

**July 1, 1930.**

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**1,769,150**

## ELECTRICAL STARTING AND IGNITION SYSTEM

Filed May 10, 1928

2 Sheets-Sheet 1

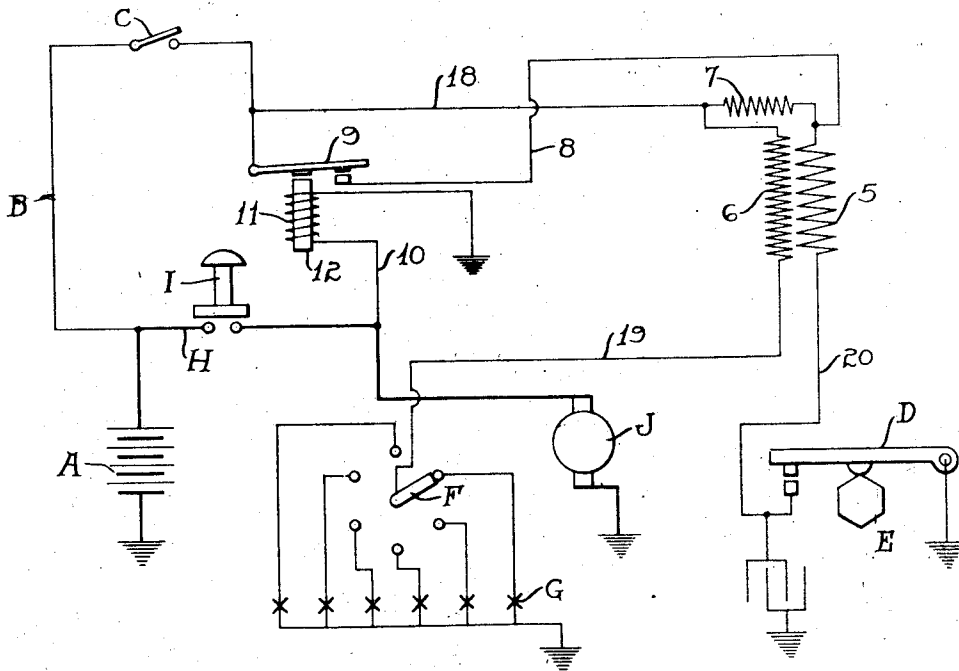


**Fig. 1**

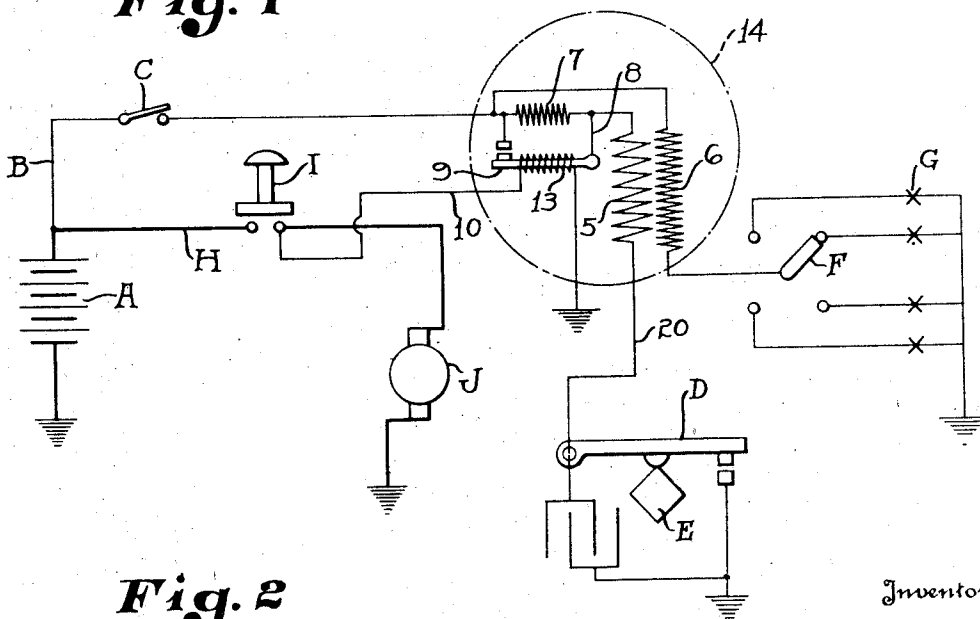


**Fig. 2**

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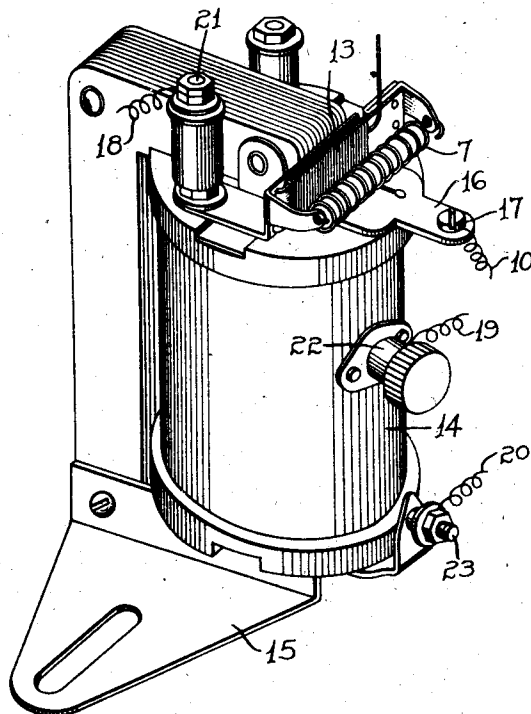
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*Fig. 3*



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## UNITED STATES PATENT OFFICE

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ELECTRICAL STARTING AND IGNITION SYSTEM

Application filed May 10, 1928. Serial No. 276,805.

The present invention relates to an electrical starting and ignition system for use in connection with internal combustion engines. As disclosed in this application, my invention embodies the novel features shown and described in my earlier application Serial No. 192,546, filed May 19, 1927, and constitutes, in part, a continuation of said earlier application.

10 The object of this invention is to provide novel and improved means for producing a hot spark when starting the engine. Ignition coils are commonly designed for the capacity of the electrical system while the motor is running, which is approximately eight volts in the so-called six volt systems, when the battery is fully charged; but when the starter is being operated to start the engine, it causes a heavy drain on the battery, which results in a considerable voltage drop, generally to about one-half of the normal voltage. With the present device, the resistance unit in the primary circuit of the ignition system is automatically cut out when the starting motor is engaged to crank the engine, so that the ignition coil operates to produce hot sparks from a very low primary voltage, and after the engine is started and the generator increases the voltage, the resistance is automatically inserted again in the primary ignition circuit by disengaging or opening the circuit between the battery and starting motor.

25 The specific details of the invention, together with its mode of operation, will be more fully explained in connection with the accompanying drawings, which illustrated the same in connection with a well known type of ignition system.

