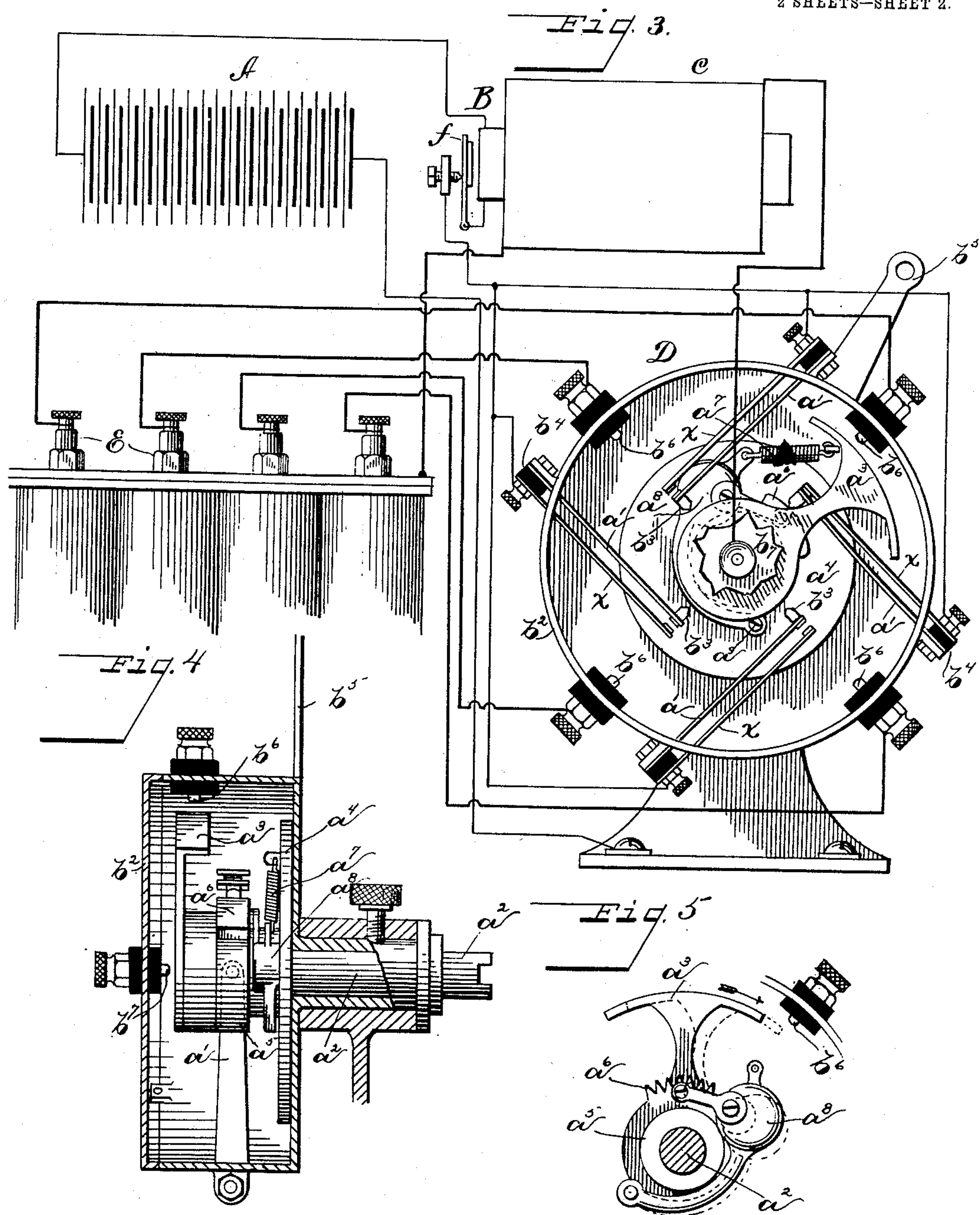


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PATENTED NOV. 6, 1906.

J. N. KELLY.
ELECTRIC IGNITER.
APPLICATION FILED OCT. 29, 1903.

2 SHEETS—SHEET 2.



Witnesses
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JOSEPH N. KELLY, OF DAYTON, OHIO, ASSIGNOR OF ONE-HALF TO G. H. GEIGER, OF DAYTON, OHIO.

ELECTRIC IGNITER.

No. 834,912.

Specification of Letters Patent.

Patented Nov. 6, 1906.

Application filed October 29, 1903. Serial No. 178,988.

To all whom it may concern:

Be it known that I, JOSEPH N. KELLY, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Electrical Igniters, of which the following is a specification.

