Dec. 27, 1927. 1,654,220

J. JOHNSTONE ET AL

MEANS FOR AUTOMATICALLY CONTROLLING THE IGNITION SYSTEMS OF INTERNAL COMBUSTION ENGINES

Filed Aug. 3, 1926

Fig. 1

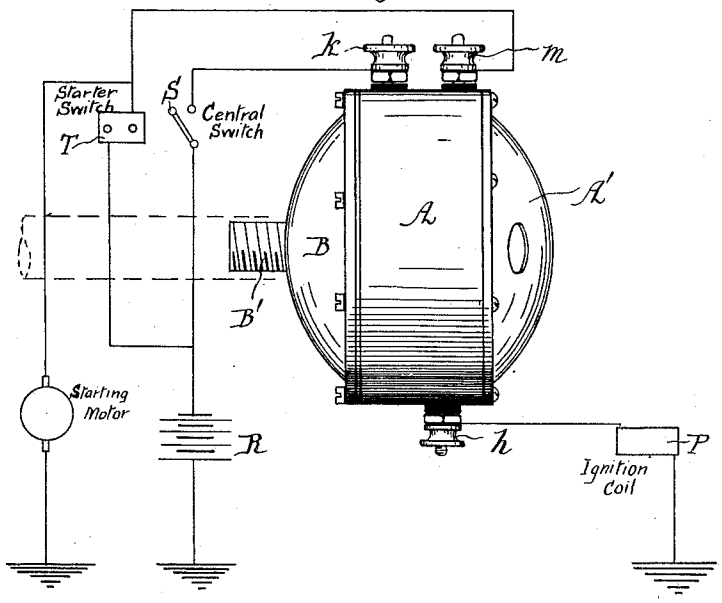


Fig. 2

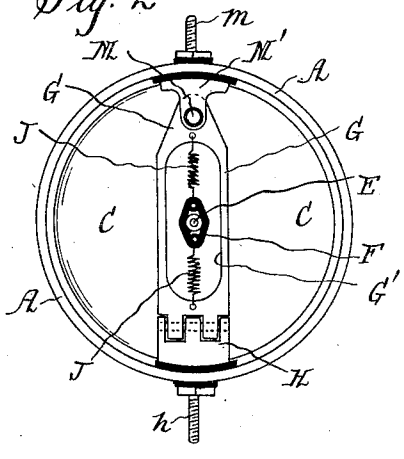
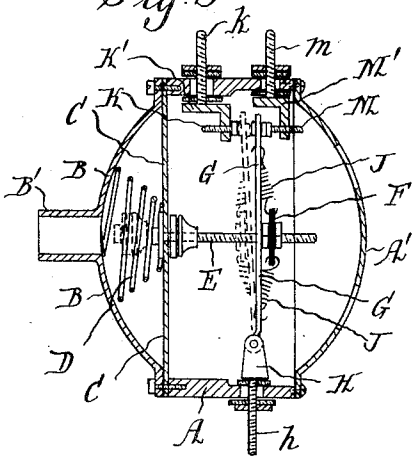


Fig. 3



Inventors
John Johnstone,
Percy J. Allen, and
Albert E. Allen
By Marks & Clerk
Attys.

Patented Dec. 27, 1927. 1,654,220

UNITED STATES PATENT OFFICE.

JOHN JOHNSTONE, PERCY JOHN ALLEN, AND ALBERT EDWARD ALLEN, OF GISBORNE, NEW ZEALAND.

MEANS FOR AUTOMATICALLY CONTROLLING THE IGNITION SYSTEMS OF INTERNAL-COMBUSTION ENGINES.

Application filed August 3, 1926. Serial No. 126,876.

This invention has been devised with the object of providing improved means for combination with an internal combustion engine having a pump operated lubricating system and an electric ignition system, for the purpose of controlling such ignition system automatically to such an extent that the electric circuit of the ignition system can only be complete while the lubricating pumping system is in operation. Any failure of the pumping system, as through the depletion of oil or break down in its mechanism, will therefore result in the breaking of the ignition system circuit, and the consequent stopping of the engine.

It has previously been proposed to employ the pressure of the pumping system to actuate a contact making device interposed in the ignition circuit and which device is made so that the contact is made and maintained while the pressure continues but is automatically broken when the pressure ceases.

In the present invention the apparatus employed is designed to be controlled by the suction of the pump of the lubricating system directed upon a diaphragm to move it from a normal position and in such movement to operate special switch appliances to complete the circuit of the ordinary electric ignition system of the engine employing an ignition coil and control switch. This apparatus also is so made that in the normal position of the said diaphragm, the switch appliances close the circuit through the usual electric starter system of the engine employing a starter switch with the ignition coil, so that provision is thus made for the engine being started in its usual manner and then immediately on starting, for the usual running ignition circuit being closed. Then, should a break down in the pumping system occur to destroy its suction, the running circuit is broken and the engine stopped and the starter circuit restored. This also occurs when the engine is stopped in any ordinary manner.

The invention consists in a special construction of apparatus that has been designed for carrying out these functions. This apparatus is shown in the accompanying drawings, in which:—

Figure 1 is a side elevation thereof showing also the arrangement of the circuits in which it is combined.

