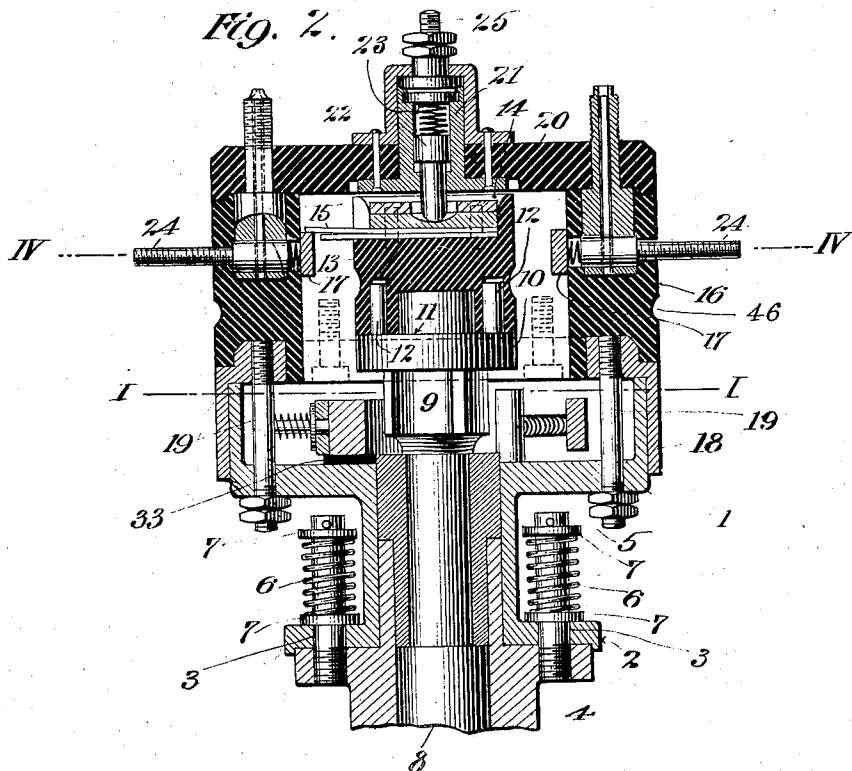
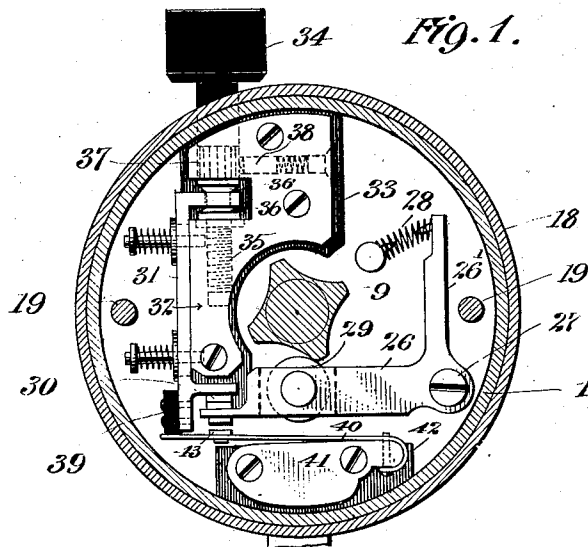


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3 SHEETS—SHEET 1.



