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PROTECTING DEVICE FOR SPARK PLUGS

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Fig. 1.

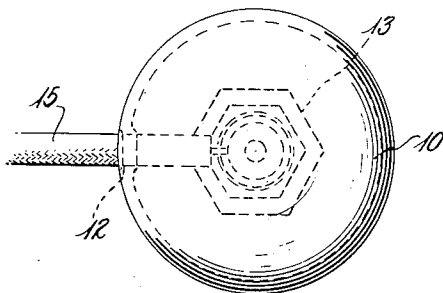


Fig. 3.

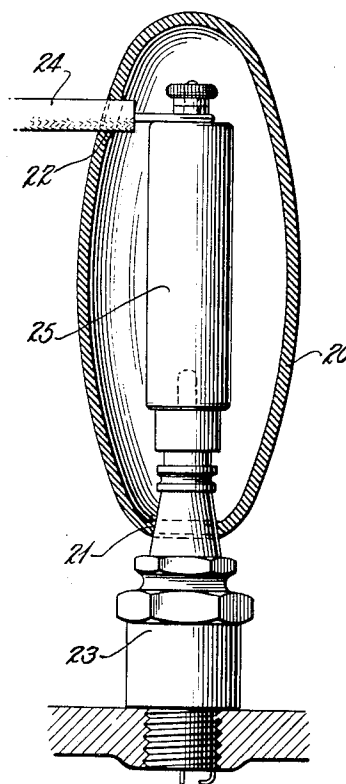
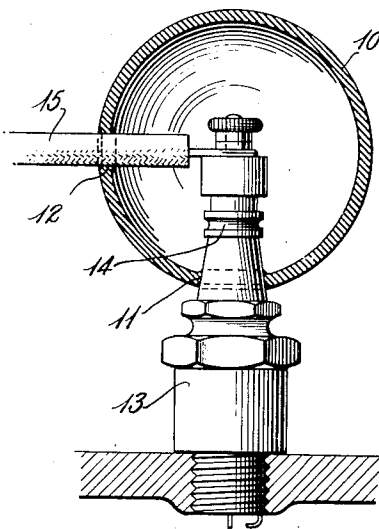


Fig. 2.



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PROTECTING DEVICE FOR SPARK PLUGS

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9 Claims. (Cl. 123—169)

This invention relates to the art of internal combustion engines and particularly to the protection of certain vital parts thereof whereby the efficiency of the engine is kept constant in so far as keeping the insulating power of a spark plug porcelain constant will do so and starting is facilitated in cold or wet weather.

In the past it has often been pointed out that the spark plugs are the very heart of the ordinary internal combustion engine and that its operation depends largely upon their characteristics and condition. This is not thoroughly appreciated by the layman because most spark plugs now on the market operate the engine once it is started and it does not occur to the layman that the condition of his spark plugs may be causing his engine to start only with difficulty, consume an excessive amount of fuel, lack power and even need frequent trips to the repair shop for the removal of carbon, the grinding of valves and the like. Yet all of these things may be caused by the failure of the spark plugs to properly and regularly ignite the charges within the combustion chambers of the engine.

Much of the cause for unsatisfactory operation of spark plugs arises on the outside of the engine where the spark plug extends outward to meet the high tension cable carrying the operating current. The connection between the cable and the plug is usually bare, and moisture or other foreign material that happens to collect upon the porcelain of the spark plug, eventually forms a conductor or by-pass through which all or part of the current, that should go into a spark inside of the engine, can leak off to the motor block or head and the effect of the spark is partially or all lost. Each bit of current that is so lost lessens the spark in the engine and this in turn lessens the thoroughness with which the fuel is burned and hence the power and efficiency of the engine is impaired.

In cold or wet weather, the condition is aggravated and engines often refuse to start at all or stop while they are running due to the leakage of the current through the moisture or foreign matter accumulated on the outside of the spark plug porcelain. Often a glow on the spark plug porcelains can actually be seen, especially if it is dark, thus visibly indicating the loss of current from its intended use.

