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METHOD AND APPARATUS FOR IGNITION SYSTEMS.

APPLICATION FILED MAR. 18, 1918.

1,318,220.

Patented Oct. 7, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

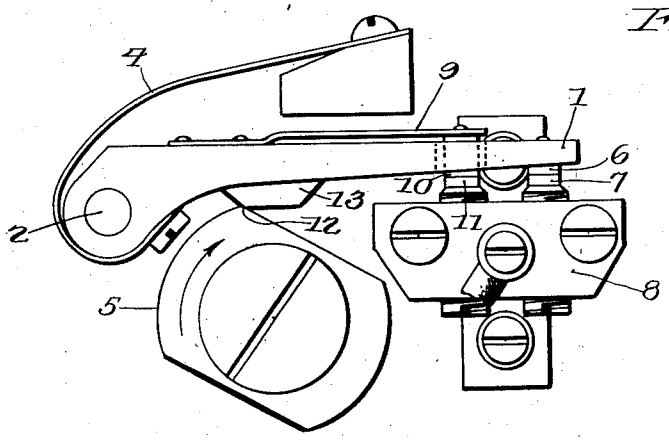


Fig. 2.

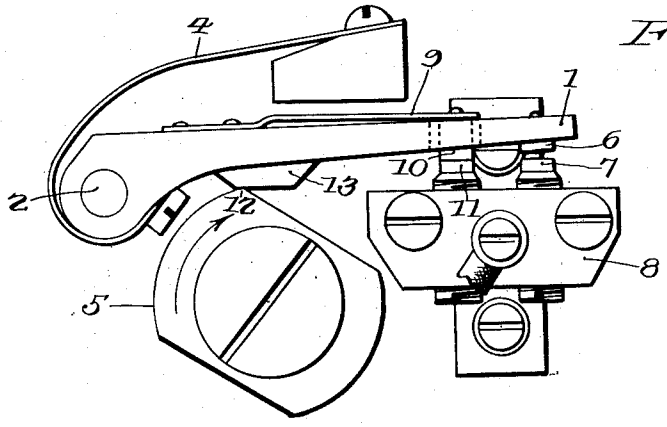
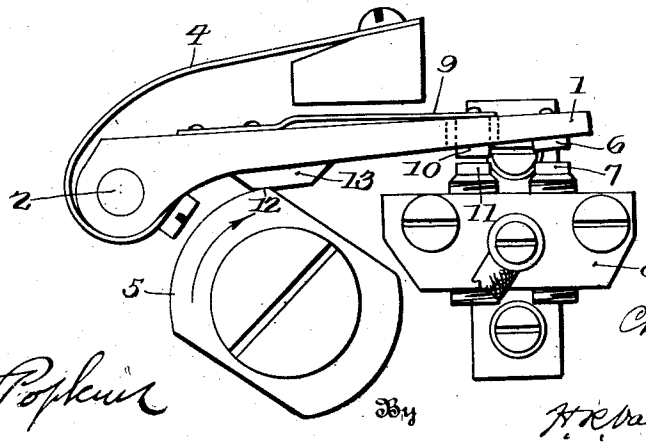


