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CURRENT CONTROLLER FOR ENGINE IGNITION SYSTEMS

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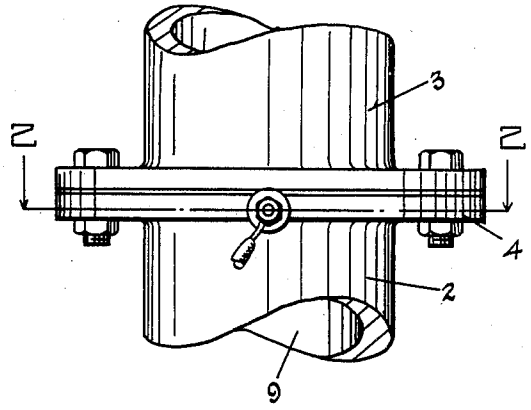


Fig 1

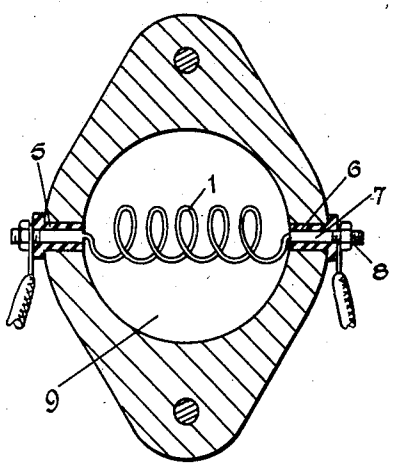


Fig 2

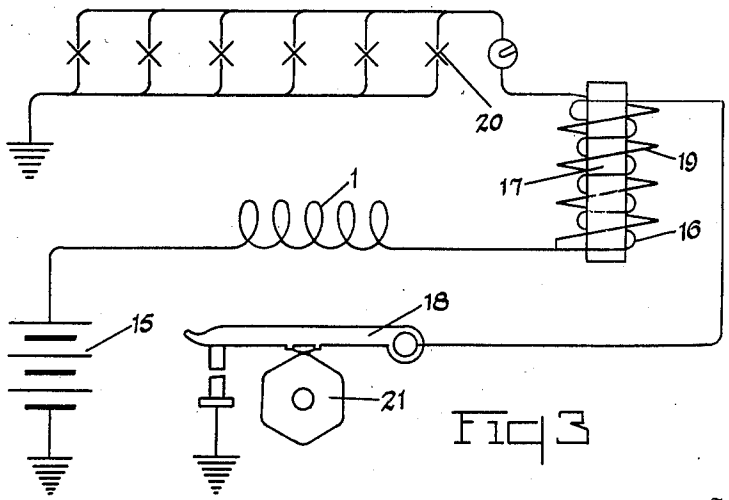


Fig 3

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UNITED STATES PATENT OFFICE

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CURRENT CONTROLLER FOR ENGINE-IGNITION SYSTEMS

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My invention has for its object to provide a means for varying the resistance of a primary circuit of an engine ignition system whereby the resistance of the primary circuit during the idling of the engine will be increased and the resistance will be reduced when the engine is speeded up. Thus, the invention provides a means which operates to prevent the consumption of an unnecessary quantity of current in the operation of the ignition system, means being provided for reducing the current quantity when the engine is idling or operating slowly, the quantity, however, being ample to build up the magnetic flux in the magnetic circuit of the induction coil of the ignition system during the extended periods in which the circuit is closed through the cam operated circuit closer. Means is provided for reducing the resistance of the circuit when the engine is operating at a normal running speed during which time the contact periods of the circuit closer are shorter, and, consequently, a larger current operates during the shorter closure periods that occur when the engine is operating at a higher speed. The current consumed is thereby greatly reduced, which means a saving of the storage batteries commonly used in ignition circuits.

The invention may be contained in structures that vary in their details and, to illustrate a practical application of the invention, I have selected a means for controlling the flow of current in the primary circuit of the ignition system as an example of the various embodiments of my invention and shall describe it hereinafter. The structure and system containing the invention and selected for purposes of illustration are shown in the accompanying drawings.

Fig. 1 illustrates a side view of a part of the intake pipe of the intake manifold of an internal combustion engine. Fig. 2 is a view of a section taken on the plane of the line 2—2 indicated in Fig. 1. Fig. 3 is a diagrammatic illustration of a system in which the device for regulating the flow of the current in the primary circuit is connected.

