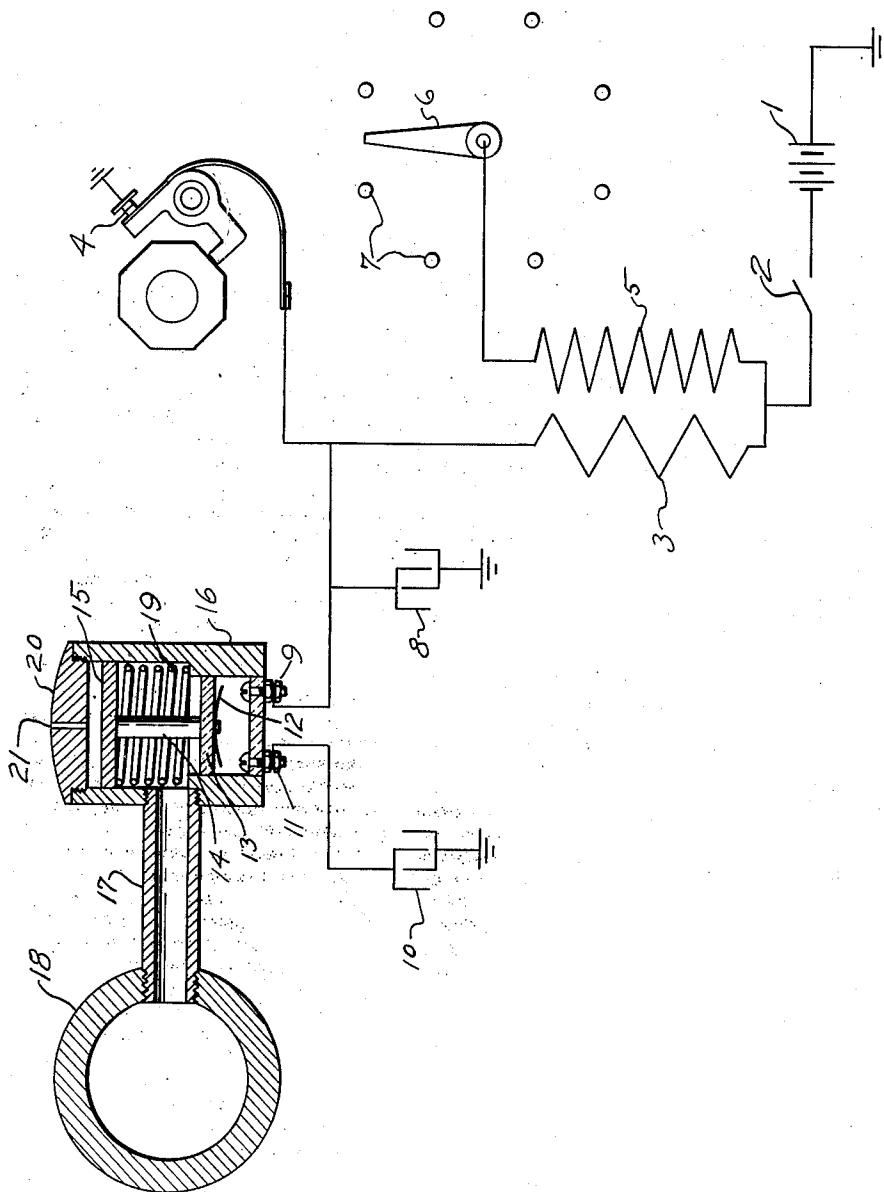


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CONDENSER CONTROL DEVICE

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CONDENSER CONTROL DEVICE

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5 Claims. (Cl. 123—148)

This invention relates to a condenser control device adapted primarily for use in automobile ignition systems. The main purpose of a condenser in an ignition system is to reduce sparking at the contact points and thereby increase their life. The condenser is charged when the circuit breaker opens and is then immediately discharged through the primary winding of the coil. When the circuit first opens, the condenser is charged with a surge, due to the collapse of the magnetic lines within the core of the coil when the primary circuit is interrupted. The collapse of these magnetic lines induces current into the primary circuit in addition to the battery current. At low speeds, when the contact dwell is comparatively long, the core of the coil is completely magnetized. Consequently, the surge in the primary circuit will have charged the condenser to its capacity when the circuit breaker opens, and the condenser will then immediately discharge with high pressure back through the primary winding of the coil. This causes a more sudden collapse of the magnetic lines, which, in turn, induces more current into the secondary.

