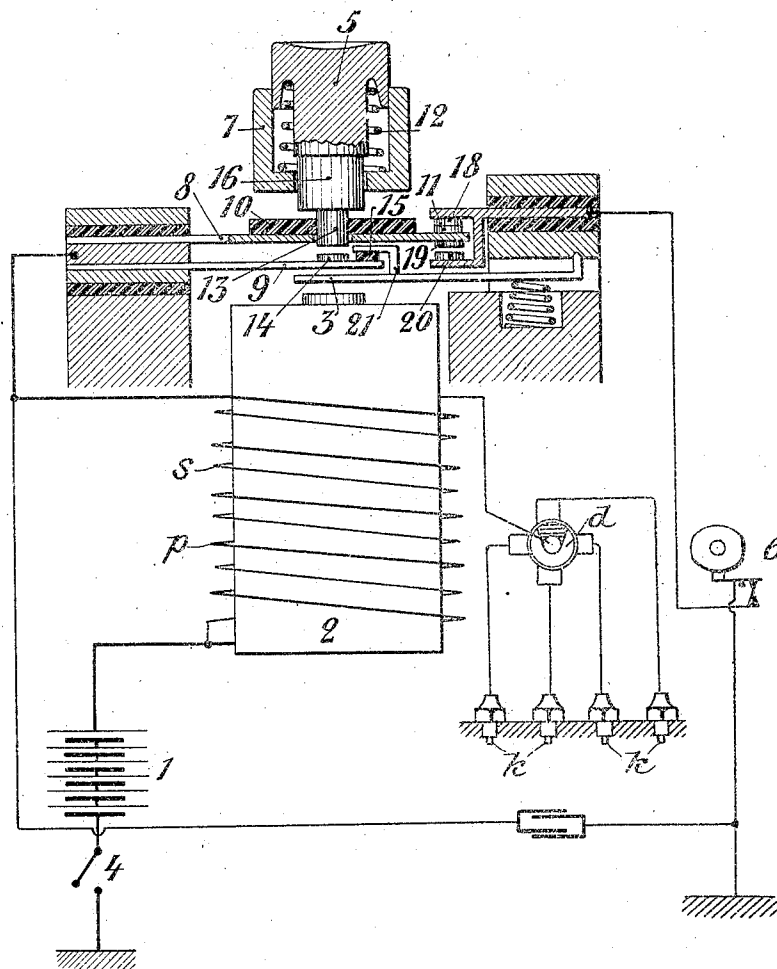


F. KRATZ.
CIRCUIT CONTROLLING DEVICE FOR ELECTRIC IGNITION SYSTEMS.
APPLICATION FILED OCT. 26, 1911.

1,063,556.

Patented June 3, 1913.



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UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

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Application filed October 26, 1911. Serial No. 656,858.

To all whom it may concern:

Be it known that I, FRANZ KRATZ, a subject of the Emperor of Germany, and resident of Schlossstrasse 59, Stuttgart, Germany, have invented certain new and useful Improvements in Circuit-Controlling Devices for Electric Ignition Systems: and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a circuit controlling device, preferably of the push-button type, adapted for use in connection with a certain system of apparatus for starting multiple cylinder combustion engines by the ignition of an ignitable gas remaining in one of the cylinders of the engine, which system is illustrated and described in my co-pending application for United States Letters Patent Serial No. 650,248, filed September 19, 1911. That system, and the device covered by the present application, constitute improvements upon a prior system and device in which there is a mechanical interrupter and an ignition coil having a vibratory armature, in connection with a circuit controlling device, by means of which it is possible to close the circuit of the primary winding of the ignition coil through a path in parallel with a second path likewise adapted to close the primary circuit of the ignition coil, which second path contains and is controlled by the mechanical interrupter. With such an arrangement, the ignition coil with its vibratory armature may be used for starting ignition by the manipulation of the said circuit closing device, and after the engine is started, ignition is brought about by the mechanical interrupter. To that end, the said circuit closing device, which is of the push-button type, embodies means whereby the complete depression of the push-button will open the circuit of the interrupter. The necessity of this becomes apparent when it is considered that in such an arrangement, if the engine stops with the mechanical interrupter in such position that the circuit is open at the interrupter, then the completion of the primary circuit of the ignition coil through the second path by means of the circuit controlling device will have the effect to cause the vibratory armature to operate and set

