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INTERFERENCE PREVENTING ARRANGEMENT FOR INTERNAL COMBUSTION ENGINES

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Fig. 1

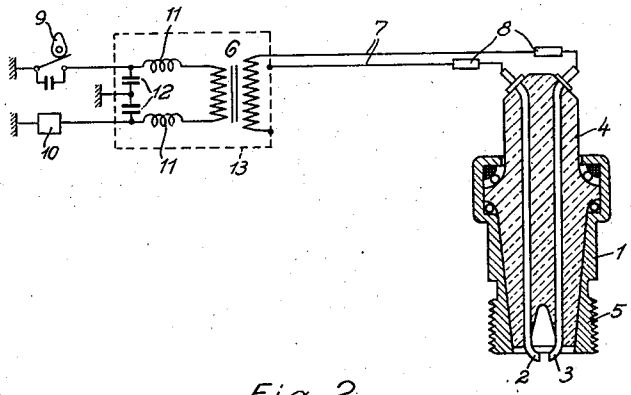
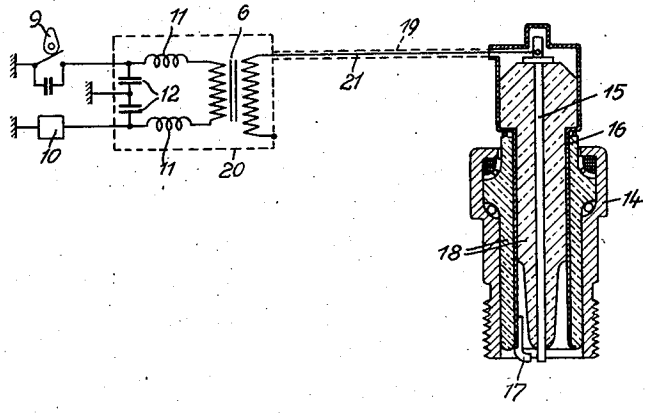


Fig. 2



Inventors
Johannes Dietrich and
Kurt Hagenhaus
by Knight Bros
Attorneys

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INTERFERENCE PREVENTING ARRANGEMENT FOR INTERNAL COMBUSTION ENGINES

Johannes Dietrich, Berlin-Charlottenburg, and Kurt Hagenhaus, Berlin-Siemensstadt, Germany, assignors to Siemens Apparate und Maschinen Gesellschaft mit beschränkter Haftung, Berlin, Germany, a corporation of Germany

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5 Claims. (Cl. 123—148)

The present invention relates to an arrangement for eliminating radio interferences caused by the electric ignition apparatus of internal combustion engines on vehicles.

In order to subdue radio disturbances in receiving sets on vehicles with an internal combustion engine, it is known to insert in the ignition circuits of the engine resistances or other attenuating means in the neighborhood of the spark gaps, or to shield the ignition apparatus to a great extent. However, an absolute elimination of interferences cannot be thereby attained, since the circuit from the spark plug is closed through the frame of the vehicle and the internal combustion engine, so that the interfering currents to a great extent pass through these parts and thus have an opportunity to spread. The connections from the shielding parts of the ignition apparatus and the like to the frame of the vehicle are often very long, the length depending upon the construction of the vehicle, and may also give rise to a spreading of interfering oscillations.

It is an object of the invention to improve the protection against radio interferences on vehicles over the above-mentioned arrangements, and, more in particular, to prevent disturbing oscillations from passing through and spreading from the frame and the engine or from grounding leads connected therewith. Other objects will become apparent from the following.

According to the invention the ignition circuit including the spark plugs, the sparking coil, the ignition cables and the like, is insulated against the frame or the body of the internal combustion engine of the vehicle, as well as against the other electric circuits on the vehicle. To this end, it is preferable to individually insulate the two electrodes of the spark plug from the outer metallic sleeve of the plug so that there is no connection of the electrodes with the body of the vehicle. In connecting such a double-pole spark plug with the sparking coil, a two-wire ignition cable is accordingly employed which may be provided with a protective sheath. The ignition cable may also be designed in the manner that one conductor forms a concentric sheath around the other so that an electric and magnetic field is created only within the cable between both conductors, but not so as to radiate outwardly. In the neighborhood of such ignition cables, radio receiving sets may be arranged without interferences being transmitted to the set, owing to the absence of interfering fields outside of the conductor. When using such conductors the outer conductor in the form of a sheath may also be employed for connecting the protective hoods of parts of the ignition apparatus, that is to say, particularly of the shielded spark plug, the shielded distributor and of the correspondingly designed sparking coil.

While thus the spreading of interfering currents over the frame of the vehicle and the body of the internal combustion engine is prevented by the complete insulation of the ignition apparatus, particularly of its high-voltage side, the spreading of the interfering oscillations from circuits connected to the ignition system may be prevented by the arrangement of filters in the current supply leads of the ignition system. A shielding between these circuits, furthermore, may be provided by arranging, for instance, a metallic screen between the windings of the sparking coil.

Further details of the invention will be apparent from the following description taken in connection with the accompanying drawing in which—

Fig. 1 shows diagrammatically an arrangement according to the invention with a two-wire ignition cable leading to the spark plug shown in cross-section, and

Fig. 2 is a modified form of the invention with an ignition cable whose conductors lie concentrically with respect to each other, the spark plug connected therewith being of a type other than shown in Fig. 1.

Referring to Fig. 1, 1 denotes a double-pole spark plug. Both spark plug electrodes 2 and 3, which form the spark gap, are completely insulated by the insulator 4 from the threaded metallic casing 5.

