G. W. WACKER.

MAGNETO.

APPLICATION FILED DEC. 23, 1915.

1,224,245.

Patented May 1, 1917.

2 SHEETS—SHEET 1.

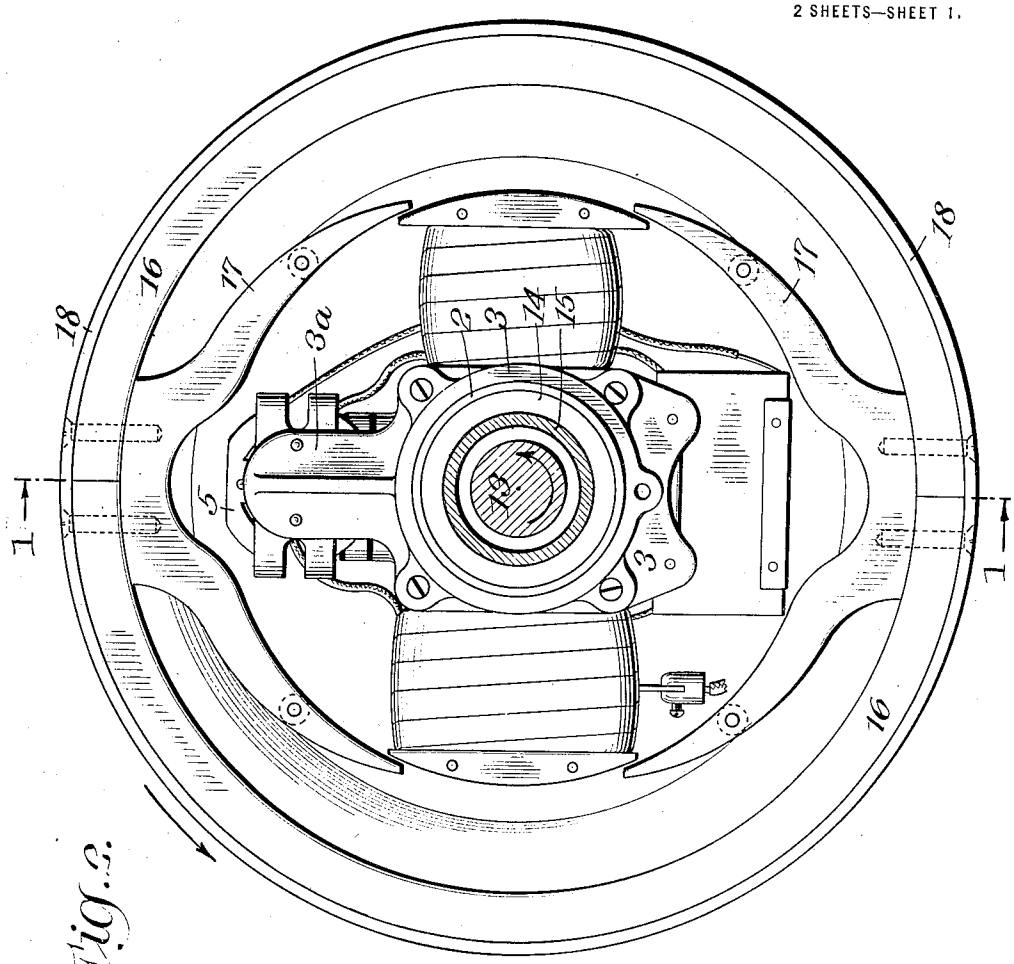


Fig. 2.

