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Schafer

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[54] **SPARK PLUG ESPECIALLY FOR ROTARY PISTON INTERNAL COMBUSTION ENGINES**

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[58] **Field of Search**.....313/135, 118

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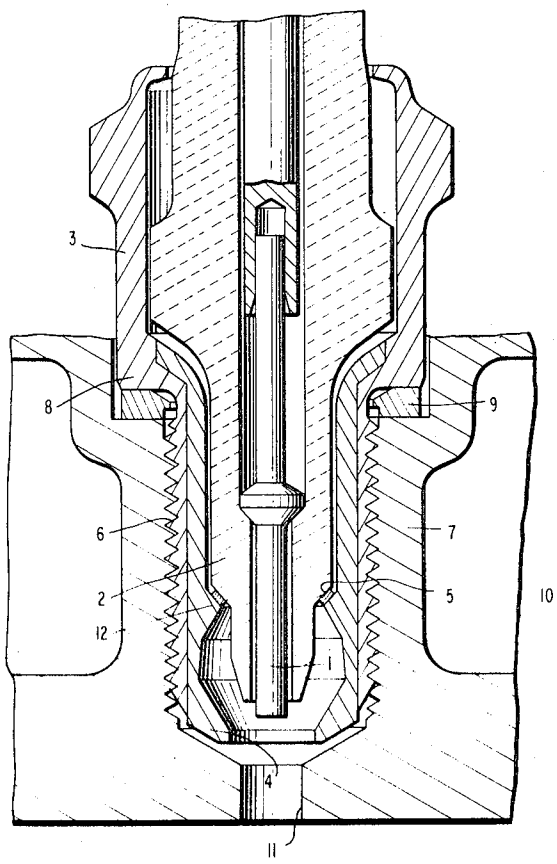
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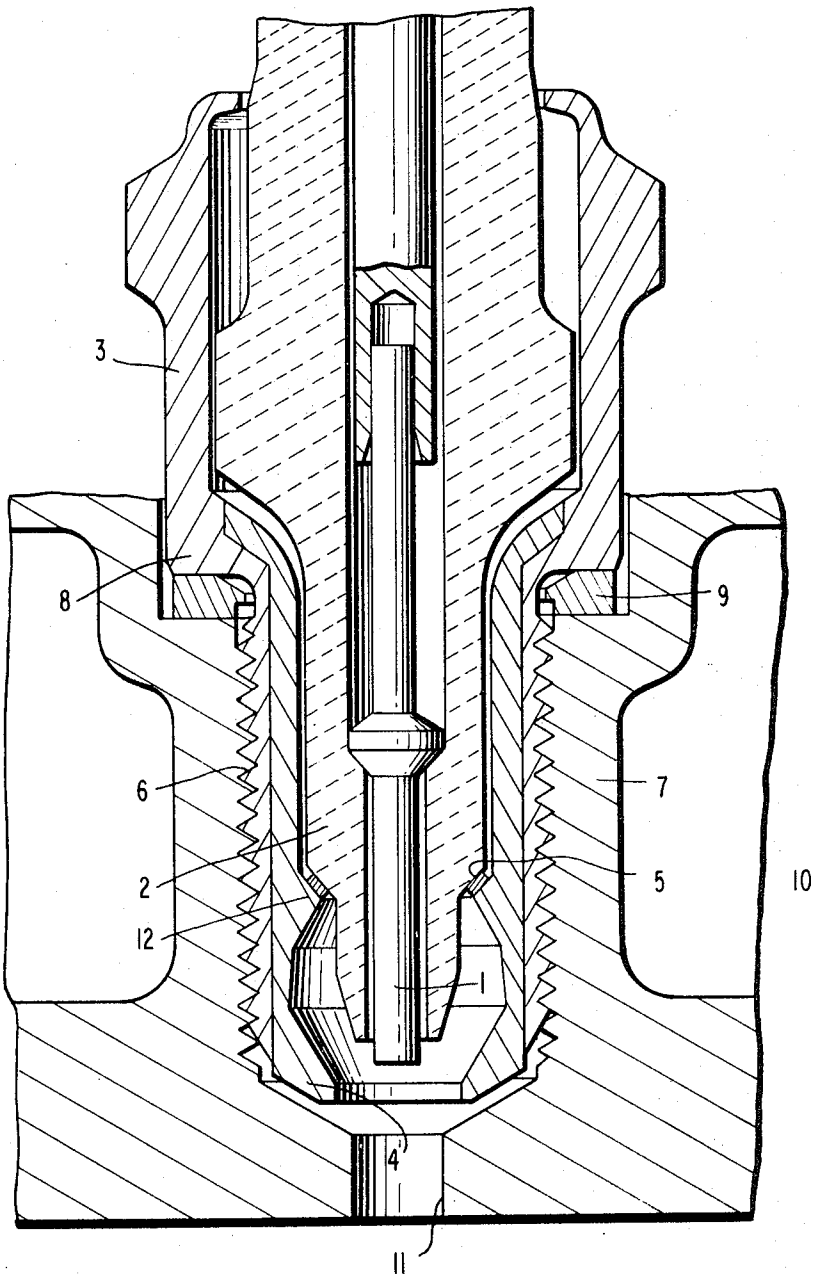
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[57] **ABSTRACT**

