C. T. MASON.

INTERRUPTER FOR IGNITION DEVICES.

APPLICATION FILED APR. 2, 1918.

1,387,796.

Patented Aug. 16, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

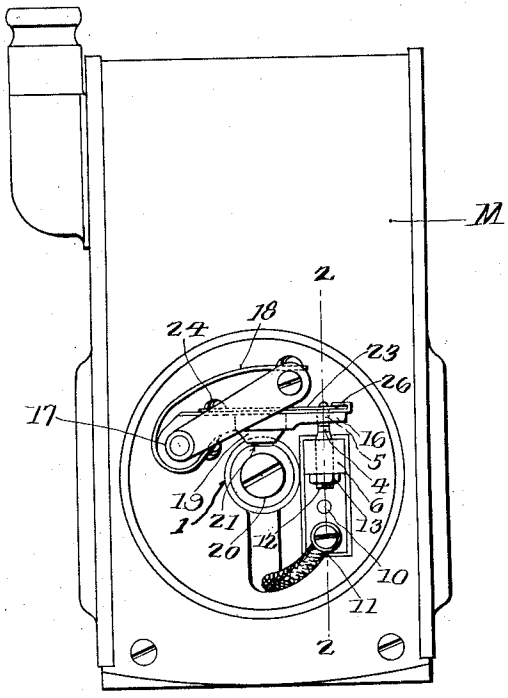
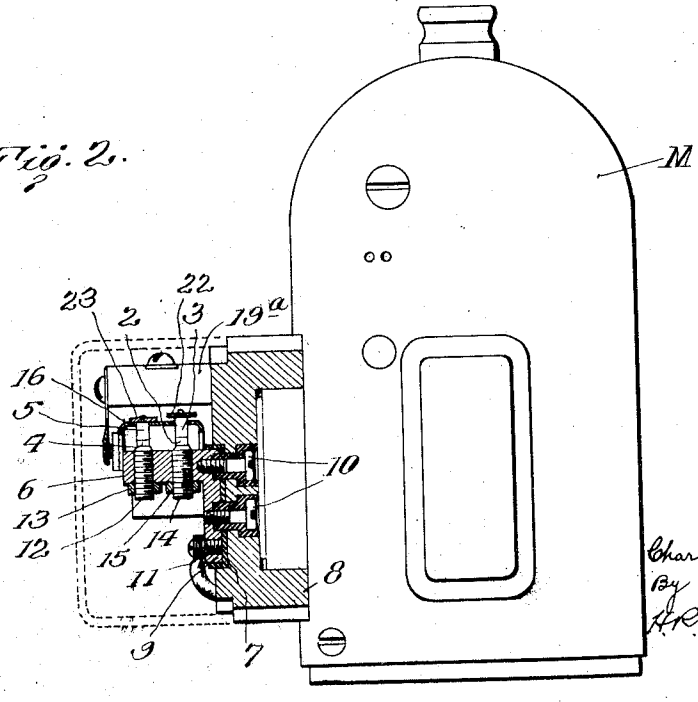


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

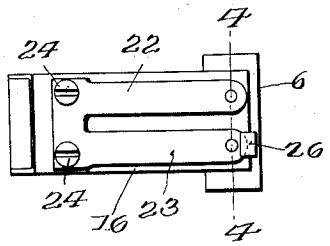


Fig. 4.

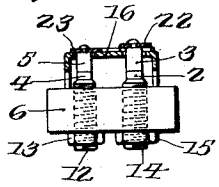


Fig. 5.

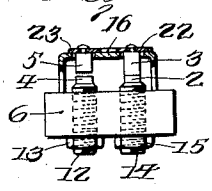


Fig. 6.

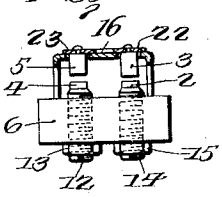


Fig. 7.

