D. L. ORDWAY & J. W. BROWN.

CIRCUIT CONTROLLER.

APPLICATION FILED APR. 22, 1909.

1,046,846

Patented Dec. 10, 1912.

2 SHEETS—SHEET 1.

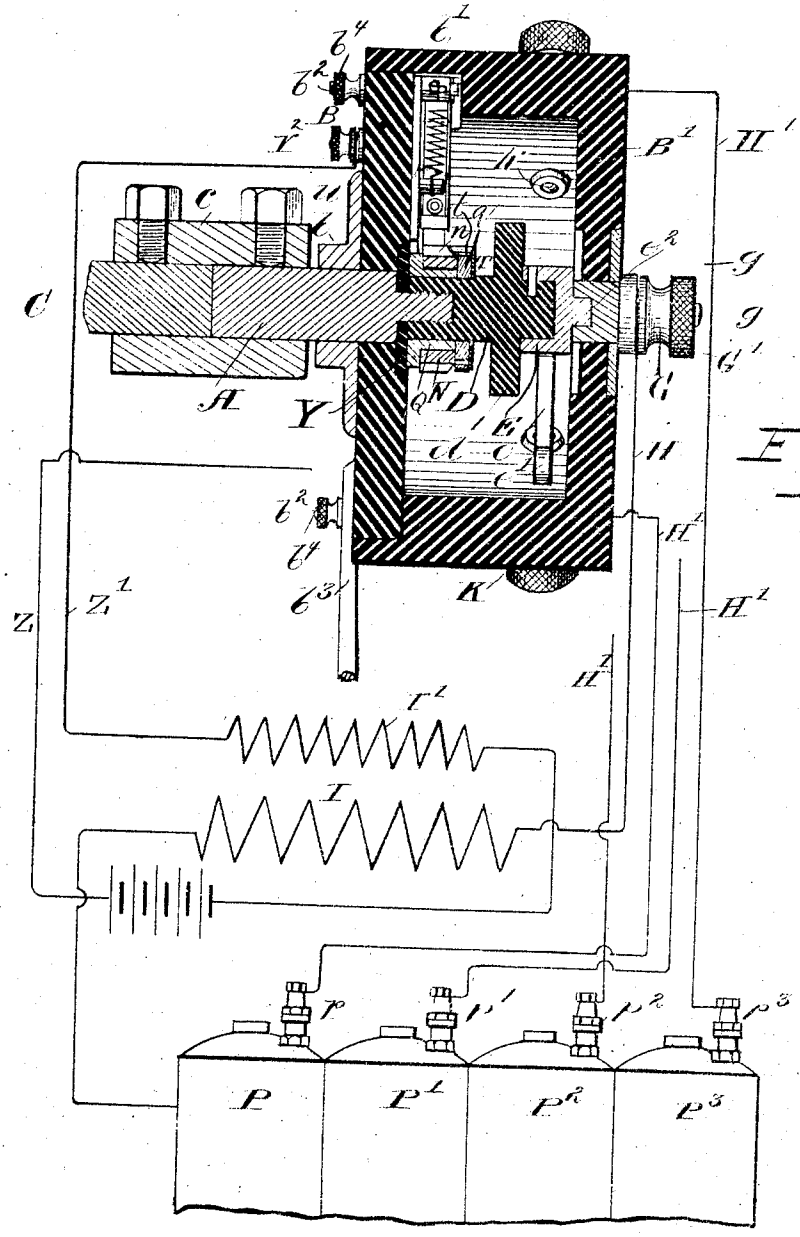


Fig. I

Witnesses:

P. C. Turner

A. L. Lord

Inventors.

Daniel L. Ordway

John W. Brown

By Thurston & Woodward

Attorneys.

D. L. ORDWAY & J. W. BROWN.

CIRCUIT CONTROLLER.

APPLICATION FILED APR. 22, 1909.

1,046,846.

Patented Dec. 10, 1912.