Figure 2 is a rear elevation thereof with the cover removed.

Figure 3 is a sectional side elevation of the device.

In this invention a cylindrical casing A, of approved material, is provided and such casing has a dome shaped cover B fitted hermetically upon one end which cover is formed with a central passage B′ that is adapted to be connected by pipe connection with any approved part of the suction side of the pumping system with which the device is combined. This connection therefore is designed to exhaust the air through this end of the cylinder.

Secured between the cylinder end and this cover is a diaphragm C of flexible material, such as leather, that extends across the whole cross sectional area of the cylinder. This diaphragm is so made that normally it retains a position remote from the cylinder end, and if required may be assisted in retaining such position by placing a compression spring D in between it and the cylinder end. It is however adapted to be forced back into the cover (which is made of the dome shape shown to allow of this movement) by atmospheric pressure acting on its other side when the air is exhausted from the cylinder end in the manner described. Thus while such cylinder end remains exhausted of air, the diaphragm is retained in its drawn in position, but when the exhaustion suction ceases, the diaphragm by its natural resiliency or with the aid of the spring D, is moved back to its normal position.

Fixed to the centre of the diaphragm C is the long stem E, and on the back end of this stem a crosshead F is fixed. This crosshead is made of any approved form of insulator material, as fibre, vulcanite or the like.

A metallic arm G is provided to extend across the main part of the cylinder's diameter and such arm, at one end, is hinged to a block H fixed to the bottom of the cylinder wall, so that its other end is free and is capable of swinging in the line of the cylinder's length. The said arm is made of flat shape and is formed with a wide slot G′ extending through most of its length, and through this slot the stem E and its crosshead F pass freely. Such crosshead is then connected, at each end, to the arm G at the corresponding end of the slot, by means of

the light helical spring J. The cross head is so adjusted in position upon the stem that when the diaphragm is in its normal position the springs will exert a pulling strain on the arm to draw it rearward and when the diaphragm moves in, the crosshead will pass through to the other side of the arm so that the springs will then act to draw the arm inward.

The free end of this arm is positioned between two contact pins K and M that are adjustably mounted in metallic brackets, K′ and M′ respectively, fixed to the inside of the casing A so that the arm is drawn into close contact with one or other of these pins as it is moved in the necessary direction by the movements of the diaphragm before described, the springs J serving to make such contact a positive one.

Each of the metallic blocks H, K′ and M′ is attached to a terminal *h*, *k* and *m* respectively, positioned on the outside of the casing, such block and terminal in each case being electrically insulated from the casing and from one another in any approved manner if the casing is formed of metal, although the casing itself may be made of an insulator material, if so desired, when the use of special insulation would not be required.

The movements of the arm G therefore are such as to make it an electric switch connecting the terminal *h* with either of the terminals *k* or *m*, according to the position assumed by the diaphragm and whether suction is acting thereon or not.

The manner of arranging this device within the ordinary ignition circuit and starter-ignition circuit of the engine is shown in Figure 1. This provides for the terminal *h* being connected to the ignition coil P, for the terminal *k* to be connected with the battery R through the usual manual control switch S, and for the terminal *m* to be connected through the starter switch T with the battery.

Thus when the diaphragm is in its normal position and the arm G makes contact with the pin M, the closing of the starter switch T will complete the battery circuit through the ignition coil P to allow the engine to start. Then as the engine turns over and the lubricating pump produces its suction, the diaphragm C moves in and the arm G is drawn over to contact with the terminal K and thus complete the circuit (the switch S being closed) through the ordinary ignition circuit of the car. This circuit is then maintained so long as the pump continues to carry out its functions, or so long as the engine is kept running.

The rear end of the casing A is covered in by a cover A′ made with apertures therein to allow of free access of air to the outside of the diaphragm C.

We claim:—

1. In an internal combustion engine having the ordinary electric ignition circuit through an ignition coil and a control switch, and also an electric starter ignition circuit through the said ignition coil and a starter switch, and also having a force feed lubricating system, the combination with such ignition controls and with the pump of the lubricating system, of a cylindrical casing at one end connected to the suction side of such pump and at the other end open to the atmosphere, a flexible diaphragm fixed across the casing between its ends, a hinged metallic contact arm electrically connected with the ignition coil end of the said controls, two contact pins disposed on respectively opposite sides of the free end of such arm, one of which is electrically connected to the control switch of the ordinary ignition circuit while the other is connected to the starter switch of the starter circuit, and means connecting the said diaphragm to the contact arm so constructed and arranged that in the normal position of the diaphragm the arm is held in contact with the latter of the said contact pins and when acted upon by the pump suction is held in contact with the former of the said pins, substantially as and for the purposes specified.

2. In the means for combination with an internal combustion engine described in claim 1, connections between the said hinged contact arm and the said diaphragm formed by a stem fixed to the centre of the diaphragm and extending at right angles therewith, a crosshead affixed to the outer end of the stem, which stem and crosshead are designed to pass through a slot with which the contact arm is formed, and a helical spring extending between each end of the crosshead and the arm, at the corresponding end of the slot, substantially as specified.

In testimony whereof, we affix our signatures.

JOHN JOHNSTONE.
P. J. ALLEN.
A. E. ALLEN.