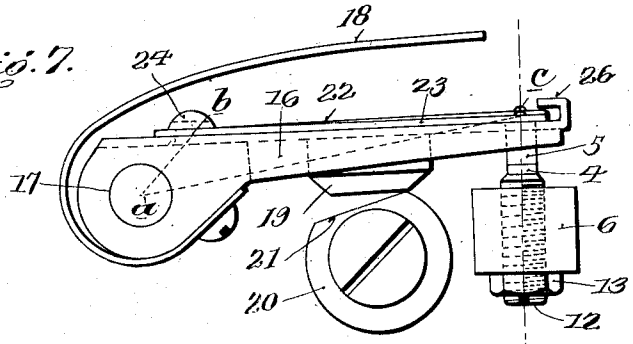
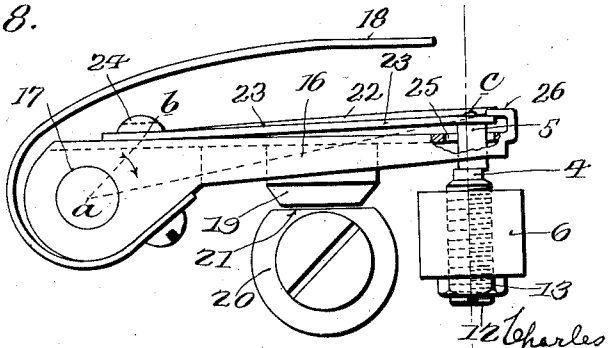


Fig. 8.



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UNITED STATES PATENT OFFICE.

CHARLES THOMAS MASON, OF SUMTER, SOUTH CAROLINA, ASSIGNOR TO SPLITDORF ELECTRICAL COMPANY, OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

INTERRUPTER FOR IGNITION DEVICES.

1,387,796. Specification of Letters Patent. **Patented Aug. 16, 1921.**

Application filed April 2, 1918. Serial No. 226,292.

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 Interrupters for Ignition Devices, of which the following is a specification, reference being had to the accompanying drawing.

The invention relates to new and useful improvements in interrupters for ignition devices and more particularly to an interrupter for breaking the primary circuit in a high tension ignition system for producing a current in a secondary circuit for sparking purposes. In my copending application, Serial No. 223,164, filed March 18th, 1918, I have shown and described a method and ignition mechanism for carrying out the method in which the primary circuit of a high tension ignition system is interrupted by the separation of the same pair of contacts at each sparking interval and wherein the resistance of said contacts when closed is reduced by other contacts arranged in multiple therewith and which are timed so as to open before and close after the other contacts which interrupt the primary circuit.

An object of the present invention is to provide an interrupter for an ignition system such as set forth in my prior application, which interrupter is so constructed and operated that the contacts for reducing the resistance through the contacts which operate to make and break the circuit have a rubbing engagement with each other in order to maintain a clean metal surface contact engagement between said contacts.

A further object of the invention is to provide an interrupter of the above character wherein both of the movable contacts are yieldingly carried by an interrupter lever and wherein the movement of one of said contacts is positively limited.

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

In the drawings which show by way of illustration, one embodiment of the invention:—

Figure 1 is an end view of a magneto generator having my improved interrupter attached thereto, the cover plate being removed;

Fig. 2 is a view partly in side elevation and partly in vertical section through the same, the section being on the line 2—2 of Fig. 1;

Fig. 3 is a detail showing in top plan view the interrupter lever and the contact supporting block;

Fig. 4 is a sectional view on the line 4—4 of Fig. 3, showing both pairs of contacts in engagement so that the current in the magneto may build up to maximum efficiency;

Fig. 5 is a similar view but showing the pair of contacts of relatively high conductivity as separated preparatory to the separating of the contacts of relatively low conductivity for producing a spark;

Fig. 6 is a similar view but showing both pairs of contacts separated;

Fig. 7 is a view showing more or less diagrammatically the interrupter lever, the cam for operating the same and the fixed contacts and at the time when the contacts of relatively high conductivity are first brought into engagement;

Fig. 8 is a similar view but showing the cam as having completely released the interrupter lever and the contacts as having slid or moved transversely on each other for cleaning the surfaces thereof.