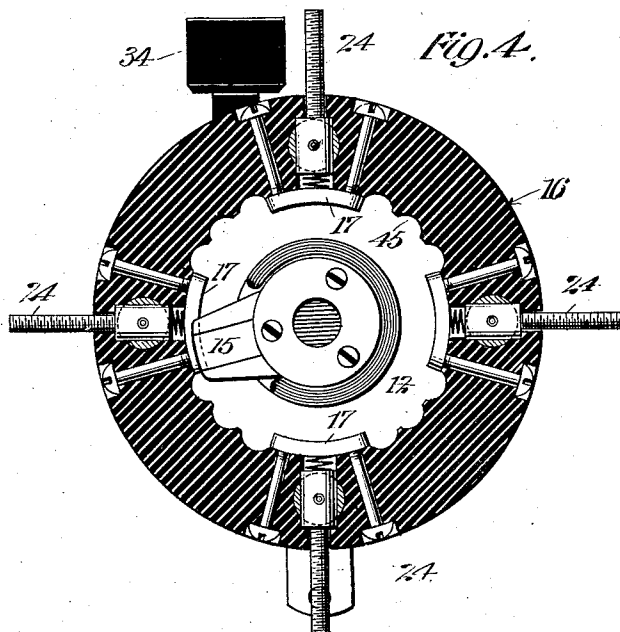
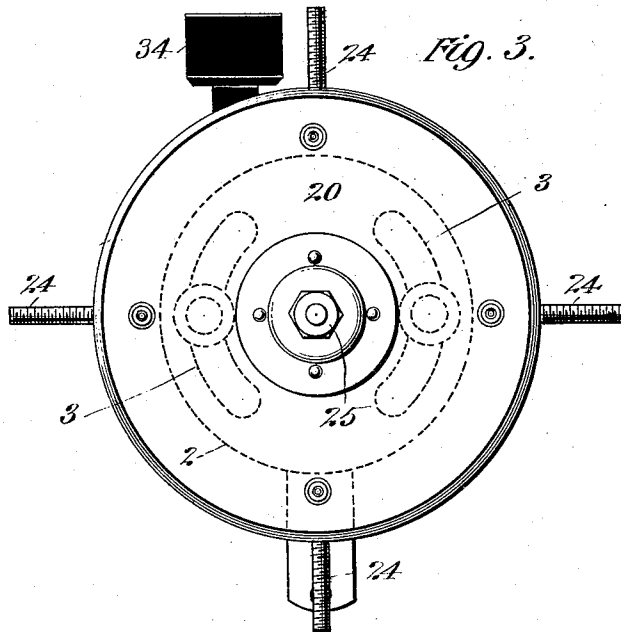
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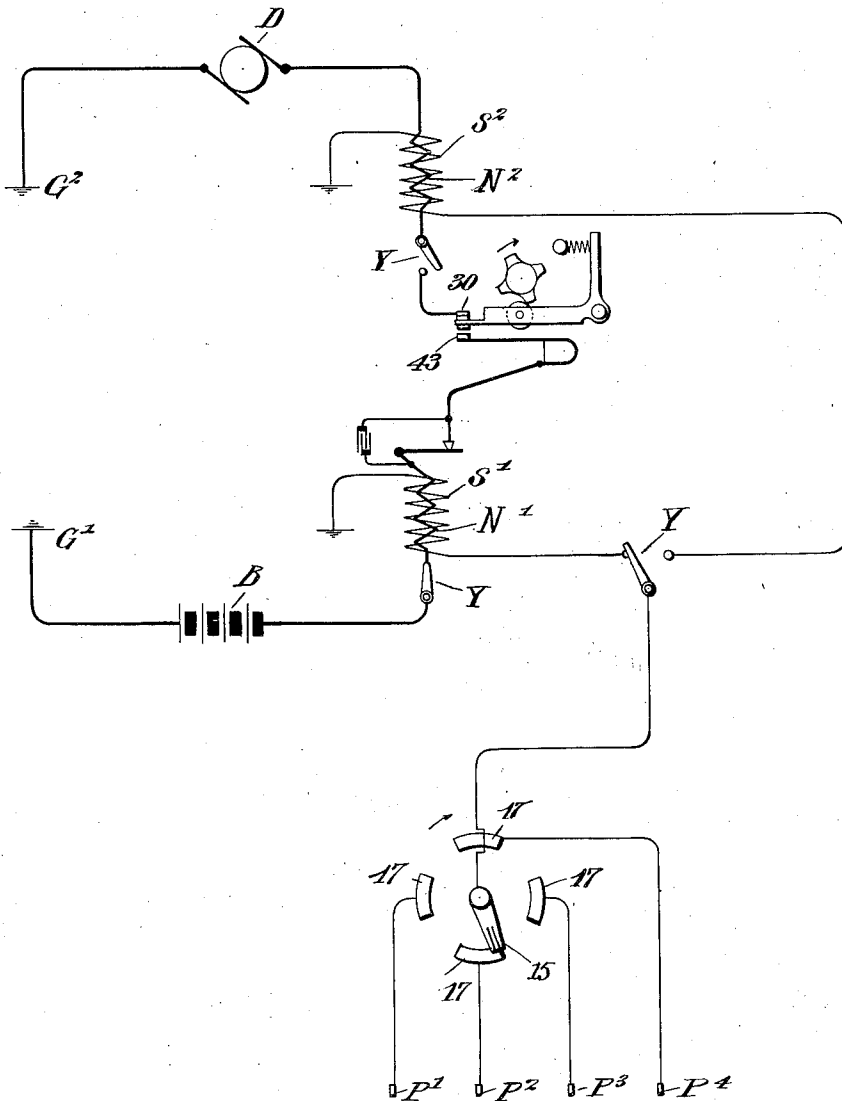
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Fig. 5.



