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CORROSION INHIBITOR

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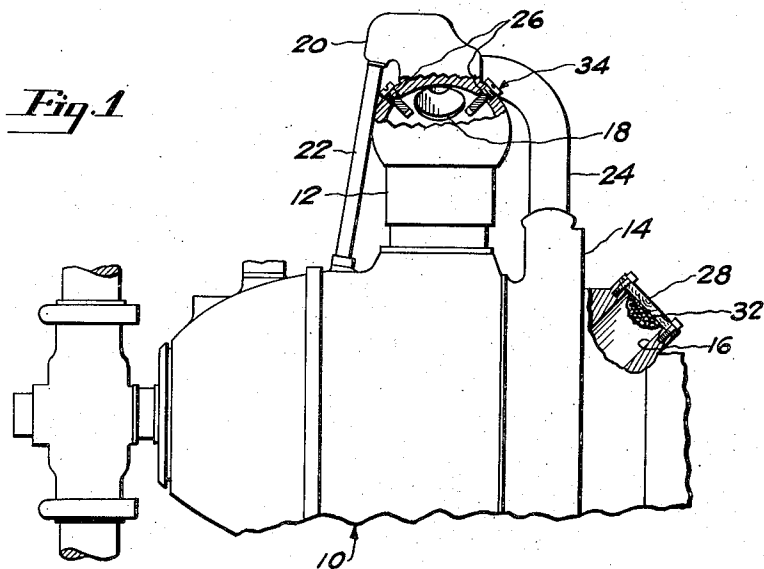


Fig. 3

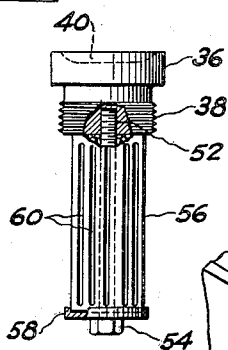


Fig. 2

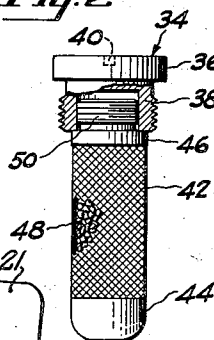


Fig. 4

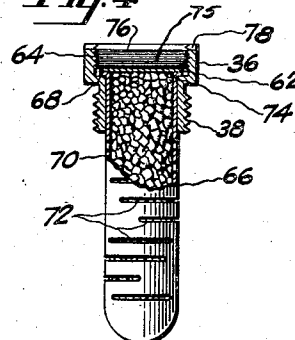
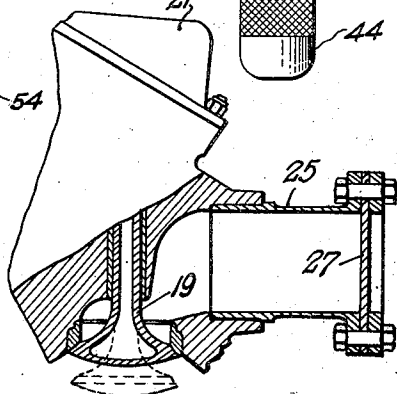


Fig. 5



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CORROSION INHIBITOR

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This invention relates to improvements in corrosion preventing, desiccating means and has particular reference to improved means for preventing corrosion in the interior portions of internal-combustion engines while such engines are in storage or in transportation.

An object of the invention resides in the provision of improved desiccating means of the character indicated constructed in units which may be readily applied to an engine while it is being prepared for storage or transportation.

A further object resides in the provision of a dehydrating or desiccating unit containing a non-corrosive moisture absorbing material in a container so constructed as to provide adequate contact of the moisture absorbing material with the air inside the engine.

A more specific object resides in the provision of corrosion preventing units of the character indicated which may be inserted in and secured in the spark plug apertures of an internal-combustion engine and which, when so inserted and secured, will remove the moisture from the air within the engine cylinders.

Other objects and advantages will be more particularly pointed out hereinafter or will become apparent as the description proceeds.

In the accompanying drawing, in which like reference numerals are used to designate similar parts throughout, there is illustrated, in three somewhat modified forms, a suitable dehydrating or desiccating unit for the purpose specified, and the manner in which the units are applied to an engine. The drawing, however, is for purposes of illustration only and is not to be taken as limiting the invention as it will be apparent to those skilled in the art that various changes in the illustrated constructions may be resorted to without in any way exceeding the scope of the invention.

In the drawing,

Fig. 1 is a schematic elevational view of an internal-combustion engine showing corrosion preventing desiccating units constructed according to the invention applied thereto.

Fig. 2 is a partly sectional view of one form of improved desiccating unit.

Fig. 3 is a partly sectional view of a somewhat modified form of desiccating unit.

Fig. 4 is a partly sectional view of a still further modified form of desiccating unit, and

Fig. 5 is a partly sectional view of an engine cylinder head showing an exhaust valve port and the application thereto of a port closure member.