The invention is embodied broadly in an interrupter for breaking the circuit of a high tension ignition system which includes two pairs of contacts, one of which is of higher conductivity than the other. One contact in each pair is fixed while the other contacts of each pair are carried by a movable lever which is operated by a cam on the main shaft of the magneto or generator, when the interrupter is applied to such ignition system. Both of the contacts carried by the lever are mounted yieldingly thereon, preferably by attaching each contact to a flat spring arm. The arms are independently yieldable. Means is also provided for limiting the movement of the spring arm carrying the contact of relatively high conductivity, so as to insure that these contacts will be pressed firmly together by the spring means which shifts the lever. This spring arm which carries the movable contact of relatively high conductivity is so disposed on said lever and relative to the fulcrum of the lever that the contacts will have a rubbing engagement with each other so as

to keep the metal surfaces clean which make contact. It is well understood that where a spark passes from one contact to another the spark tends to maintain the metal surface of the contacts clean but where there is no spark there is liable to be more or less accumulation which tends to create a resistance between the metal surface of the contacts. By this rubbing of the metal surfaces of the contacts which do not spark I am able to keep the surfaces clean and thus the resistance due to these contacts at a minimum.

Referring more in detail to the drawings, I have shown my invention as applied to an interrupter for a magneto which is indicated at M in the drawings. The main shaft of the magneto is indicated at 1. The interrupter includes two pairs of contacts, one pair is indicated at 2 and 3 while the other pair is indicated at 4 and 5. The contacts 2 and 3 are preferably formed of tungsten or similar metal of relatively low conductivity. It is understood that metal contacts of this character are not injured or damaged by sparking but that the resistance in the primary circuit of the generator or magneto will be considerably increased by the use of contacts of this type. The contacts 4 and 5 are preferably of silver or some other metal of relatively high conductivity. These contacts are not used to make and break the circuit for causing a spark in the secondary winding of the ignition system but are used for reducing the resistance in the primary circuit afforded by the contacts 2 and 3 of relatively low conductivity. To this end these contacts 4 and 5 are timed so as to open before and close after the contacts 2 and 3. The contacts 2 and 4 are relatively fixed. These contacts are carried by an L-shaped block 6 which sets in a recess 7 in the base 8 which supports the interrupter parts. Said block 6 is insulated from the base by means of an insulating strip 9. The block is secured to the base by screws 10 which are also insulated from the base 8. The primary circuit is connected to this block 6 by a wire 11 extending through a slot in the base 8. The cap for inclosing the parts of the interrupter in indicated at C.

The contact 4 is formed as part of a screw 12 which is threaded into the block 6 and is capable of adjustment therein and is held in adjusted positions by a lock nut 13. The contact 2 is carried by a similar screw 14 which is locked in adjusted positions by a lock nut 15.

The contacts 3 and 5 are supported by the interrupter lever 16. This interrupter lever 16 is pivoted at 17 and is moved in one direction by a spring 18 attached to an abutment 19ª carried by the base 8 and at its other end to the interrupter lever 16. This interrupter lever 16 may be made of any suitable construction but as herein shown it is formed from sheet metal stamped into channel shape. In my co-pending application, Serial No. 225,030 filed March 27th, 1918, I have shown an interrupter lever similar in construction to that herein shown and also mounted in a similar manner and have claimed such specific mounting and, therefore, further detailed description of the construction and mounting of the present interrupter lever will not be necessary. It is understood, however, that in certain aspects of the invention this lever may be of any desired construction.

Mounted on the lever 16 is a fiber block 19 which coöperates with a cam 20 on the shaft 1. This cam 20 is concentric throughout a greater portion of its extent but is provided with a flat face 21. As the cam rotates the interrupter lever will be swung on its fulcrum point so as to move the contacts away from each other and said lever is returned to cause the contacts to close by the spring 18, when the flat side of the cam moves underneath the fiber block 19. As herein shown, the movable contact 3 is carried by a spring arm 22. While the movable contact 5 is carried by a spring arm 23 these spring arms are shown as formed from the same piece of metal and as secured to the lever by screws 24—24. The interrupter lever is formed with an opening 25 for each movable contact. The contacts are preferably screwed or riveted to the spring arms. The opening 25 is slightly larger in diameter than the contacts and particularly larger in diameter than the contact 5. The lever is formed with a bent up portion 26 which overhangs the end of the arm 23. The overhanging portion 26 is placed above the arm 23 so as to permit a limited movement thereof.

