March 9, 1926. 1,576,222

W. ROBBINS

IGNITION APPARATUS

Filed Nov. 23, 1921

Fig.1.

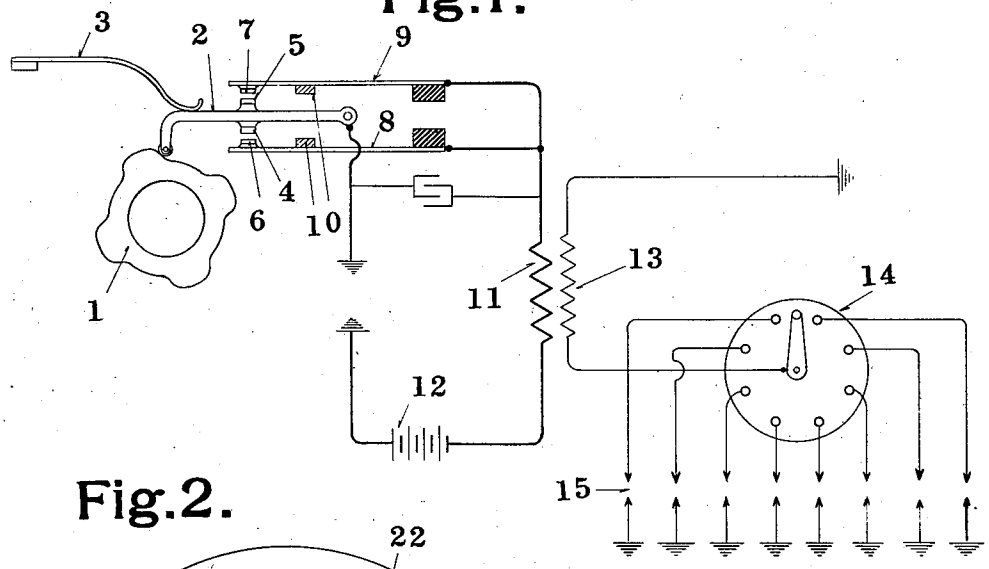


Fig.2.

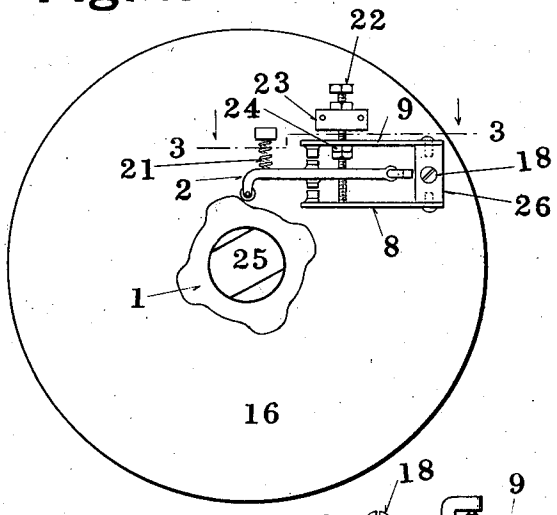
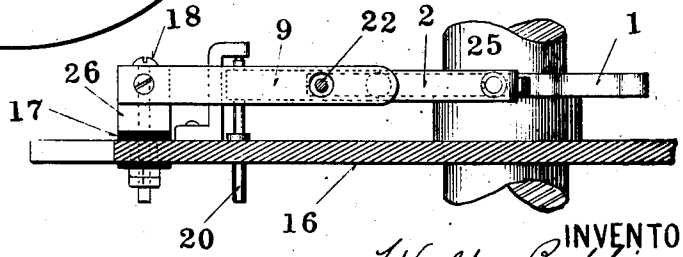


Fig.3.



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UNITED STATES PATENT OFFICE.

WALTER ROBBINS, OF ST. LOUIS, MISSOURI.

IGNITION APPARATUS.

Application filed November 23, 1921. Serial No. 517,188.

To all whom it may concern:

Be it known that I, WALTER ROBBINS, a citizen of the United States of America, residing at the city of St. Louis, State of Missouri, United States of America, have invented a certain new and useful Ignition Apparatus, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an ignition apparatus for internal combustion engines and particularly to a mechanically controlled interrupter mechanism for the primary circuit of the ignition coil.

The ordinary interrupter construction for an ignition system having a normally closed primary circuit comprises a spring controlled lever carrying a movable contact and an engine driven cam cooperating with said lever to interrupt the primary circuit. At low engine speeds the lever follows the cam surface closely and closes the circuit within the time after break which is predetermined by the cam surface or in other words the time of closed circuit is governed by the speed of the cam and equals the time required for the cam to pass through a definite angle of rotation.

At high speeds, however, the inertia of the interrupter lever is not overcome with sufficient rapidity by the controlling spring to maintain the relation described and inertia causes the interrupter lever to have a greater amplitude of vibratory movement than at lower speeds with the result that at high speeds the time during which the primary ignition circuit remains closed is shortened to a greater extent than proportionally to the speed of cam and the current in the primary coil, on account of impedance and other factors is unable to reach as high a value as at lower engine speeds. This condition results in a weakened secondary spark at high speeds and beyond certain limits in the omission of some of the sparks altogether.