Spark plug for rotary piston internal combustion engines having a two-part outer conductive housing including an outer threaded portion of high strength and an inner portion having a high heat conductivity so that heat is conducted longitudinally away from the discharge end of the plug to an area where it will be more efficiently conducted to the engine housing.

11 Claims, 1 Drawing Figure





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SPARK PLUG ESPECIALLY FOR ROTARY PISTON INTERNAL COMBUSTION ENGINES

The invention relates to a spark plug, especially for rotary piston internal combustion engines of the type consisting essentially of a center electrode, an insulator and a plug housing which, at one end, serves as a ground electrode; whereby, between the insulator and the plug housing, a seal is provided and the plug housing supports itself in the engine housing by means of a shoulder in contact with the seal. With spark plugs of this type, glow ignitions often occur because the spark plug becomes overheated as a result of insufficient heat removal. This is especially true with spark plugs used in rotary piston internal combustion engines, because in contrast to reciprocating piston internal combustion engines, the spark plug is surrounded to a lesser degree with cooling air as a result of the particular construction of the rotary piston engine.

The invention has the object to prevent overheating of the spark plug by providing an improved heat removing construction to thereby eliminate the cause for glow ignition.

The problem is solved in accordance with the present invention by forming the plug housing, at least between the shoulder and the seal, entirely or at least partly of a good heat-conducting material, preferably of copper or copper alloys.

By means of the construction of the spark plug in accordance with the present invention, the heat occurring in the spark plug is quickly conducted upwardly and absorbed by the engine housing through the plug shoulder. In this way, an accumulation of heat is avoided especially in the region of the seal between the insulator and plug housing where the center electrode and insulator transmit the largest amount of heat to the plug housing. This heat can only be supplied to the engine housing in this area to a very small degree along the shortest path to the housing through the screw threads since the screw thread normally provided in this area, between the plug housing and the engine housing, is capable of satisfactory heat removal only in the relatively small area of the load-carrying portion of the threads. Thus, the heat created in the area of the ground electrode may be more quickly removed when the plug housing between the ground electrode and the shoulder consists of a good heat-conducting material, which can conduct the heat upwardly to a point where it can be more efficiently transmitted to the engine housing.

It is a principal object of the present invention to provide a spark plug for rotary piston internal combustion engines which avoids or eliminates the heat dissipation problems, which conventional spark plugs have been subjected to heretofore.

It is another object of the present invention to provide a spark plug for rotary piston internal combustion engines which eliminates the problem of glow-ignition.

It is a further object of the present invention to provide a spark plug for rotary piston internal combustion engines which serves to effect longitudinal heat conduction from the firing end of the plug to an area of high heat conduction to the engine housing.

It is still another object of the present invention to provide a spark plug for rotary piston engines which provides improved heat dissipation with a simple and inexpensive spark plug construction.

