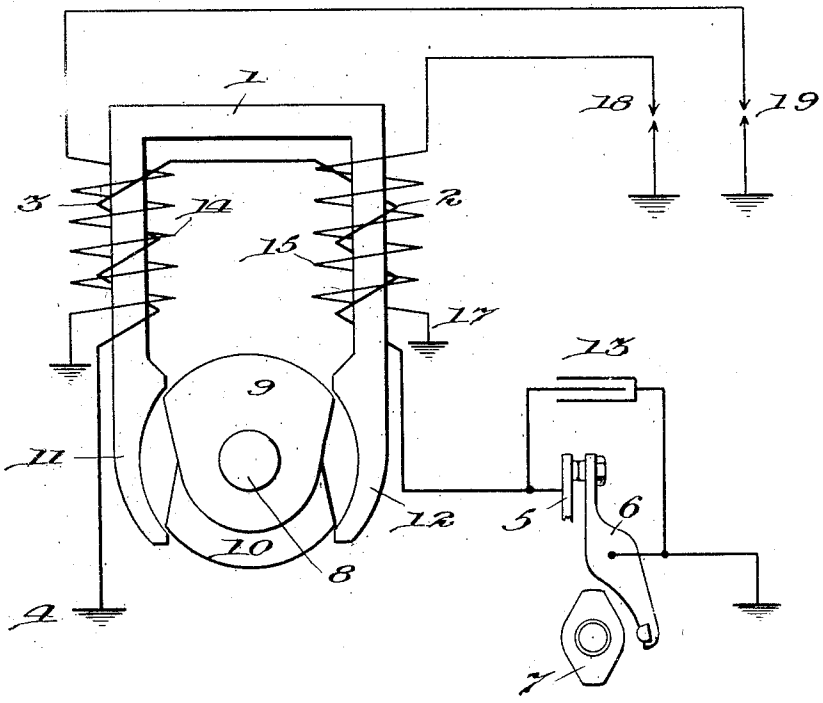
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IGNITION DYNAMO.

APPLICATION FILED JULY 26, 1913.

1,140,993. Patented May 25, 1915.



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IGNITION-DYNAMO.

1,140,993. Specification of Letters Patent. Patented May 25, 1915.

Application filed July 26, 1913. Serial No. 781,415.

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 Ignition-Dynamos, of which the following is a specification, reference being had to the accompanying drawing.

This invention relates to ignition dynamos, and particularly to those of the magneto type, and the object is to provide a machine adapted to produce two simultaneous currents at the same instant.

Another object of the invention is to generate each current in a separate winding, but to dispose all windings so they well be included in the same magnetic circuit.

Further objects of the invention are, to employ the same interrupter contacts for both windings, to produce a simplified structure, to increase the efficiency of the generation and to eliminate the use of special spark plugs.

My invention is illustrated in the accompanying drawing, which is a simplified diagram showing the invention applied to an ignition system with two spark devices such as plugs.

Any form of magneto having a suitable field structure carrying generating windings may be employed. Such a machine is disclosed in my pending application Serial No. 732681, filed Nov. 21, 1912.

The details of construction of the magneto are immaterial except the disposition of the windings on the field structure, hence I shall describe herein only sufficient to illustrate how my invention is embodied and practised.

It is well known that the time required for the propagation of the flame from a single spark throughout the mixture in the cylinder of an internal combustion engine, has been such as to make it necessary to time the magneto, so that the spark would be produced before the piston reaches dead center. In some high speed engines the ignition is advanced as much as 60 degrees. This advance is undesirable for reasons well known to those skilled in the art, and many attempts have been made to secure a more rapid propagation of the flame area whereby the amount of advance could be reduced. It is obvious that if a large single spark could be produced, the flame area would be propagated throughout the mixture much faster, but as the size of a single spark is limited by commercial considerations such as the size of the magneto, etc., it is impossible to materially increase its area. It is also obvious that if two sparks are produced at separate points in the cylinder at the same instant, that the flame area will be more rapidly increased than if a single spark is used. Many attempts have been made to employ two sparks. For example it has been objectionable to use two spark plugs in series but the attempts so far as I know have been unsuccessful as it requires one of the plugs to be provided with two points insulated from the engine cylinder, instead of the usual single insulated point. A very high potential is also necessary to jump two spark gaps. Another plan is to arrange the secondary winding on the magneto so that both ends of same are brought out to a double distributer but this is also objectionable as requiring a high potential, and because it makes the magneto complicated in construction, as it is particularly difficult to insulate both ends of the secondary, as distinguished from the usual practice of "grounding" one end on the frame of the magneto. Other attempts contemplate the use of two armatures with separate interrupters, or other complicated devices, none of which have proven commercially successful.

To obtain the advantages of the double spark ignition without necessitating the use of special spark plugs or other objectionable features, I provide the field structure 1 of the type of magneto disclosed in my pending application hereinbefore mentioned, with two separate primary windings 2 and 3 in series, one end of 3 being grounded as shown at 4 and the remaining end of 2 connected to the interrupter point 5. The movable interrupter point 6 is grounded, and operated by the cam 7, which is mounted on the shaft 8 carrying the rotors 9 and 10 by means of which magnetic impulses of alternately opposite polarity are transferred to the pole shoes 11 and 12 of the field structure. The interrupter contacts are bridged by the usual condenser 13.

Each primary winding is provided with a secondary winding 14 and 15. One end of each secondary winding is grounded as

shown at 16 and 17. The remaining ends are connected to the insulated terminals 18 and 19 of ordinary spark plugs, it being understood that these are both located within the same cylinder, but spaced apart as far as practicable.

