No. 865,663. PATENTED SEPT. 10, 1907.

R. VARLEY.

IGNITION SYSTEM FOR EXPLOSION ENGINES.

APPLICATION FILED OCT. 8, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

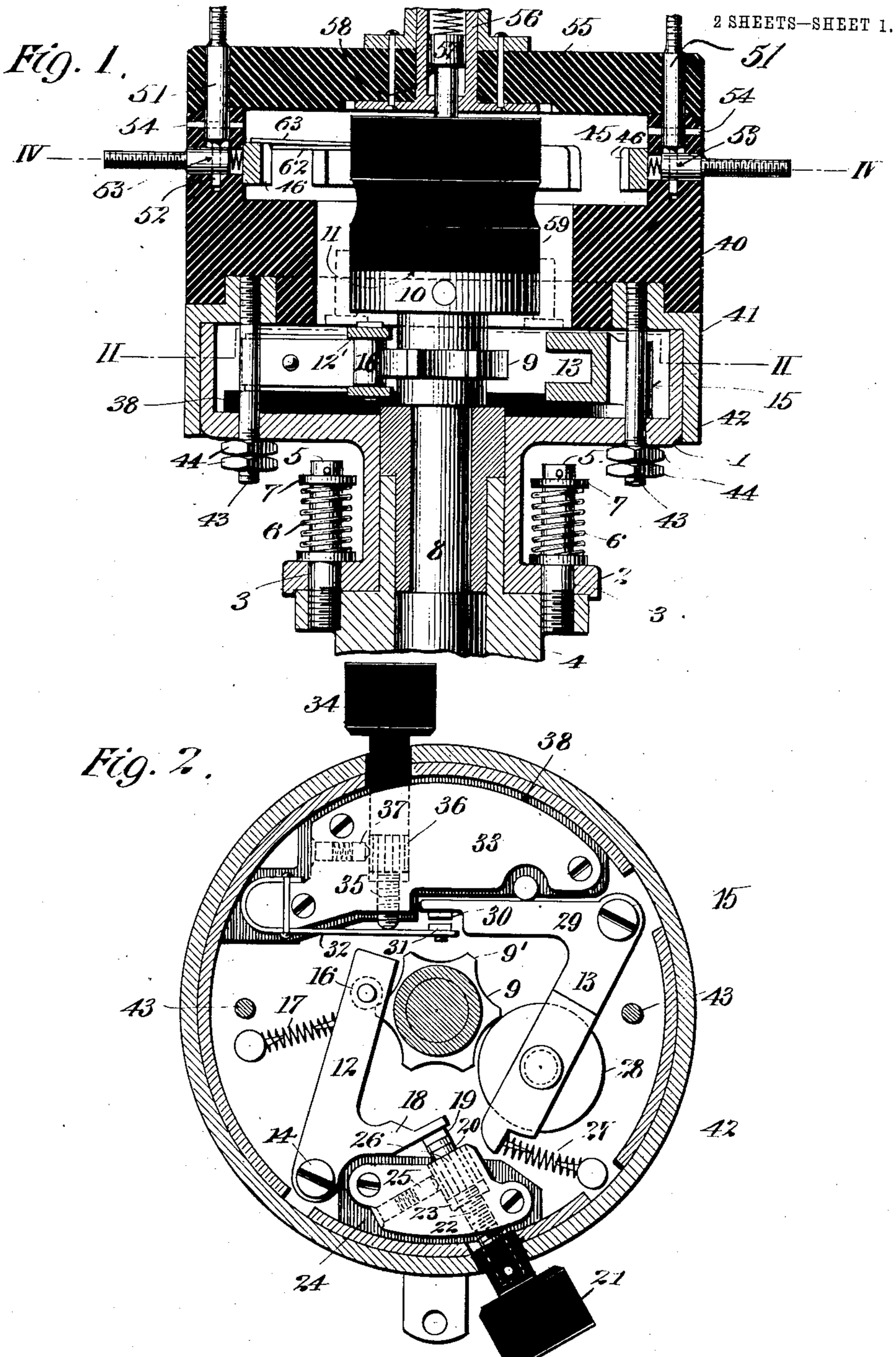

Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

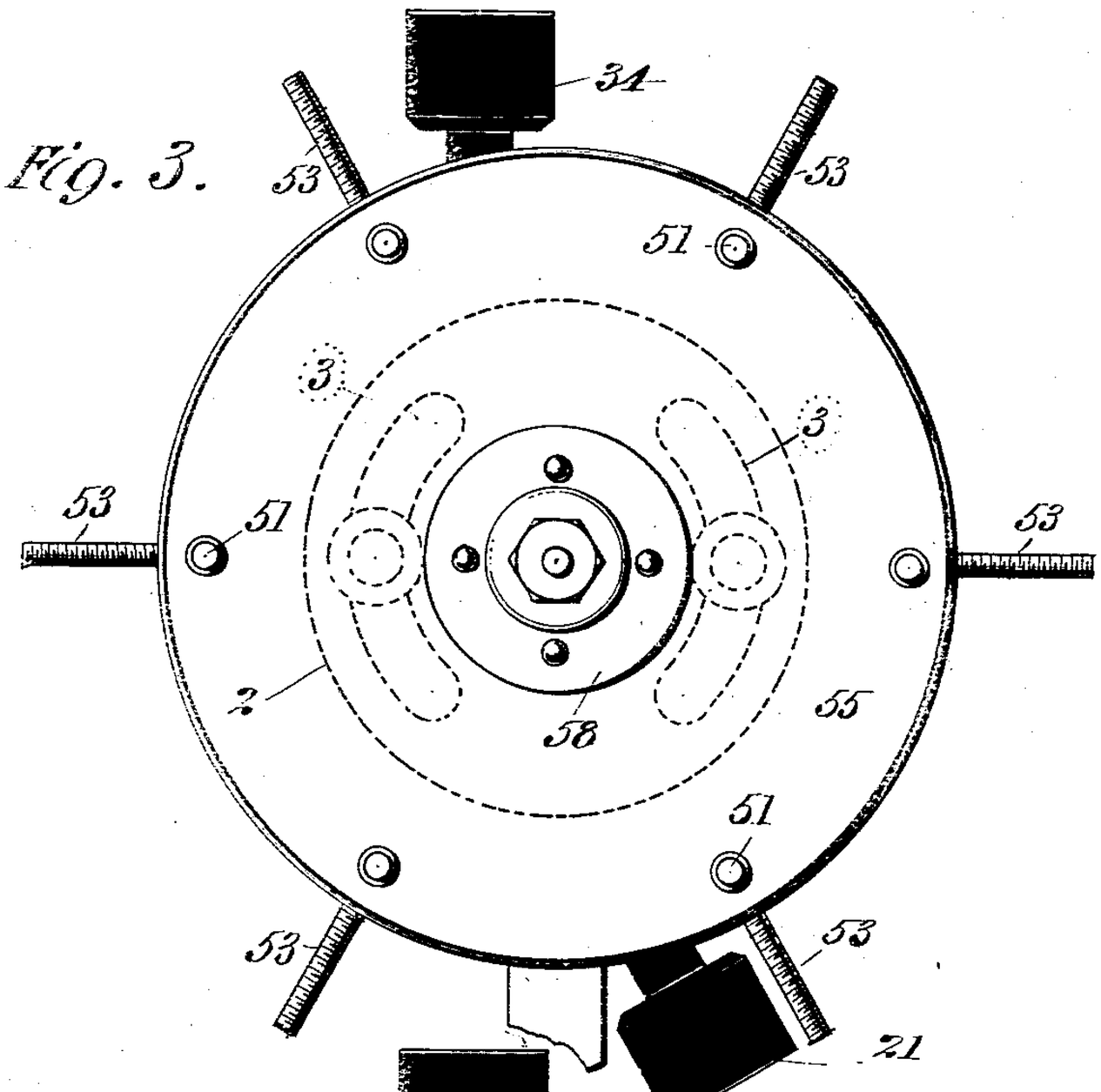
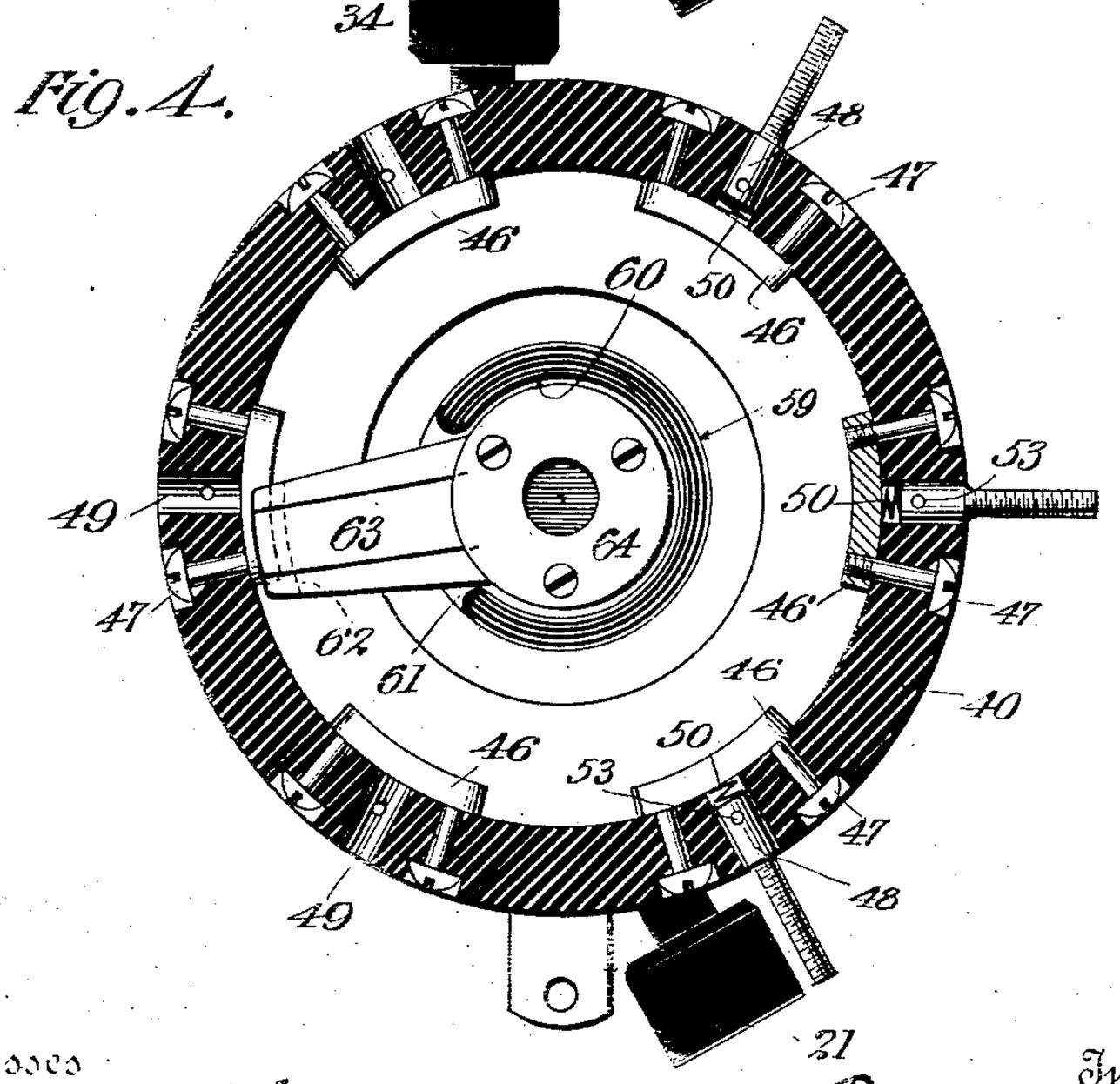


