Dec. 1, 1931. J. JOHNSTONE ET AL 1,833,996

DIAPHRAGM OPERATIVE SWITCH

Filed Sept. 24, 1925

Fig. 1

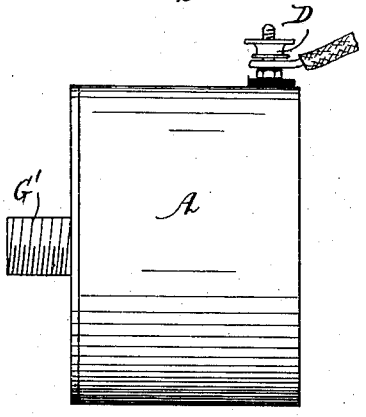


Fig. 2

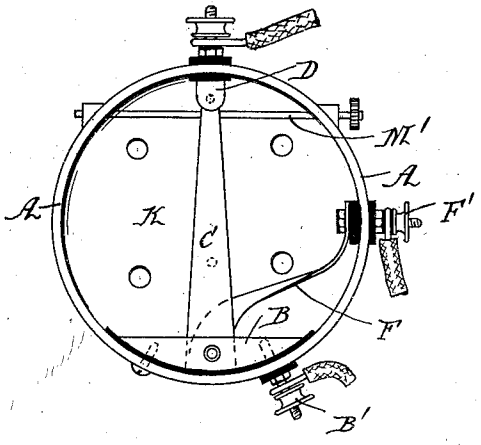


Fig. 3

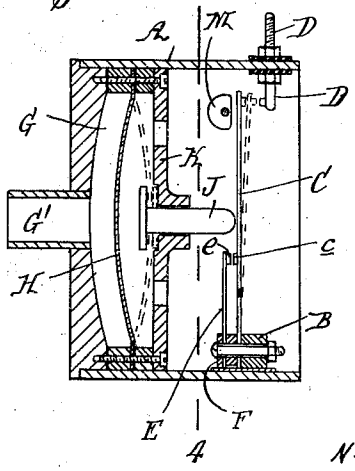
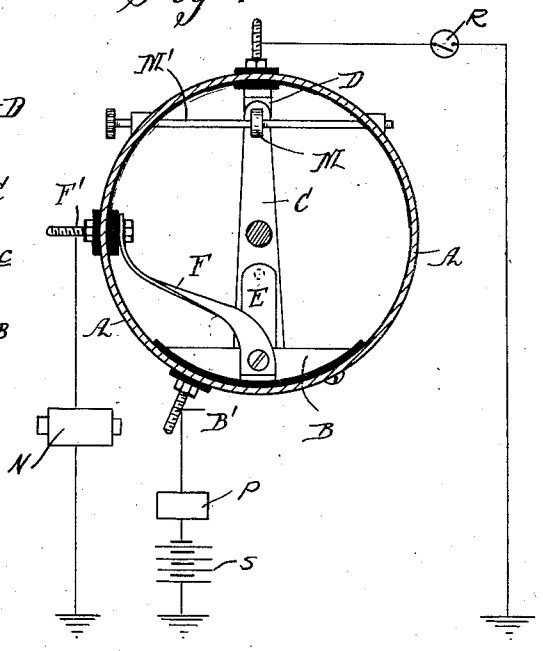


Fig. 4



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UNITED STATES PATENT OFFICE

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DIAPHRAGM OPERATIVE SWITCH

Application filed September 24, 1925, Serial No. 58,427, and in New Zealand August 24, 1925.

This invention has been devised for use in conjunction with all those classes of oil engines, particularly those used in motor propelled vehicles, in which a storage battery spark ignition system is employed, and in which also a lubricating system is embodied and operated by a pressure pump driven by the engine.

The purpose of the invention is to provide for the said spark ignition system being automatically controlled by the lubricating pressure system so that when the pressure stops, as by the stopping of the engine or fault in the working of the system, the ignition system is rendered inoperative. This control will therefore stop the engine should the supply of oil in the lubricating system fall short, or the oil pressure system cease to function properly. It will also cause the ignition system to be automatically broken on the stopping of the engine to prevent waste of battery current should the ordinary ignition switch be left closed.