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

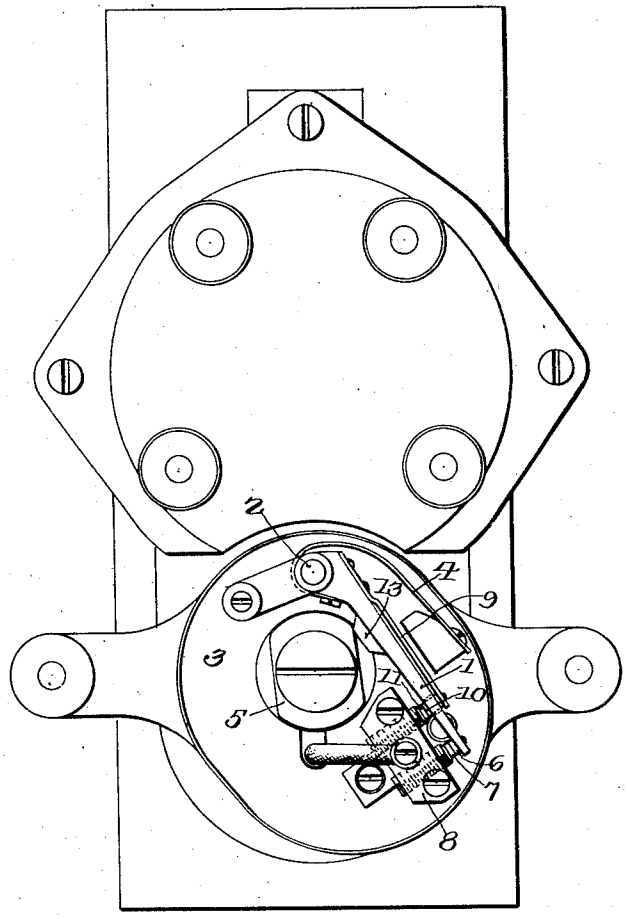
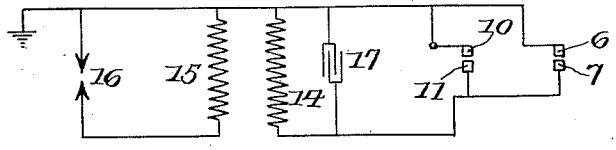


Fig. 5.



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METHOD AND APPARATUS FOR IGNITION SYSTEMS.

1,318,220. Specification of Letters Patent. Patented Oct. 7, 1919.

Application filed March 18, 1918. Serial No. 223,164.

To all whom it may concern:

Be it known that I, CHARLES THOMAS MASON, a citizen of the United States, residing at Sumter, in the county of Sumter and State of South Carolina, have invented certain new and useful Improvements in Methods and Apparatus for Ignition Systems, of which the following is a specification, reference being had to the accompanying drawing.

The invention relates to new and useful improvements in the method of interrupting a circuit for producing ignition spark and an apparatus or ignition mechanism for carrying out the same, and more particularly to the method and mechanism for interrupting the primary circuit in a high tension ignition system for producing a current in a secondary circuit for sparking purposes.

Interrupters are commonly used in connection with battery and coil systems for the purpose of interrupting the primary circuit of the coil and also in ignition generators for interrupting the primary circuit in timed relation to the peak of the magnetic flux passing through the generating coil. I am aware that interrupters have been provided in connection with batteries, which interrupters include contacts of relatively low conductivity, such for example, as tungsten. Such contacts, however, have not proved satisfactory in high tension ignition systems and particularly in magneto ignition systems, owing to the high contact resistance of tungsten under working conditions. In a magneto the current in the primary circuit in which the interrupter must be placed is so feeble that a film of oxid or dirt may collect on the contacts, which will increase the resistance thereof, so that the magneto will not build up and consequently it will not operate efficiently. Of course, if the current is of considerable amperage when the circuit is broken the points are kept clean by reason of the arcing.

An object of the invention is to provide a method and mechanism for interrupting the primary circuit in a high tension ignition system wherein main contacts may be separated at each sparking interval for interrupting the circuit and wherein a second pair of auxiliary contacts may be used in multiple with the main contacts and be opened before and closed after the main contacts so that the primary circuit may be established through both pairs of contacts yet always broken by the same pair of contacts for sparking purposes.

A further object of the present invention is to provide a method and mechanism of interrupting the primary circuit of a magneto which permits the use of a pair of contacts of relatively low conductivity without interfering with the proper flow of ample current when the contacts are closed to permit the magneto to build up and produce efficient maximum current for sparking purposes.

A still further object of the invention is to provide an interrupter for a high tension ignition system wherein tungsten contacts may be used for making and breaking the circuit at each sparking interval and wherein contacts of relatively high conductivity such as silver, may be used for making the circuit while the tungsten contacts are closed so as to reduce the resistance due to the tungsten contacts in the primary circuit.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

While it is obvious to those skilled in the art that my invention may be utilized in connection with any suitable form of ignition device in which interrupters are employed, for the sake of illustration I here describe the invention as applied to an ignition magneto of the well known "Dixie" construction, the said magneto being of the usual high tension type and having a primary and secondary winding.