2 SHEETS—SHEET 2.

Fig. 2

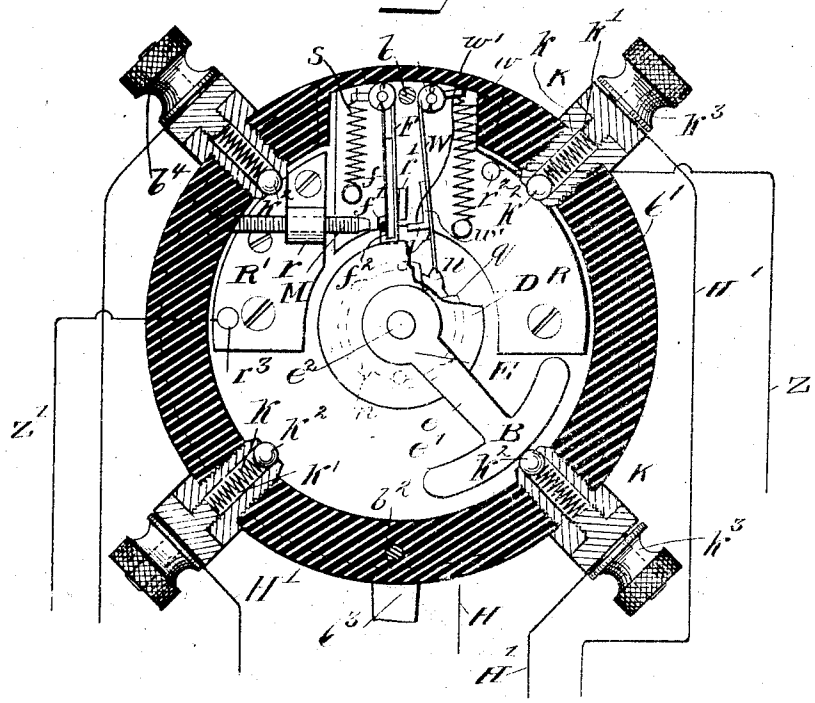
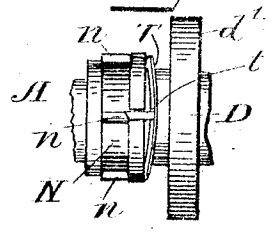


Fig. 3



Witnesses:

J. C. Turner

A. L. Lord.

Inventors

Daniel L. Ordway

John W. Brown

By Thurston Woodward

Attorneys.

UNITED STATES PATENT OFFICE.

DANIEL L. ORDWAY AND JOHN W. BROWN, OF LAKEWOOD, OHIO, ASSIGNORS TO NATIONAL CARBON COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF NEW JERSEY.

CIRCUIT-CONTROLLER.

1,046,846. Specification of Letters Patent. Patented Dec. 10, 1912.

Application filed April 22, 1909. Serial No. 491,444.

To all whom it may concern:

Be it known that we, DANIEL L. ORDWAY and JOHN W. BROWN, both citizens of the United States, and both residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Circuit-Controllers, of which the following is a full, clear, and exact description.

This invention, in the form in which it is illustrated in the drawing, is especially adapted for use on a motor car driven by an internal combustion engine having a plurality of cylinders, and employing an induction coil ignition system, as a means for producing properly timed sparks in the several cylinders.

The object of the invention is to provide a simple and durable device, capable of being easily applied and controlled, and adapted to properly distribute the secondary current to the spark plug, or, if there be more than one, to the spark plugs of the several cylinders in proper sequence; to minimize the drain on the battery-generator by completing the primary circuit for brief, properly timed intervals in order that sparks may be produced in the respective engine cylinders; to prolong the life of the distributing mechanism by both making and breaking the primary circuit while the secondary circuit is closed; to prevent back firing; to prevent short circuiting within the distributing and timing mechanism; and generally to render the device efficient and practical for the stated purpose.

In the drawing, Figure 1 is a central sectional side elevation of a device embodying the invention, and a diagrammatic view of the induction coil, its circuits, etc. Fig. 2 is an end view, with the casing in section of said device; and Fig. 3 is a fragmentary view designed especially to show the spring pawl through which the tappet carrying collar is drawn.

The device includes a small cylindrical case made of insulating material, a shaft rotatably mounted therein, and parts carried and supported by said shaft and case. Said shaft is indicated by A, and it is rotatably mounted in a metallic sleeve b which is fixed to the outer face of the end B of said case. This shaft A is to be fixed to the end of a shaft C by any suitable means, as, for example, an ordinary sleeve coupling c. The shaft C must be a shaft driven from the engine, and when said engine is of the four cycle type this shaft must rotate at half the speed of the engine shaft. The case is composed of the end B and the end B′, the latter having an integral cylindrical flange b' which engages with the end B when the two parts are fastened together. And they may be fastened together by metal bolts b^2 and nuts b^4.

