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RECONDITIONING SPARK PLUGS

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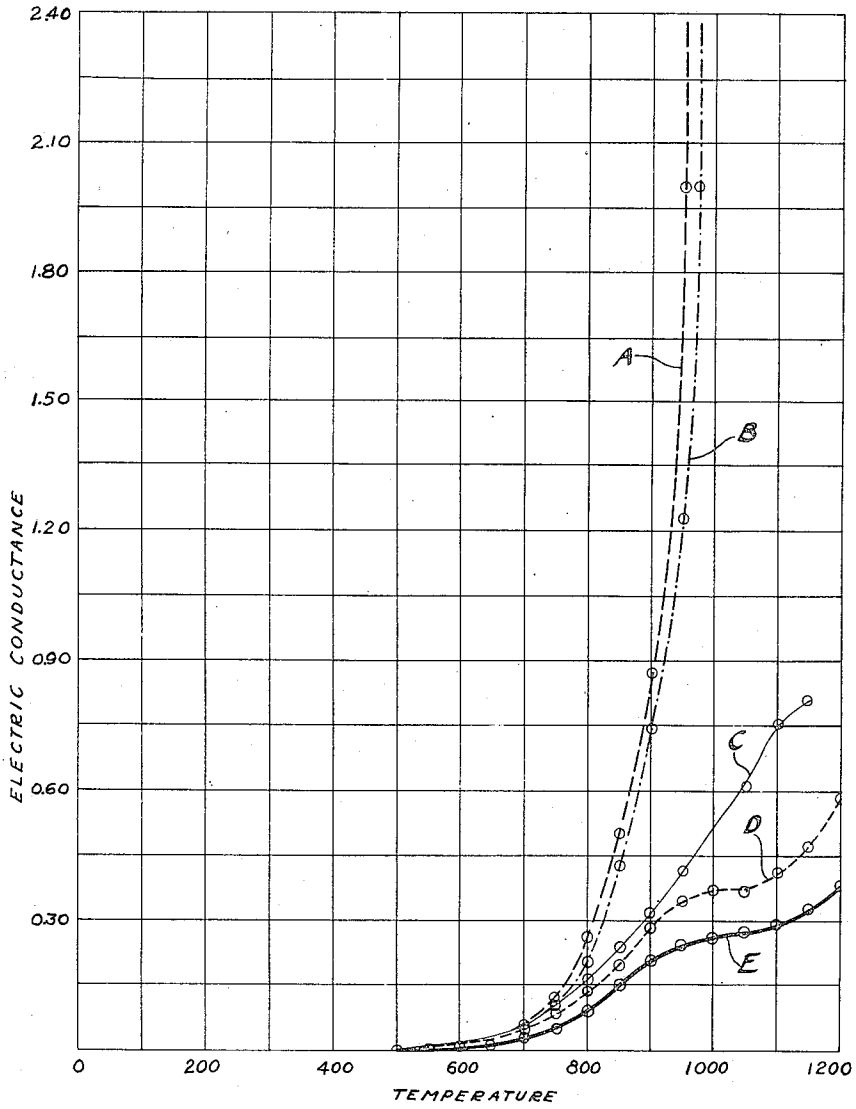

Inventors
Arthur S. Fry &
Lloyd L. Withrow

By Blackmon, Spencer & Flint
Attorneys

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RECONDITIONING SPARK PLUGS

Arthur S. Fry and Lloyd L. Withrow, Detroit, Mich., assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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9 Claims. (Cl. 51—281)

This invention has to do with reconditioning spark plugs.

Engine deposits from leaded gasolines affect deleteriously the electrical resistance of spark plug insulators at high temperatures. It has been proposed heretofore to sand blast spark plugs in an effort to remove the leaded deposits from the porcelains and thus to minimize the effects of temperature on the conductivity of the porcelains. We have found that the sand blasting may have a comparatively small effect in improving the electrical resistance at high temperatures once these properties have been deleteriously affected by the lead deposits. The primary object of the present invention is a process of improving the electrical resistance properties of spark plug insulators that have been run on leaded gasolines.

In accordance with our invention after first cleaning the plugs, as by the usual sand blasting or equivalent treatment, we treat the spark plug porcelains with a phosphorus compound or compounds. Phosphoric acid (H_3PO_4), phosphoric anhydride, alkyl phosphoric acids, organic phosphites and organic phosphates are typical examples of suitable phosphorus compounds.