In the practical application of the invention, a resistance element, such as a metal wire, having a coefficient of resistance that increases as the temperature of the wire increases, is utilized and, consequently, as the current heats the wire its resistance is increased, which operates to reduce the current until there is a counterbalancing of the inherent effect of the current on the metal resistance element and the heat produced by the current. The resistance element is connected in the primary circuit of the ignition system and is supported where it will be cooled according to the speed of the engine. When the speed of the engine increases, the resistance element will be cooled and the resistance will be reduced. As the speed of the engine decreases, the reverse effect will take place.

The resistance element 1 is, preferably, made in the form of a coiled wire to give it considerable surface area and is located in the passageway through which a gas may be directed at a rate that varies according to the speed of the engine. As shown in Fig. 1, the resistance element is located at the point of connection of the carburetor with the intake pipe of the manifold. These parts are indicated by the numbers 2 and 3, respectively. The mixture of fuel and air, which is substantially at atmospheric temperature, is directed through the passageway formed through the carburetor into the manifold of the engine. The flange 4 used for connecting the carburetor to the engine pipe of the manifold of the engine is recessed as at 5 to receive a bushing 6 of insulating material within which is located a rod or stud 7 that forms the binding post 8. The ends of the resistance wire 1 are connected to the binding posts 8. It extends across the passageway 9 through which the mixture of fuel and air passes into the engine.

The rate of flow of the fuel mixture will depend upon the speed of the engine and, while the current flow through the wire 1 operates to heat the wire, the flow of the gas through the passageway 9 will reduce the temperature of the wire 1 by reason of the contact of the large quantity of the gas with the wire which conveys away the heat. The cooling effect of the gas will be quite in pro-

portion to the speed of the engine which, by its suction, draws the gas through the passageway 9 and into the engine.

In Fig. 3 is shown a diagram of the connection of the variable resistance wire in the primary circuit of an engine ignition system. The parts illustrated in Fig. 3 are shown conventionally to indicate the parts of the ignition circuit. The variable resistance coil 1 may be connected to the battery 15 and to the primary coil 16 of the induction coil 17. The circuit is completed through the circuit closer 18 to the ground or to the battery 15. The secondary coil 19 of the induction coil 17 is connected to the spark plugs 20, the circuit of the secondary coil 19 being completed through the ground in the manner well known in the art. The circuit closer 18 is operated by the cam 21 which is connected to the cam shaft of the engine.

When, therefore, the engine is idling, the flow of gas through the passageway 9 is relatively slow and the wire 1 has opportunity to become heated by the electric current that flows therethrough. This, however, increases the resistance of the wire which keeps the current down materially. When the speed of the engine increases, the flow of gas operates to cool the wire which causes a decrease in the resistance of the wire, and, consequently, an increased drop of potential in the primary coil at a time when the speed of the engine shortens the closure periods of the electric current which is advantageous in that it increases the current quantity that is induced in the secondary circuit that would otherwise be produced, and produces more efficient ignition.

I claim:

1. In an ignition system for internal combustion engines, a primary circuit and a secondary circuit, a circuit closer connected to the ignition system, a resistance element, whose resistance increases as its temperature is increased, connected in the primary circuit, and means operated by the engine for directing a fluid against the resistance element to vary the resistance of the resistance element.

2. In an ignition system for internal combustion engines, a primary circuit and a secondary circuit, a circuit closer connected to the ignition system, a resistance element, whose resistance increases as its temperature is increased, connected in the primary circuit, and means operated by the engine for directing a fluid against the resistance element at a rate that varies according to the speed of the engine.

3. In an ignition system for internal combustion engines, a primary circuit and a secondary circuit, a circuit closer connected to the ignition system, a resistance element, whose resistance increases as its temperature is increased, connected in the primary circuit, and means for supporting the resistance element in the passageway of the intake of the internal combustion engine for varying the temperature of the resistance element as the flow in the intake of the engine is varied.

4. In an ignition system for internal combustion engines, an ignition circuit, a circuit closer located in the ignition circuit, a resistance element whose resistance increases as its temperature is increased located in the ignition circuit, and means for directing a fluid against the resistance element substantially in accordance with the rate of rotation of the crank shaft of the engine.

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

MARION MALLORY.