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ELECTRODE FOR SPARKING PLUGS

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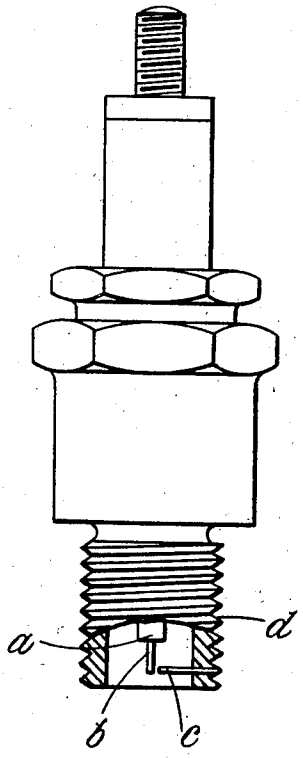

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ELECTRODE FOR SPARKING PLUGS

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3 Claims. (Cl. 123—169)

This invention relates to electrodes for sparking plugs, constructed of platinum alloys having improved characteristics.

It has already been proposed to use platinum, iridium, or ruthenium, either alone or alloyed with each other or with osmium or tungsten for electrodes of the said kind. The electrodes thus obtained have a longer life than the easily oxidised base metal electrodes previously used and many of them withstand corrosion by the lead compounds normally added to high-grade motor spirit to prevent knocking. Many of the alloys, however, are extremely difficult to fabricate to the form of wire and are liable to have hidden flaws and internal defects. Furthermore, some of the alloys are relatively soft and the electrodes are liable to be readily deflected when at high temperatures. This latter defect is extremely serious, since if the alloys lose their stiffness at high temperatures the gap between the electrodes may alter in length and injuriously affect the performance of the engine in which the plugs are used.

We have now found that these difficulties can be overcome by the use of platinum alloyed with from 0.5% up to 10% of molybdenum for the sparking plug electrodes. Contrary to expectation, we find that these molybdenum-platinum alloys do not lose molybdenum when heated in air but remain bright and untarnished. The stability of the molybdenum-platinum alloys on heating is remarkable, in view of the volatile nature of the oxide of molybdenum, MoO_3. In one test, wires 0.020 inch in diameter were heated for 24 hours in freely circulating air to 1100° C. by the passage of an electric current. A small amount of volatilisation occurred during this treatment, as with all platinum metals; but there were no indications of any preferential loss of molybdenum; the composition of the wires remained unchanged as far as could be detected by chemical analysis. The total loss of weight of the wires is shown in the following table:

Per cent Mo	Per cent total loss of weight after 24 hours
1	0.8
2	0.9
4	1.5
6	1.9

In contrast, an alloy of Pt with 20% Ir, such as is widely used for sparking plugs, loses 4.5% in weight in the same conditions. Furthermore, although the molybdenum-platinum alloys containing from 0.5 to 10% molybdenum are very hard, they are readily fabricated by forging, rolling and wire drawing. These molybdenum-platinum alloys are, unexpected, nearly twice as hard as the corresponding tungsten-platinum alloys and are very much easier to work. The hardness of the alloys, measured after annealing at 1400° C. is as follows:

Per cent Mo	Vickers pyramid hardness No.
0.5	70
1	100
2	129
3	156
4	200
5.25	230
7	253
10	300

In contrast, the Vickers hardness of the alloy of Pt with 20% Ir, when fully annealed, is 180; and the Vickers hardness of the alloy of Pt with 4% W, which has recently been proposed as a sparking plug alloy, is only about 140.

Within the range of 0.5 to 10% molybdenum, the preferred range from considerations of both hardness and workability is 2 to 6%. As an example within this preferred range, an alloy containing 4% of molybdenum and the balance platinum, is equal in hardness to the 20% iridium-platinum alloy at present widely used for sparking plug electrodes and is readily drawn down to the form of electrode wire.

The alloys according to this invention may be used as point electrodes in the form of wire or as tips applied to a base metal foundation.

The present invention is generally applicable to sparking plugs of all constructions. By way of illustration, a conventional type of sparking plug is shown in the accompanying drawing in part section.

In the drawing the body part *d* has a screw threaded portion adapted to be screwed into a hole in the engine cylinder. Within the hollow body part *d* is an insulated central stem *a* to which is secured an electrode *b* made from a short length of wire of substantially uniform diameter. The complementary electrode *c* is mounted on the body part *d* and consists of another short length of wire. In applying the present invention to this sparking plug, the wire electrodes *b* and *c* are made from a molybdenum-platinum alloy as hereinbefore specified.

Naturally, the invention is equally applicable to sparking plugs of different construction, in some of which it may be more convenient to provide tips of the said molybdenum-platinum alloys rather than to make the entire electrode thereof.

We claim:

1. An electrode for a sparking plug consisting of platinum-molybdenum alloy containing molybdenum within the range 0.5–10%, the balance being platinum.

2. An electrode for a sparking plug consisting of a platinum-molybdenum alloy containing molybdenum within the range 2–6%, the balance being platinum.

3. An electrode for a sparking plug consisting of a platinum-molybdenum alloy containing 4% molybdenum and 96% platinum.

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