up sparks in the proper cylinder; but if the engine stops with the mechanical interrupter closed, then the current flowing through the primary winding of the ignition coil will draw up its armature and prevent its vibratory action, so that in such case it is necessary, by the further depression of the push-button, to open the interrupter circuit before the vibratory armature will act. The prior system and device above referred to, however, has the defect that if the push-button is held in the depressed position, so that the circuit of the interrupter remains open, then the action of the vibratory armature is continuous, and as soon as the distributor, in its rotation, establishes connection with the next succeeding cylinder, sparking is set up therein and premature ignition may occur. The present invention overcomes this difficulty by providing a double-contact in the interrupter circuit, and controlled by the push-button, of such a character that the movement of depression of the push-button first opens the interrupter circuit and, in the completely depressed position, closes it again. The result is that if the engine stops with the mechanical interrupter closed, it is possible by depression of the push-button to open the circuit of the interrupter and bring the vibratory armature of the ignition coil into action, as in the prior system above referred to, but the further depression of the push-button, which will naturally be effected by the chauffeur, will again close the interrupter circuit, so that it is practically impossible for the push-button to be held in such a position as to keep the interrupter circuit open long enough to bring about the undesirable premature ignition referred to.

The accompanying drawing illustrates the preferred form of the invention, in conjunction with a diagrammatic illustration of the remaining parts of an ignition system to which it may be applied.

One terminal of the battery 1 is grounded through the switch 4, while the other terminal is connected to the primary winding *p* of the ignition coil 2 which has a vibratory armature 3, the circuit of the primary winding being completed through the spring plate 8, contacts 11 and 18, mechanical interrupter 6, and the ground, the circuit being grounded as usual, on the engine frame. The second parallel path for the completion

of the circuit of the primary winding *p* includes the spring plate 9 carrying the contact 14, the plunger 13 of the push-button 5, and the engine frame to which the socket 7 of the push-button is electrically connected. The push-button 5 is guided in the stationary socket 7 and its inward movement is opposed by the spring 12. The reduced contact-portion 13 of the push-button passes through an aperture in the spring plate 8, and the portion 16 of the plunger, being of larger diameter, is guided in an appropriate aperture in the bottom of the socket 7. The spring plate 8 carries a block of insulation 10 which prevents the push-button from coming into electrical contact with the spring plate and which is adapted to be engaged and moved by the underface of the plunger portion 16 when the push-button is fully depressed. The vibratory armature 3 is adapted to actuate the spring plate 9 through a hooked piece 21 carried by the armature and insulated from the spring plate 9 by the block of insulation 15. All these parts correspond to the device of the prior system above referred to, but the present invention differs therefrom in the addition of the second contact 20 electrically connected to the interrupter circuit and co-operating with the contact button 19 on the underside of the spring plate 8.

In order to start the vibratory armature when the mechanical interrupter is open, the switch 4 is closed and the push-button 5 is depressed until the contacts 13 and 14 are brought together. The electric current then flows intermittently in accordance with the vibration of the armature 3 from the battery 1 through the primary winding *p* and the contacts 13 and 14 back to the battery through the socket 7 and the frame of the engine.

In the event that the engine is stopped with the mechanical interrupter closed, the vibratory armature will be drawn toward its magnet and away from the end of the plunger 13, so that a further depression of the push-button will be necessary to put the vibratory armature into operation. This further depression carries down the spring plate 8 and opens the interrupter circuit at the contacts 11—18, whereupon the ignition current is generated in the secondary winding *s* of the ignition coil 2, and the spark

produced at the appropriate spark plug *z* selected by the distributor *d*, as will be readily understood. The natural impulse of the chauffeur will, however, be to further depress the push-button until the contacts 19 and 20 engage, thereby again completing the circuit of the mechanical interrupter. Thereafter the mechanical interrupter will assume control of the sparking and premature ignition is entirely avoided. In the event that the spark produced by the first depression of the push-button does not ignite the combustible mixture in the cylinder, it is only necessary for the chauffeur to rapidly repeat the operation until such ignition does occur. In no case, however, will the push-button remain for more than an instant in that intermediate position in which the circuit of the mechanical interrupter is opened.

Having thus described my invention, what I claim is:—

1. The combination with an ignition coil having a vibratory armature and a contact moved thereby, of a push-button carrying a contact member coöperating with the said armature contact, two oppositely disposed contacts electrically connected together, and a conducting contact-member moving between said oppositely disposed contacts and engaged by the push-button in its movement of depression; substantially as and for the purpose described.

2. The combination with an ignition coil having a vibratory armature, of a push-button, a spring plate carrying contacts and having an aperture through which the end of said push-button is adapted to pass, a spring plate vibrated by the armature of the ignition coil and carrying a contact coöperating with the end of the push-button, a contact adapted to engage one of the contacts carried by the first named spring plate when the push button is not depressed and a second contact adapted to engage another contact carried by the first named spring plate when the push-button is depressed.

In testimony whereof I affix my signature, in presence of two witnesses.

FRANZ KRATZ.

Witnesses:

REINHOLD ELWERT,
PAUL WOLFART.