T. HUBERT.

ELECTRIC IGNITION DEVICE.

APPLICATION FILED NOV. 23, 1906.

1,045,405.

Patented Nov. 26, 1912.

2 SHEETS—SHEET 1.

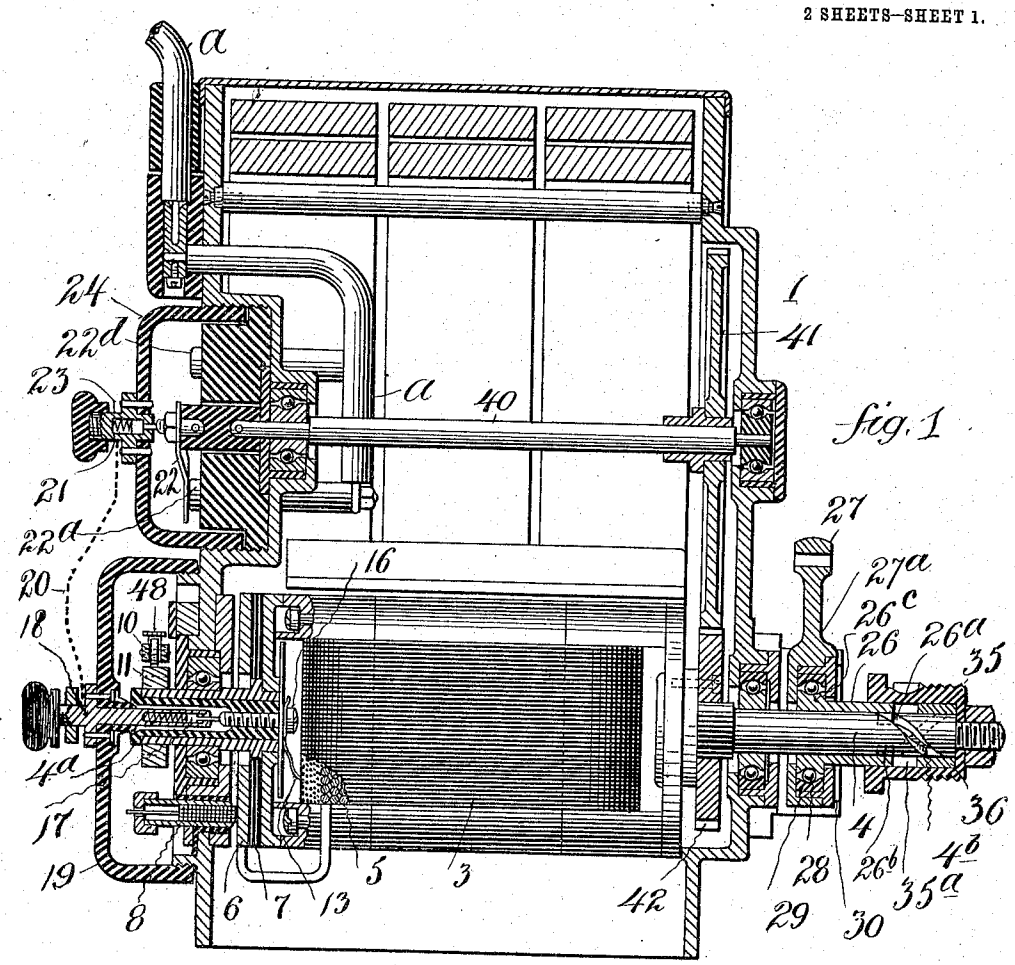

fig. 1.