It will be observed that as the rotor revolves alternate opposite magnetomotive forces are set up in the field structure and corresponding alternate E. M. F.'s. in the primary windings, while synchronously with these the interrupter contacts 5 and 6 are opened, thereby opening the circuit through the primary winding which in turn affects the secondary windings 14 and 15 and produces simultaneous sparks at the spark plugs.

In the case of multi-cylinder engines, a suitable distributer is inserted in the circuits between the magneto and spark plugs. As such an arrangement is well known, I do not show it.

If for any reason additional simultaneous sparks are necessary, additional windings may be placed on the field structure in any suitable manner. The various windings may be superimposed on each other, or separate secondary windings over a single properly proportioned primary winding may be employed; but in any case the break down or short circuiting of any secondary winding will not affect the remaining secondary winding or windings and consequently one or more spark plugs will always be operative. The potential required is only the normal potential necessary to jump a single gap.

While I have described herein a specific ignition system and arrangement of spark plugs, it is to be understood that the machine embodying my invention is not limited thereto but may be employed in other systems and for other purposes than those herein specifically disclosed.

It should be additionally noted that changes in matters of detail may be made without departing from the spirit of the invention, and I contemplate and intend to cover all such non-essential changes and modifications as fall fairly within the scope of the appended claims.

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

1. In a dynamo electric machine, a primary magnetic field, a secondary magnetic field, means movable between the fields for producing varying magnetomotive forces therein, a primary winding associated with said secondary field, and a plurality of secondary windings associated with said primary winding and having suitable terminals for connection to translating devices.

2. In a dynamo electric machine, a primary magnetic field, a normally fixed secondary magnetic field, means movable between the fields for producing varying magnetomotive forces in said secondary field, a primary winding associated with said secondary field, and a plurality of windings associated with said primary winding having suitable terminals for connection to translating devices, together with an interrupter included in circuit with the primary winding, and means for actuating said interrupter synchronously with the variations in magnetomotive force of the secondary field.

3. In a dynamo electric machine, a primary exciting field, a secondary field structure adjustable with respect to the primary field for purposes of timing, movable means for periodically varying the flux from the primary field through the secondary field, and a plurality of generating windings carried on said secondary field structure, and all adapted thereby to be simultaneously exposed to the same magnetic flux variations, and to be simultaneously timed by the adjustment of one field structure with respect to the other.

4. In a dynamo electric machine, means for furnishing primary magnetic excitation, a magnetic field structure mechanically adjustable for purposes of timing, means for carrying magnetic flux from the primary exciting means to said magnetic field and for varying the same therethrough periodically, a plurality of generating windings mounted on said magnetic structure and simultaneously adjustable therewith for synchronous timing, and interrupting means operated in synchronism with the flux variations with electrical circuit connections from the generating windings controlled by said interrupting means.

5. In a dynamo electric machine, means for furnishing primary magnetic excitation, a magnetic field structure mechanically adjustable for purposes of timing, means for carrying magnetic flux from the primary exciting means to said magnetic field and for varying the same therethrough periodically, a plurality of generating windings mounted on said magnetic structure and simultaneously adjustable therewith for synchronous timing, and interrupting means operated in synchronism with the flux variations, with electrical circuit connections from the generating windings controlled by said interrupting means, said interrupting means being connected to said magnetic field structure for adjustment therewith, whereby the point of the curve of E. M. F. at which interruption takes place, is maintained constant for all the generating windings, in all adjusted positions, and the current discharges delivered therefrom are always of the same predetermined intensity and in perfect synchronism.

6. In a dynamo electric machine for igni-

tion systems, a relatively fixed magnetic field structure, a relatively adjustable generating coil structure of magnetic material, a movable flux carrier driven to shift the magnetic flux from the magnetic field alternately in opposite directions through the generating coil structure, a primary winding on said coil structure, a plurality of secondary windings associated with said primary winding, and an interrupter mechanically associated and operated in synchronous relation with said movable flux carrier, and electrically connected in circuit with said primary winding.

7. In a dynamo electric machine for ignition systems, a relatively fixed magnetic field structure, a relatively adjustable generating coil structure of magnetic material, a movable flux carrier driven to shift the magnetic flux from the magnetic field alternately in opposite directions through the generating coil structure, a primary winding on said coil structure, a plurality of secondary windings associated with said primary winding, and an interrupter mechanically associated and operated in synchronous relation with said movable flux carrier, and electrically connected in circuit with said primary winding, said interrupter being also mechanically connected with the generating coil structure and movable therewith for timing purposes.

8. A dynamo electric machine for ignition systems comprising a fixed magnetic field, a coil structure constituting a secondary magnetic field, a rotor having a pair of permanently oppositely polarized elements each connected to and constituting a movable extension of one pole piece of the fixed magnetic field, said elements in rotating coming into alternate proximity with opposite poles of the coil structure and thereby shifting the magnetic flux from the primary field through said secondary poles alternately in opposite directions, means for adjusting the coil structure or secondary field angularly about the axis of said rotor for timing purposes, an interrupter mechanically connected to said coil structure and adjustable therewith for timing, operating means for said interrupter mechanically connected to the rotor shaft and driving means, a primary winding on the coil structure or secondary field, in circuit with said interrupter, and a plurality of secondary windings associated with said primary winding, having independent circuit connections to ignition devices, whereby absolutely simultaneous and synchronous sparks may be obtained of uniform intensity and volume throughout the entire range of timing.

9. A dynamo electric machine for ignition systems comprising a magnetic field, a rotor excited therefrom, and a normally fixed generating coil having a plurality of separate spark producing windings, with means for producing simultaneous adjustment between all the windings and the rotor for timing purposes.

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

CHARLES THOMAS MASON.

Witnesses:

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