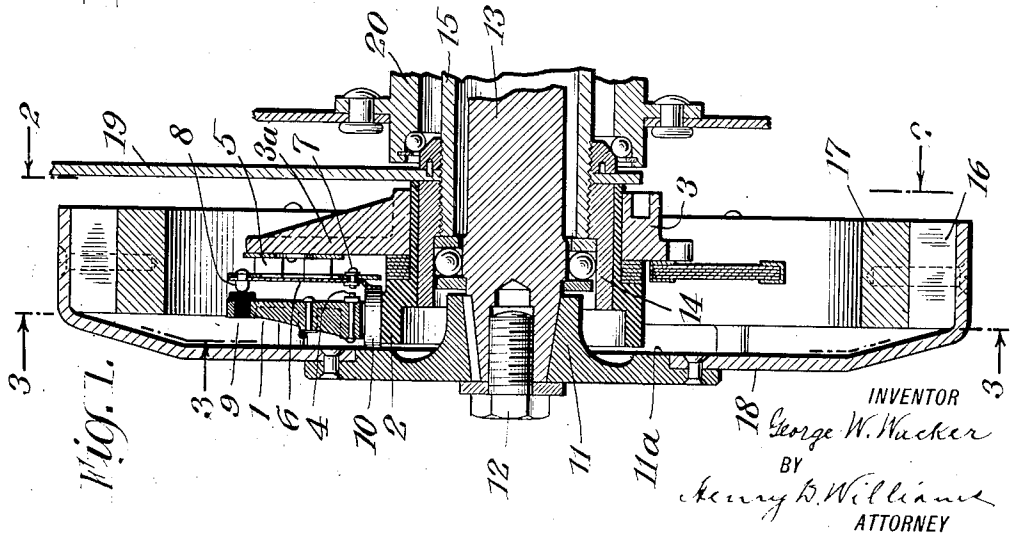


Fig. 1.

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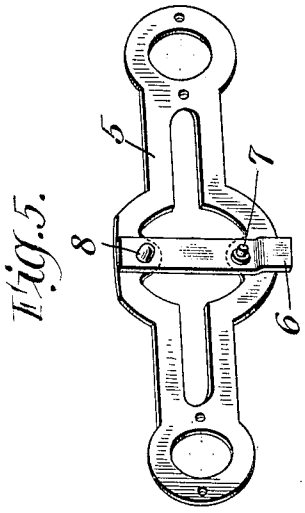


Fig. 5.

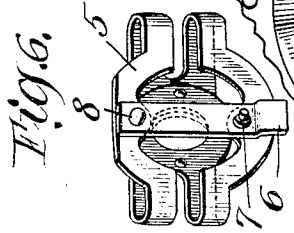


Fig. 6.

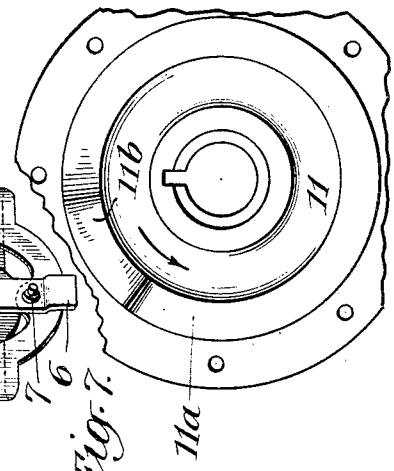


Fig. 7.

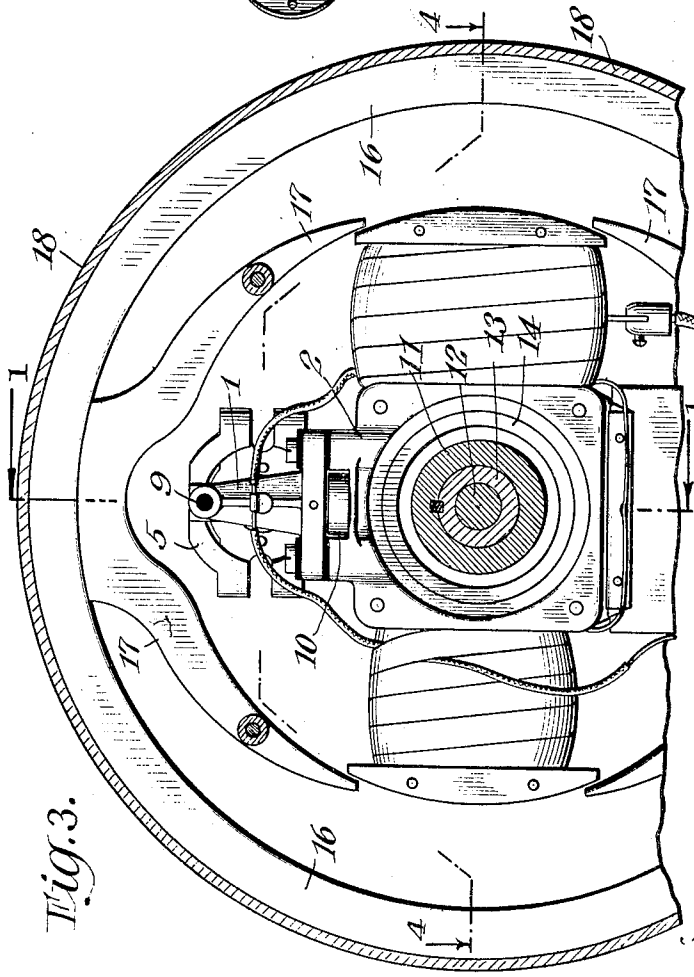


Fig. 3.