Referring to the drawing in detail, the numeral

10 generally indicates the engine crankcase to which are attached a plurality of cylinders, one of which is indicated at 12. Attached to the crankcase 10 is an air induction system 14 having an intake air inlet 16. Each cylinder is provided with intake and exhaust valves as indicated at 18 and 19. Suitable valve operating mechanisms which may be enclosed in housings, such as is indicated at 20 and 21, and in tubes, as indicated at 22. The intake valves are connected with the air induction system by suitable intake manifolds, as indicated at 24, and the exhaust valves when the engine is prepared for operation are connected with exhaust stacks or an exhaust collector ring, not illustrated. For shipping or storage purposes, however, the exhaust ports, one of which is indicated at 25 in Fig. 5, are normally tightly sealed usually by flat plates such as is illustrated in Fig. 5 and indicated at 27. Each cylinder is provided in the head portion thereof with one or more internally threaded spark plug apertures, as indicated at 26. While a particular engine construction has been schematically illustrated in Fig. 1 it is to be understood that the invention is not limited in its application to any special form of engine.

When an engine is prepared for storage it is customary to seal all of the openings leading to the interior thereof. For example, the air intake 16 is closed by a temporary cover plate 28 which may be a flat piece of wood, the valve ports may be closed by adjusting the valve operating mechanism until the conventional valve springs bring the valves into close contact with the valve seats provided in the cylinder heads, or by sealing off the cylinder exhaust ports, and other openings into the crankcase with suitable caps or plugs. This preparation provides within the engine a relatively large closed chamber within the crankcase and air induction system, and a relatively small closed chamber in each cylinder between the cylinder head and the included piston.

It is probable that one or more of the engine intake valves will be open when the engine is prepared for shipment or storage, thus connecting the interior of a cylinder with the induction system including the pipes 24 and chamber 16. In order to prevent moist air from entering the cylinder from that source a mass of moisture absorbing material, as indicated at 32, may be secured to the inner surface of the cover plate 28 to extract moisture from the air in the air induction system. Specially constructed units, as generally indicated at 34, may be inserted in the cylinder spark plug apertures to extract the mois-

ture from the air in the various cylinder chambers. Desiccating material may also be disposed in other crankcase chambers if found desirable.

One form of unit 34 is particularly illustrated in Fig. 2 and somewhat modified forms are illustrated in Figs. 3 and 4.

The unit shown in Fig. 2 has a cap portion comprising a slotted circular head 36 and a screw threaded shank 38 the threads of which are adapted to engage with the interior screw threads of the spark plug apertures. The cap may be screwed into a spark plug aperture by inserting a suitable tool, such as screw driver, in the tool slot 40. A suitable perforate cylindrical member 42, which may be formed of a suitable wire mesh is provided with end caps 44 and 46 and contains a mass of desiccative material 48. While various absorbing materials could be used in the unit, a material known as "Silica Gel" has been found particularly advantageous for this purpose since it absorbs a proportionately large amount of moisture from the atmosphere and unlike some desiccative salts, does not give off any fumes or gases or go into solution with the water and tend to drip on the surfaces of the chamber which the unit is designed to protect. Common table salt, although capable of absorbing moisture from the atmosphere, possesses some of the above-mentioned undesirable qualities, and would not, therefore, be as desirable as "Silica Gel" and might even invite corrosion instead of preventing it. One of the end cap members, for example the member 46 is provided with a screw threaded portion 50 which is threaded into the interior of the hollow shank 38 to secure the desiccating material container to the cap. When the unit is screw threaded into the spark plug aperture it makes an air tight seal with the aperture and the porous container for the desiccating material is projected into the chamber to bring the material into intimate contact with the air in the chamber so that moisture in the air will be taken up by the desiccating material. If the cylinder is provided with more than one spark plug aperture a separate unit may be threaded into each aperture to provide an adequate drying capacity for the air in the cylinder enclosed space.

One prevalent source of corrosion has been found to be the lead deposits in the cylinders in cases where the engine has been in operation with leaded gasoline before being prepared for storage. This type of corrosion, however, can also be inhibited by maintaining the air enclosed in the engine cylinders in a dry condition. Since the moisture absorbing material may be reactivated by the simple process of drying it in a suitable oven, the units may be made very strong and substantial so that they can be used many times and in many different engines so long as the engines are all provided with similar spark plug apertures. A number of units may be kept on hand at the place where the engines are prepared for storage or shipment and may be kept in proper condition by keeping them in a desiccating oven or in air tight containers which also contain an excess amount of desiccating material.

The unit illustrated in Fig. 3 has a cap similar to that of the unit shown in Fig. 2 having a circular head portion 36, a screw threaded shank portion 38 and a tool slot 40. The cap shown in Fig. 3 differs from that shown in Fig. 2 in one detail, in that, instead of the shank portion being made hollow, it is provided with a relatively small internally screw threaded well 52 which receives the screw threaded end of a bolt 54. A perforated

cylindrical member 56, which may be formed of some suitable thermoplastic material such as a resinous condensate serves as the container for the moisture absorbing material and is clamped by the bolt 54 between the shank end of the cap and an end closure plate 58 against which the head of the bolt bears. The perforations may be provided in any one of various desired forms, elongated slots 60 running lengthwise of the cylindrical member 56 being shown in the drawing for purposes of illustration.