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UNITED STATES PATENT OFFICE.

RICHARD VARLEY, OF ENGLEWOOD, NEW JERSEY, ASSIGNOR TO THE AUTOCOIL COMPANY,
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IGNITION SYSTEM FOR EXPLOSION-ENGINES.

No. 902,783.

Specification of Letters Patent.

Patented Nov. 3, 1908.

Application filed October 1, 1906. Serial No. 336,860.

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 Ignition Systems for Explosion-Engines, of which the following is a full, clear, and exact description.

My invention relates to an ignition system for explosion engines, and pertains to several features of improvement in a combined timer and distributor of the general type employed in connection with a single induction coil for discharging it successively in the different cylinders.

One of the principal objects of the invention is to provide a timer and distributor of the above character which is capable of use when a dynamo furnishes the primary current, and when a battery furnishes the primary current, without readjustment, or any other manipulation than switching into circuit the required source.

A further object of the invention is to provide a single means projecting from the casing for adjusting the primary current duration or dwell, to suit any special conditions; or to compensate for wear of the parts. This adjustment is furthermore secured simultaneously for both dynamo or battery ignition, so that when made for either the adjustment, the time, relation, or any factor, will not be impaired by the substitution of the other.

Additional objects are to provide a distributing switch or flier which is readily removable whenever desired, and which is insured against being improperly replaced when the parts are re-assembled; also to make use of a single vibrating lever for securing all the above functions, and to obtain an adjustment of the primary dwell by simply moving the primary circuit breaking lever with relation to its operating cam.

With these and other objects in view the invention consists in the features of construction hereinafter set forth and claimed.

In the drawings: Figure 1 is a sectional view of a timer and distributor embodying the principles of my invention. This section is taken on the line I—I of Fig. 2. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is a top or plan view. Fig. 4 is a section on the line IV—IV of Fig. 2. Fig. 5 is

a diagrammatic view showing an arrangement of circuits which may be employed.

In operating motor cars there are three factors in the matter of the electric ignition which require attention on the part of the driver. The first is, of course, the relation of the spark (or the first spark of the cascade if a vibrator induction coil is used) to the engine stroke. This is constantly being varied by the usual timing lever on the steering wheel. The second matter which requires attention is the duration or dwell of the primary current. This is apt to become varied in use by wear. Accordingly it is important to have means by which this is accomplished. Lastly, it is usual to have two independent sources of primary current, and these are frequently substituted for one another. A battery and a magneto or dynamo are examples of alternative primary current sources often used. It is desirable that the shifting from one current source to another does not necessitate any re-positioning of the first two named adjustments. In carrying out my invention I secure all these requisites, so that the driver may shift from one current source to another as often as he pleases without impairing any of the adjustments; and may vary the dwell for the primary current without interfering at all with the throw of movement of the timing lever on the steering wheel.

Referring to the drawings in which like parts are designated by the same reference sign, 1 indicates a frame or casing, preferably formed as a cylindrical metallic frame or shell, having a flange 2, with curved slots therein, by which it is angularly movable on its support 4.

5 indicates studs projecting through said slots, and having springs 6, and washers 7, for holding the parts in non-vibrating but relatively movable relation.

8 denotes a shaft revolving commensurately with the engine, usually termed the half-time shaft, because of the speed relation most commonly employed. This shaft has a cam 9 fixed thereto, and also an enlargement 10, with a flat face 11, from which project upwardly the studs 12. These studs are unsymmetrical with respect to one another in any way, as, for example, by having one stud larger than the others. Positioned on the flat face 11 of the shaft is an insulating

block 13, the upper part of which is chambered or hollowed out as shown at 14, and has a laterally projecting blade 15 therein. This blade constitutes the distributing switch for the secondary current, and is capable of slight spring movement in an axial direction. Means are provided for keeping the insulating block 13 closely pressed upon the surface 11; as will later appear.