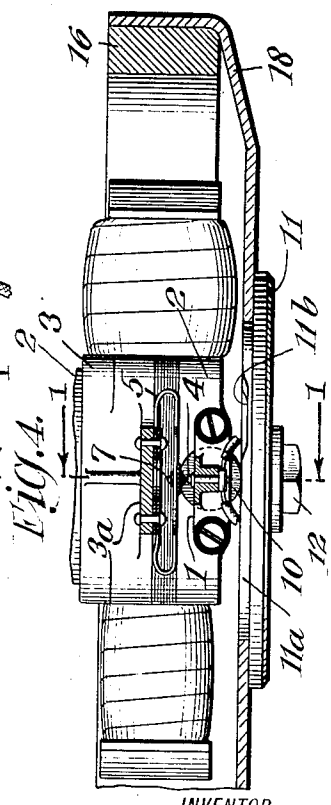


Fig. 4.

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UNITED STATES PATENT OFFICE.

GEORGE W. WACKER, OF RUTHERFORD, NEW JERSEY, ASSIGNOR TO AUTO-PED COMPANY OF AMERICA, A CORPORATION OF DELAWARE.

MAGNETO.

1,224,245. Specification of Letters Patent. Patented May 1, 1917.

Application filed December 23, 1915. Serial No. 68,444.

To all whom it may concern:

Be it known that I, GEORGE W. WACKER, a citizen of the United States, residing at Rutherford, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Magnetos, of which the following is a specification, reference being had therein to the accompanying drawings, forming part thereof.

My invention relates to magnetos such as are employed for ignition purposes in connection with the internal combustion engines of self-propelled vehicles. In such magnetos a contact breaker or circuit breaker is commonly provided for periodically interrupting or breaking the short circuit of a short circuited primary coil, for the purpose of producing an ignition spark by means of a secondary high tension coil or spark coil, and my present invention relates more particularly to the circuit breaking means.

Other features of construction included in the magneto which embodies my present invention and in part illustrated in the accompanying drawings form the subject of three other applications for patent filed by me on even date herewith, application Serial Number 68,443, including an armature construction in combination with other parts, Application Serial Number 68,445, directed to means for making an electrical connection to the end of the high tension coil, and Application Serial Number 68,446, relating to means for eliminating objectionable electrical disturbances.

Objects of my present invention are the best utilization of available space, inexpensiveness of manufacture, simplicity of construction, durability, continued maintenance in operative condition, compactness, lightness in weight, a high degree of effectiveness in operation, and other objects and advantages which will hereinafter appear.

My invention includes features of construction and combination of parts as will appear from the following description.

I shall now describe the magneto embodying the circuit breaker of my invention illustrated in the accompanying drawings and shall thereafter point out my invention in claims.

Figure 1 is a vertical section on a plane indicated by the line 1—1 of Figs. 2, 3 and 4 as viewed from the left in Fig. 2 and as viewed from the right in Figs. 3 and 4.

Fig. 2 is a vertical section on a plane indicated by the line 2—2 of Fig. 1 as viewed from the right and illustrates the entire magneto in elevation.

Fig. 3 is a partial transverse section on planes indicated by the line 3—3 of Fig. 1 as viewed from the left.

Fig. 4 is a similar view on planes indicated by the line 4—4 of Fig. 3 as viewed from above.

Fig. 5 is a perspective view of the circuit-closing spring straightened or flattened out, showing also the circuit-breaking lever fixed thereupon.

Fig. 6 is a perspective view of the complete circuit-closing spring and the circuit-breaking lever carried thereby together with their immediate adjuncts substantially as the parts appear in Fig. 3, or as viewed substantially from the left in Fig. 1, or from below in Fig. 4.

Fig. 7 is an elevation of the combined fly wheel hub and field magnet support as seen from the right in Fig. 1, showing a face view of the circuit-breaking cam which is formed on this part.

In carrying out my present invention the conductors forming the short circuit of the coil or coils which is to be interrupted or broken by the circuit breaker are connected to an insulated connector piece or contact post 1 which may be said to form a part of the armature frame. The connector piece or post 1 is shown as firmly mounted upon and insulated from a main frame part or armature hub 2, and the hub 2 carries a second frame part or collar plate 3 having a projecting extension 3^a providing a flat surface arranged in spaced parallel relation with the opposed flat surface of the correspondingly projecting connector piece 1, as clearly appears in the drawings, more particularly in Figs. 1 and 4. A stud 4 forms a fixed or stationary contact terminal or

contact point on the connector piece or post 1 on its side adjacent to the extension or projection 3ª of the hub collar 3.