In the accompanying drawings in which like figures of reference denote the same parts wherever they are shown,—

Figure 1 is an enlarged diagrammatic view of the interrupter normally closed;

Fig. 2, same as Fig. 1 with one set of points open;

Fig. 3 a view showing both sets of points open;

Fig. 4 is an end view of a complete magneto, showing the improved interrupter in place; and

Fig. 5 is a circuit diagram of the magneto and interrupter connections.

The invention is embodied broadly in a method and mechanism of interrupting a primary circuit of a high tension ignition

system; that is, where a current is induced in a secondary circuit or coil for producing a jump spark. My method and mechanism contemplates the use of an interrupter having two or more pairs of contacts which are arranged in multiple and which are so operated that one pair of contacts is utilized for making and breaking the circuit at each sparking interval and the other pair or pairs of contacts is utilized for establishing a better flow of current through the primary circuit than could be secured where a single pair of contacts alone is used.

In the present embodiment of the invention the method and mechanism includes the use of an interrupter having a pair of tungsten contacts which may be employed as the main interrupter for making and breaking the circuit of the primary and also a pair of contacts of relatively high conductivity arranged in multiple with the tungsten contacts and which are operated so as to close after the tungsten contacts are closed and open before the tungsten contacts are open so that these contacts of relatively high conductivity are utilized as auxiliary contacts to establish a better flow of current in the primary circuit while the tungsten contacts which are of relatively low conductivity may be used at each spark interval for making and breaking the circuit and thus excessive sparking or injurious sparking at the contacts is avoided.

Referring more in detail to the drawings, the numeral 1 denotes a lever pivoted to move about the pin 2 secured to the base plate 3. The spring 4 is secured to the lever 1 in such a manner that the lever is pressed toward the cam 5. Secured to the lever 1 is the contact point 6 which may be of silver or any other metal of relatively high conductivity. This point is adapted to normally make contact with a second point 7, supported in the bracket 8, which is insulated from lever 1 and the base plate 3. Riveted to 1 is the spring 9, to which is secured a contact point 10 of tungsten or other metal, hereafter referred to as of relatively low conductivity, as compared with the points 6 and 7. It will be observed that this point 10 projects freely through a hole in lever 1 and normally makes contact with a similar point 11, supported in bracket 8. Now consider the magneto in operation. All of the contact points are closed as shown at Fig. 1, consequently the primary circuit 14, Fig. 5 is closed at 6 and 7, and 10 and 11. The cam 5 is mounted upon the rotor shaft and timed with the peak of the flux wave of the magneto in the usual manner, and when the lobe 12 of the cam strikes the bumper 13, lever 1 is raised as shown at Fig. 2, thereby opening the silver points 6 and 7. This also takes up the lost motion between the spring 9 and lever 1, by reason of the elasticity of said spring. It will be noted, however, that contacts 10 and 11 remain closed. As the cam moves on, lever 1 continues to rise. Spring 9 strikes the upper surface of lever 1 and contacts 10 and 11 are separated, thus opening the primary circuit 14. This induces a current in the secondary 15 and produces a spark in the plug indicated at 16.

It will be observed from a study of the figures that the tungsten or low conductivity points interrupt the circuit and, therefore, the sparking due to the interruption of the primary circuit, will occur between said points (10 and 11), and, therefore, these contacts may be referred to as the main contacts. Said main contacts will operate at each spark period.

It is true that a condenser 17 is commonly employed connected across the interrupter points, which serves to prevent sparking, but in practice it is difficult to correctly proportion this condenser for all operating speed, consequently the interrupter points often spark, which wears them away, necessitating frequent adjustment as in time this wear prevents the points making good contact.

I call attention to the fact that in my improved interrupter, the high conductivity or silver points 6 and 7 are always closed last and opened first, and, therefore, a spark cannot occur at these points, consequently they will always be in condition to make the best possible contact, independent of the relatively low conductivity points 10 and 11, which always break last in the cycle of events, making the spark. These contacts 6 and 7 may, therefore, be referred to as the auxiliary contacts and their main purpose is to reduce the resistance of the contacts of low conductivity.