The casing 1 has attached thereto what I shall term the upper casing 16. This is a cylindrical hollow shell or tube of hard rubber or insulating material, having embedded therein or attached thereto, a plurality of internal metallic segments 17. These segments lie in the path of rotation of the spring blade 15 above described, and constitute the terminals for connection to the various spark plugs.

18 indicates a thin metallic rim depending from the upper casing 16 to which it is firmly secured, and serving to guide the upper casing in proper concentric relation to the lower casing 1.

19 indicates screws for holding the parts in connected relation.

The top 20 of the upper casing 16 has a cylindrical guiding piece 21, in which is a plunger 22. 23 indicates a spring for normally impelling this plunger downward, and the plunger thereby serves to keep the insulating block 13 firmly set upon the face 11 of the half-time shaft. This plunger also serves as a terminal connection for the switch blade. The various wires of the secondary circuit are connected to the screws 24 and 25 in an obvious manner.

The primary circuit closing and opening means constitutes the most important feature of the present invention. The details of the practical construction which I employ are particularly shown in Fig. 1.

26 denotes a primary circuit breaking lever or vibrator pivoted at 27 upon the casing 1, and having an arm 26' spring impelled by spring 28 to move the lever 26 toward the cam 9.

29 denotes a roller on the lever 26 to engage said cam. The outer end of the lever 26 plays between two contact points which may be of platinum compound if desired. One of the contact points 30 forms part of a sliding bar 31 guided on the stationary metallic base 32 in any suitable way. The base 32 is fixed to the casing 1, but insulated therefrom by an insulating plate or block 33. Means are provided for adjusting the bar 31 slidably on the base 32, so that the position of the contact point 30 is varied with respect to the lever 26. This is accomplished by a thumb wheel 34, having a stem screw-threaded at 35 into the base 32. This stem has collars 36 which hold the bar 31 between them so that when the thumb wheel 34 is turned, it is moved in and out, and varies

the position of the bar 31, and the contact point 30.

37 denotes a fluted part of the stem 35 which is engaged by a spring impelled plunger or detent 38 to hold the parts in any adjustment to which they may be set.

The bar 31 has fixed thereto an insulating plug 39, and a spring blade 40 is normally tensioned to bear against this plug. The blade 40 is for this purpose mounted on a base 41, which is insulated from the casing by the plate 42. The blade 40 also has a contact 43, in the path of the vibrating lever 26, this contact being engaged at the opposite position of throw from the contact 30. The contact 30 is connected to the potential terminal of a dynamo or magneto machine, and the other contact 43 is put in connection with the potential terminal of a battery. These connections are made by ordinary wires leading to the base 32 and the base 41, as will be sufficiently obvious. The other terminals of the battery or dynamo are, of course, grounded in the usual way on the frame of the machine.

The operation is as follows: As the half time shaft 8 rotates its cam 9 impinges against the roller 29 and separates the lever 26 from the contact 30. This abruptly terminates the primary current of the dynamo or magneto, supposing the circuit thereof is otherwise closed, and a disruptive discharge is produced in the secondary of the induction coil in the usual way. At almost the same instant the lever 26 moves over into contact with the contact point 43, establishing the battery current, supposing that its circuit is otherwise completed. The battery therefore operates its induction coil which has a trembler, and produces a cascade discharge. Thus the spark of the dynamo ignition and the first spark of the battery cascade ignition occur about the same time, as is required. If the duration of the battery cascade is not sufficient, it may be lengthened by turning the thumb wheel 34, so as to move the bar 31 upward in Fig. 1. This results in a longer contact between lever 26 and contact point 43, so that the primary circuit of the battery is closed for a longer time. But this movement of contact point 43 is accompanied by a corresponding movement of point 30, so that the relation of dynamo ignition and battery ignition which is required, and as above indicated, is not disturbed by such adjustment. In other words, the timing of the explosions in cylinders remains substantially simultaneous for battery and dynamo, notwithstanding the movements of the thumb wheel 34. I regard this as a very important feature of the invention, since the driver has merely to turn the thumb wheel 34 until the right result is secured with his battery ignition, and then leave the mechanism alone. Otherwise it would be

necessary after having secured the proper battery ignition, to manipulate other adjustments to compensate for the disturbance in the timing of the dynamo ignition. In practice, the adjustment of the thumb wheel 34 should only be made occasionally to compensate for wear.

