R. VARLEY.

ELECTRIC IGNITION SYSTEM FOR EXPLOSION MOTORS.

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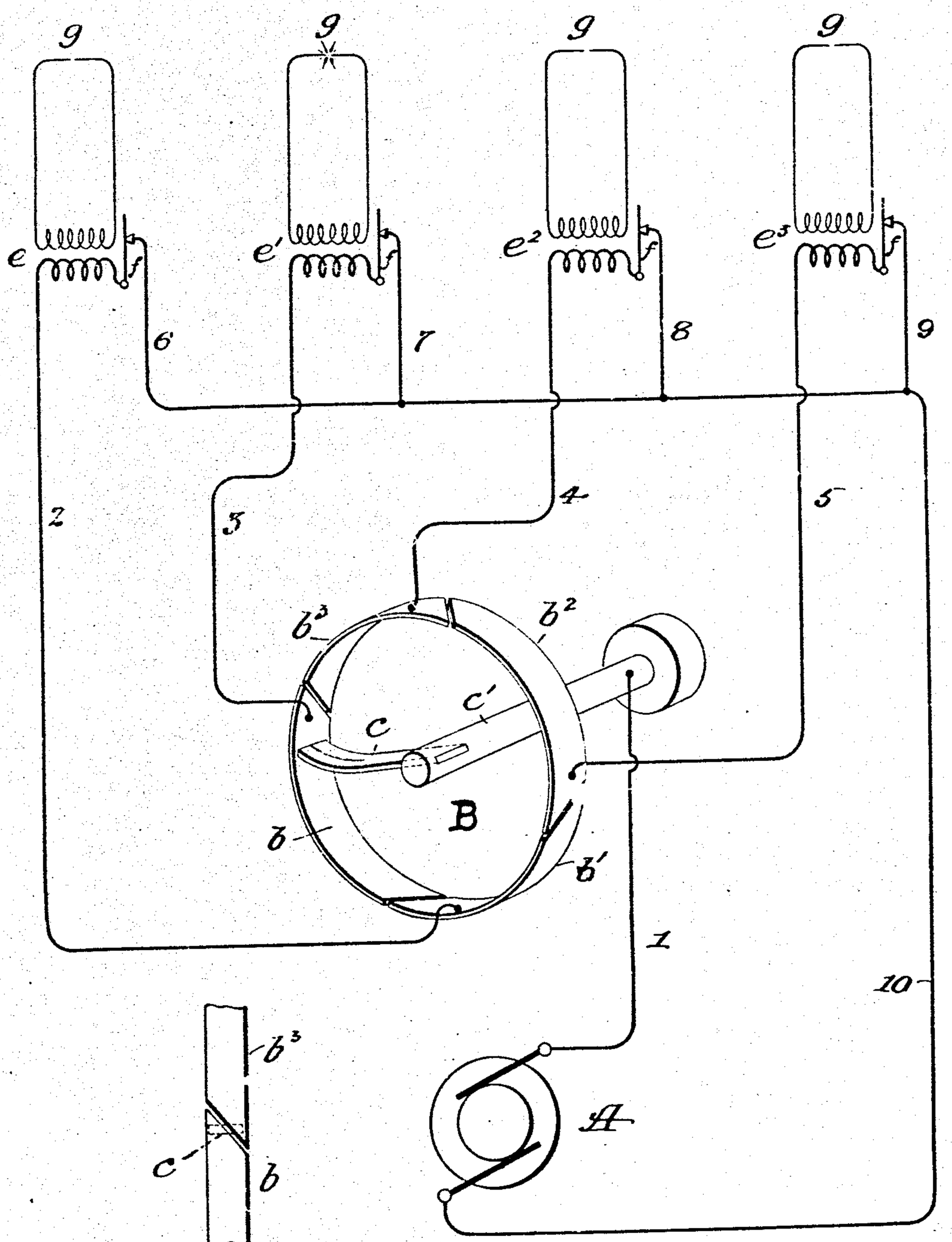
955,618. Patented Apr. 19, 1910.



Witnesses
Frank S. Ober
Waldo M. Chapin

Inventor
Richard Varley
By his Attorneys
Rosenbaum & Stockbridge

UNITED STATES PATENT OFFICE.

RICHARD VARLEY, OF ENGLEWOOD, NEW JERSEY, ASSIGNOR TO THE AUTOCOIL COMPANY, A CORPORATION OF NEW JERSEY.

ELECTRIC IGNITION SYSTEM FOR EXPLOSION-MOTORS.

955,618. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed September 23, 1905. Serial No. 279,775.

To all whom it may concern:

Be it known that I, RICHARD VARLEY, a citizen of the United States, residing at Englewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Electric Ignition Systems for Explosion-Motors, of which the following is a full, clear, and exact description.

This invention relates to ignition systems for explosion motors and has special reference to that class of systems wherein the igniting spark is furnished by a magneto electric machine.

It has been found in practice that a magneto electric machine of the same voltage as a battery will not support the ignition with the same exactness and certainty as the battery; particularly is this the case where a multiple cylinder engine is used. The reason for this is that current supplied by the battery is constant, its full voltage being available at the instant of a closure of its circuit, whereas in the dynamo the current is not constant; that is to say after a break in its circuit, an appreciable time is required to enable it to build up its electro-motive force, so that its full electro-motive force is not immediately available upon the closure of the circuit.

