April 23, 1935. A. S. SIMSACK 1,999,118

SHIELDING SYSTEM FOR RADIORECEIVER EQUIPPED VEHICLES

Filed Aug. 30, 1934

Fig. 1.

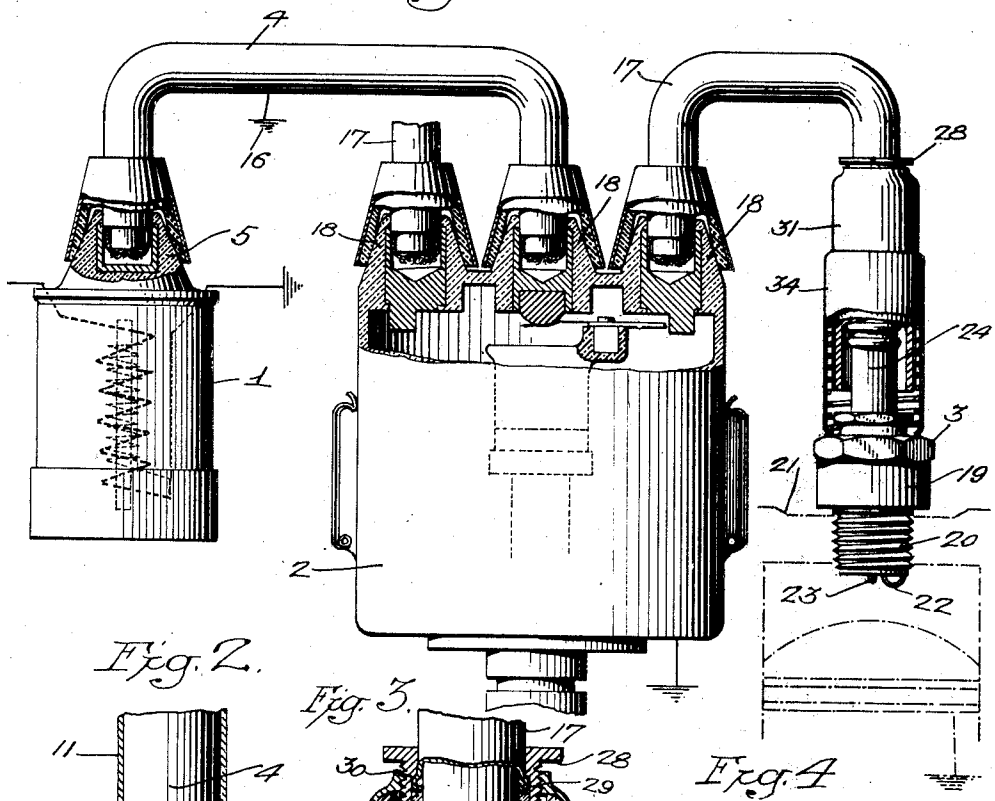


Fig. 2.

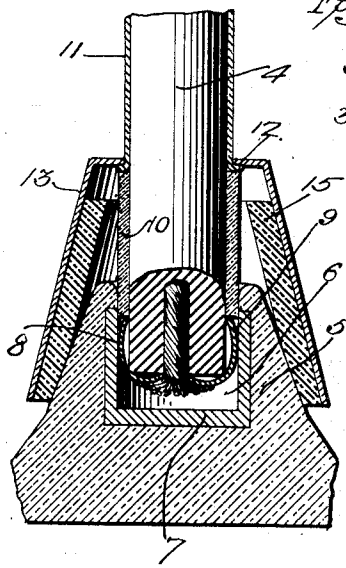


Fig. 3.