These and other objects, features and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawing, which provides a longitudinal sectional view of one exemplary embodiment of a spark plug for a rotary piston internal combustion engine.

The spark plug consists essentially of a center electrode **1**, an insulator **2** and a metal plug housing **3** which is constructed at its lower end as a ground electrode **4**. A seal **5** is provided between the insulator **2** and the plug housing **3**. The plug housing **3** is screwed into the engine housing **7** of the rotary piston internal combustion engine by means of threaded portion **6** of the plug housing **3** and, at the same time, supports itself with a shoulder **8** and through the sealing ring **9** in the engine housing **7**. A cooling water space is designated at **10**. An opening **11** provides for the connection from the spark plug to a combustion chamber, not shown.

The plug housing **3** between the ground electrode **4** and shoulder **8** consists of a first radially inwardly directed, essentially annular layer **12** of copper and a second conventional layer of steel for the accommodation of the thread **6**. By this means, the higher heat-conductive layer **12**, in the area of the ground electrode **4** and the seal **5** provides a good heat conducting path; whereas, the outer layer takes care of the required strength to effect securing of the plug in the housing. The result is that heat is quickly carried through layer **12** to the upper portion of the plug housing **3** and through shoulder **8**, the sealing ring **9** and the engine housing **7** into the cooling water in the colling water space **10**; whereas, only a relatively small amount of heat flows through the threaded portion **6** to the engine housing **7**.

While I have shown and described only one embodiment in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to those skilled in the art, and I therefore do not wish to be limited to the details shown and described herein, but intend to cover all such changes and modifications as are within the scope of those skilled in the art.

What I claim is:

1. Spark plug, especially for rotary piston internal combustion engines, comprising a center electrode, an insulator surrounding said center electrode, and a conductive housing surrounding said insulator, said housing consisting at least in part of an outer threaded part and an inner thermally conductive part of higher thermal conductivity than said outer threaded part in heat contact with said insulator for conducting heat longitudinally of said plug away from said threaded portion, said inner part of said housing being separated from said insulator along the major interior surface thereof so as to provide a gap between said inner part and said insulator, while being in thermally conductive communication with said insulator only at a specified portion thereof to provide heat contact therebetween.

2. Spark plug, as defined in claim **1**, wherein said inner part of said housing includes an inwardly directed annular projection, and wherein a thermally conductive seal is provided between said insulator and said inwardly directed annular projection of said inner part of said housing providing said heat contact between said

insulator and said inner part of said housing, so that said insulator and said inner part of said housing are bridged only by said seal and said annular projection.

3. Spark plug, as defined in claim 2, wherein said housing is provided with a shoulder portion spaced from said threaded part and providing a support surface for said plug.

4. Spark plug, as defined in claim 3, wherein said inner part of said housing is made of a material selected from a group essentially consisting of copper and copper alloys.

5. Spark plug, as defined in claim 1, wherein one end of said housing is positioned adjacent an exposed end of said center electrode thereby forming a discharge gap therebetween, said inner and outer parts of said housing being provided at the end thereof forming said discharge gap.

6. Spark plug, as defined in claim 2, wherein said housing is provided with an outer shoulder portion spaced from said threaded part and forming a support surface for said plug communicating with said inner part of said housing.

7. Spark plug, as defined in claim 6, wherein said inner part of said housing is made of a material selected from a group essentially consisting of copper and copper alloys.

8. Spark plug, as defined in claim 1, wherein said inner and outer housing parts are annular concentric layers forming one end of said housing.

9. Spark plug, as defined in claim 8, wherein said outer part is made of steel and said inner part is made of copper.

10. Spark plug, as defined in claim 3, wherein said inner part of said housing extends only from the area of said shoulder portion to beyond said inwardly directed annular projection to an area adjacent the end of said insulator.

11. Spark plug, as defined in claim 5, wherein the end of said housing adjacent the end of said insulator is positioned adjacent an exposed end of said center electrode, thereby forming a discharge gap therebetween, said inner and outer parts of said housing being provided at the end thereof forming said discharge gap.

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