My invention relates to electrical igniters for gas-engines, and particularly relates to controlling devices therefor. Its object is to provide a device which will automatically vary the time of discharge to correspond with the varying speed of the engine and to provide for thus automatically controlling a plurality of igniters and further permit the time of ignition to be controlled by hand at the will of the operator.

A further object is to provide means to insure the positive breaking of the electric circuit and to avoid the possible leakage of current through the adherence of metallic particles or mineral oil to any of the electric conductors.

A further object is to greatly simplify the construction, as well as the means and mode of operation, of such devices, whereby they are not only cheapened in construction, but are rendered more efficient in operation and unlikely to get out of repair.

With the above primary and other incidental objects in view the invention consists of the means, mechanism, construction, and mode of operation or their equivalents hereinafter described, and set forth in the claims.

Referring to the drawings, Figure 1 is a perspective view of the controller and appurtenances as arranged for use with a single igniter. Fig. 2 is a detail sectional view of a portion of the controller. Fig. 3 is an elevation of the controller (with a portion of the case removed) and its connections as arranged for a four-cylinder engine. Fig. 4 is a vertical sectional view of the controller. Fig. 5 is a detail view of a modification. Fig. 6 is a modification of the controller for a four-cylinder engine.

Like parts are indicated by similar characters of reference throughout the different views.

In the drawings, A represents the battery or source of electrical energy for exciting the induction-coil, of which B is the primary coil, and C the secondary coil. The induction-coil is provided with the usual vibratory

circuit-breaker or buzzer, which is indicated at f.

D is the controller of which the present invention consists and which will hereinafter be described in detail, and E represents the igniters to be intermittently operated.

The controller D consists of a frame or support having a bearing formed therein for the hollow trunnion of a casing b^2 , within which are located the working parts of the controller. The casing b^2 is held normally stationary within the bearing of the frame, but is adjustable therein through the adjusting-screw, as illustrated in Fig. 4. Extending through the hollow trunnion of the casing b^2 is a revoluble shaft a^2 , which is driven from the engine. Rigidly secured to the shaft a^2 is a disk a^4 . There is also loosely journaled on said shaft a^2 a collar a^5 , having a cam-face a^6 , forming a movable or revolving contact, as hereinafter described. The end of the shaft a^2 is formed with a head for retaining the collar a^5 in position, as shown in Fig. 2. Rigidly attached to the movable collar a^5 , but insulated therefrom by suitable non-conducting material, is a segmental distributor-arm a^3 .

The collar a^5 , with the attached distributor-arm a^3 , revolves with the shaft a^2 , being connected therewith by a centrifugal governor mechanism; but said parts are capable of movement independent of said shaft through the influence of said governor mechanism. The centrifugal governing mechanism referred to consists of an arm pivoted at a^9 to the disk a^4 . At its opposite extremity said arm carries a head or weight a^8 . A link (shown in dotted lines in Fig. 6) is pivotally connected to said weight a^8 and to the collar a^5 , respectively. A spring a^7 connects said weight a^8 and the disk a^4 in such manner that as the shaft a^2 is revolved the centrifugal force will cause the weight a^8 to move outward against the tension of the spring a^7 and through the aforementioned link connection will cause the collar a^5 and attached distributor-arm a^3 to oscillate on said shaft a^2 , and thus advance the time of ignition.

Supported upon suitable lugs on the casing b^2 is a double-blade "make-and-break" connection or switch. The respective blades a' and x of the switch are insulated from the case b^2 and also from each other, as at b^4 . At the inner end of the lower blade a' of the

pair is an electrical contact-point b^3 , adapted to be engaged by the cam-face a^6 upon each revolution of the shaft a^2 , which will spring said lower blade a' upward into contact with the upper stationary blade or contact of said switch. Upon the passing of the cam-face a^6 the lower blade will return to normal position, which will leave a break or gap between the respective lower blade a' and upper or stationary blade x of the switch and also between the lower blade and the collar a^5 . As the primary circuit passes through these points, as hereinafter described, the double space or gaps mentioned will insure the prevention of leakage of current.

Arranged about the periphery of the casing b^2 , but insulated therefrom, are one or more electrical connections b^6 . These connections b^6 extend through the wall of the casing b^2 to a point in proximity to the path of the rotary distributor-arm a^3 , thus forming at intervals electrical connection with said distributor-arm, although not necessarily being in absolute contact therewith, a slight air-gap at this point being desirable. Extending centrally through the side of the casing b^2 , but also insulated therefrom, is an electrical connection b^7 . The connection b^7 extends to a point in proximity to the axis of the distributor-arm a^3 and is constant in its relation therewith. Like the connections b^6 , the connection b^7 is in electrical connection, although not in absolute contact, with said arm a^3 , a slight intervening space being desirable here also.

