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Skildum

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[54] **METHOD AND DEVICE FOR INHIBITING THE CORROSION OF METALLIC SURFACES**

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[51] **Int. Cl.**..... **C23f 11/02,** F02b 77/04

[58] **Field of Search** ..... 21/2.5 B, 61; 123/198 E; 239/54–56

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Primary Examiner—Barry S. Richman

[57] **ABSTRACT**

A tubular housing having an enclosed end with a hexagonal head thereon and external threads at the other end for threadedly engaging the housing into the spark plug receiving opening in an engine. The housing contains a mixture of organic amonium nitrites with varying vapor pressures, a buffer system to neutralize lead acids and an anti-oxidant for removing varnish and/or preventing the formation thereof.

4 Claims, 2 Drawing Figures

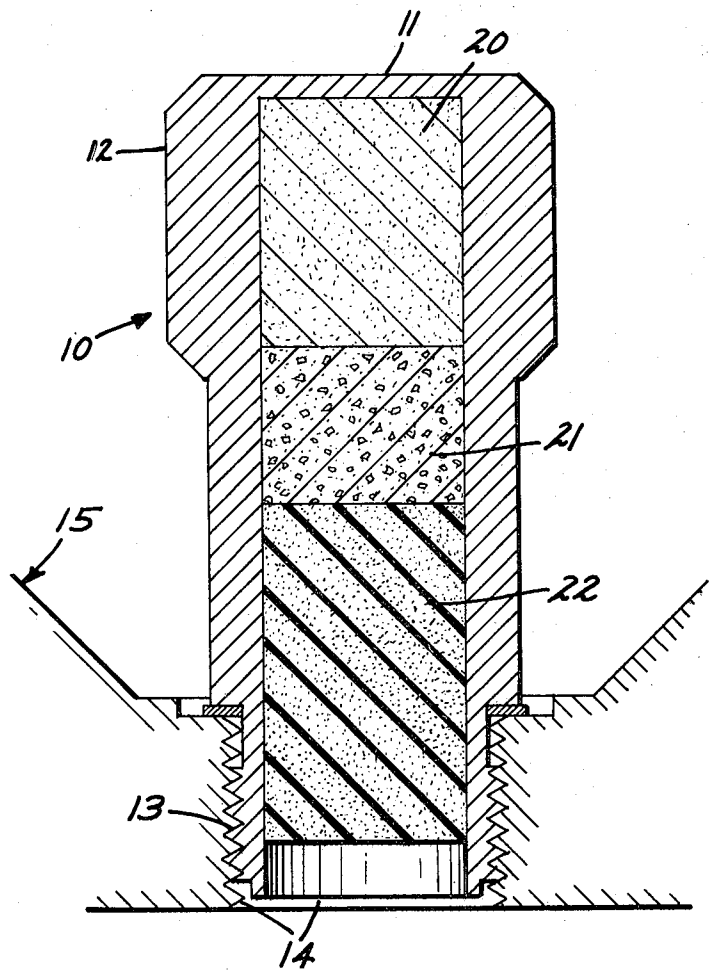


FIG. 1

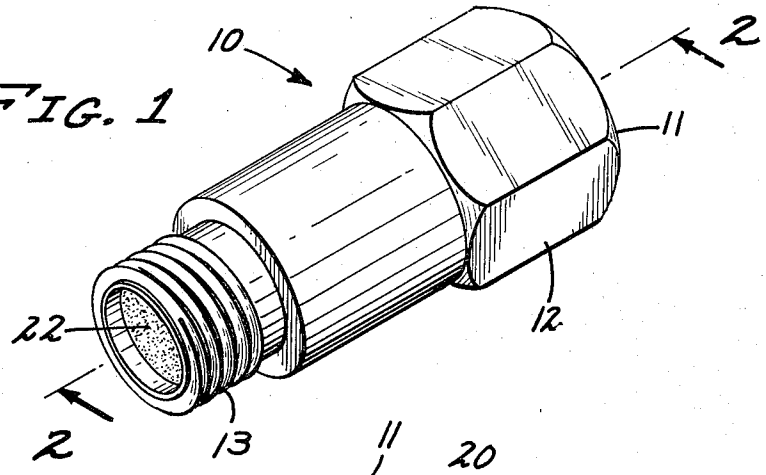
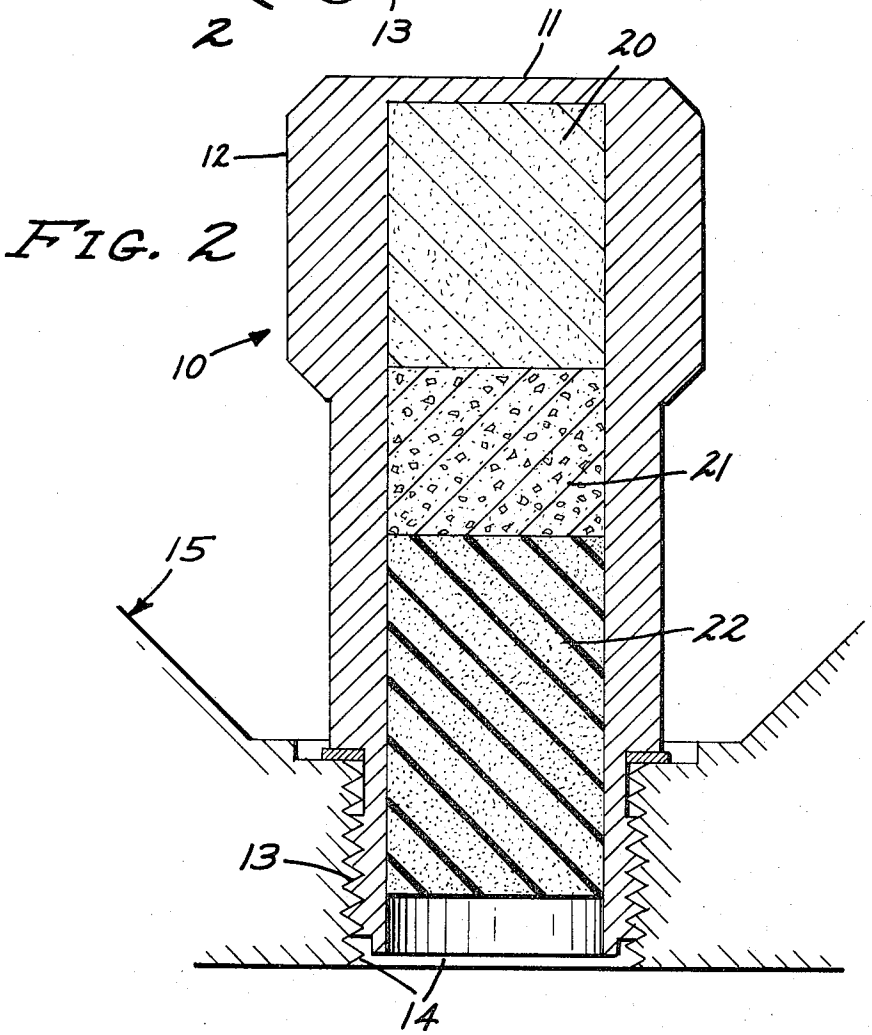


FIG. 2



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METHOD AND DEVICE FOR INHIBITING THE CORROSION OF METALLIC SURFACES

BACKGROUND OF THE INVENTION

1. Field of the Invention

Great numbers of internal combustion engines are presently being utilized to drive a variety of vehicles, including lawnmowers, motor boats, snowmobiles, all-terrain vehicles, automobiles, etc., and many of these vehicles are periodically stored for complete seasons, or longer. During the storage of internal combustion engines rusting and other deposits may form within the engine, seriously damaging the engine. It is essential, therefore, that some means is utilized to retard the formation of rust and other deposits during storage of the engine.