When the parts are in the position shown in Fig. 8, both contacts are closed. The spring arm 23 is raised slightly from the upper face of the lever 16. The spring arm 22 is raised therefrom to a greater extent. The overhanging portion 26 engaging the arm 23 limits the movement of the interrupter lever toward the cam so that these contacts 4 and 5 are pressed into engagement with each other by the full force of the spring 18. When the parts are in the position shown in Fig. 8, the spring arm is raised from the lever 16 to a greater distance than the spring arm 23, substantially twice the distance. As the cam 21 rotates the interrupter lever will be raised and will first engage the arm 23 and separate the contacts 4 and 5, as clearly shown in Fig. 5 of the drawings. A further movement of the interrupter lever 16 in an upward direction separates the contacts 2 and 3 and breaks the primary circuit for producing the igni-

tion spark. A continued movement of the cam will finally cause the lever 16 to be lowered through the action of the spring 18 and the contacts 2 and 3 will close first, as is obvious from Fig. 6 of the drawings. A further downward movement of this lever 16 will close the contacts 4 and 5. When these contacts close inasmuch as both pairs of contacts are in multiple the resistance offered to the primary circuit through the tungsten contacts 2 and 3 will be greatly reduced. In Fig. 7 I have shown the position of the parts when the contacts 4 and 5 are first brought into engagement. In Fig. 8 I have shown the lever 16 as moving still further in a downward direction and the movement of said lever limited by the overhanging portion 26. It will be noted that when the parts move from the position shown in Fig. 7 to the position shown in Fig. 8, the lines *a*, *b*, and *b*, *c*, tend to straighten out or to approach the line *a*, *c*. In other words, the point *b* continues to move about the fulcrum of the lever as a center while the point *c* cannot move further in a downward direction as the contacts are in engagement. The result is that the point *c* moves to the right and this causes the movable contact after it has engaged the fixed contact to rub or slide thereon laterally as indicated in Fig. 8. This rubbing action between the contacts cleans the metal surfaces and maintains an efficient electrical engagement between the contacts thus reducing to a minimum the resistance in the primary circuit. As the lever starts to move in an upward direction the contacts will slide again on each other to the position shown in Fig. 7 and then the movable contact will be directly raised from engagement with the fixed contact.

It will be understood, of course, that changes in the details of construction may be made without departing from the spirit of the invention which consists broadly in the pairs of contacts in multiple wherein the breaking of the circuit for producing the spark is produced at all times on one pair of contacts while the other pair opens before and closes after the pair of contacts breaking the circuit and wherein the contacts which do not break the circuit for sparking purposes, have a rubbing action one on the other to maintain the surfaces thereof clean and free from accumulation which might tend to resist the building up of the maximum current in the generator.

Attention is further called to the fact that by my improved construction described above, the movable contacts may be readily removed by taking out the screws 24 without removing the interrupter lever. Then again, it is noted that the connection from the primary to the stationary contacts is wholly within the cap inclosing the parts of the interrupter.

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

1. An interrupter mechanism for ignition systems, comprising a pair of main contacts one of which is movable for breaking a circuit for producing an ignition spark, a pair of auxiliary contacts in multiple with said main contacts and one of which is movable, said auxiliary contacts being timed so as to open before and close after said main contacts, means for supporting and operating said contacts whereby said auxiliary contacts are caused to rub one on the other after they are in engagement.

2. An interrupter mechanism for ignition systems, comprising a pair of main contacts one of which is movable for breaking a circuit for producing an ignition spark, a pair of auxiliary contacts in multiple with said main contacts and one of which is movable, said auxiliary contacts being timed so as to open before and close after said main contacts, an interrupter lever for said contacts and means for supporting the movable contacts thereon whereby the auxiliary contacts are caused to rub one on the other after they are in engagement.