In the drawings:—

40 Figure 1 is a wiring diagram illustrating one embodiment of the invention.

Fig. 2 is a similar diagram illustrating another embodiment of the invention.

45 Fig. 3 is a perspective view illustrating a unit which may be used in connection with a common type of ignition system for carrying out the invention.

50 As illustrated in Figs. 1 and 2, the ignition system in connection with which the invention may be used, comprises the usual bat-

tery A having a line B leading therefrom through an ignition switch C and adapted to be connected to a circuit breaker D, which is actuated by a cam E, and to a distributor arm F, which leads successively to spark plugs G. A starter circuit, also connected to the battery A, leads through a line H and starter switch I to the starting motor J which is adapted to be operated to start the engine.

The system to which my invention relates comprises an ignition coil, preferably including a primary 5 and a secondary 6. The primary 5 is connected through a resistance element 7 and wire 18 to the battery line B, the other end of the primary being connected through a line 20 to the interrupter D. The secondary coil 6 is connected at one end to the line 18 and at the other end through the line 19 to the distributor F. A shunt 8 extends across the resistance 7 in the circuit through the primary coil 5 and includes a normally open switch 9. A line 10 is connected with the starter circuit H, parallel with the starting motor J and includes a high resistance magnetic coil, which is adapted to close the switch 9, whenever the circuit through the starting motor is closed.

In the system illustrated in Fig. 1, the high resistance magnetic coil in the line 10, as indicated at 11, is wound about a core 12, of which the switch 9 constitutes the armature. When the switch I is closed to operate the starting motor J, sufficient current will pass through the coil 11 to close the switch 9, without any material lessening of the current through the starting motor. When the engine is running normally, sufficient current for ignition is supplied through the resistance element 7. When the starter is being operated, the switch 9 closes to cut out the resistance 7, thus furnishing a hot spark in spite of the drop in voltage.