The means devised provide for an automatic circuit controlling device interposed in the ignition system, and in the starting system of the engine, and which device is designed, when the engine is at rest, for the circuit through the ignition and starting systems being completed so that when such circuit is closed through the closing of the starter switch, the engine may be started in the usual way. Combined with this circuit control device is a device adapted to be acted upon by the pressure of the oil in the lubricating system and to break such ignition-starting circuit and close the ignition circuit and keep it closed so long as the pressure remains. The ordinary control switch having also been closed, the ignition system will be in order to continue the running of the engine.

The means devised for carrying out the invention are illustrated in the accompanying drawings, in which:—

Figure 1 is a side elevation, and

Figure 2 a back end elevation thereof.

Figure 3 is a longitudinal vertical section, and

Figure 4 a cross sectional elevation on the line 4—4 of Figure 3 and looking to the right of such figure, and showing also in diagram the manner of connecting the appliance for use.

In carrying out the invention a cylindrical casing A, of approved material, is provided. In one end of the casing a contact block B is fixed, such block being suitably insulated from the casing and is provided with a terminal B′ also insulated from the casing by which connection may be made with the ignition coil P circuit of the engine. Fixed at one end to the block, so as to make electric contact therewith, is a spring contact arm C the free end of which is positioned adjacent a contact terminal D affixed to the casing and insulated therefrom. This terminal is connected with the usual control switch R of the engine ignition circuit. The spring arm C is so set that its normal tendency is to be free of contact with the terminal D. It is however adapted to be moved to engage such terminal and thereby place the ignition coil P in operative circuit with the control switch R and battery S, in order that, such switch being closed, the ignition circuit of the engine is complete. When the arm moves away from the contact terminal D by its natural springiness, such circuit is broken.

Attached to the inner end of the block B and suitably insulated therefrom, is a second spring arm E that extends for a distance parallel with the arm C. Contact points *c* and *e* are fixed on the adjacent faces of these respective arms and make contact when the arm C is in its normal position.

The arm E is connected by a metallic strip F with a terminal F′ attached to the casing and suitably insulated therefrom to which the starting motor N of the engine is connected. Thus when the arm C is in the normal position shown by the full lines in Figure 3, circuit is established between the starting motor and the ignition coils P and battery S, in order that, the switch R of the said motor being closed, the engine may be started in the usual way. When the arm C is moved to make contact with the terminal D, this contact with C and E is broken, as shown by the dotted lines in Figure 3.

The actuating device is contained within the other end of the casing A and it comprises a chamber G that is connected direct through the tube G' to the oil pumping system so that oil pressure is obtained and maintained within it through the working of such system. This chamber has a flexible diaphragm H extending across its area, the normal condition of which is to bend inwards into the chamber. The working pressure of the system however is adapted to force this diaphragm outwards. A pusher rod J of insulating material is mounted in a partition K upon the inner end of the chamber and is designed to be engaged by the diaphragm H and moved longitudinally outward through such cover, when the diaphragm is distended. The outer end of this rod engages the spring contact arm C of the control device and forces such away from the second arm and into contact with the terminal D to close the ignition circuit, when the rod J itself is forced out. When, however, the pressure on the diaphragm H is removed from the rod, the spring contact arm is free to move in and to break contact in the ignition circuit and restore the starting ignition circuit.

It will thus be seen that the normal position of the control is such as to permit of the engine being started by its usual starting means comprising battery S and motor N with part of battery current sent through the ignition coil P, and then when the pressure is thus obtained in its pumping system, for the starter circuit being broken and the ordinary ignition circuit (battery S, switch R and ignition coil P) completed to continue the running of the engine. When the oil pressure falls, however, such ignition circuit will be automatically broken.

To provide for the ignition circuit being mechanically closed to allow for the hand starting of the engine, a cam M made of insulated material is mounted on a spindle M' adjacent to the spring contact arm, by the turning of which, the said arm C may be moved to cut out the starter, and to close the ignition circuit.

We claim:—

A device of the class described comprising a casing having a partition fixed therein and cooperating with a wall of the casing to provide a chamber for receiving fluid under pressure, said partition having a central bearing, a diaphragm in the chamber, a rod slidable in the bearing and adapted to engage the diaphragm when the diaphragm is subjected to pressure and moves outwardly, a contact terminal in the casing, a spring contact arm carried by the casing and normally disengaged from the contact, a second spring arm contact in the casing adapted to contact with the first named arm when the latter is in normal position, said first named arm being movable into contact with the contact terminal when the rod is moved outwardly upon outward movement of the diaphragm, and manually controlled means for moving the first named contact arm into contact with the contact terminal.

In testimony whereof, we affix our signatures.

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