I find in practice that the arrangement here shown and described serves to conserve the points longer and that practically no adjustment of the same is required under normal operating conditions. It is obvious that points 6 and 7 may be of any suitable metal. I employ silver with very good results, as this is a good conductor, even if oxidized, and the primary current, therefore, builds up perfectly; silver, however, burns and, therefore, the silver points alone could not be employed in an interrupter, however, by employing the additional points 10 and 11 of tungsten or other metal and opening the silver points an instant before the interruption of the primary circuit by the tungsten points, the silver points are properly protected and will last indefinitely.

I may find it desirable to allow a slight spark at the points for the purpose of keeping them free from slight films of dust or oxid. In addition it may be desirable to serrate one or both of the points of each pair or arrange one of the silver points so it will make a slightly rubbing contact; all

such modifications I deem within the scope of my invention.

It will be observed that the system herein described of interrupting the primary circuit of an ignition magneto includes definite steps, to-wit:

First, closing the circuit through a plurality of contacts, some of which are of relatively high conductivity; second, opening said high conductivity contacts; third, opening said low conductivity contacts, thereby opening the primary circuit.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. An interrupter mechanism for a magneto ignition system including in combination a pair of main contacts adapted to break the primary circuit of the magneto, a pair of auxiliary contacts in multiple with said main contacts and adapted to open before the main contacts, and means for operating said contacts.

2. An interrupter mechanism for a magneto ignition system including in combination a pair of main contacts adapted to make and break the primary circuit of the magneto, a pair of auxiliary contacts in multiple with said main contacts and adapted to open before and close after said main contacts, and means for operating said contacts.

3. An interrupter mechanism including in combination a pair of main contacts of relatively low conductivity and means for operating the same to break the circuit and a pair of auxiliary contacts of relatively high conductivity, and means for operating the same whereby they are opened before the main contacts are operated to break the circuit.

4. An interrupter mechanism for a magneto ignition system including in combination a pair of main contacts of relatively low conductivity, means for operating the same to make and break the circuit and a pair of auxiliary contacts of relatively high conductivity arranged in multiple with the main contacts and means for operating said auxiliary contacts whereby the same are opened before and closed after said main contacts.

5. An interrupter mechanism for ignition systems including in combination a pair of tungsten contacts, means for operating the same to make and break the circuit and a pair of auxiliary contacts of higher conductivity than the tungsten contacts and in multiple therewith and means for operating the auxiliary contacts whereby they are opened before and closed after the tungsten contacts.

6. An interrupter mechanism for a magneto ignition system including a pair of tungsten contacts adapted to make and break the circuit and a pair of auxiliary silver contacts in multiple with the tungsten contacts and adapted to open before and close after the tungsten contacts and means for operating said contacts.

7. Interrupter mechanism for ignition systems including two sets of contact points, each of said sets of dissimilar metals, one contact point of each set being in multiple with a contact point of the other set and means for operating said contact points whereby one set of contacts is made first and broken last in the cycle of operations.

8. In combination with an ignition dynamo, an interrupter mechanism therefor including a pair of low conductivity contacts, means for operating said contacts, a second pair of contacts operated by said means and connected in multiple with said first contacts and adapted to open the circuit after said first contacts are opened, substantially as described.

9. In an ignition dynamo, an interrupter comprising stationary and movable members, contacts of relatively high conductivity positioned in said members and adapted to engage each other when the movable member is actuated, a second pair of contacts in multiple with said first contacts and means for actuating said second contacts whereby the circuit through the interrupter will always be first made and broken thereby.

10. The herein described method of producing an ignition spark consisting in interrupting the primary circuit of a high tension system by the separation of the same pair of contacts at each spark interval, and in reducing the resistance incident to said contacts when closed for a portion only of the period of closure by establishing a circuit for the primary in multiple with the contacts, whereby the building up of the primary is facilitated.

In testimony whereof I hereunto affix my signature.

CHARLES THOMAS MASON.