenum disilicide. Note will be taken that portions 11 and 12 are tapered at 14 and 15, respectively. This provides a strong bond of portions 11 and 12 to portion 13. Further, portions 11 and 12 are bare of the molybdenum disilicide at 16 and 17 and, therefore, can act as electric terminals of a relatively high conductivity.

If desired, points 18 and 19 of portions 11 and 12 may be connected by a filament of molybdenum.

Igniter 10 is manufactured by converting only the central portion of a wire of molybdenum to molybdenum disilicide.

The manner in which igniter 10 is used is shown in FIG. 2 including a pilot burner 20, a support 21 for the igniter 10, and means 22 to pass electric current through the igniter 10.

Igniter 10 may be bent to the U-shape shown in FIG. 2 before the conversion to molybdenum disilicide is made in accordance with the method of the invention.

In FIG. 3, the filament is indicated at 23 including molybdenum end portions 24 and 25, and a molybdenum disilicide central portion 26.

Terminal posts 27 and 28 may be swaged upon or otherwise fixed to end portions 24 and 25, respectively.

Filament 26 has a circular cross section throughout its entire length. The outside diameter of filament is the same everywhere along its length. Posts 27 and 28 have a symmetrical axis and perfect axial symmetry.

 Entirely conventional lugs 29 and 30 with attached leads 31 and 32, respectively, are fixed between an insulator 33 and eyelets 34 and 35 which are integral with posts 27 and 28, respectively.

Posts 27 and 28 have external shoulders 36 and 37, respectively. Shoulders 36 and 37 with eyelets 34 and 35 hold posts 27 and 28 in fixed positions relative to insulator 33 through holes 38 and 39 therethrough, respectively.

Posts 27 and 28 have cylindrical end portions 40 and 41, respectively, spaced from filament portions 24 and 25, respectively, to provide heat radiators to keep portions 24 and 25 cool. Portions 25 and 29 will therefore not oxidize and good electrical connections will be maintained secure between portions 24 and 25 and posts 27 and 28, respectively. The difference between the maximum radius of filament end portion 25 and the maximum inside radius of post 28 is typically shown at FIG. 3.

Parts 27, 28, 29, 30, 31 and 32 are preferably made of any suitable highly conductive metal.

What is claimed is:

1. A resistance wire heater comprising: an insulating means; first and second conductive terminal posts fixed relative to said means, said first and second posts being elongated hollow bodies open at least at one end: a conductive filament having first and second ends extending into said one end of each post, said first and second filament ends being electrically connected to one end of each of said first and second posts, respectively, said one end of each post being positioned out of contact with said first and second filament ends, said one end of each post extending axially in a position surrounding a corresponding filament end over a substantial length thereof, but spaced therefrom and second portions of the lengths of said first and second posts, respectively, from respective points intermediate their ends to said one end of each of are first and second hollow conductive cylinders having concentric internal and external surfaces, said filament having first and second portions contiguous to the internal surfaces of said first and second cylinders, respectively, said filament portions being straight and having uniform circular cross sections, respectively, concentric with said cylinders, the diameters of said first and second filament portions being less than the inside diameters of said first and second cylinders, respectively, the said one end of one post opening in a direction along said filament toward the said one open end of the other post thereon, said filament having a circular cross section of the same diameter throughout its entire length, a central portion of molybdenum disilicide, said central portion having a hollow conical bore at each end, said filament first and second ends having conical end portions to mate with said bores, said conical end portions being fixed in said bores, and means including a dielectric plate having flat and parallel surfaces on each side thereof, and two cylindrical holes therethrough normal to said flat surfaces, said posts projecting through said holes, respectively, both of said first and second end posts being located one and the same side of said plate; said posts being snugly fitted in said plate holes, those portions of said posts located in said plate holes having cylindrical external surfaces of diameters only slightly less than the diameters of the respective
holes, said posts having respective annular shoulders of an outside diameter larger than the respective hole diameters, said shoulders abutting said one plate side, said posts having eyelets integral therewith on the ends thereof opposite said first and second ends, said eyelets having annular flanges external to said plate larger in diameter than the respective holes positioned to hold said posts in fixed positions relative to said plate, two conductive annular lugs around said two posts, respectively, clamped between said plate and the respective eyelet flanges, and an electrical lead conductively bonded to each lug, both of said posts being hollow throughout their entire lengths and open at both ends thereof.