Fixed to the shaft A within the case so as to form an extension of said shaft is a section D made of hard rubber or some other suitable insulating material. On the end of this insulating section, a metal cap E is fixed, which cap carries an arm e having an arc shaped head e'. A metal stud G is secured in and extended through the end member B′ of the case and it has a cylindrical recess in its inner end in which a reduced portion e^2 of the cap E is rotatably supported. The outer end g of the stud G is fashioned to serve as a binding post in connection with the nut G′ which screws onto the same.

Set into the flange b' of the case at regular intervals apart are metallic studs K, there being as many of them as there are engine cylinders. These studs preferably screw through the flange b' and each has a longitudinal hole k drilled through it from its outer end. A ball k^2 is then inserted into this hole, the inner end of which is not large enough to let the ball entirely through, although it does allow it to project so that it may engage the end of head e'. A spring k' yieldingly forces the ball inward as far as it can go, said spring being held in by a plug k^3 which screws into said hole and serves also as a binding post.

I represents the secondary coil, and I′ the primary coil of an ordinary induction coil. One end of the secondary coil is grounded, *i. e.* is connected with the metallic part of the engine. The spark plugs p, p', p^2, p^3, of the cylinders P, P′, P², P³ are electrically connected respectively by wires H′ with said several studs K. The other end of the secondary coil is connected by a wire H with the stud G. The case B, B′, b' has fixed to it an arm b^3 which is adapted to be connected by suitable mechanism with any suitable controlling device, as, for example, the so-called spark lever of the motor. Through this mechanism said case is prevented from

rotating while the shaft A rotates, but permits the case to be turned a little so as to advance or retard the spark. It is clear that during each rotation of shaft A the head e' comes successively into contact with the yielding contact devices, *i. e.* the four balls k^2; thereby successively completing the secondary circuit to the several spark plugs. It will be understood that the type of spark plugs illustrated is that in which the spark jumps from the inner terminal of the spark plug to some part of the metallic cylinder.

The completion of the primary circuit results from the operation of a so-called timer mounted upon the insulating case and inside of the same. This timer includes two metallic plates R, R' fixed to the inner face of the end plates B, and insulated from each other. The terminals of the primary coil are connected by wires Z, Z', with these plates by means of binding posts r^2, r^3. On the plate R' is a boss r which supports the adjustable contact screw M. A lever F is pivoted to plate R and extends from its point of support toward the shaft A. It is under the influence of a spring S tending to swing it away from the screw M. Fixed to the lever F is a small flat contact spring f carrying a contact stud f' located opposite the end of the screw M. The inner end of the lever F extends under the inner end of this spring, and is then bent back to form a finger f^2 which lies in front of the inner end of the spring f. A hammer lever W is also pivoted to the plate R and extends inward from its point of support toward the shaft and in such position that its inner end may be engaged by the four tappets n on a ring N which embraces and normally rotates with said shaft A. A spring w acts to swing this lever toward the lever F and into engagement with a fixed stud r' which limits the spring induced movement of said lever. Fixed to the lever is a finger w' which projects past the stud r' and into engagement with the lever F. As the shaft rotates the tappets n successively strike the lever W and swing it to the position shown in Fig. 2, and then release it to the action of its spring w. The lever flies then to the left striking the lever F a smart blow which swings said lever F also to the left and thereby brings the stud f' against the end of the screw M. The lever F will continue to swing to the left after this contact has been made, the spring f bending as this is happening until the spring S overcomes the momentum of the lever F, stops it and then swings it in the opposite direction. In moving in this direction the finger f^2 engaging with the inner end of the flat spring f draws it to the right and separates the stud f' from the contact screw M. While these contacts are closed, however, the primary circuit is closed, and thereupon an induced current is produced in the secondary coil. When the primary circuit is broken by the separation of the contacts f' and M the secondary circuit being closed, a spark will be produced in the cylinder which then happens to be connected with the secondary coil.