There is, however, a limit to the amount of capacitance that can be placed in the primary circuit. The greater the capacity of the condenser, the longer it takes to charge it. Speed is therefore a limiting factor in the size of the condenser. At high speeds, with a comparatively high capacitance in the primary circuit, there is insufficient time for the coil to build up, because of the short closure period of the circuit breaker.

Most manufacturers, therefore, use a condenser of comparatively low capacity, to insure proper operation at high speed. When this is done, there will of course be more contact flashing at the lower speeds, unless a coil of low inductance is used, and such a coil produces sparks of low intensity. If too much condenser capacity is used, the ignition is liable to miss at high speeds, unless a high capacity coil is used.

With the above facts in mind, the object of the present invention is to obtain a more perfect condenser balance for a variable speed engine by providing the ignition circuit with two condensers, one of which may be automatically cut out when the throttle is wide open or nearly so and the automobile consequently travelling at high speed.

The invention will be more specifically described in connection with the accompanying drawing, which represents a wiring diagram of an automobile ignition system having one em-

bodiment of the invention associated therewith.

As illustrated in the drawing, the primary ignition circuit is from the battery 1 through the ignition switch 2 and primary winding 3 to the circuit breaker 4, and thence back through ground to the battery. The secondary circuit is through the ignition switch 2 and secondary winding 5, thence to the rotor 6 of the distributor, which wipes the successive terminals 7 connected to the respective spark plugs.

A condenser 8 has a constant connection with the primary circuit and is also connected to an insulated terminal 9. A second condenser 10 is constantly connected to an insulated terminal 11. The two terminals 9 and 11 are adapted to be connected by a bridge piece 12 which is secured to a plunger 13 of insulating material. The plunger 13 is connected by a stem 14 to a piston 15, which is reciprocable within a cylindrical casing 16. The casing 16 is connected by a tube 17 to the intake manifold 18 of the engine. A spring 19 within the casing 16 urges the piston 15 and bridge piece 12 away from the condenser terminals 9 and 11, and the vacuum of the intake manifold 18 tends to move the piston and bridge piece in the opposite direction. The head 20 of the casing is provided with a vent 21 to permit free movement of the piston within the casing.

From the foregoing description, it will be understood that when the engine is operating at its maximum speed, that is, with the throttle wide open, there will not be sufficient vacuum in the intake manifold to close the connection between the condenser terminals 9 and 11 and only the condenser 8 will be connected with the ignition circuit, as shown in the drawing. As the throttle is moved toward closed position, however, there will be a point at which the vacuum of the intake manifold will overcome the resistance of the spring 19 and the second condenser 10 will be also connected to the ignition circuit.

Various tests have shown that the average automobile is operated about 90% of the time at part throttle and about 10% of the time with open throttle. Since the automobile cannot travel at maximum speed with the throttle partly closed, it is feasible to utilize the manifold vacuum, as herein illustrated, to increase the condenser capacity at light loads. This will increase the life of the contact points by adding more capacitance to the circuit for 90% of the operating time. It is obvious, however, that other means may be used, within the scope of the invention, to vary the capacitance in accordance

with the conditions under which the automobile is operated.

I claim:

- 5 1. The combination with the intake manifold of an internal combustion engine, and an ignition system comprising a primary circuit and a secondary circuit, of means operable by a predetermined degree of vacuum in the intake manifold to increase the capacitance of said primary circuit.
- 10 2. The combination with the intake manifold of an internal combustion engine, and an ignition system comprising a primary circuit, a secondary circuit, and a condenser constantly connected to the primary circuit, of a second condenser having
- 15 a terminal which is normally insulated when the engine is not in operation, and means operable by a predetermined degree of vacuum in the intake manifold to connect said terminal to the primary circuit.
- 20 3. The combination with the intake manifold of an internal combustion engine, and an ignition system comprising a primary circuit and a sec-

ondary circuit, of a casing secured to said manifold and having a wall of insulating material, two condensers each having a terminal in said wall, one only of said terminals being constantly connected to said primary circuit, and a plunger within said casing operable by a predetermined degree of vacuum in the intake manifold to bridge the space between said terminals.

4. The combination with the intake manifold of an internal combustion engine and an ignition system comprising a primary circuit normally including a condenser unit, of a second condenser, and means operable only upon the occurrence of a predetermined degree of vacuum in the intake manifold to operatively connect the second condenser to said circuit.

5. An ignition system for automobile engines comprising a primary circuit normally including a condenser unit, a second condenser unit normally disconnected from the circuit, and a switch operable by vacuum to operatively connect the second condenser unit to said circuit.

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