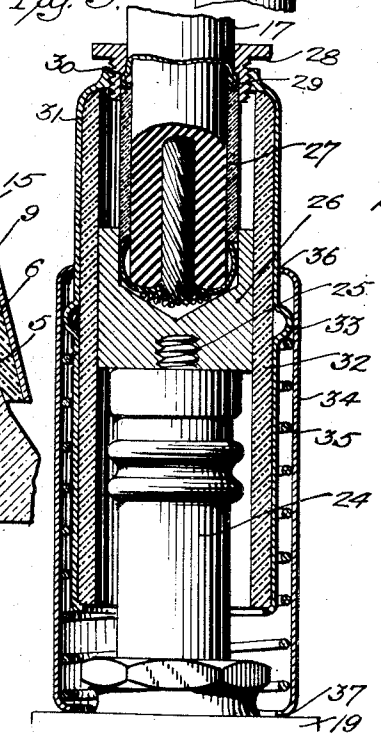
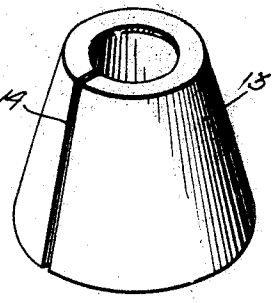


Fig. 4



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1,999,118

SHIELDING SYSTEM FOR RADIORECEIVER EQUIPPED VEHICLES

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5 Claims. (Cl. 123—148)

This invention relates to shielding systems for ignition elements of radio-receiver-equipped vehicles, the general object being to provide an improved system which functions to eliminate the disturbing effects which certain of the ignition elements have on a radio receiver. The invention is applicable to automobiles, aeroplanes, motor boats and other vehicles employing ignition systems.

An object of the invention is to provide a system comprising shielding devices for the essential ignition elements, which devices are simple in construction and may be readily applied to the ignition elements.

Another object of the invention is to provide a novel shielding and conductor attachment structure for each of the ignition elements.

A further object of the invention is to provide a shielding device for an ignition element comprising a cap which is adapted for removable attachment to the ignition element without the necessity of attaching devices.

A still further object of the invention is to provide a shielding device for a spark plug comprising a plurality of telescopic members which are adapted to cooperate with each other and with certain other elements to attain the desired object.

The invention may be more fully understood from the following detailed description of a preferred embodiment illustrated on the drawing.

In the drawing:

Fig. 1 is an elevational view showing the essential elements of an ignition system to which the novel shielding system is applied, the elements being shown partly in section to illustrate the details;

Fig. 2 is an enlarged section of one of the shielding devices;

Fig. 3 is an enlarged sectional view of another of the shielding devices; and

Fig. 4 is a perspective view of one of the shielding elements.

Referring to Fig. 1 of the drawing, there is shown the usual induction coil 1, distributor 2, and spark plug 3 commonly found in the ignition system of a vehicle which is propelled by an internal combustion engine. The complete ignition system comprises other elements but the disturbance effect upon a radio receiver carried by a vehicle or in the vicinity thereof is due largely to the ignition elements shown. This is due to the fact that the voltages and currents in the system, prior to their reaching the induction coil, are of such character that they have practically no disturbing effect on the radio receiver. The characteristics of the voltages and currents beyond the induction coil, however, are such as to set up disturbances, principally by radiation of disturbing energy. It is for this reason that the present invention is directed to these disturbing elements of the ignition system.

The induction coil 1 is generally of conventional form and is modified only at the top portion thereof in accordance with the present invention. As is customary, the top portion of this element, to which the high tension conductor 4 is attached, comprises a recessed conical insulating body 5. As shown more clearly in Fig. 2, there is seated within the recess 6 of the said body a metallic cup-shaped member 7 which is adapted to receive the end of conductor 4. The stranded conductive core of the insulated conductor has attached to its end a terminal member or clip 8 which is of conventional form. This terminal member comprises resilient or spring fingers 9 which extend about the end of the conductor insulation as shown. The cup-shaped member 7 is of such shape and dimension that it snugly receives the end of the conductor with the terminal member attached thereto so that the resilient fingers of the terminal member make good electrical contact with the inner wall of the cup-shaped member.

An insulating sleeve or bushing 10 extends slightly into the cup-shaped member 7 and engages the resilient fingers of the terminal member 8. Conductor 4 has an outer metallic sheath 11, the end of which is flared outward, as at 12, and is securely held between the upper end of sleeve 10 and the annular wall of the truncated conical member 13. The conductor extends through the apertured wall of member 13 as illustrated. This member is preferably formed of sheet metal and is slit longitudinally at 14 (see Fig. 4) to impart resiliency or expansibility to it. An insulating sleeve or bushing 15, which may be formed of rubber or other suitable material is positioned within member 13, as clearly illustrated. The cap-like device comprising members 13 and 15 is of such shape and dimension that it fits snugly and resiliently upon the conical body 5, as illustrated in Fig. 2. The inner surface of member 15 frictionally engages the outer surface of body 5, holding the device securely in place.

