

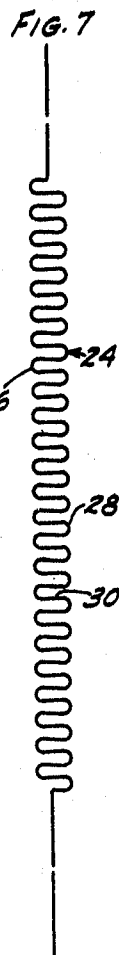
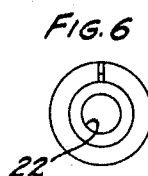
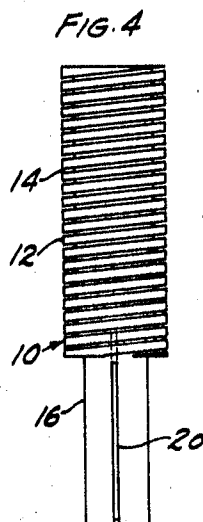
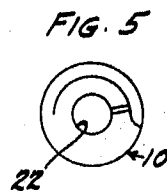
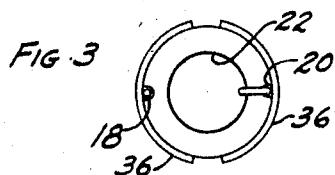
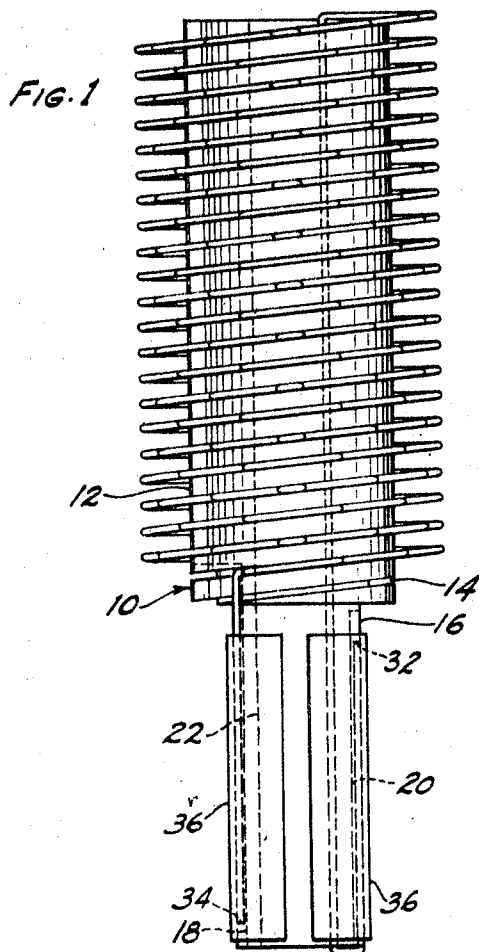
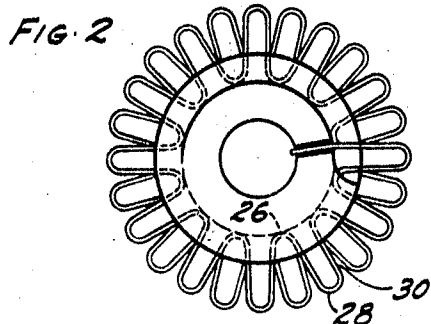
July 29, 1969

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3,458,766

ELECTRICAL RESISTANCE IGNITER FOR GAS

Filed April 22, 1968



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3,458,766

ELECTRICAL RESISTANCE IGNITER FOR GAS
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 Filed Apr. 22, 1968, Ser. No. 723,081
 Int. Cl. F23q 7/00

U.S. Cl. 317—98

5 Claims

ABSTRACT OF THE DISCLOSURE

A glow igniter comprising a sinuously formed wire wound in a helical groove formed in a ceramic rod with alternate bends of the wire entered in the groove and with alternate opposed bends and portions joining the bends projecting radially from the surface of the rod, whereby substantial growth or lengthening of the wire, which may occur in use, will not appreciably distort the configuration.

This invention concerns the provision of an electrical resistance, wire-type igniter constructed so as to provide good surface contact with the gas to be ignited and to permit substantial growth or lengthening of the wire, which may occur in use, without appreciable distortion of the wire configuration or sagging which may result in contact and shorting of spaced portions of the wire.

Some high melting point alloys, apparently those containing aluminum and which are otherwise quite suitable for glow wire igniters operating above 2000° F., have been found to grow and cause wire formed thereof to lengthen considerably upon repeated heating and cooling. It is believed that this is due to the formation of aluminum oxide on the surface of the wire at high temperatures, which oxide, while providing an excellent protective coating, has a substantially lower coefficient of thermal expansion than the alloy from which the wire is drawn. Because of this differential in expansion, cracks in the tightly bonded aluminum oxide occur when the wire is rapidly heated and more oxide is then formed within these cracks, causing the wire to be subsequently stretched when it tries to shrink upon cooling. This process apparently continues because experiments have shown that lengthening of the wire continues upon repeated heating and cooling to the point where distortion of conventional helically wound wire coils results in contact and shorting of adjoining loops.