In the operation of explosion motors of the multiple cylinder type it is customary to use a switching device between the source of electricity and the various cylinders, the said switching device having segments corresponding to the respective cylinders and having a moving element adapted to coöperate with the segments and connect with the source of current. As this moving part of the switching device passes from one segment to another, the current from the source is momentarily broken and in case of a dynamo, and particularly of a magneto-electric machine, the cessation of the current creates a self-induction in the currents of the armature which prevents the instantaneous building up of the current when the circuit is again completed. This action results in irregular, unreliable and weak sparking at the instant when the spark is required to be hottest. To overcome this defect in the magneto machine it has been customary to construct them to deliver higher voltages that are actually required for the spark, resulting in a heavier and more expensive machine. The defect noted is present more particularly in small machines such as are used for ignition purposes. In order to overcome this defect without the necessity of building a larger and more expensive machine, I have modified the switching apparatus which is interposed between the dynamo and the engine cylinders in such a way that the current, while being shifted from one circuit to another, is never interrupted at the dynamo, the modification consisting in overlapping the adjacent extremities of the contact segments of the switch, in such a way that the circuit is established through one segment before it is broken through the other.

In the accompanying drawing the figure is a conventional representation of the apparatus and circuits comprised in my invention.

A represents a dynamo or magneto-electric machine supplying current for a four-cylinder explosion motor.

B represents a distributing switch comprising a ring made up of four conducting segments b, b', b^2 and b^3 and a trailer or contact brush c carried by a rotating shaft c'. This shaft and the machine A are supposed to be driven by the motor or engine.

e, e', e^2 and e^3 are, respectively, four induction coils, the primary circuits of which include vibrators f and the secondary circuits terminating in the cylinders of the engine, which are not shown, in a suitable sparking plug or other ignition device indicated by the gaps g. The segments b, b', b^2 and b^3 of the switch are flat bands having their adjacent ends severed diagonally or obliquely so as to overlap each other in such a manner that the tip of the brush 3 which is arranged transversely of the strips will pass into contact with one segment before it leaves the other.

The circuit from the machine A leads by wire 1 to the shaft c', thence to the brush c, then to one or two of the segments, depending upon the position of the brush, then to one or two of the primary windings of the induction coil, over the wires 2, 3, 4 or 5, then through a vibrator or vibrators f, then by wire or wires 6, 7, 8 or 9 to a return conductor 10 leading back to the machine. In the position of the switch shown the current leads from the dynamo through the primary winding by induction e' alone, the corre-

sponding vibrator *f* is supposed to be in activity and the induced currents are supplying a spark at the gap *g* in the secondary circuit. As the brush *c* leads to segment *b* and passes into the segment *b'*, the connection with *b'* is made before it is broken with *b*, thus permitting the current generated by the machine A to flow uninterruptedly, so that at the instant the brush touches the segment *b'*, the full electro-motive force of the machine will be delivered to the primary winding of the induction coil *e* and a spark of maximum heat and body will at once appear at the gap in the secondary circuit of this induction coil, the action of the machine being the same as that of a battery.

I am aware that there is nothing especially new in the construction of the switching apparatus B, but I believe I am the first to provide the combination of apparatus and circuits described for an ignition system.

It is obvious that any of the usual modifications of the switching apparatus may be adopted in place of the specific construction shown. For instance instead of the terminals of the segments being obliquely arranged, the end of the trailing brush may be so arranged or the brush may be in the form of a two-part or double roller, one following the other in the direction of movement. In fact any mechanical arrangement whereby the circuit through one circuit will be established before it is severed through the other, may be adopted.

What I claim, is:—

1. In combination with a plurality of induction coils having primary and secondary windings, spark plugs in the circuits of said secondary windings, a dynamo electric generator having said primary windings successively for its exclusive external circuit, a circuit-controlling device including a plurality of concentric segments respectively connected to the said primary windings and diagonally formed so as to overlap at their ends, and a blade revolving therewithin and connected to said generator, whereby the circuits of said primary windings are broken in succession, while the external circuit of the generator is never broken.

2. In combination with a plurality of induction coils comprising primary and secondary windings, a dynamo-electric generator having continuously at least one of said primary windings in its external circuit, normally open partial circuits each including one of said secondary windings, spark plugs in said circuits, a circuit controlling device comprising a plurality of conductive parts respectively connected to the said primary windings, and means coöperating with said device and electrically connected to said generator for successively interrupting the flow of current through said primary windings while permitting a continuous flow of current through the external circuit of said generator.

3. In combination with a plurality of induction coils comprising primary and secondary windings, a dynamo-electric generator having continuously at least one of said primary windings in its external circuit, normally open partial circuits each including one of said secondary windings, spark plugs in said circuits, a circuit controlling device comprising a plurality of conductive parts respectively connected to said primary windings, and means coöperating with said device and electrically connected to said generator for interrupting the flow of current through each and every one of said primary windings in sequence, while permitting a continuous flow of current through the external circuit of said generator.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

RICHARD VARLEY.

Witnesses:
FRANK S. OBER,
WALDO M. CHAPIN.