It will be seen that the electrically conductive member 13 forms a shield about the upper part of body 5 and the conductive elements therein, so as to effectively prevent radiation of disturbing

energy at that point. It is at that point that the disturbing energy would be radiated in the absence of the shielding device because the thickness of the insulation is diminishing to a minimum and the disturbing energy naturally seeks the path of least resistance. The shielding member 13 is electrically connected to the conductor sheath 11, which, in turn, is grounded in any suitable fashion as indicated at 16. Thus, there is provided a good electrical path from the shielding element to ground, through which path the energy which would otherwise be radiated, is conducted, thus preventing interference with the radio receiver.

Mechanically, the shielding and conductor attachment structure is strong and there is little possibility of the parts becoming detached. It naturally follows that the electrical connections which rely upon the mechanical parts cannot become loose. The frictional engagement of the terminal 8 with the inner wall of member 7 secures and maintains the end of the conductor in place. Added to this is the clamping of the conductor sheath between the sleeve 10 and member 13, which also insures firm connection of the conductor. The frictional engagement of member 15 with the outer surface of body 5 is, of course, important to the proper functioning of the device and serves further to maintain the parts in proper position. It will be understood, however, that the parts may be modified as to the details. For example, the cap-like shielding device may be arranged for threaded attachment to the body 5.

It will be seen that this device is simple and affords ready connection of the conductor to the induction coil. In connecting the conductor, it is simply necessary to slip the cap-like device over the conductor, then cut back the metallic sheathing to the proper point, after which the sleeve 10 may be placed over the exposed insulation and the terminal 8 may be conventionally applied. The end of the conductor may then be inserted in recess 6 and the cap lowered into place.

The distributor 2 is also of conventional construction excepting for the top portion comprising the conductor attachment portions 18. Each of these portions is generally similar to the structure employed at the upper part of the induction coil, as above described. The above description, therefore, applies to each of the conical conductor attachment portions of the distributor. The shielded conductor 4 and the shielded spark plug conductors 17 are thus effectively connected to the distributor and, at the same time, there is provided about each conductor attachment portion a shielding device which is connected electrically to the conductor sheath.

Each of the spark plugs 3 may take the form illustrated. As customary, each plug comprises a metallic shell 19 having a lower threaded portion 20 which is adapted for removable attachment to the cylinder head 21 of the internal combustion engine. As usual, the grounded shell 19 carries the outer electrode 22, while the central electrode 23 extends through insulating member 24.

As shown more clearly in Fig. 3, the insulating member 24 extends considerably above the uppermost part of shell 19 and the central electrode terminates at its upper end in the projecting threaded portion 25. In accordance with the present invention, a recessed electrically-conductive member 26 is adapted for threaded attachment to the portion 25 and is also adapted to receive the end of conductor 17 in its recessed portion. It will be seen that member 26 corresponds to the cup-shaped member 7 of the previously-described device and cooperates with its associated elements in substantially the same manner as does member 7. An insulating sleeve 27, corresponding to the sleeve 10, extends slightly into the recess of member 26 and engages the terminal member or clip carried at the end of conductor 17.

The upper end of sleeve 27 extends into a recessed nut or cap 28 and cooperates therewith to secure the flared end of the conductor sheath, as at 29. The end of the metallic sheath is securely held between the upper end of sleeve 27 and the annular shoulder 30 of cap 28.