In the form of the unit shown in Fig. 4 the entire cap portion including the head 36 and shank 38 is made cylindrical and provided with an internal annular shoulder 62 and internal screw threads 64 extending from the shoulder to the outer open end of the head portion 36. The material container 66 is in the form of a molded tube of thermoplastic material having one end closed and the opposite end provided with an external annular flange 68 adapted to overlie the shoulder 62. This container is filled with a suitable desiccating material, such as "Silica Gel," 70, and is perforated by suitable openings, such as the circumferential slots 72. A disc 74 of material similar to the material of the container 66 overlies the open end of the container and rests at its outer circumferential portion on the flange 68, and a plug 75 is screw threaded into the open end of the head portion 36 to retain the container and disc in the cap and hold the disc in firm contact with the end of the container. This plug 75 may be provided with a tool slot 76 for inserting the plug in the cap and slots 78 may be provided in the cap for inserting the unit in a spark plug aperture.

The containers 56 and 66, shown in Figs. 3 and 4 are preferably made of a transparent material, and may contain "Silica Gel" having an indicating substance therein which changes color as the "Silica Gel" absorbs moisture. It may then be determined by inspection whether the desiccating material is in a dry state and suitable to be placed in the engine or whether the material already contains moisture and must, therefore, be dried before being used as a dehydrator. A visual inspection of the unit while still in the engine after it has been in the engine for a period of time will be sufficient to determine whether or not the unit should be replaced.

While a suitable mechanical arrangement of the invention has been hereinabove described and illustrated in three somewhat modified forms, it is to be understood that the invention is not limited to the particular forms so illustrated and described, but that such changes in the size, shape and arrangements of the various parts and of the materials thereof may be resorted to as come within the scope of the sub-joined claims.

Having now described the invention so that others skilled in the art may clearly understand the same, what it is desired to secure by Letters Patent is as follows:

1. Means for preserving against corrosion an engine having cylinders provided with valve ports and spark plug apertures, and a piston in each cylinder closing the inner end thereof, said means comprising, members sealing said valve ports, and desiccating units sealing said spark plug apertures and projecting into said cylinders to dry the air in the chambers between said pistons and the outer ends of the cylinders.

2. Means for preserving against internal corrosion an engine having a crankcase provided with an opening therein and cylinders having

valve port and spark plug openings, said means comprising, a closure for said crankcase opening, a mass of desiccating material carried by said closure within said crankcase to dry the air in said crankcase, means for closing said valve ports, and desiccating units sealing said spark plug apertures and projecting within said cylinders to dry the air in said cylinders.

3. Means for inhibiting internal corrosion in an engine having a cylinder, an air induction system leading to an intake port to said cylinder, an exhaust port for said cylinder, and spark plug openings in said cylinder, said means comprising, a closure for said induction system, a mass of desiccative material secured in said induction system in contact with the air in said system for drying the air in said system and any cylinder connected therewith through said intake port, means for sealing said exhaust port, a mass of desiccative material secured in said cylinder, and means for sealing said spark plug openings.

4. The method of preparing an engine for storage which comprises, sealing the cylinder valve ports, and sealing the cylinder spark plug apertures with desiccating units which support desiccating material within the cylinders in contact with the cylinder included air.

5. The method of preparing an engine for storage which comprises, sealing all openings in the engine crankcase with tight closures, securing a mass of desiccating material to the inner surface of at least one of said closures in contact with the air within said crankcase, sealing the cylinder valve port openings, and sealing the cylinder spark plug apertures with units which carry desiccating material in said cylinders in contact with the air therein.

6. The method of preparing for storage an engine having a cylinder, intake and exhaust ports and spark plug apertures in said cylinders, and an air induction system connected with said intake ports, comprising sealing the exhaust ports, inserting a container containing desiccating material, such as "Silica Gel" in said induction sys-

tem, sealing said air induction system and thereby the intake ports with the desiccating material enclosed therein, and inserting a container containing desiccating material in said cylinder and sealing the spark plug apertures.

7. The method of preparing for storage an engine having a cylinder, intake and exhaust valves and valve seats, valve operating mechanism for lifting said valves from their seats and spark plug apertures opening into said cylinders which comprises, loosening said valve operating mechanism to cause all of said valves to seat on their seats, inserting a container, having a desiccating material therein, in said cylinder and sealing said spark plug apertures.

8. The combination with an engine prepared for shipping or storage, said engine having a crankcase having an aperture in the wall thereof and a cylinder having at least one valve port aperture, of closure members for each of said apertures, said closure members providing tight seals for said apertures, at least one of said closure members having a mass of desiccating material secured to the inner side thereof.

9. The combination with an engine prepared for shipping or storage, said engine including a crankcase and cylinders and having apertures for receiving engine operating elements, of removable closures for each of said apertures forming tight seals therefor, at least one of said closures having at the inner side thereof a mass of desiccating material for the removal of moisture from the air in the opening within the engine communicating with said aperture.

10. Means for preserving against corrosion an engine cylinder having at least one valve port and at least one spark plug aperture comprising, a device providing a substantially air tight closure for said valve port, and a desiccating unit inserted through said spark plug aperture and associated in a substantially air tight relation therewith.

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