Referring to Fig. 1, it will be seen that the primary circuit extends from the primary coil B to the frame or support of the device, thence to the shaft a^2 , which is in electrical contact with the support, through the hollow trunnion of the casing b^2 . From the shaft a^2 the circuit extends to the collar a^5 , which carries the cam-face a^6 . As the shaft revolves the cam-face a^6 engages the contact-point b^3 on the lower blade a' of the switch, thus closing one break of the circuit. Continuing the rotation, it forces said blade upward into contact with the stationary blade x , thus closing the second break in the circuit, and the current passes from the cam-face a^6 , through the contact-point b^3 , to the upper or stationary blade x of the switch, which is electrically connected with the battery A. A connection between the battery and the primary coil B completes the circuit. Upon the further rotation of the shaft a^2 the lower blade a' of the switch assumes its original position, causing a break in the circuit on both sides thereof—i. e., between the cam a^6 and said lower blade and between the respective blades of the switch. Thus the lower blade of the switch, with its contact-point b^3 , becomes a "dead" member interposed between the rotary terminal or cam a^6 and the stationary terminal or upper blade of the

switch a' . The sole purpose of said lower blade and contact b^3 is to connect said rotary and stationary terminals at stated intervals.

It has been found in practice that in devices of the commutator type where the stationary terminal is in contact with the rotating body, one segment of which constitutes the movable terminal, the constant wiping of the parts and the adherence of metallic particles forms a metallic path about the rotary member, which results in the leakage of current, which may also result from a drop of mineral oil between the contacts. By the construction as above described, with an interposed dead member and a gap on either side thereof, such danger of leakage of current is obviated.

Upon the closing of the primary circuit through the switch parts x and a' , as described, the secondary current will pass from the coil C to the connection b^7 and thence to the rotary distributor-arm a^3 , from which it will pass in succession to each of the connections b^6 as the arm a^3 passes the respective connections b^6 during its rotation. From the connection b^6 the current passes to the igniter and thence returns to the coil C, thus completing the circuit.

In order that the primary circuit may be closed as the distributor-arm a^3 approaches each of the connections b^6 , a plurality of switches a' are provided, one for each connection b^6 or each igniter to be operated, as shown in Fig. 3. When more than one igniter is to be operated, the primary circuit is formed with a number of branches, one of which leads to each switch a' , as shown in said Fig. 3. However, the same result may be accomplished by the use of a single switch a' and a multiple of cam-faces to close said switch at proper intervals, as illustrated in Fig. 6.

It may sometimes be desirable to give to the switch a' a vibratory movement or cause said switch to make and break with great rapidity during the moment the igniter is being discharged. This may be accomplished by a series of serrations in the cam a^6 , as illustrated in Fig. 5. The time of the discharge may be advanced or delayed at the will of the operator by the oscillation of the casing b^2 within its bearing in the main support, carrying with it the connections b^6 independent of the distributor-arm a^3 , an arm b^5 being provided for this purpose.

Having thus described my invention, I claim—

1. In a device as described, the combination with a primary and a secondary electric circuit, of a rotary terminal and a stationary terminal in said primary circuit, the stationary terminal being in the path of the rotary terminal, a normally dead member in proximity to the stationary terminal and in position to be brought in contact therewith by

the rotary terminal, whereby said member is interposed between said terminals at a certain point in the revolution of the rotary terminal and at intervals an electrical connection is formed between said terminals, substantially as specified.

2. In a device as described, the combination with an electric circuit of a movable contact, a stationary contact, a member interposed between, but normally disconnected from both said contacts, and means for bringing said interposed member synchronously into electrical connection with both said contacts, substantially as specified.

3. In a device as described, an electric circuit, a rotary member forming one terminal of said circuit, a stationary terminal, a member between said terminals and normally independent of said circuit, said rotary member having a cam-face which engages said member to force same into contact with said stationary terminal and complete the circuit, substantially as specified.

4. In a device as described, an electric circuit, a rotary shaft and cam-shaped contact carried by said shaft but capable of move-

ment independent thereof, a stationary contact, an elastic member intermediate and independent of said contacts but adapted when engaged by said cam-shaped contact to engage said stationary contact and close said electric circuit, and a centrifugal governor connected with said cam-shaped contact to automatically advance or delay the moment of closing of said circuit, substantially as specified.

5. In a device as described, an electric circuit, a rotary terminal and a stationary terminal in said circuit, a member interposed between said terminals and normally independent thereof, but in position to be brought in contact with the stationary terminal to complete the circuit when engaged by the rotary terminal, substantially as specified.

In testimony whereof I have hereunto set my hand this 10th day of October, A. D. 1903.

JOSEPH N. KELLY.

Witnesses:

OLIVER H. MILLER,
CLIFTON P. GRANT.