The primary object of the invention is to provide an electrical resistance wire igniter for gas having such form and support means as will permit extensive surface contact of a gas with the wire and will permit substantial lengthening of the wire, which may occur in use, without sagging of the unsupported portions of the wire or appreciably affecting its overall configuration.

Further objects and advantages will appear from the following description when read in connection with the accompanying drawing.

In the drawing:

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

FIG. 2 is a front end view of the igniter shown in FIG. 1;

FIG. 3 is a rear end view of the igniter shown in FIG. 1;

FIG. 4 is an elevational view of the helically grooved ceramic rod;

FIGS. 5 and 6 are front and rear end views, respectively, of ceramic rod shown in FIG. 4; and

FIG. 7 is a view of the sinuously formed wire element.

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Referring to the drawing, the igniter comprises a ceramic rod generally indicated at 10 having a large diameter portion 12 in the surface of which is formed a continuous helical groove 14. The rod 10 also has a small diameter portion 16 having longitudinal grooves 18 and 20 formed therein and a longitudinal bore 22 extending therethrough.

A sinuously formed wire element generally indicated at 24, see FIG. 7, having substantially half circle reverse bends 26 and 28 and substantially straight portions 30 joining the bends is wound in the helical groove 14 of rod 10 with the bends 26 and small adjoining parts of the straight portions 30 entered in the groove and with the greater part of the straight portions 30 and connecting bends 28 extending outward from the surface of the rod.

At the forward end of the ceramic rod, the wire element 24 is formed at 90° and extends therefrom through the bore 22 to the rear end of the ceramic rod where it is formed in a reverse bend and extends longitudinally forward therefrom in the groove 20 in the small diameter portion of rod 10 to its one end 32. At the rear end of the large diameter grooved portion of the ceramic rod, the wire element 24 is formed at substantially a right angle and extends rearward therefrom in the groove 18 to its other end 34 at approximately the rear end of the ceramic rod. The groove 18 extends forward into the large diameter portion and intersects the groove 14.

Overlying diametrically opposite portions of the periphery of the small diameter portions of the ceramic rod are a pair of arcuate conductive contact members 36 cemented to the surface of the ceramic rod and having contact with the underlying straight end portions of element 24.

The depth of the helical groove 14 may be varied as desired. As illustrated in FIG. 2 the depth is preferably such that the bends 26 and approximately one fourth of the straight joining portions 30 are entered therein. The width of the helical groove 14 is preferably just sufficiently greater than the diameter of the wire of element 24 to permit easy entry. The length of wire forming the straight joining portions 30 is preferably somewhat greater than the length of wire forming the bends.

The igniter described hereinabove has particular advantage when an alloy from which the element wire is drawn has a tendency to lengthen considerably in use. However, the construction described has other considerable advantages. It is economical to construct, the element is uniformly supported, and temperature throughout the coil is substantially uniform due to its uniformly spaced portions in contact with the ceramic rod which acts as a heat sink. Moreover, its uniformly spaced projecting loops permit free circulation and good area contact with the gas to be ignited.

I claim:

1. An electrical resistance type igniter comprising a rod of dielectric material having a helical groove formed in the surface thereof and a sinuously formed electrical resistance wire element having reverse bends and straight portions joining the bends wound in said helical groove with alternate bends entered into said groove and with the greater part of the straight portions and the opposed alternate bends projecting outward from the surface of the rod.

2. An igniter as set forth in claim 1 in which the reverse bends of the sinuously formed resistance wire element are substantially half circles of uniform radii.

3. An igniter as set forth in claim 1 in which the material from which the electrical resistance element wire is drawn is an alloy containing a relatively small percentage of aluminum.

4. An electrical resistance type igniter for igniting gas comprising a ceramic rod having a helical groove formed

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therein and a longitudinal bore therethrough, an sinuously formed wire element adapted to be heated to gas ignition temperature by the passing of electrical current therethrough, said sinuously formed wire element having reverse bends and straight portions joining the bends and said element being wound in said helical groove with alternate bends entered into said groove and with the joining straight portions and opposed alternate bends forming loops projecting substantially radially from the surface of said rod, and said sinuously formed wire element having straight portions at the ends thereof for electrical connection, and one of said straight portions being returned from one end of said helical groove to the other through said longitudinal bore.

5. An igniter as set forth in claim 4 in which said helical groove is deep enough to receive said alternate bends entered therein and a part of said joining straight

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portions and said groove being just sufficiently wider than the diameter of the wire from which said element is formed to permit easy insertion.

References Cited

UNITED STATES PATENTS

2,640,902	6/1953	Aske et al.	338—303 X
3,086,187	4/1963	Duggan et al.	338—283
3,056,846	10/1962	Glazer	13—20 X
3,372,305	3/1968	Mileulec	317—98

VOLODYMYR Y. MAYEWSKY, Primary Examiner

U.S. Cl. X.R.

219—270; 338—283, 303