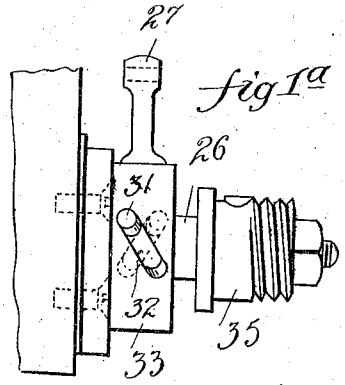

fig 1a

Witnesses
C. F. Benjamin
L. Dimitow

Inventor
Theodore Hubert.
By his Attorney
A. P. Bourne

T. HUBERT.

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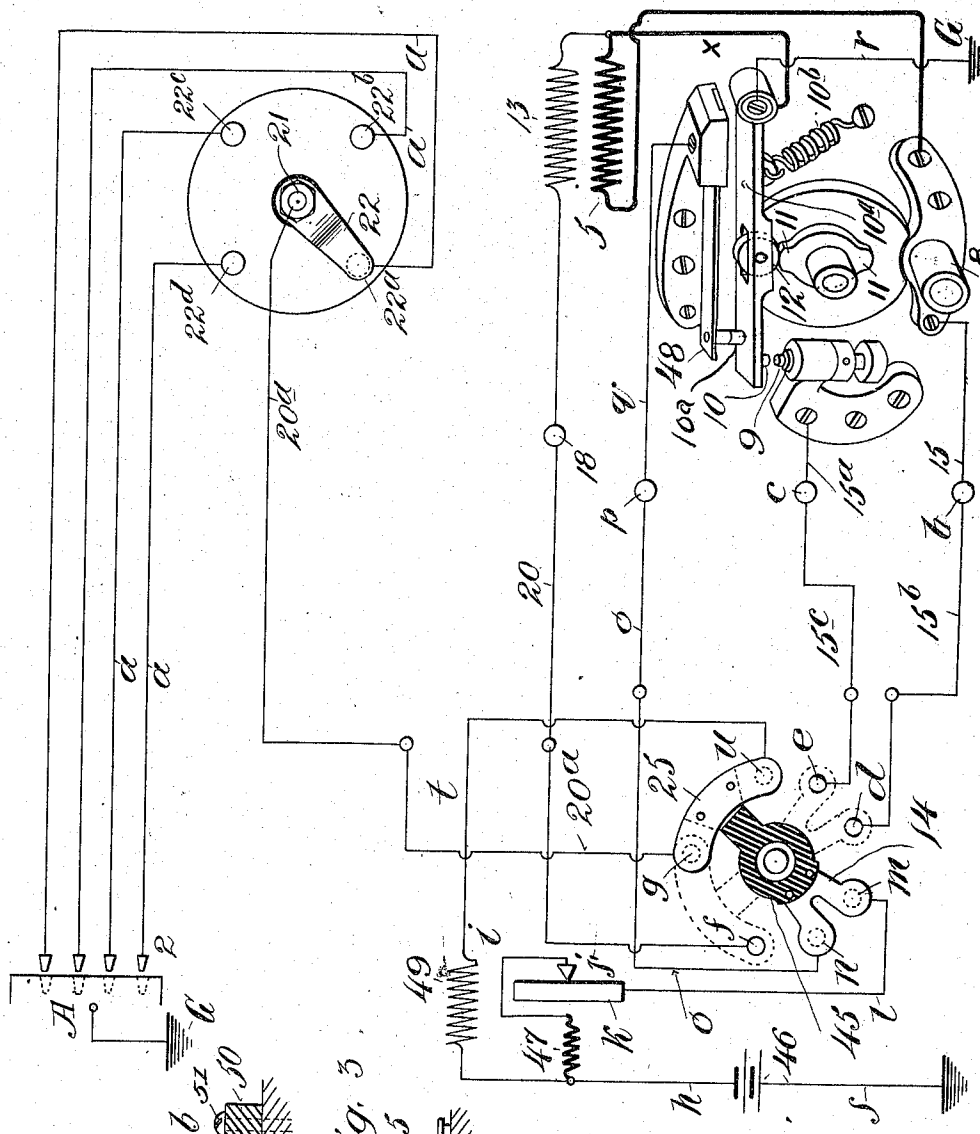

Fig. 2.

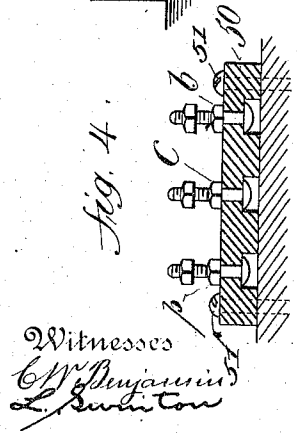

Fig. 4.

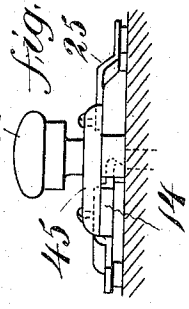

Fig. 3.