It is to be noted that the timer operates to close the primary circuit, while the head e' of the arm e is in contact with one of the balls k^2, and also that the circuit of the primary coil is broken before the head e' leaves its contact with this ball. There is, therefore, no sparking or burning between the head e' and any of the balls k^2 because these are never brought into engagement or separated while the secondary current is flowing.

The tappets n are projections upon a ring N rotatably mounted upon a metallic sleeve Q fixed to the insulating shaft section D. A spring pawl t supported by this metallic sleeve engages with one or the other of the tappets, and, when the shaft A is going in the right direction, causes said ring to turn with the shaft. When, however, the shaft is turned in the opposite direction, the tappets present a beveled face for contact with said pawl, and thereby push the same back out of the way and permit the shaft to turn without turning said ring. The pawl as shown is a pin with a beveled end which slides through a hole in member q which rotates with sleeve Q being suitably secured thereto, and projects into the path of the tappets. The outer end of the pin is connected with a spring disk T which is fixed in any suitable manner to said member q and exerts its force to move the pawl as described.

One aim in embodying the invention herein claimed has been to make the device as small as possible. This necessitates the placing of the parts pretty close together,—so close that if some means were not provided to prevent it, there might be short circuiting within the device. With this end in view a flange d' on the extension D is located between cap E and the metallic parts of the timer. In order that any spark may jump from the cap to such metallic parts it has to go around this flange, which is, however, made of such diameter as to make this impossible. So also a flange Y of hard hubber is interposed between the metallic sleeve Q and the shaft A.

We claim—

1. The combination of a case made of insulating material, a shaft rotatably mounted in and projecting through one end of the casing, an insulating section secured to said shaft, a metallic arm having a hub which is mounted upon the insulating section, a stud extending through the end of the casing, said stud being provided with a depression, and the head of the arm being provided with a

projection which extends into the said depression in the stud whereby the arm is pivotally supported, said arm being provided with an elongated rounded head, and a series of regularly placed yielding contacts supported in the casing with which the head upon the arm contacts as it rotates.

2. The combination of a case made of insulating material, a supporting shaft rotatably mounted in and projecting through one end of said case, an arm secured to the case wherewith to prevent its rotation, an extension made of insulating material secured to the end of said shaft within said case, a metallic stud extending through and secured to the other end of said case in alinement with said shaft, a metallic cap secured to the end of said insulated shaft section and rotatably supported by said stud, an arm fixed to said cap and having an elongated head, a series of regularly disposed yielding contact devices extended through the wall of said case in position to be engaged by the periphery of said head, a circuit closing device fixed within said case, a pivoted spring actuated lever for operating said circuit closing device, a collar rotatably mounted on said shaft and having a plurality of tappets for engagement with said operating arm, a spring pawl carried by said shaft for engagement with said tappets, and thereby move said collar when the shaft moves in one direction, the tappets and pawl having oppositely inclined surfaces whereby the spring pawl is thrust backward when the shaft is turned in the opposite direction to that mentioned, said insulated shaft extension being provided with an outwardly extended flange between the end cap and said collar.

3. The combination of a case made of insulating material, a shaft rotatably mounted and projecting through one end thereof, a collar carried by said shaft but insulated therefrom, said collar being provided with projections, a spring pressed arm pivoted within said casing and engaging with the projections upon the collar, a fixed contact device, and a second spring pressed arm normally being held out of contact with said contact device, said second spring pressed arm being adapted to be actuated by the movement of the first arm.

4. The combination of a case made of insulating material, a shaft rotatably mounted in and projecting through one end thereof, a collar having projections secured upon said shaft but insulated therefrom, a pivoted spring held lever mounted upon the casing and engaging with the projections upon the collar, a second lever pivoted within the casing and arranged in the path of movement of the first lever, a flexible spring mounted at one end upon said second lever and adapted to be moved thereby, and carrying a contact point at the other end thereof, and a fixed contact carried by the casing thereof with which the contact point upon the second lever is adapted to contact, substantially as described.

In testimony whereof, we hereunto affix our signatures in the presence of two witnesses.

DANIEL L. ORDWAY.
JOHN W. BROWN.

Witnesses:
GEO. M. SMITH,
RAYMOND A. GORDON.