2. Description of the Prior Art

In prior art methods of protecting engines, liquid chemicals are injected into the fuel tank and pass through the engine from the fuel tank. This is highly unsatisfactory because it is very difficult, if not impossible, for the protective material to infiltrate the entire engine and protect the various working parts thereof. Also, if the material is soluble in gasoline it must have a relatively low vapor pressure and will not protect the engine for long periods of storage. If the material is not soluble in gasoline, it simply sinks to the bottom of the tank and provides no useful purpose. Thus, most of the protective materials injected into the gasoline tank are initially designed to preserve the gasoline during storage and aid in preventing the carburetor from becoming fouled but do not provide substantial protection for the engine.

SUMMARY OF THE INVENTION

The present invention pertains to a device for protecting engines during storage which includes a housing having a cavity therein with a tubular externally threaded portion in communication with the cavity and a tool receiving portion on the housing for threading the tubular portion into a spark plug socket, said housing containing a mixture of organic ammonium nitrites with varying vapor pressures and a chemical buffer system for neutralizing lead acids in the engine.

It is an object of the present invention to provide an improved device for protecting engines, which is adapted to thread into spark plug sockets of the engine.

It is a further object of the present invention to provide an improved device for protecting engines including a housing filled with solid or crystalline materials having varying degrees of volitility for providing protection over extended periods of time.

It is a further object of the present invention to provide a device for protecting engines which introduces acid neutralizing chemicals and varnish removing and preventing chemicals directly into the engine.

These and other objects of this invention will become apparent to those skilled in the art upon consideration of the accompanying specification, claims and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings, wherein like characters indicate like parts throughout the figures:

FIG. **1** is a view in perspective of a device for protecting engines constructed in accordance with this invention;

FIG. **2** is an enlarged sectional view as seen from the line **2—2** in FIG. **1**, with the device seated in a spark plug socket;

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIGS. **1** and **2**, the numeral **10** generally designates a housing, which in this embodiment is constructed with an elongated tubular configuration. One end **11** of the housing **10** is closed and a hexagonal head **12** is formed in the periphery adjacent the end **11**. The opposite end of the housing **10** is open and threads **13** are formed in the outer periphery thereof. The size of the housing **10** is such that the threads **13** can be threadedly engaged in a spark plug socket **14** of an engine **15**. In general, the overall construction of the housing **10** should be such that it can be easily fitted into substantially any spark plug socket after removal of the spark plug. In the present embodiment the hexagonal head **12** is constructed so that a standard spark plug wrench can be utilized to engage the housing **10** in the socket **14**. While many modifications and innovations may be devised by those skilled in the art, it is believed that the present embodiment is the most convenient and easiest to install.

Referring to FIG. **2**, it can be seen that the housing **10** is at least partially filled with three layers, designated **20, 21** and **22**, of material. The first layer **20** is positioned within the central opening of the housing **10** adjacent the closed end **11** and contains a buffer system for neutralizing lead acids in the engine as well as any of a class of anti-oxidants. In the present embodiment the buffer system is sodium tetraborate and the anti-oxidant utilized is **2,6** ditertiary butyl-**4**-methylphenol. A mixture of mono-di and tristyrenated phenol and phenyl-beta-napthylamine is an example of another satisfactory anti-oxidant. Approximately one-tenth gram of the buffer system and four-tenths grams of the anti-oxidant are dissolved in approximately four grams of a high terpin solvent, such as pine oil. The buffer system neutralizes lead acids within the engine and provides a basic atmosphere for the other chemicals, to be explained presently, to operate. It has been found that a pH of at least 5.5 is desirable for the operation of the other chemicals in the device. The anti-oxidants are utilized primarily to prevent the formation of varnishes within the engine and to scavenge oxygen from varnish deposits already formed so that these varnishes are rendered volatile and will be exhausted from the engine when the engine is operated. It should be understood that other buffer systems and anti-oxidants may be utilized by those skilled in the art and it is fully intended to include in this disclosure any chemicals which will perform the functions and come within the scope of this invention.

