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SPARK PLUG

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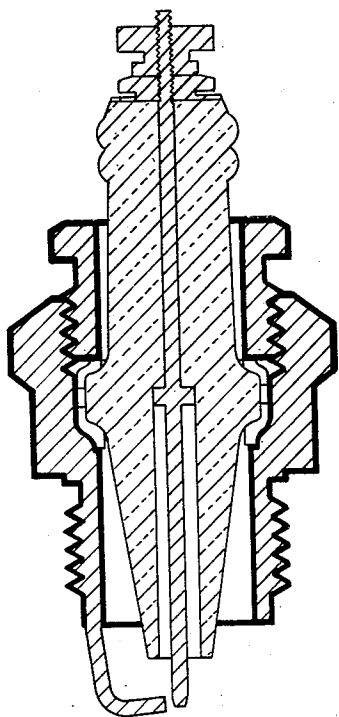


Fig 1

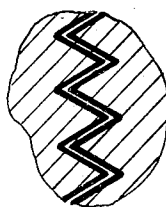


Fig 2

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UNITED STATES PATENT OFFICE

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SPARK PLUG

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5 Claims. (Cl. 123-169)

This invention relates to spark plugs for use in internal combustion engines in which the metallic parts are coated with an electrodeposit of cadmium metal.

It has been necessary usually to use considerable pressure and force on a spark plug in screwing it into place in an engine in order that no gas leak would occur around the threads. Due to the fact that it is necessary to screw it into the cast iron metal so tightly, and also to the fact that these threads sometimes rust or set due to the temperatures encountered, it is quite often difficult to remove the spark plugs for cleaning or replacement.

Furthermore, the carbon formed by incomplete combustion in the cylinders of the internal combustion engine tends to deposit on the metallic parts of the spark plugs, sometimes shorting the spark plugs and in other ways preventing proper ignition of the gas mixture. Such carbon deposits also interfere with the proper flow of the gas into and out of the portion of the spark plug in which the contact points are placed, in other words, the carbon deposit shields this portion of the spark plug from direct contact with the explosive gas mixture.

These disadvantages inherent in ordinary spark plugs are overcome in spark plugs of our invention in which metallic parts thereof are covered with an electrolytic deposit of cadmium metal.

The attached Figure 1 shows a section of a spark plug and Figure 2, a detail thereof.

A coat of cadmium of the thickness of the order of magnitude of 0.0003 to 0.0005" on the parts of a spark plug composed of ferrous metal is rather difficult to show on a figure and the heavy lines in Figs. 1 and 2 are intended to represent such a cadmium coat.

The spark plug represented in Fig. 1 is of the conventional, well known type and it would seem unnecessary to describe in detail its construction. The figure clearly shows that no coat of cadmium has been applied to the brass, tungsten or porcelain parts of the spark plug where such a coat would not be essential, the coat of cadmium metal being only applied to the ferrous metal which comprises the parts in contact with the explosive gas mixture and the threaded parts.

Fig. 2 shows a portion of a threaded part and is intended to show the cadmium coat by heavy lines on the threads of the two parts of the spark plug screwed together.

When the threaded parts of the spark plug carry a reasonable thickness, for instance from

0.0003 to 0.0005" of cadmium metal, the contact of the threads with the unplated metal parts of the cylinder is, due to the ductility and softness of the cadmium deposit, much closer and the tendency for the gas to leak around the threads is to a great extent prevented. The spark plug with the plated threads need, therefore, not be screwed in place with particular force and as there is no baking together of the cadmium with the unplated ferrous metal the plugs can be unscrewed and removed with great ease.

We also found that carbon does not deposit upon cadmium in a hard compact form as is the case with a ferrous metal. The carbon deposited on cadmium plated spark plugs was found to be quite soft and easily removed. Furthermore, the carbon does not have the tendency to build up in the same manner than otherwise occurs, the soft state of so deposited carbon is evidently more easily consumed and its formation therefore decreased.

It also appears that the high temperatures to which the spark plugs are submitted in the cylinders of the engines do not materially affect the cadmium plates.

Due to these various novel properties imparted to the spark plugs by the cadmium plate, their life and serviceability are greatly prolonged.

Spark plugs are most easily plated with cadmium metal by immersing them as cathodes in a cadmium plating bath of common composition. Cadmium-cyanide plating baths, for instance of the type disclosed in U. S. Patent No. 1,681,509, August 21, 1928, L. R. Westbrook, are eminently suited for the production of a dense, adherent and ductile cadmium plate on the metallic parts of spark plugs. The thickness of the cadmium plate should be of the order of 0.0003 to 0.0005" though somewhat thinner deposits will already give a considerable advantage. Thicker plates are usually not necessary and are not recommended on the threads where they might interfere with the fastening of the plugs. Thick deposits of cadmium on the parts in contact with the explosive gas mixture are not detrimental and the deposits thereon can be made as thick as desired.

It might in certain instances be desired to plate only the threads or only the parts which come in contact with the explosive gas mixture and though we prefer to plate both, as this simplifies the plating process and the plugs will have all the advantages derived from our invention, it is understood that spark plugs in which only either the threads or the parts which come in contact with the explosive gases are embraced within the

scope of our invention and the appended claims.

The metallic gaskets used in spark plugs are also conveniently and advantageously cadmium plated for the same reasons for which we prefer 5 to cadmium plate the threads, and metallic gaskets as used in spark plugs are intended to be included within the expression "metallic parts" as used herein.

We claim:

10 1. A spark plug for use in internal combustion engines, the metallic parts of said spark plug carrying a coat of cadmium metal.

15 2. A spark plug for use in internal combustion engines, the metallic parts of said spark plug

carrying an electrolytic deposit of cadmium metal.

3. A spark plug for use in internal combustion engines, the metallic parts of said spark plug which come in contact with the explosive gas mixture being cadmium plated. 80

4. A spark plug for use in internal combustion engines, the metallic, threaded portions of said spark plug being cadmium plated.

5. A spark plug for use in internal combustion engines, the metallic, threaded portions of said spark plug carrying a coating of cadmium metal of a thickness of about 0.0003 to 0.0005". 85

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