Witnesses

C. W. Benjamin

L. Burlington

Inventor

Theodore Hubert

By his Attorney

T. F. Bourne

UNITED STATES PATENT OFFICE.

THEODORE HUBERT, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO SPLITDORF ELECTRICAL CO., OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ELECTRIC IGNITION DEVICE.

1,045,405. Specification of Letters Patent. Patented Nov. 26, 1912.

Original application filed April 4, 1906, Serial No. 309,736. Divided and this application filed November 23, 1906. Serial No. 344,703.

To all whom it may concern:

Be it known that I, THEODORE HUBERT, a citizen of the United States, and resident of New York city, borough of Brooklyn, New York, have invented certain new and useful Improvements in Electric Ignition Devices, of which the following is a specification.

This application is a division of my application filed April 4, 1906, Serial No. 309,736, for improvements in electric ignition devices, and my present invention has for its object to provide improvements whereby sparks may be produced at the same spark plugs either by means of a magneto or by means of a battery and vibrator coil or coils, at will, by a simple manipulation, whereby the magneto may be cut out and the battery cut in circuit, or vice versa.

My invention comprises the novel arrangements and combinations of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming part hereof, wherein Figure 1 is a central sectional view of a magneto having primary and secondary circuits adapted for use with my improvements, Fig. 1ª is a detail view hereinafter referred to, Fig. 2 is a diagrammatic view illustrating the combined magneto and battery ignition circuits and controlling devices, Fig. 3 is a detail view of the switch shown in Fig. 2, and Fig. 4 is a detail sectional view illustrating a support for binding posts.

Similar numerals and letters of reference indicate corresponding parts in the several views.

The magneto 1 may be of any well known construction provided with a distributer for distributing the secondary current to igniting devices or spark plugs 2. The armature 3 is mounted to rotate within usual fields, (not shown) and shaft 4 of the armature is rigidly attached thereto and mounted in suitable bearings carried by the magneto frame. The primary winding 5 of the armature is shown connected with a metal plate 6 rigidly carried by the armature but insulated therefrom, as by insulation 7, and engaging a brush 8 carried by but insulated from the frame of the magneto. At 9 is a contact in the primary circuit supported by and insulated from the frame of the magneto, and at 10 is a movable contact shown carried by a pivoted arm 10^a supported by the frame of the magneto, which arm may be grounded through the frame with which one terminal of the primary winding may also be grounded. The contact 10 is operated by a cam 11 carried by the magneto shaft 4^a, said cam being shown provided with two projecting portions to engage a roller 12 of arm 10^a, a coil spring 10^b serving to pull the arm toward the cam, all whereby when the primary magneto circuit is closed and opened the discharge in the secondary armature winding 13 will be produced in well known manner in high tension magnetos. To control the magneto primary circuit at will I provide a switch indicated at 14 in a branch line 15 as more fully hereinafter explained.

The secondary magneto winding 13 is shown connected by a screw 16, insulated from shaft 4^a, with a spring pressed contact 17 in circuit with a binding post 18 shown carried by an insulating cap 19 screwed upon the magneto frame, the post 18 being shown connected (Fig. 1) by wire 20 with a post 21 in circuit with a distributer contact 22, as by means of a spring pressed contact 23 shown carried by an insulating cap 24 attached to the magneto frame, the opposite terminal of the secondary winding being grounded through the magneto frame, as indicated in Fig. 2. As shown in Fig. 2 and as hereinafter explained I provide a switch, as at 25, in the secondary magneto circuit. With the arrangements above described and the primary and secondary magneto circuits closed, current will be generated during the rotation of armature 3 as in well known high-tension magnetos, the discharges in the secondary circuit being produced during the make and break of the primary circuit as the contacts 9, 10.

I have shown means to advance and retard

the ignition or sparking in internal combustion engines by advancing and retarding the armature 3 with respect to the armature driver or pistons of the engine, and also for advancing and retarding the movable contact 22 of the distributer, as follows: Upon the magneto shaft 4 is loosely mounted a sleeve 26 provided with one or more projections or pins 26^a, 26^b that enter spiral grooves 4^b in shaft 4, and upon sleeve 26 is mounted an arm 27 whose hub portion 27^a is so connected with sleeve 26 as to rotate with respect thereto and yet not have lateral motion independent of said sleeve. I have shown ball bearings interposed between hub 27^a and sleeve 26, the latter being shown provided with a ball race 26^c receiving the balls 28 that are within a ring or the like 29 carried by hub 27^a and shown held in place by a retainer 30.