The second layer **21** of material in the housing **10** is approximately three grams of a mixture of organic ammonium nitrites with varying vapor pressures. The organic ammonium nitrite is a crystalline material which sublimes and salts out on the walls of the engine in the form of nitrite salts. The nitrite salts on the walls of the engine absorb moisture within the engine to prevent rust of the various parts. A mixture of organic ammonium nitrites with varying vapor pressures is utilized to provide a constant protection over an extended period of time. The organic ammonium nitrites having higher vapor pressures sublime first and the lower vapor pres-

sures sublime later so that a substantially constant and continual sublimation of organic ammonium nitrite is occurring over the extended period of time. A satisfactory mixture of organic ammonium nitrites can be purchased commercially under the trademark "VPI-270" but it should be understood that other mixtures will operate and different proportions of the organic ammonium nitrite having specific vapor pressures might be desired. As stated previously, it has been found that the mixture of organic ammonium nitrite provides a more efficient and constant protection over an extended period of time if the atmosphere within the engine is basic and preferably above a pH of approximately 5.5. It has been found that the organic ammonium nitrites do not sublime properly when the pH is below approximately 5.5 and, thus, the engine is not provided with the maximum protection.

The third layer **22** of material within the housing **10** is an ester sponge with a low molecular weight, or high vapor pressure, organic ammonium nitrite chemically reacted thereon. The layer **22** aids in maintaining the layers **21** and **20** in the desired position and the low molecular weight organic ammonium nitrite therein sublimes quickly to provide initial protection for the engine. In the present embodiment approximately one gram of low molecular weight organic ammonium nitrite is reacted on the ester sponge. It should be understood that other means might be utilized for maintaining the various layers of material within the housing **10** as long as it is perforate to allow the chemicals in layers **21** and **20** to pass therethrough.

Specific amounts of the various chemicals listed herein are for exemplary purposes and are generally sufficient to protect an engine for a period of 4 to 6 months. However, it should be understood that the amount of chemicals utilized is dictated only by the length of time the engine is to be stored and more or less chemicals can be included if the engine is to be stored for a greater or shorter period of time, respectively.

Thus, an improved device for protecting engines during storage is disclosed which provides a relatively constant protection for an extended period of time. Further, the device protects the engine parts, as opposed to gasoline in the tank and the carburetor, from rust and other corrosion while neutralizing lead acids, preventing the formation of varnish and removing varnish deposits already formed. The device is simple to manufacture and install and, because the device introduces the chemicals directly into the engine combustion chambers, the chemicals permeate substantially the entire engine, including the exhaust system and fuel intake system.

While I have shown and described a specific embodiment of this invention, further modifications and improvements will occur to those skilled in the art. I desire it to be understood, therefore, that this invention is not limited to the particular forms shown and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of this invention.

I claim:

1. A method of inhibiting the corrosion of the internal metallic surfaces of an apparatus comprising the steps of:

a. providing a housing defining a cavity therein;

b. placing a mixture of organic ammonium nitrites with varying vapor pressures within said cavity;

c. placing within said cavity a chemical buffer system for neutralizing lead acids;

d. placing said housing within the apparatus to be protected; and,

e. whereby said internal surfaces are exposed to and contacted by the organic nitrites and chemical buffer system within said cavity.

2. The method of claim **1** wherein said chemical buffer system includes sodium tetraborate dissolved in a high terpin solvent.

3. The method of claim **1** further including the step of placing within said cavity any of a class of volatile anti-oxidents for preventing the formation of varnish and scavenging oxygen from varnish deposits.

4. A device for protecting engines during storage comprising:

a. an elongated tubular housing having one end closed and adapted to receive a tool in engagement therewith, and the other end being open and having external threads formed proximate said opening;

b. the opening in said housing being partially filled with a first layer of material including a buffer system for neutralizing lead acids in an engine and any of a class of anti-oxidants for preventing the formation of varnish and scavenging oxygen from varnish deposits to render them volatile;

c. the opening in said housing being partially filled with a second layer of material including a mixture of organic ammonium nitrites with varying vapor pressures; and

d. said first and second layers of material being held in position by a layer of ester sponge having low molecular weight organic ammonium nitrite chemically reacted therein.

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