A sheet metal contact-making or circuit-closing spring 5 is supported upon the frame extension 3ª. This sheet metal circuit-closing spring 5, as will perhaps most clearly appear when it is straightened or flattened out as shown in Fig. 5, has rounded slightly enlarged apertured ends and a further enlarged rounded and apertured central portion, from the central aperture of which slots extend toward the opposite ends of the spring, so that the middle and central portions of the spring are divided into two spaced lateral parts. This circuit-closing spring 5 in its completed form as embodied in the magneto construction, has its ends reversely turned toward each other into overlapping relation and secured by means of rivets, as appears in the drawings, to the frame extension or projection 3ª, the spring 5 then presenting flattened, outwardly bowed loops, each loop of which is divided or split into two parts, and the middle portion of the spring between these loops being in the form of laterally outwardly bowed separated spaced middle continuations of these spring loops, as clearly appears in Fig. 6 and in other figures of the drawings.

A circuit-breaking lever bar 6 is fixed transversely across the separated middle parts of the spring 5, being firmly secured to and supported by the spring, and it is shown as projecting beyond the spring at one of its ends adjacent to the hub 2 of the armature. Adjacent to this projecting end of the lever bar 6, such lever bar is firmly secured to the middle side portion of the spring 5 by means of a short stud 7 which also forms a movable contact terminal or contact point which is coöperative with the longer stationary contact stud or terminal 4 carried by the insulated connector piece 1. At its upper end, removed from the armature hub 2, the circuit-breaking lever bar 6 is connected to the adjacent portion of the circuit-closing spring 5 by means of a fulcrum pin 8 which has a rounded fulcrum head projecting toward the outer end of the connector piece 1. The adjacent end of the connector piece 1, opposite to the rounded fulcrum end of the fulcrum pin 8, is provided with a fulcrum bearing or fulcrum heel 9 of suitable insulating material, such as hard rubber, and presents an enlarged fulcrum surface, shown as the flat outer surface of a flange or head, upon which the rounded fulcrum end of the fulcrum stud 8 is adapted to rest under pressure of the circuit-closing spring 5 as appears in the drawings, particularly in Fig. 1. Also it is to be noted that the circuit-closing spring 5 when unrestrained will hold the movable contact terminal 7 in circuit-closing contact with the stationary contact terminal 4 so that normally the electrical conductors connected to the insulated connector piece 1 will also be electrically connected to the collar 3 of the armature frame which in the construction illustrated in the drawings forms a ground, the magneto circuits being of the single wire or grounded type.

The means provided by my invention for interrupting or breaking this closed grounded circuit periodically as desired will now be described. A cam roller 10 of suitable insulating material, as for example hard fiber, is loosely contained in a slot shown as provided therefor between the face of the insulated connector piece 1 and the armature hub 2, this roller-receiving slot being shown as formed by a notch in a projecting portion of the hub 2 and as extending through from one side to the other of such projecting portion and also extending from one side to the other of the connector piece 1. It is to be noted that the cam roller 10 is free in its guiding slot for both rotative and bodily movements therein. It is also to be noted that the cam roller 10 projects from both sides of its containing slot and that it is free to engage the lower downwardly projecting end of the contact-breaking lever bar 6. The lower projecting end of the lever bar 6 is shown as bent or off-set slightly toward the cam roller 10.

A hub part 11 of a rotative field magnet support has formed thereon an annular cam which is provided with a raised cam surface 11^a and a depressed cam surface 11^b joined by inclined or sloping cam faces, as appears in the drawings. In the particular construction illustrated in the drawings, the depressed cam surface 11^b is of an angular or arcuate length of substantially forty-five degrees. The depressed cam surface 11^b does not press upon the cam roller 10, and during the movement of such depressed cam surface past the cam roller, the circuit is kept closed by the spring 5. The short circuit of the magneto is thus kept closed through about one-eighth of a rotation. When the advancing inclined end of the raised cam engages the cam roller 10 it pushes the cam roller inward through its containing slot so that the cam roller 10 in turn pushes the projecting end of the lever bar 6 inward and thereby separates the movable contact terminal 7 from the stationary contact terminal 4 to break the circuit, which is then held open by the raised cam surface 11^a throughout the remaining about seven-eighths of a rotation. When the lower projecting end of the circuit breaking lever bar 6 is thus moved by the cam roller 10, it rocks at its upper end upon the rounded end of its fulcrum pin 8 upon which it also similarly rocks in the op-

posite direction when the pressure of the cam roller is relieved to permit the movable contact terminal 7 to be returned into contact with or into circuit-closing position with the stationary contact terminal 4. It will be noted that the circuit is made and broken once during each rotation of the hub 11, the circuit being closed only for a fraction of a rotation sufficient to build up the electrical potential and the circuit being held open during the remainder and greater part of the rotation by the pressure of the raised cam surface 11a. Therefore, although the magneto construction embodying my invention illustrated in the drawings is bipolar, only one spark will be produced for each rotation of the rotative field hub 11.