In the system as illustrated in Fig. 2, the high resistance magnetic coil in the line 10 is indicated at 13 and is wound about the switch 9. Thus, the core of the coil 13 is itself the movable element which is moved to close the shunt circuit through the line 8 when the starter is operating. The form of the in-

vention illustrated in Fig. 2 involves the same principles as that illustrated in Fig. 1.

The invention is especially adapted to be carried out in connection with any ignition system now in common use. For this purpose, the ignition coil and the parts associated therewith may be manufactured and sold as a unit, which may be arranged as illustrated in Fig. 3, and which is adapted to be substituted for the ignition coil in the existing system. If the existing system contains a resistance element in series with the ignition coil, that is likewise removed.

The parts of this unit and the connections therefor, as represented in the drawings, are designated by reference numerals, while the remaining parts of the system, which are common to practically all ignition systems now in use, are designated by letters.

In this unit, as illustrated in Fig. 3, the ignition coil, which in the present instance includes a primary and a secondary, is enclosed within an insulating housing 14 supported by a base 15, by means of which it may be mounted on any suitable part of the motor vehicle. One end of the magnetic coil 13 may be grounded to the frame and the other end is connected to a conductor element 16 which is mounted on the housing and provided with a terminal 17 to which the line 10 may be connected. One end of the primary coil is electrically connected through the resistance element 7 to a terminal 21, to which the line 18 may be connected. The other end of the primary coil is connected to a terminal 23, to which the line 20 may be connected. One end of the secondary coil is connected to the terminal 21 and the other end is connected to a terminal 22, to which the line 19 may be connected. Thus, it will be seen that the invention is adapted to be installed in connection with any existing ignition system with the least possible trouble.

From the foregoing description, it will be understood that the device constituting the subject matter of the invention is simple in its construction, yet will operate efficiently for the purpose described. It may be used in connection with any engine having a battery and a starting motor which is adapted to be connected thereto by a switch.

A device embodying the essential features of the invention may be manufactured and sold as a unit, which may be installed in any starting and ignition system now in use without altering the latter in any way except to connect said unit.

In any system having a resistance coil, the latter may be taken off and my device substituted as a unit therefor; and in any system which does not have a resistance coil, my device may be installed, with the resistance between the battery and the primary coil, which resistance is cut out during the operation of starting the motor.

It is obvious that the essential features of the invention may be embodied in various ways other than those shown and described, and it is my intention, therefore, to include all such possible modifications within the scope of the appended claims.

What I claim is:

1. A device adapted to be embodied as a unit in an ignition system, and comprising an ignition coil with primary and secondary windings, means for mounting the same including a housing, a resistance mounted on said housing, means for connecting said primary winding and said resistance in series in an ignition circuit, means mounted on said housing for shunting out said resistance but normally inoperative, and means for connecting said shunting means to a starter circuit in such a manner as to be rendered operative when the starter circuit is closed.

2. A device adapted to be embodied as a unit in an ignition system, and comprising a primary coil and a secondary coil, means for mounting the same including a housing, means for connecting the coils to a battery and to the ignition devices respectively, a resistance mounted on said housing between the primary coil and the battery connection, a shunt across said resistance and having a normally open switch, and an electromagnet supported by said housing and operable, when energized, to close said switch, and terminals for connecting said electromagnet to a starter circuit.

3. A device adapted to be embodied as a unit in an ignition system, and comprising a primary coil and secondary coil, means for mounting the same including a housing, a resistance mounted on said housing, means for connecting the primary coil and the resistance in series with a battery and timer, means for connecting the secondary coil to a distributor, means on said housing for shunting out said resistance but normally inoperative, and means for connecting said shunting means to a starter circuit in such a manner as to be rendered operative when the starter circuit is closed.

4. An ignition coil comprising a primary winding, a magnetically operated switch having a resistance element connected across its contacts, one end of the resistance being connected directly to one end of the primary winding, and an electro-magnet for operating the switch, said magnet having a fixed armature constituting one of said contacts and a movable core carrying the other contact, said armature and core constituting a path of low resistance to short circuit said resistance element when the magnet is energized.

In testimony whereof, I have hereunto signed my name to this specification.

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