A diagrammatic representation of the circuits is shown in Fig. 5. B is the battery grounded at G', and including the primary N' of an induction coil, and connected to contact point 43. D is a dynamo or magneto machine (which I shall term generally a dynamo in the claims), grounded at G², and including the primary N² of an induction coil, and finally connected to the contact point 30. The secondaries S' and S² each have one terminal grounded and the other terminal run to the spring blade or flier 15. The various spark plugs P¹, P², P³ and P⁴ are connected to the segments 17. A plurality of switches Y are included in the primary and the secondary circuits so that either the dynamo or the battery can be used as desired. In practice I provide a single switch for connecting either the battery or the dynamo as desired, and it is to be understood that any suitable or desired switching means may be employed.

A feature of the invention relates to means for preventing creepage currents within the upper casing 16. The potential of the secondary discharge is, of course, very high, and loss may occur by reason of the current creeping to ground over intervening insulators. This creepage is due to a thin film of moisture which gathers on all objects in humid weather. The effect is of course reduced by increasing the surface over which the current may creep.

In Fig. 4 I have illustrated a method of increasing the surface by the corrugations 45, which are produced by vertically fluting the material of the block 16 between the segments 17. The effect of these flutings is to substantially double the amount of surface over which the creepage currents must pass. The outer surface is also circumferentially fluted at 46 for the same purpose.

What I claim, is:—

1. In an ignition system for explosion engines, a dynamo circuit, a battery circuit, a vibrator, contacts in the path of said vibrator for closing said dynamo circuit or said battery circuit by movements of the vibrator in opposite directions, and means for simultaneously adjusting said contacts with respect to the vibrator but without changing their relation to one another.

2. In an ignition system for explosion engines, a vibrator, a pair of contact points respectively engaged by said vibrator in its to and fro movement and simultaneously adjustable while maintained at a fixed distance of separation from one another.

3. In an ignition system for explosion engines, a cam, a vibrator engaged thereby, a contact adjustable into the path of said vibrator and included in one primary circuit, and a spring blade supported a fixed distance from said contact and also in the path of said vibrator, said spring blade lying in a separate primary circuit.

4. In an ignition system for explosion engines, a cam, a vibrator engaged thereby, and a pair of contacts in the path of said vibrator in its to and fro movement, and means for simultaneously adjusting said contacts with respect thereto.

5. In an ignition system for explosion engines, two separate primary circuits, means for breaking said circuits, a casing for inclosing said means, and a stem extending through the wall of the casing and arranged to adjust the primary dwell for both of said circuits.

6. In an ignition system for explosion engines, a pair of separate primary circuits, a single means for interrupting said circuits, a casing, and means projecting through said casing for simultaneously adjusting the dwell for both said primary circuits.

7. In an ignition system for explosion engines, a primary circuit including a dynamo, a second primary circuit including a battery, means for interrupting said circuits, a casing, and means projecting through the casing for varying the dwell of said battery primary circuit without disturbing the relative time of adjustment of said dynamo primary circuit with respect to the engine stroke.

8. In an ignition system for explosion engines, a plurality of separate primary circuits, means for interrupting said circuits, a casing, and a single thumb wheel projecting through said casing for adjusting the duration of the interruption of both of said primary circuits.

9. In an ignition system for explosion engines, a shell or casing of insulating material, and a plurality of metallic segments internally positioned thereon, the internal walls of said shell or casing being corrugated between the segments, as and for the purpose set forth.

10. In an ignition system for explosion engines, a half-time shaft having a disk or circular plate thereon, said plate having a cam integral with the lower face thereof and extending downward, and said plate also having a pin projecting upward from the upper face thereof, means in the path of said cam for interrupting a circuit, and means on said disk and pin for establishing different circuits in a predetermined order.

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

RICHARD VARLEY.

Witnesses:

FRANK S. OBER,
WALDO M. CHAPIN.