Attempts have been made to remedy this highly undesirable condition, but thus far no remedy has been proposed that is sufficiently low in cost and yet effective enough in action to warrant general adoption. The present inventor has,

however, conceived a device that may be produced very economically and applied easily to practically any engine that uses a spark plug without the need of any skill or special tools. Furthermore the device is highly effective in protecting the spark plug and greatly facilitates starting and operating in bad weather as well as increasing the efficiency and power of the engine.

In a general way, the new device comprises a hollow ball of insulating material adapted to surround the outer end of the spark plug and the insulated end of the connecting cable and protect the connection between the cable and spark plug points from moisture and other foreign matter. The ball has two holes in it to permit the entrance of the end of the cable and the end of the spark plug and each of these holes is of such size that the part which passes through it fits snugly therein so that no foreign material can find its way into the interior of the ball thereby keeping the porcelain insulator clean. From the term ball it may be thought that the device is spherical. This is ordinarily but not necessarily so, for the ball may in some instances be of elongated form. For example, when oscillation suppressors are used between the end of the spark plug and the end of the cable to protect a radio from the oscillations arising from the spark plug it may be desirable to elongate the ball so that it can enclose the suppressor as well as the ends of the cable and spark plug.

The advantage to making the new protecting device in the form of a ball whether spherical or elongated is that because of its form it is simple and inexpensive to form and yet is an adequate protection to the spark plugs. Numerous more complicated forms of covers have been suggested, but such forms are more costly to manufacture and furnish at best no better protection since the device of the present invention forms practically a hermetic seal around the uninsulated parts, and does so in a simple, substantially trouble proof manner. Further details of the new device and the process of its manufacture will be apparent from the following detailed description of the preferred forms of the device and from the accompanying drawing.

In the drawing:

Figure 1 is a plan view of a spark plug with the new device applied thereto.

Figure 2 is a side elevation of the same spark plug and protector with the protector cut away to show the arrangement of parts therein.

Figure 3 is a side elevation of an elongated spark plug protector enclosing not only the end of

the spark plug and cable but also an oscillation suppressor. Part of the protector is cut away to show the parts inside.

As shown in Figures 1 and 2, the protecting device consists of a spherically shaped hollow ball 10 preferably of rubber, and having two holes 11 and 12 therein spaced about ninety degrees apart. The holes, however, may be spaced differently to accommodate a different type of spark plug and cable and this invention contemplates the placing of the holes in any desired position, such, for example, as 180° apart. Usually the wall of the ball will be about an eighth of an inch in thickness. One of the holes 11 is for the spark plug 15 porcelain and the other 12 is for the insulated cable that connects to the outer end of the plug. A spark plug 13 is shown with the porcelain 14 extending into the opening and connected to the end of the plug is a cable 15 extending outward through the other opening 12. The size of the openings are such that they are stretched somewhat by the spark plug or cable when they are in place therein so that a seal is formed that effectually prevents the entrance of moisture and other foreign matter.

In making the new protecting devices, care is taken to select material that is a good insulator and preferably resilient. Rubber has been found best suited to this purpose. The material selected is usually made into hollow balls by one of the known processes and the necessary openings thereafter cut either by drilling or stamping through the walls of the ball. When this process of manufacture is used care must be exercised to remove any moisture that remains in the device after it is finished. Quite often moisture is present inside of hollow rubber balls and such moisture will detract greatly from the beneficial effects of the new protecting device if allowed to remain.

Should it be desired to mold the new protecting device with the openings in it, this may also be done, although it has been found most expedient to mold a complete ball and thereafter cut the openings.

In Fig. 3 a modified form of the new device is shown which is adapted particularly for automobile engines on which oscillation suppressors are used to prevent the spark oscillations from interfering with a radio in the automobile. On such automobile engines a suppressor is usually connected to the outer end of each spark plug and an ignition cable connected to the opposite end of the suppressor. Hence in order to effectually protect the spark plug, the end of the cable, the suppressor and the end of the spark plug must all be covered.

To accomplish this, the new device may be made in an elongated form 20, and provided, as before, with two openings 21 and 22 for the outer end of the spark plug 23 and the end of cable 24. A suppressor 25 will then lie wholly within the protecting device between the cable and the spark plug.