3. An interrupter mechanism for ignition systems, comprising a pair of main contacts one of which is movable for breaking a circuit for producing an ignition spark, a pair of auxiliary contacts in multiple with said main contacts and one of which is movable, said auxiliary contacts being timed so as to open before and close after said main contacts, an interrupter lever for supporting the movable contacts, spring arms carried by the interrupter lever, one for each movable contact, said contacts being disposed on said spring arms so that the main contacts will open after the auxiliary contacts and close before said auxiliary contacts.

4. An interrupter mechanism for ignition systems, comprising a pair of main contacts one of which is movable for breaking a circuit for producing an ignition spark, a pair of auxiliary contacts in multiple with said main contacts and one of which is movable, said auxiliary contacts being timed so as to open before and close after said main contacts, an interrupter lever for supporting the movable contacts, spring arms carried by the interrupter lever, one for each movable contact, said contacts being disposed on said spring arms so that the main contacts will open after the auxiliary contacts and close before said auxiliary contacts, said spring arms being also disposed so that the auxiliary contacts will rub one on the other after they are in engagement.

5. An interrupter mechanism for ignition systems, comprising a pair of main contacts one of which is movable for breaking a circuit for producing an ignition spark, a pair

of auxiliary contacts in multiple with said main contacts and one of which is movable, said auxiliary contacts being timed so as to open before and close after said main contacts, an interrupter lever, a cam for moving the interrupter lever in one direction, a spring for moving it in the other direction, spring arms mounted on said interrupter lever and carrying the movable contacts, said arms and contacts being disposed so that the main contacts will open after and close before the auxiliary contacts and said auxiliary contacts will be caused to rub one on the other after they are in engagement.

6. An interrupter mechanism for ignition systems, comprising a pair of main contacts one of which is movable for breaking a circuit for producing an ignition spark, a pair of auxiliary contacts in multiple with said main contacts one of which is movable, said auxiliary contacts being timed so as to open before and close after said main contacts, an interrupter lever, a cam for moving said lever in one direction and a spring for moving the lever to cause the contacts to close, spring arms carried by the lever and carrying said contacts said spring arms being mounted adjacent the fulcrum of the lever and extending outwardly on the lever, means carried by the lever and overhanging the spring arm carrying the auxiliary contact for limiting the movement of the spring arm.

7. An interrupter mechanism for ignition systems comprising a fixed contact, a pivoted lever, a flat spring attached to said lever on the side thereof opposite the fixed contact, said lever having an opening therethrough, a contact carried by said flat spring, projecting through the opening in the lever and adapted to engage the fixed contact, and a cam for engaging the lever for moving said lever to cause said spring to separate the contacts, said lever being movable toward the fixed contact after said contacts are in engagement for causing a sliding of one contact on the other.

8. An interrupter mechanism for ignition systems comprising a pair of main contacts one of which is movable for breaking a circuit for producing an ignition spark, a pair of auxiliary contacts in multiple with said main contacts and one of which is movable, said auxiliary contacts being timed to open before and close after the main contacts, an interrupter lever carrying the movable contacts, means for operating the lever, a flat spring detachably connected to the outer face of the lever and extending lengthwise thereof, said movable contacts being carried by said flat spring.

9. An interrupter mechanism for ignition systems comprising a pair of main contacts one of which is movable for breaking a circuit for producing an ignition spark, a pair of auxiliary contacts in multiple with said main contacts and one of which is movable, said auxiliary contacts being timed to open before and close after the main contacts, an interrupter lever carrying the movable contacts, means for operating the lever, a flat spring detachably connected to said lever and having two independent arms on which the movable contacts are mounted respectively, said lever having openings through which the contacts extend for engagement with the fixed contacts.

10. An interrupter mechanism for ignition systems comprising a pair of main contacts one of which is movable for breaking a circuit for producing an ignition spark, a pair of auxiliary contacts in multiple with the main contacts and one of which is movable, said auxiliary contacts being timed so as to open before and close after said main contacts, a supporting base, an interrupter lever mounted on the base and carrying the movable contacts, means for operating the interrupter lever, an L-shaped block secured to but insulated from said base and carrying the fixed contacts.

CHARLES THOMAS MASON.