The spark plug is connected to the sparking coil 6 by means of a two-wire ignition cable 7 in which are inserted resistors or reactors 8 in the neighborhood of the spark plug in order to prevent the spreading of interfering oscillations set up in the spark gap over the ignition cable 7. Corresponding attenuation means may also be arranged in the ignition cable on the distributor which for the sake of simplicity is not shown.

In the primary circuit of the sparking coil 6 is arranged in a known manner the breaking contact 9 in series with the primary winding of the sparking coil and with the power source 10. The spreading of interfering high-frequency oscillations over the primary circuit is prevented by means of a filter consisting of reactors 11 and capacitors 12 which are connected at one side to the ground, i. e. to the body of the vehicle. This

measure is essential in order to prevent a spreading of the interfering oscillations over the other circuits connected to the battery 10, as, for instance, the lighting circuits in the case of vehicles.

The sparking coil 6 is preferably provided with a protective casing 13 which may be connected to one side of the high-voltage winding. In this case it is preferable to insulate the casing from the frame of the vehicle and of the internal combustion engine, as a completely insulated arrangement of the ignition apparatus can only be of advantage.

In the embodiment shown in Fig. 2, the spark plug 14 consists of a central electrode 15 surrounded by an insulatedly arranged sleeve 16 which at the same time serves as a supply lead to the electrode 17. The electrodes 15 and 17 as well as the sleeve 16 are insulated from the outer metallic casing 14 of the spark plug. To this end, two concentric insulating sleeves 18 are provided consisting preferably of ceramic material. The sleeve 16 extends also over the terminal for the central electrode 15 and is connected to the casing 20 of the sparking coil through the outer conductor 19 of the concentric ignition cable designed in the form of a sheath, whereas the inner conductor 21 of the cable is connected to the pole of the sparking coil at the high-voltage side not connected to the sheath. In the primary circuit of the ignition apparatus are arranged the same devices for preventing the spreading of interfering oscillations over the other circuits and are designated by the same reference numerals as in Fig. 1. Also in this case it is preferable to prevent any passage of the interfering oscillations to the frame of the vehicle or the body of the internal combustion engine by insulating both conductors of the ignition cable as well as by insulating the protective hoods of the sparking coil and the other devices, for instance, the distributor not shown in the drawing.

What is claimed is:

1. In an arrangement for preventing the ignition system of internal combustion engines from causing radio disturbances, comprising an ignition transformer having a primary winding, and a secondary winding insulated from said primary winding, a bipolar cable having its conductors connected with said secondary winding and insulated from said engine, a spark plug having a casing mounted on said engine and bipolar electrodes insulated from said casing and connected with said conductors, an energizing circuit connected with said primary winding, said circuit including a ground connection between said primary winding and said engine, shunt means for blocking high frequency currents from passing through said ground connection, and a conductive casing enclosing said transformer and said shunt means, said casing being insulated from said engine.

2. In an arrangement for preventing the ignition system of internal combustion engines from causing radio disturbances, comprising an ignition transformer having a primary winding and a secondary winding insulated from said primary winding, a bipolar cable having its conductors connected with said secondary winding and insulated from said engine, a spark plug having a casing mounted on said engine and bipolar electrodes insulated from said casing and connected with said conductors, an energizing circuit connected with said primary winding, said circuit including a ground connection between said primary winding and said engine, high-frequency shunt means connected across said primary winding, and a conductive casing enclosing said transformer and said shunt means, said casing being insulated from said engine and connected with one of said secondary conductors.

3. In an arrangement for preventing the ignition system of internal combustion engines from causing radio disturbances, comprising an ignition transformer having a primary winding and a secondary winding insulated from said primary winding, a bipolar cable having its conductors connected with said secondary winding and insulated from said engine, a spark plug having a casing mounted on said engine and bipolar electrodes insulated from said casing and connected with said conductors, impedances for attenuating high-frequency oscillations, said impedances being connected with said conductors near said electrodes, an energizing circuit connected with said primary winding, said circuit including a ground connection between said primary winding and said engine, shunt means for blocking high frequency currents from passing through said ground connection, and a conductive casing enclosing said transformer and said shunt means, said casing being insulated from said engine and connected with one pole of said secondary winding.

4. In an arrangement for preventing the ignition system of internal combustion engines from causing radio disturbances, comprising an ignition transformer having a primary winding, a secondary winding insulated from said primary winding, and a metallic screen between said primary and secondary windings, a spark plug having a casing mounted on said engine and bipolar electrodes insulated from said casing, a secondary circuit connected with said secondary winding and including said electrodes, a primary circuit connected with said primary winding, said primary circuit having a ground connection leading to said engine, shunt means for blocking high frequency currents from passing through said ground connection, and conductive shielding means enclosing said secondary circuit, said transformer and said shunt means, said shielding means being insulated from said engine and connected with said secondary winding.

5. In an arrangement for preventing the ignition system of internal combustion engines from causing radio disturbances, comprising an ignition transformer having a primary winding, a secondary winding insulated from said primary winding, and a static screen between said primary and secondary windings, a spark plug having a casing mounted on said engine and concentric electrodes insulated from said casing, a cable having two concentric conductors insulated from said engine and connected between said electrodes and said secondary winding, an energizing circuit connected with said primary winding, said circuit including a ground connection between said primary winding and said engine, shunt means for blocking high frequency currents from passing through said ground connection, and a conductive casing enclosing said transformer and said shunt means, said casing being connected with the outer of said concentric conductors and insulated from said engine.

JOHANNES DIETRICH.
KURT HAGENHAUS.