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1,991,574

RADIO INTERFERENCE SUPPRESSOR

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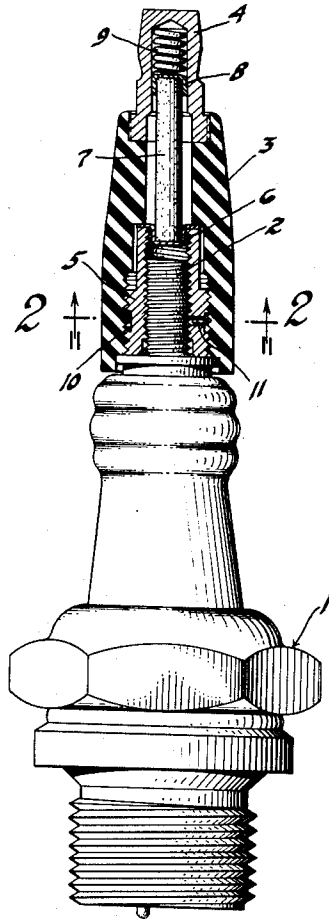


Fig. 1

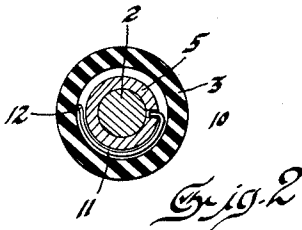


Fig. 2

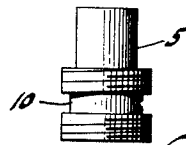


Fig. 3
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UNITED STATES PATENT OFFICE

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RADIO INTERFERENCE SUPPRESSOR

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6 Claims. (Cl. 201—76)

This invention relates to ignition apparatus for internal combustion engines and more particularly to an adaptor device for insertion in the ignition circuit for the purpose of reducing electrical disturbances set up when the engine is operated and which interfere with radio communication.

One of the objects of the invention is to provide a device, making use of a resistance to damp the train of electrical oscillations incident to current flow across the spark gap of a spark plug, which may be readily and quickly installed in the engine ignition system of a motor vehicle equipped with a radio receiving set without requiring a large expenditure for modifying the conventional ignition system or a substitution of parts.

Another object of the invention is to provide an improved structure of simplified design made up of a few low cost parts which may be easily assembled for application either as standard equipment on new cars or as an accessory when radio apparatus is to be added to cars already in use.

A further object is to provide an improved device wherein the assembled parts are held against accidental separation and in electrical contact with each other regardless of slight irregularities and inaccuracies of manufacture.

A further object is to provide a device in which the resistance element, which may be more or less fragile, is contained within the adaptor body so that it does not take any supporting load or stresses.

Other objects and advantages of the invention will be apparent from an inspection of the accompanying drawing illustrating a preferred, but not necessarily the only embodiment thereof, and wherein

Figure 1 is a vertical sectional view of an adaptor device applied to a spark plug.

Figure 2 is a sectional view taken on line 2—2 of Figure 1, and

Figure 3 is a detail view of one of the adaptor parts.

Referring to the drawing, the numeral 1 indicates a conventional spark plug to be inserted in the combustion chamber of an internal combustion engine and having at its upper end a binding post 2 which is shown as being screw threaded to receive a fastening nut, whereby the customary ignition wiring is attached to the plug. The adaptor forming the present subject matter is intended for attachment to the usual spark plug binding post. It involves an insulator body or hollow sleeve 3 preferably formed of phenolic condensation material, or the like, in the upper

end of which is embedded a terminal connector or binding post 4 shown in the drawing as being shaped to receive a snap-on connector associated with the ignition wire usually attached to the binding post 2, but which may be screw threaded or otherwise arranged for connection with such wiring. The opposite end of the insulator sleeve 3 is preferably screw threaded to receive a nut 5 exteriorly threaded for engagement with the threads of the insulator sleeve and interiorly threaded for engagement with the binding post 2. Interposed between the inner end of nut 5 and the shoulder or seat in the bore of the sleeve 3 is an outward flange of a stamping or cupped abutment 6 which receives one end of a stick or piece of carbon, or other suitable resistance material 7, the opposite end of which fits into a stamped cup 8 that affords the bearing for one end of a helical coil spring 9 seated at its opposite end against the end wall of the terminal 4. The elasticity of the spring 9 accommodates irregularities of manufacture, as well as relative expansion between the parts, and insures an electrical connection through the resistance element 7 between the terminal connector 4 and the terminal nut 5, while the resistance of the element 7 to current flow checks or damps the electrical impulses incident to the passage of a spark across the gap of the plug which ordinarily cause disturbance to radio reception.