Hub 27^a is shown provided with pins 31 that extend into slots 32 in blocks 33 secured on the magneto frame (see Fig. 1^a) which slots are disposed at an angle to the plane of arm 27, said slots extending in opposite directions whereby as arm 27 is rocked in either direction around shaft 4 said arm and thereby sleeve 26 will be caused to move to the right or left the desired distance along shaft 4 by reason of the ball bearings interposed between said sleeve and hub 27^a. This sliding motion of sleeve 26 on shaft 4 will, by reason of the projections 26^a of sleeve 26 entering grooves 4^b in shaft 4, cause said shaft to be rotated more or less and thus will adjust the armature correspondingly with respect to its fields and thereby with respect to the point of connection between shaft 4 and its driving part, such as an engine shaft, cam 11 being similarly adjusted with respect to contact 10. Connection is to be made between the driving part or an engine shaft and sleeve 26 so that shaft 4 of the armature will be free for adjustment with respect to the engine shaft and yet be rotated thereby, and to this end I have shown a sleeve or driving part 35 mounted freely upon shaft 4 and provided with internal grooves 35^a that receive the arms or projecting portions 26^b of sleeve 26, in the nature of a tongue and groove connection, whereby sleeve 26 may slide along shaft 4 freely with respect to sleeve 35 and maintain rotary connection therewith.

The sleeve 35 is to be rigidly connected with a driver, as with a shaft of a gas engine, whereby the rotation of said shaft will be communicated to armature 3. With arm 27 in position to cause retarded breaks in the secondary circuit of the magneto the explosions in the engine cylinder, indicated at A, Fig. 2, will be "late," and to advance the spark in the cylinder the arm 27 will be rotated a suitable distance to cause it to move laterally thereby moving sleeve 26 to the right (in Fig. 1) to rotate shaft 4 forwardly independently of sleeve 35, thereby also advancing cam 11 with respect to contact 10, whereby the break in the primary magneto circuit will be caused to occur earlier than before, and so on according to the position of arm 27. To retard the spark, arm 27 is moved reversely thereby correspondingly rotating shaft 4 and armature 3 reversely with respect to sleeve 35, thus retarding the breaking of the primary magneto circuit with respect to the engine pistons.

The distribution of the secondary current for a plurality of spark plugs 2 of the engine cylinders is produced by the contact 22 whose shaft 40 is geared to the shaft of the armature, as in the ratio of two to one for a four cylinder engine, by means of gears 41 and 42 carried by said shafts respectively, as shown in Fig. 1, and thereby it will be understood that as shaft 4 and its armature 3 are advanced or retarded with respect to the driving part or engine shaft the distributer contact 22, through said gearing, will be correspondingly advanced or retarded to cause the distribution of the secondary current for the several cylinders of the engine to accord in time and position with the breaking of the primary circuit of the magneto, the contact 22 controlling contacts 22^a, 22^b, 22^c and 22^d, to be connected with wires *a* with the spark plugs 2.

The above described magneto, and the means for advancing and retarding its armature with respect to its driver or an engine shaft illustrate a high tension generator adapted for use in connection with my improvements, and I have shown in Fig. 2 means whereby a battery circuit and vibrator coil or coils may be used in connection with said high tension magneto and its circuits, and wherein when the battery circuits are being used the magneto circuits may be cut out, and vice versa. To this end I have shown the wire 15 of the primary magneto circuit connected with a binding post *b* and the wire 15^a of said circuit connected with a binding post *c*, wires 15^b, 15^c connecting said posts *b* and *c*, respectively, with contacts *d* and *e*. The circuit through contacts *d* and *e* is adapted to be opened and closed by the contact or switch 14 that is shown secured to an insulating block 45 controlled by a handle or button 45^a, suitably journaled, whereby when circuit is closed at *d*, *e* the current will flow from brush 8 through 15, 15^b, *d*, 14, *e*, and 15^a, the contacts 9 and 10, and thence through the primary coil of the magneto back to brush 8. The secondary circuit of the magneto is also to be opened and closed with the opening and closing of the primary circuit thereof, and to this end the circuit,