The phosphorus compound is applied to the spark plug porcelain and then the spark plug is heated in any suitable manner as by heating in an oven or by means of a torch to a temperature on the order of about 700 to 1000 degrees Fahrenheit to promote the desired reaction of the phosphorus compound or compounds with the deposits in or on the spark plug porcelain. In the event any non-volatile material collects in the annular space about the porcelains during the heating process, the plugs must be sand blasted a second time. The temperature-resistance relationships of the plugs as thus reconditioned are greatly improved.

The accompanying drawing forming a portion of this specification compares the effects of two different phosphorus treatments with the effects of sand blasting alone on the electrical conductance vs. temperature relationships, as measured in an oven. The relationships of a new unused plug and of a used plug which had no reconditioning are included for further comparison. In the figure, the values given for electrical conductance represent the reciprocals of the resistance of the spark plug porcelains as measured in megohms. The temperatures are expressed in degrees Fahrenheit. Curve A indicates the electrical conductance-temperature relationship of a spark plug run on leaded gasoline which had had no treatment. Curve B is a similar curve of a spark plug that was sand blasted only. Curves C and D illustrate the results obtained by sand blasting the spark plugs, then treating with phosphorus compounds, and thereafter sand blasting again. In curve C the phosphorus compound was $CH_3 \cdot H_2PO_4$ and after the compound was applied to the spark plug porcelain the plug was heated to 1000° F. In curve D the spark plug porcelain had applied thereto P_2O_5 and alcohol. The porcelain was thereafter heated to 700° F. Curve E illustrates values obtained from tests carried out on a new spark plug. The curves demonstrate that sand blasting by itself had little beneficial effect and that the phosphorus treatments greatly improved the conductance-temperature relationships of the spark plug porcelains or insulators.

Measurements of spark plug resistances during actual operation in an engine have shown differences in plug characteristics similar to those revealed by the conductance-temperature relationships determined under controlled temperature conditions in an oven.

The spark plugs may also be reconditioned by installing the plugs to be treated, after a preliminary sand blasting, in an engine and operating the engine at or near full load on a gasoline containing up to about 0.3 per cent of an organic phosphorus compound. It is desired to use no more than about 0.3 per cent of the phosphorus compound to avoid excessive deposits being formed which might harm the moving engine parts. In case a leaded gasoline is used, it is desirable to use trimethyl phosphate since some phosphorus compounds depreciate the anti-knock property of the tetraethyl lead; however, if a clear gasoline is used, any organic phosphorus compound which is soluble in gasoline will have the desired effect.

As a specific example of results obtained from a spark plug reconditioned by being operated in an engine with a phosphorus compound in the fuel, a plug which after preliminary sand blasting had 0.7 megohm of resistance under a given set of engine conditions, had 10 megohms of resistance after burning 2 gallons of gasoline containing 10 cc./gal. of trimethyl phosphate. Under these same engine conditions, plugs which have resistances as low as 0.5 megohm fail to fire the engine, whereas new plugs operate steadily with 50 to 80 megohms of resistance.

Various changes and modifications may be made in the specific procedures outlined above

without departing from the principles of our invention.

We claim:

1. A method of reconditioning a spark plug that has been operated on leaded gasoline which includes cleaning deposits from the spark plug and treating the spark plug with a phosphorus compound.

2. A method of reconditioning a spark plug that has been operated on leaded gasoline which includes sand blasting the spark plug, and then treating the sand blasted plug with a phosphorus compound.

3. A method of reconditioning a spark plug that has been operated on leaded gasoline which includes cleaning deposits from the spark plug insulator, applying a phosphorus compound to the insulator, and heating the plug as thus treated.

4. A method as in claim 3 in which the temperature is on the order of 700°–1000° F.

5. A method as in claim 3 in which the plug is heated in an oven at a temperature of 700°–1000° F.

6. A method as in claim 3 in which the plug is heated by being operated in an engine.

7. A method of reconditioning a spark plug that has been operated on leaded gasoline which includes sand blasting the spark plug and operating the plug in an engine employing a leaded gasoline containing up to about 0.3% of trimethyl phosphate.

8. A method of reconditioning a spark plug that has been operated on leaded gasoline in order to improve the temperature-resistance characteristics thereof which includes, sand blasting said plug, treating the sand blasted plug with a phosphorus compound of the class of phosphorus compounds including phosphoric acid (H_3PO_4), phosphoric anhydride, alkyl phosphoric acids, organic phosphites and organic phosphates, and baking said plug at a temperature on the order of 700 to 1000 degrees Fahrenheit.

9. A method of reconditioning a spark plug that has been operated on leaded gasoline which includes sand blasting the spark plug and operating the sand blasted spark plug in an engine employing a gasoline containing up to about 0.3% of trimethyl phosphate.

ARTHUR S. FRY.
LLOYD L. WITHROW.