The loosely mounted cam-actuated contact-breaking roller 10 has been found to be a very advantageous feature of the construction embodying my present invention. For example, cam rollers 10 of slightly lesser or greater diameter may be employed so as to effectively compensate for slight manufacturing inaccuracies and thereby to provide the required exactness of adjustment in reference to the circuit-breaking operation. Also the wear is slight because of the fact that it is distributed over an extensive surface extending entirely around the circumference of the cam roller. However, when after the elapse of sufficient time wear does take place, its effects may be remedied by substituting a cam roller of the requisite slightly larger diameter so as to compensate for wear, not only upon the roller itself but also upon its actuating cam and upon the end of the lever bar 6 which is engaged by the cam roller, likewise upon the contact points. This means of making adjustment is not only simple and effective but also it is to be noted that it effectually prevents any tampering or inaccurate adjustments such as heretofore have frequently taken place in cases where adjustment was dependent upon a screw device or similar arrangement.

In the magneto construction embodying my invention illustrated in the drawings, the rotative field magnet supporting hub 11 also forms the hub of the fly wheel of an internal combustion engine and is removably mounted, by means of a tap bolt 12, upon the projecting end of the engine crank shaft 13. The engine crank shaft 13 is shown as journaled by means of ball bearings in a stationary bearing collar 14 carried by the end of a stationary sleeve 15, and the hub 2 of the armature frame is fixed upon the outside of the bearing collar or ring 14, so that the armature of the magneto is held stationary while the field thereof is rotative with the engine shaft 13. The field magnet is shown as comprising two semi-circular permanent magnets 16 provided with pole pieces or pole shoes 17, the magnets 16 being mounted within the rim of and carried by a combined fly wheel shell and magnet carrier 18 fixed on the hub 11, as clearly appears in the drawings. A stationary frame part 19 of the vehicle appears in the drawings as does also portions of a ground wheel having a hub 20 shown as rotatively mounted upon the stationary bearing sleeve 15.

It is obvious that various modifications may be made in the construction shown in the drawings and above particularly described within the principle and scope of my invention.

I claim:

1. A magneto having, in combination, a circuit-closing spring having double reversely arranged outwardly turned flattened loops, a lever bar firmly secured to and supported by the spring transversely across the middle of the spring, an armature frame upon which the spring is supported at a point substantially opposite to the transverse lever bar, a movable contact terminal on the lever bar, a fixed contact terminal insulated from and coöperative with the movable contact terminal, the armature frame having therein a guiding slot for a cam roller, a cam roller of insulating material contained loosely in the guiding slot for engagement with one end of the transverse lever bar, the other end of the transverse lever bar being fulcrumed, and a field magnet support provided with a cam engageable with the loosely mounted insulative cam roller for breaking the circuit, the field magnet support and the armature frame being relatively rotative.

2. A magneto having, in combination, a field magnet support, an armature frame, the field magnet support and the armature frame being mounted for relative rotation, a sheet metal circuit-closing spring having its ends reversely turned toward each other and secured to the armature frame to provide flattened outwardly bowed loops, each loop being split into two parts and the middle portion of the spring between the loops being in the form of separated spaced middle continuations of the split loops, a lever bar extending transversely across the separated middle portions of the spring and projecting therefrom at one of its ends, a stud forming a movable contact terminal firmly securing the transverse lever bar adjacent to its projecting end to one of the middle portions of the spring, a fulcrum stud firmly securing the transverse lever bar at its other end to the other middle portion of the spring, a connector piece rigidly mounted upon and insulated from the armature frame, a fulcrum stud bearing of insulating material on the insulated con-

nector piece, a fixed contact terminal carried by the insulated connector piece and cooperative with the movable contact terminal, a guiding slot for a cam roller being provided between the insulated connector piece and the armature frame, a cam roller of insulating material loosely contained in the roller-guiding slot for circuit-breaking engagement with the projecting end of the transverse lever bar, and a cam on the field magnet support engageable with the loosely mounted insulative cam roller for breaking the circuit.

In testimony whereof I have affixed my signature.

GEORGE W. WACKER.