instead of running direct from post 18 to post 21 by wire 20, as in dotted lines in Fig. 1, may be arranged as follows:—From the post 18 (such as a terminal of winding 13), wire 20 leads to the contact f and wire 20^a leads from contact g to post 21 and thence to contact 22, and switch 25 is adapted to close the circuit between contacts f and g at the time that switch 14 closes the circuit between contacts d and e, as shown in dotted lines in Fig. 2. Switch 25 is shown secured to insulating piece 45 so as to be operated coincidently with switch 14. Thus, when switch 25 closes circuit between contacts f and g the secondary circuit of the magneto will be from the secondary winding 13 through post 18, wire 20, contact f, switch 25, contact g, wire 20^a, contact 22, and through contacts 22^a, 22^b, 22^c or 22^d and wire a to ground at the engine, and thence through the frame of the magneto back to the secondary winding, as indicated by wire x in Fig. 2.

The battery, with the primary and secondary of the vibrator coil and their circuits are indicated in Fig. 2 as follows:—From battery 46 the wire h leads to the primary coil 47, and thence by wire i, contact j, and vibrator spring k through wire l, to a contact m, and from an associate contact n, through wire o, post p, and wire q, to a spring or contact 48 adapted to make and break circuit with movable member 10^a, which member leads thence back to the battery as by ground through the mechanism, indicated in Fig. 2 by wires r and s to ground. The contacts b, c, and p are shown carried by an insulating piece 50, such as rubber, that may be held upon the magneto frame by screws 51, (see Fig. 4). Switch 14 is adapted to open and close the circuit through contacts m and n, and when in such position, as shown in Fig. 2, the rotation of cam 11 will cause the primary battery circuit to be made and broken at contacts 10 and 48. Thus it will be seen that the time of the make and break between contacts 10^a and 48, caused by the lifting of contact 10^a by cam 11, will be slightly retarded with respect to the make and break between contacts 9 and 10 of the primary magneto circuit, so that, for instance, when the engine is being started by means of the battery circuit the spark will be slightly retarded with respect to the time of the retarded spark produced by the magneto, because the latter occurs at the break between contacts 9 and 10 and the battery circuit break does not occur until after the cam has left arm 10^a and spring 10^b has pulled the latter from contact 48, thereby making it more safe to the operator, as respects a "back kick" from the engine, to start the engine with the battery circuit. The secondary winding 49 of the vibrator coil is grounded at one terminal, as through the mechanism, or through wire h in Fig. 2, and the wire t, leads from the other terminal to the contact u to be engaged by switch 25 to place said winding in circuit with contact 22 through contact g and wire 20^a when switch 25 is in the position shown in Fig. 2. Thus, when the battery primary circuit is closed by switch 14 at contacts m, n, the battery secondary circuit will be from ground or the mechanism through winding 49, wire t, contacts n and g, switch 25, wire 20^a, contact 22, and through contacts 22^a, 22^b, 22^c or 22^d and wire a to the engine and back to ground.

From the foregoing it will be understood that by simply turning button 46 for contacts d, e, and f, g the magneto primary and secondary circuits may be closed for operating the igniting devices while the battery primary and secondary circuits will be broken, and that by placing the switch in the position shown in full lines in Fig. 2 the magneto primary and secondary circuits will be broken while the battery primary and secondary circuits will be closed for the igniting devices.

As the switch 14, as shown in Fig. 2, is adapted to control both the primary of the magneto circuit and the primary of the battery circuit I have shown said switch forked so that each arm of the switch may make firm contact with the contacts d and e of the magneto secondary circuit to prevent injury from sparks thereat.

My invention is not limited to the details of construction and arrangements of parts shown and described as they may be varied without departing from the spirit thereof.

I do not, in this application, claim the mechanism of the magneto shown and described, as that is claimed in my pending application, Serial No. 309,736, before mentioned; nor do I claim the circuit breaker for the battery and magneto primary circuits, since that is claimed in my application, Serial No. 344,702.

Having now described my invention what I claim is:—

1. The combination of a magneto having an armature provided with primary and secondary windings, circuits for such windings, and a switch device to simultaneously make or break said circuits, with a battery and induction coil having primary and secondary circuits, said circuits being provided with contacts arranged to be opened and closed by said switch device, said contacts being so located that the primary and secondary circuits of the coil may be opened when the primary and secondary circuits of the magneto windings are closed, and vice versa and means to advance or retard the magneto armature.