The nut 5 is shown in Figure 3 as having an intermediate reduced portion or neck 10 with a radial opening at one side thereof to receive an turned end of C-shaped spring wire 11, whereby the spring is received within the clearance provided by the neck 10 and is carried by the nut. This spring wire may extend for more or less of a half turn according to conditions of use, its purpose being to exert an outward expansive force against the wall of the sleeve 3 to resist separation of the nut 5 from the sleeve. For this purpose, the free end of the wire is preferably bent outwardly, as at 12 to afford a more or less sharpened point, and the wire is extended in a direction opposite to the direction of relative movement between the nut and sleeve when the parts are being threaded together. For this reason the outward expansive tendency of the spring will offer little or no opposition to the assembly of the parts, but will effectively resist accidental separation since the reverse movement of the parts will tend to augment the natural expansive force of the spring in moving its free end into tight frictional contact with the wall of the sleeve.

From the above description, it will be seen that

there is provided a small sized unit of rugged construction, which can be readily attached to a spark plug when it is desired to eliminate radio interference and one in which the support of the resistance element in the main body is such that it is freed from the imposition of strains incident to installation and use. The invention of course is not limited to the exact details shown and any such modifications may be made as come within the scope of appended claims.

I claim:

1. For use in damping radio interference resulting from the operation of an engine ignition system, an adaptor device for insertion in the system, including an insulator body having a central bore shouldered intermediate its ends with the larger end provided with screw threads, a hollow metal shell projecting from the unthreaded end of the body to provide a terminal connection for a current conducting cable and having its hollow interior in alignment with the shouldered bore of the insulator body, a post of electrical oscillation retarding material enclosed within said bore and aligned hollow space of the shell, a spring seat interposed between the shell and one end of the post, a plate-like seat for the opposite end of the post, in engagement with the shoulder of the bore, a nut interiorly threaded for engagement with a spark plug binding post, and exteriorly threaded for engagement with the screw threaded end of the insulator body, said nut engaging the plate-like seat to clamp it tightly against said shoulder, and being provided with an annular peripheral groove, and a spring wire seated within the groove with one end anchored to the nut and its free end exerting an outward expanding force against the threads of the insulator body to resist outward turning movement of said nut.

2. In an accessory device for ready insertion between complementary detachable connector devices associated respectively with a spark plug and an ignition cable, a sleeve of insulating material carrying a terminal for connection with one of said devices and enclosing a self supporting radio interference suppressor element, means to retain the suppressor element within the sleeve and in electrical connection with the terminal, comprising a terminal adapted for connection with the other of said devices and screw threadedly engaged with said sleeve, a relieved portion associated with the interengaging screw threaded surfaces affording a clearance space between the terminal and sleeve, and a curved spring wire located within said clearance space with one end anchored relative to one of the threaded surfaces and its opposite end dragging on the other threaded surface to resist unthreading.

3. An accessory device for ready insertion between conventional cable connectors and spark plug terminals, including as a unitary assembly, a pair of spaced terminals adapted for detachable connection with a cable connector and a spark plug terminal respectively, a self-supporting resistance element for suppressing radio interference, interposed between said terminals, a spacer sleeve of insulating material joining the ter-

minals and surrounding said element, a threaded connection between said sleeve and one of the terminals adapted to be made subsequent to the insertion of the element within the sleeve, and a spring wire having one end anchored and frictionally engaged at its free end on one of the inter-engaging parts of the threaded connection.

4. An accessory device for ready insertion in an engine ignition circuit, including a sleeve of insulating material having a shouldered bore there-through, a connector to removably receive a binding post fitted inside the insulator sleeve with an end thereof in pressure maintaining relation with the interior shoulder of the bore, a seat element extending across the bore and clamped between said shoulder and the end of the connector, a stick of material suitable for suppressing radio interference enclosed within the bore and seated at one end on said seat element, a binding post projecting beyond said sleeve and having an interior recess to receive the opposite end of said stick and a spring device within said recess bearing on the adjacent end of the stick to hold the other end on its seat.

5. For use with a spark plug having a terminal connector adapted for detachable connection with a cable clip, an accessory device for ready insertion or removal as a unit assembly between the spark plug terminal connector and the cable clip, comprising as a sealed casing, means adapted for detachable connection with a spark plug terminal connector, a hollow body fastened at one end to said means, and a terminal fixed on the other end of said body for connection with a cable clip, and having a domed recess aligned with and constituting a continuation of the hollow space within the body, together with a self supporting stick of material suitable for damping electrical oscillations disturbing to radio communication, enclosed within said casing with one end seated on said means and the other end projected into said recess, and resilient means also positioned within the recess, to exert axial pressure on said stick.

6. For use with a spark plug having a terminal connector adapted for detachable connection with a cable clip, an accessory device for ready insertion or removal as a unit assembly between the spark plug terminal connector and the cable clip, comprising as a sealed casing, means adapted for detachable connection with a spark plug terminal connector, a hollow body fastened at one end to said means, and a terminal fixed on the other end of said body for connection with a cable clip, and having a domed recess aligned with and constituting a continuation of the hollow space within the body, together with a self supporting stick of material suitable for damping electrical oscillations disturbing to radio communication, enclosed within said casing, a contact cap on one end of said stick fixedly related to said means, a contact cap on the other end of the stick projecting into and fitting closely the recessed terminal and an expansion spring positioned within said recess to exert an axial pressure against the adjacent cap.

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