The principal object of my invention is to decrease the interval of open circuit with increasing speed in interrupter apparatus by providing means whereby the distance of travel of the breaker lever between open and closed circuit positions will be the same at all speeds and the necessary angle of rotation of the cam during the time between the interruption and re-closing of the ignition circuit be considerably less than in the ordinary interrupter mechanism in which the breaker lever must reverse its direction of travel between opening and reclosing the circuit. Other objects and advantages of my invention lie in the division of the primary circuit interruptions between two sets of contacts thereby lengthening the life and efficiency of the contacts and the provision of a simple mechanical structure for the purpose desired and one which is capable of easy adjustment.

In the accompanying drawings, Figure 1 is a diagrammatic view of an interrupter mechanism, embodying my invention and showing the primary and secondary ignition circuits. Figure 2 is a top plan view of one form of mechanism embodying my invention and Figure 3 is a vertical sectional view along the line 3—3 of Figure 2 and in the direction indicated.

Referring to Figure 1, 1 represents the breaker cam driven by a half time shaft of the engine and 2 is a pivoted interrupter lever or breaker arm having its free end held in contact with the cam by spring 3. The interrupter lever carries contacts 4 and 5 on opposite sides as shown which contacts cooperate with contacts 6 and 7 respectively, these contacts 6 and 7 being carried by flat springs 8 and 9. The travel of each of these contact springs toward the contact lever is limited by the stops 10. The primary ignition circuit comprises the winding 11 of the ignition coil, the battery or other source of current 12, the interrupter lever 2 and either of the contact carrying members 8 and 9, these members being connected in parallel. The secondary 13 of the ignition coil is in circuit with the distributor 14 which distributes the secondary current to the engine spark plugs diagrammatically indicated at 15.

In the mechanical embodiment of my invention shown in Figure 2, the contact carrying springs 8 and 9 are mounted on a conducting block 26 which block is supported on the base plate 16 through which the half time shaft 25 passes. Block 26 is insulated from plate 16 by insulating collar 17. The screw 18 serves to hold the block 26 in position and also for the attachment of one lead from the primary of the ignition coil. The other lead from the primary is

connected to breaker arm 2 and may be so connected by attaching it to the pivot 20 of the arm or by grounding the lead and the pivot.

The breaker arm may be actuated toward the cam either by a flat spring 3 of the type shown in Figure 1 or by a coil spring 21 as shown in Figure 2. Adjustment of the stationary position of the contacts 6 and 7 with respect to the contacts 4 and 5 on the interrupter lever is accomplished in the apparatus of Figure 2 by the screw 22 passing through insulating block 23 supported on the base 16. This screw 22 passes through an opening in the lever 9 and an opening in the breaker lever 2, the end of the screw forming the stop for the lever 8 and the nut 24 forming the stop for the lever 9. Suitable lock nuts as shown serve to hold the screw 22 and the nut 24 in adjusted position. The position of the contacts 6 and 7 can thus be adjusted for proper timing with respect to the contacts on the breaker arm so that the primary circuit will be re-established through one pair of contacts immediately after having been broken at the other. The actual time interval of open circuit will be affected by the shape of the cam, and the adjustment of the stops, screw 22, and nut 24. The illustrated cam is for an eight cylinder engine but the necessary modification for an engine of two or a multiple of two cylinders will be obvious. In the case of engines having one, three or other odd number of cylinders the cam shaft would be driven at engine speed.

It will be noted that in the apparatus described, the distance of travel of the breaker arm during the interval of open circuit is not affected by the inertia factor and is constant at all speeds instead of variable with varying speeds as in the ordinary type of interrupter. The time of open circuit will be decreased with increasing speed due to the fact that the distance traveled by the breaker arm while in open circuit position remains the same and its rate of travel increases.

My improved apparatus has further advantages in that the breaking of the primary circuit is divided between two sets of contacts resulting in long life and more reliable action and that the radius of movement of the contacts on the breaker arm may be less than the radius of movement of the cooperating contacts with the result that there is a rubbing action between contacts.

I am aware that my invention may be embodied in apparatus of specifically different construction than that herein described without departing from the principle thereof and I, therefore, do not desire that the scope of the invention be limited other than by the appended claims.

Having fully described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. Circuit breaker mechanism for electric ignition systems, comprising two breaker contacts electrically connected, an interrupter member adapted to engage said contacts alternately, and a revolving cam for actuating said member, said cam having a plurality of non-radial engaging surfaces for controlling the motion of said member, and said breaker contacts being so arranged with respect to the interrupter member that a single non-radial face of the cam controls the interrupter member to cause both its disengagement from one breaker contact and its immediate re-engagement with the other contact through further movement of the interrupter member in the same direction.

2. Circuit breaker mechanism for electric ignition systems, comprising spring mounted contact members electrically connected, an interrupter lever extending between the contact members and carrying contacts to co-operate alternately with said contact members, a stop for each contact member limiting its movement toward the interrupter lever, and means adapted to impart vibratory motion to the interrupter lever, said means including a revolving cam having a plurality of non-radial engaging surfaces, the contacts on the spring actuated contact members being so positioned with respect to lever carried contacts that engagement of one pair of contacts during continuous movement of the lever in one direction is determined by an adjacent portion of the same non-radial surface of the cam which controlled the separation of the other pair of contacts.

In testimony whereof, I have hereunto set my hand and affixed my seal.

WALTER ROBBINS