Oct. 1, 1963 R. W. FARRIS 3,105,480

ENGINE DISABLING OVERHEAT PROTECTOR

Filed Oct. 4, 1962

Fig. 1

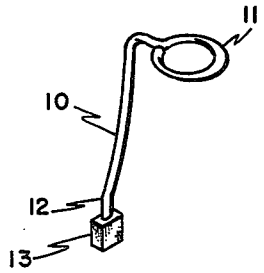


Fig. 2

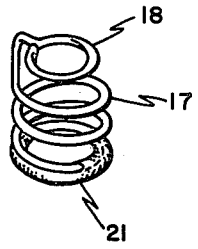


Fig. 3

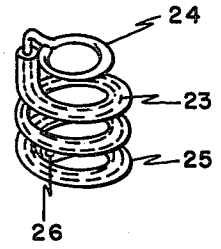


Fig. 4

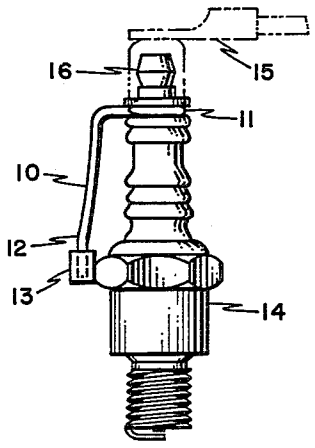


Fig. 5

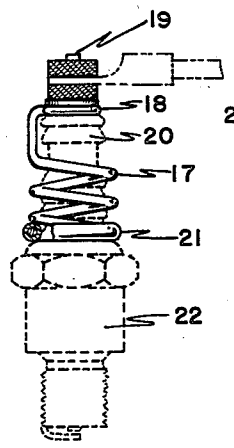
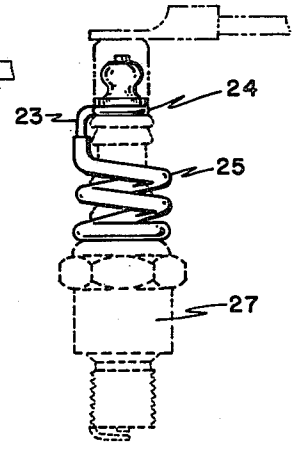


Fig. 6



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ENGINE DISABLING OVERHEAT PROTECTOR

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6 Claims. (Cl. 123—148)

This invention relates to a safety device for spark plug equipped internal combustion engines. It serves to automatically electrically short the spark plug or plugs on which it is installed in case the engine becomes overheated for any reason, thus causing the plug to cease firing, which in turn warns the operator, so that serious damage to the engine can be prevented.

My overheat protector consists generally of an elongated electrically conductive metal spring member, one end of which is electrically and physically connected to the upper end terminal of the center electrode of a spark plug. The lower end of the protector is urged by its inherent spring characteristic toward contact with the metal shell of the spark plug, which carries the ground electrode. The lower end of the spring member, however, is normally prevented from electrical contact with the metal shell by an interposed layer or sheath of electrically non-conductive material which is fusible at a selected temperature above the normal operating temperature of the engine. When the engine temperature rises above the selected fusing temperature of the insulator for any reason, the fusible material melts, the lower end of the spring member moves into electrical contact with the spark plug shell, and the spark plug is shorted, and ceases to fire.

When connected to the single spark plug of a one cylinder engine, the shorting of the plug immediately stops the engine. When one protector embodying my invention is installed on each spark plug of a multi-cylinder engine the different protectors will short out the respective plugs before the respective cylinders reach a damaging temperature. This is due to varying heat distribution.

It is a prime object of the invention to provide a simple engine overheat protector which can be quickly and easily installed on spark plugs of various types without modifying the spark plugs in any way, without the use of special tools, and without interfering with the installation of the spark plug in the cylinder head of the engine.

The invention will be more clearly understood from the following description, when read in connection with the accompanying drawing, in which:

FIGS. 1, 2 and 3 are perspective views of three different embodiments of my invention; and

FIGS. 4, 5 and 6 are side elevational views showing the same three embodiments installed on spark plugs having three different types of central electrode terminals.

The protector illustrated in FIG. 1 includes an elongated electrically conductive spring member designated as a whole by the numeral 10. At its upper end the member 10 carries an integral terminal connector in the form of an eyelet 11. Eyelet 11 lies in a plane substantially normal to the elongated body portion.

At its lower end member 10 is bent inward slightly, at 12, and is molded in or otherwise embedded in a small insulator 13 of electrically non-conductive material which is fusible at a predetermined number of degrees of temperature above the normal operating temperature of the engine in which the plug is installed. Insulator 13 may be molded from any suitable plastic material having the necessary insulating characteristic and the selected melting temperature.

The protector 10 is installed on any spark plug 14 by simply removing the conductor terminal 15 from the spark plug terminal 16, positioning the protector on the plug in the position shown in FIG. 4 with the eyelet 11 surrounding terminal 16, and replacing terminal 15.