2. The combination of a magneto having an armature provided with primary and secondary windings, circuits for such windings, and a switch device to simultaneously make or break said circuits, with a battery and induction coil having primary and secondary circuits, said circuits being provided with contacts arranged to be opened and closed by said switch device, said contacts being so located that the primary and secondary circuits of the coil may be opened when the primary and secondary circuits of the magneto windings are closed or vice versa, and a distributer for said secondary circuits having a conductor common to the secondary circuits of the magneto and the coil and means to advance or retard the magneto armature.

3. The combination of a magneto having an armature provided with primary and secondary windings, circuits for such windings, and contacts therein, and a switch device to make or break said circuits simultaneously at said contacts, a distributer for said secondary circuit, and a contact included in said circuit, with an induction coil having primary and secondary circuits to be controlled by said switch device, said contact of said distributer circuit being common to the magneto and coil secondary circuits, and means to advance or retard the magneto armature.

4. The combination of a magneto having primary and secondary windings on its armature and a make and break device having a movable member for its primary circuit, with a battery and an induction coil having primary and secondary circuits, a contact in the coil primary circuit separate from the make and break device of the magneto primary circuit and controlled by the movable member of the magneto primary circuit, and means for breaking the magneto circuit while the coil circuit is closed and vice versa.

5. The combination of a magneto having primary and secondary windings on its armature, a movable member to make and break said primary circuit, and means operated by the magneto armature to control said circuit, with a battery and induction coil having a primary circuit contact separate from the make and break devices of the magneto primary circuit, arranged to co-act with the movable member of the magneto primary circuit to make and break the primary circuit of the coil, and means to open the magneto primary circuit while the coil primary circuit is closed, and vice versa.

6. The combination of a magneto having primary and secondary windings on its armature, a movable member, make and break contacts in said primary circuit, and means to operate the movable member thereof, with a battery, and an induction coil having primary and secondary circuits, said coil primary circuit having make and break contacts separate from the first named contacts, said movable member being common to the magneto and the coil primary circuits.

7. The combination of a magneto having primary and secondary windings on its armature, a movable member, make and break contacts in said primary circuit, and means to operate the movable member thereof, with a battery, and an induction coil having primary and secondary circuits, said coil primary circuit having make and break contacts separate from the first named contacts, said movable member being common to the magneto and the coil primary circuits, and means to close the magneto primary and secondary circuits while the coil primary and secondary circuit are broken, and vice versa.

8. The combination of a magneto having primary and secondary windings on its armature, and a switch device to simultaneously make or break said circuits, with a battery and an induction coil having primary and secondary circuits, said circuits being provided with contacts arranged to be opened and closed by said switch device, said contacts being so located that the primary and secondary circuits of the coil may be opened when the primary and secondary circuits of the magneto windings are closed or vice versa, and a distributer for said secondary circuits having a conductor common to the secondary circuits of the magneto and the coil, said distributer having a movable member rotatively connected with the magneto armature, and means for advancing and retarding the armature and said distributer member simultaneously.

9. The combination of a magneto having primary and secondary windings on its armature, and a switch device to simultaneously make or break said circuits, with a battery and an induction coil having primary and secondary circuits, said circuits being provided with contacts arranged to be opened and closed by said switch device, said contacts being so located that the primary and secondary circuits of the coil may be opened when the primary and secondary circuits of the magneto windings are closed or vice versa, and a distributer for said secondary circuits having a conductor common to the secondary circuits of the magneto and the vibrator coil, said distributer having a movable member, gearing connecting said member with the magneto armature, and means for advancing or retarding said armature and said distributer member coincidently.

10. The combination of a magneto having primary and secondary windings on its armature and a circuit provided with a contact, an induction coil having a circuit provided

with a contact separate from the first named contact, a distributer having a circuit common to the magneto and coil and provided with a contact, a rotary switch having an insulating piece provided with a plurality of contacts, one of said contacts being arranged to make and break the magneto and the coil circuit independently, the other of said contacts being arranged to control the said distributer circuit.

THEODORE HUBERT.

Witnesses:
T. F. BOURNE,
L. SWINTON.