To put one of the new protecting devices in use the spark plug cable is disconnected from the plug and passed into the opening provided for it in the ball and out through the opening provided for the end of the spark plug. Then after connecting the cable to the spark plug, or suppressor if suppressors are being used, the ball is slipped back over the end of the spark plug so as to completely cover all uninsulated parts. Obviously, as many protecting devices will be used as there are spark plugs.

While this invention has been described spe-

cifically as an improvement in the art of internal combustion engines and is particularly applicable to that art, it is conceivable that other electrical connections may be protected in a similar manner by applying the principles of this invention and it is, therefore, to be understood that such application of the principles of this invention are within the scope of this invention in so far as they fall within the scope of the appended claims.

What is claimed is:

1. A device for protecting a spark plug in an internal combustion engine that comprises a hollow ball of soft resilient insulating material of the nature of soft rubber adapted to surround the outer end of the spark plug and the end of the connecting cable and having two openings therein, one for the porcelain of the spark plug and the other for the cable, said openings being of such sizes that the spark plug porcelain and the cable will fit therein tightly enough to stretch the ball around the holes and thus provide an efficient seal to keep out dirt and moisture.

2. A device for protecting a spark plug in an internal combustion engine that comprises a hollow soft rubber ball adapted to surround the outer end of the spark plug and the end of the connecting cable and having two openings therein, one for the porcelain of the spark plug and the other for the cable, said openings being of such sizes that the spark plug porcelain and the cable will fit therein tightly enough to stretch the ball around the holes and thus provide an efficient seal to keep out dirt and moisture.

3. A device for protecting a spark plug in an internal combustion engine that comprises a substantially spherical hollow ball of soft resilient insulating material of the nature of soft rubber adapted to surround the outer end of the spark plug and the end of the connecting cable and having two openings therein, one for the porcelain of the spark plug and the other for the cable, said openings being of such sizes that the spark plug porcelain and the cable will fit therein tightly enough to stretch the ball around the holes and thus provide an efficient seal to keep out dirt and moisture.

4. A device for protecting a spark plug in an internal combustion engine that comprises a hollow soft rubber ball adapted to surround the outer end of the spark plug, an oscillation suppressor and the end of the connecting cable and having two openings therein, one for the porcelain of the spark plug and the other for the cable, said openings being of such sizes that the spark plug porcelain and the cable will fit therein tightly enough to stretch the ball around the holes and thus provide an efficient seal to keep out dirt and moisture.

5. A device for protecting a spark plug in an internal combustion engine that comprises an elongated hollow soft rubber ball adapted to surround the outer end of the spark plug, and the end of the connecting cable and having two openings therein, one for the porcelain of the spark plug and the other for the cable, said openings being of such sizes that the spark plug porcelain and the cable will fit therein tightly enough to stretch the ball around the holes and thus provide an efficient seal to keep out dirt and moisture.

6. A device for protecting a spark plug in an internal combustion engine that comprises an elongated hollow soft rubber ball adapted to surround the outer end of the spark plug, an oscillation suppressor and the end of the connecting cable and having two openings therein, one for

the porcelain of the spark plug and the other for the cable, said openings being of such sizes that the spark plug porcelain and the cable will fit therein tightly enough to stretch the ball around the holes and thus provide an efficient seal to keep out dirt and moisture.

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15
20

7. A device for protecting an electrical connection that comprises a hollow ball of soft resilient insulating material of the nature of soft rubber adapted to surround the connection and having a plurality of openings therein for the conductors leading to the connection, each of said openings being of such size that the conductor passing therethrough will fit in the opening tightly enough to stretch the ball around the hole and thus provide an efficient seal against dirt and moisture.

8. A device for protecting an electrical connection that comprises a hollow soft rubber ball adapted to surround the connection and having

a plurality of openings therein for the conductors leading to the connection, each of said openings being of such size that the conductor passing therethrough will fit in the opening tightly enough to stretch the ball around the hole and thus provide an efficient seal against dirt and moisture.

9. A device for protecting an electrical connection that comprises an elongated hollow ball of soft resilient insulating material of the nature of soft rubber adapted to surround the connection and having a plurality of openings therein for the conductors leading to the connection, each of said openings being of such size that the conductor passing therethrough will fit in the opening tightly enough to stretch the ball around the hole and thus provide an efficient seal against dirt and moisture.

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