The cap extends into and is threadedly attached to a metallic sleeve 31 which is of substantial length as shown. Within this sleeve, there is positioned an insulating sleeve or bushing 32. Member 26 fits snugly within sleeve 32 and is attached thereto in any suitable manner. This attachment may be effected simply by frictional tight fit of the parts or by adhesion or by positively locking the parts together. The metallic sleeve 31 is provided with an annular rib 33 which acts as a stop or abutment for the outer metallic sleeve 34 and the interposed helical spring 35. Sleeve 34 is telescopically related to sleeve 31, these two members being adapted for movement relative to one another. The upper end of sleeve 34 is turned inwardly as at 36 in order that it may abut against the annular rib 33 and limit the extended position of the telescopic members. The lower end of the sleeve 34 is also turned inwardly as at 37 and is adapted to retain the helical spring 35 and to electrically engage the grounded shell 19 of the spark plug. The helical spring is maintained in position between rib 33 and the lower inwardly-turned end 37 of sleeve 34. The function of this spring is to urge the telescopic members into extended position and thus maintain the device in adjusted position upon a spark plug.

By virtue of the telescopic construction of this cap-like device, it may be used on spark plugs of varying sizes and it is self-adjusting when applied to a plug so that it adapts itself properly thereto. The telescopic conductive sleeves 31 and 34 constitute a complete shield about the upper part of the plug, which shield is grounded by engagement with the grounded shell 19 of the spark plug. The conductor sheath is electrically connected to the grounded shielding elements through the metallic nut or cap 28. Thus, the portion of the spark plug which is prone to radiate disturbance energy is completely shielded, as is also the conductor leading to the plug. The path to ground offered by the shielding elements effectively prevents the radiation of disturbance energy. The conductive member 26 may be formed of a metallic alloy having relatively high ohmic resistance. This places a high impedance in the ignition circuit through the spark plug electrodes and causes the disturbance energy generated by the ignition system to more readily take the shielding path to ground.

The structure is strong mechanically and is characterized by tight mechanical and electrical joints throughout. Furthermore, the structure is simple and enables ready attachment of the conductor to the plug. In applying the device, it is simply necessary to place the cap 28 upon the conductor, after which the terminal clip may be applied. The metallic member 26, together with the telescopic sleeves are assembled on the plug in the obvious manner. The conductor is then

inserted in the recess of member 26 and the nut 28 is screwed into place. When it is desired to remove the conductor, it is merely necessary to remove the nut 28 and withdraw the conductor with the insulating sleeve 27 thereon.

From the above description, it will be seen that the invention provides a complete shielding system for that part of the ignition circuit which causes the disturbances. It will be seen that the shielding system comprises simple devices which may be readily applied to the ignition elements and which are connected to ground by good electrical and mechanical joints. It will be understood that the invention is not limited to the specific preferred form disclosed herein but is capable of various modifications and changes. The various conductive and insulating parts of the system may be formed of any suitable material where a particular material has not been specified or designated as preferable.

I claim:

1. In a shielding system for the ignition elements of a radio receiver-equipped vehicle, a shielding device comprising a plurality of telescopic members adapted for adjustable positioning upon an ignition element.

2. In a shielding system for the ignition elements of a radio receiver-equipped vehicle, a shielding device comprising a plurality of telescopic members adapted for adjustable positioning upon an ignition element, and means urging said members into extended position.

3. In a shielding system for the ignition elements of a radio receiver-equipped vehicle, a shielding device comprising a plurality of telescopic members adapted for adjustable positioning upon an ignition element, and a helical spring interposed between said members and urging them into extended position.

4. In a shielding system for the ignition elements of a radio receiver-equipped vehicle, a shielding device for a spark plug comprising a pair of telescopic members adapted to surround an ungrounded conductive portion of the plug, one of said members being adapted to electrically engage a grounded conductive portion of the plug, and means for urging said member into good electrical contact with said grounded portion of the plug.

5. A shielding and conductor attachment device for a spark plug, comprising a conductive member removably attachable to an electrode of the plug and having a recess for the reception of a conductor, an insulating sleeve seated in said recess and surrounding said conductor, an apertured recessed cap surrounding said conductor and seating an end of said sleeve, a pair of telescopic conductive members surrounding a portion of the plug and the aforesaid elements, one of said telescopic members being adapted to engage a grounded portion of the plug, the other of said telescopic members being adapted to removably receive said cap, and means urging said telescopic members into extended position.

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