With the spark plug installed in an operating engine the spark plug shell is heated by conduction. Should the engine temperature reach the preselected fusing or melting temperature of the material of which the insulator 13 is made, the insulator is melted by its contact with the spark plug shell, and the inherent spring characteristic of which the protector is made causes its lower end to positively contact the adjacent portion of the spark plug shell. The central and ground electrodes of the plug are thus electrically connected, and the plug ceases to function. This causes a single plug engine to stop, or in the case of a multiple plug engine, it warns the operator of an overheated condition of the engine.

In that embodiment of the invention shown in FIGS. 2 and 5, the main body portion 17 of the protector is in the form of an electrically conductive coil spring. It has an integral eyelet shaped upper terminal 18 for engagement over the upper terminal portion 19 of the central electrode of a spark plug. Its coiled portion surrounds the ceramic insulated portion 20 of the spark plug.

The lower end of the body 17 is preferably in the form of a complete circle, and is dipped, molded or other wise embedded in a complete coating of non-conductive material, which constitutes an insulator 21. As in the first embodiment the insulator material has a fusion or melting temperature a selected number of degrees above the normal operating temperature of the engine in which the plug is installed.

The length of the coiled spring body 17 is such that when the protector is installed on a spark plug, as shown in FIG. 5, the spring is compressed, and the insulator 21 is held firmly against the upper end of spark plug shell 22.

When the engine temperature becomes excessive and reaches the melting temperature of the insulator ring 21, the insulation material melts and the lower end of the coil spring 17 makes electrical contact with the shell 22, thus shorting out the spark plug.

The embodiment shown in FIGS. 3 and 6 similarly includes a conductive coil spring body 23 preferably having a full circle loop at its lower end, and an integral eyelet shaped terminal 24 at its upper end.

This embodiment differs from the FIG. 2 embodiment primarily in that the coil spring body is encased in a tube of the previously described insulating material from a point just below eyelet 24 to and including its extreme lower end loop. In other words the extreme lower end of the tubular insulator 25 is sealed closed, as at 26, to prevent any spark jump from the lower end of the coil spring body 23 to the spark plug shell 27 during operation of the engine at normal temperature.

As in the previously described embodiment shown in FIGS. 2 and 5, the coil spring body is under compression when installed on the spark plug, as shown in FIG. 6.

When the engine temperature reaches a preselected number of degrees above normal operating temperature, the material of which tubular insulator 25 is made melts from the lower loop of the coil body and, that loop is then urged into electrical contact with the upper portion of spark plug shell 27. The plug is thus shorted out, warning the operator of the overheated condition of his engine.

Having described the invention with sufficient clarity to enable those familiar with this art to construct and use it, I claim:

1. A self-contained engine overheat protector attachable individually to spark plugs of an internal combustion engine and adapted to automatically short-circuit the spark plugs and cause them to cease firing after the plug shells reach a temperature which is a selected number of degrees above their respective normal operating temperatures, said protector comprising:

an elongated electrically conductive spring member having an integral terminal at its outer end for securing the member to the central electrode terminal of a spark plug, with the intermediate portion of the member extending alongside the insulated portion of the plug, and with the inner end of the spring member adjacent and urged toward a portion of the shell of the plug, which carries the ground electrode;

and a fusible insulator interposed between the inner end of the spring member and the adjacent portion of the spark plug shell to prevent the passage of electric current from one to the other during operation of the engine at normal temperature;

said insulator being made of a material having a melting temperature which is a selected number of degrees above the temperature of the spark plug shell when the engine is operating at normal temperature,

whereby if the engine overheats, conduction causes the spark plug shell temperature to rise to the melting point of the insulator, the insulator melts, the inner end of the spring member is spring pressed into electrical contact with the adjacent portion of the spark plug shell, and the spark plug is short-circuited.

2. The overheat protector described in claim 1 in which the spring member is of the leaf type.

3. The overheat protector described in claim 1 in which the spring member is of the coil type.

4. The overheat protector described in claim 3 in which the insulator is a coating of electrically non-conductive material which completely encases the inner end loop of the coiled spring member.

5. The overheat protector described in claim 3 in which the insulator is a tubular casing of electrically non-conductive material which completely encases the coil spring member from a point adjacent the terminal at its outer end inwardly to and including its extreme inner end.

6. A self-contained engine overheat protector attachable individually to spark plugs of an internal combustion engine and adapted to automatically short-circuit the spark plugs and cause them to cease firing after the plug shells reach a temperature which is a selected number of degrees above their respective normal operating temperatures, said protector comprising:

an elongated electrically conductive coil spring member, the inside coil diameter of which is sufficient to receive the insulated portion of a spark plug;

an integral eyelet shaped terminal at the outer end of the spring member for securing the entire member to the central electrode terminal of a spark plug, the length of the coil spring member being such that it is compressed when its terminal end is secured to a spark plug terminal and its inner end abuts the spark plug shell;

and a fusible insulator for the inner end of said coil member to prevent it from making electrical contact with the shell of the spark plug on which it is mounted during operation of the engine at normal temperature;

said insulator being made of a material having a melting temperature which is a selected number of degrees above the temperature of the spark plug shell when the engine is operating at normal temperature,

whereby if the engine overheats, conduction causes the spark plug shell temperature to rise to the melting point of the insulator, the insulator melts, the inner end of the spring member is spring pressed into electrical contact with the adjacent portion of the spark plug shell, and the spark plug is short-circuited.

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