Fig. 4.



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UNITED STATES PATENT OFFICE.

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

IGNITION SYSTEM FOR EXPLOSION-ENGINES.

No. 865,663. Specification of Letters Patent. Patented Sept. 10, 1907.

Application filed October 8, 1906. Serial No. 337,871.

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 a combined timer and distributer for explosion engines and is particularly applicable to use with explosion engines having a large number of cylinders, as, for example, six or more.

The principal object of the invention is to provide for the use of a battery or a dynamo as desired, both being permanently connected to the terminals of the timer and distributer and being selectively switched into action by merely completing their primary and secondary circuits at some distant point. The mechanism is designed to give both the battery and the dynamo a circuit closure or dwell suitable to their needs.

Additional objects of the invention are to adequately insulate the secondary or high potential circuit notwithstanding the small diameters of the various parts; to have an upper casing made of insulating material and yet firmly and removably fastened in place; and finally to improve the various minor details of the practical construction, particularly in certain locking means for preventing the loosening of the various terminal screws by the vibration.

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 combined timer and distributer embodying the principles of my invention; Fig. 2 is a transverse sectional view on the line II—II of Fig. 1; Fig. 3 is a top or plan view; Fig. 4 is a section on the line IV—IV of Fig. 1.

Explosion engines are being increasingly made with a considerable number of cylinders in order to obtain great flexibility of action and less vibration, and in the use of such engines having six or more cylinders a need arises for a combined timer and distributer capable of properly controlling the primary and secondary circuits of the ignition system. The control is obtained from a shaft rotating commensurately with the engine and usually termed the half-time shaft because of the speed relation most commonly employed. If the ignition of six cylinders is to be controlled by this shaft, it is apparent that only 60° is available for the entire action in each cylinder, and the mechanism used must be capable of attaining all the necessary functions by an angle of movement of 60° of the half time shaft. In carrying out my invention I aim to secure this result for both dynamo and battery ignition.

Referring to the drawings in which like parts are designated by the same reference sign, 1 indicates a frame or casing preferably in the form of a hollow shell or drum having a lower laterally extending flange 2, with arcuate slots 3 therein.

4 indicates a support having studs 5 extending through the slots 3, and 6 and 7 indicate springs and washers surrounding said studs and bearing on the flange 2 to hold the casing 1 in angularly adjustable but non-vibratable engagement on the support.

The half time shaft is shown at 8, and extends axially upward into the casing 1, being provided with a cam 9 therein. The upper end of the shaft is enlarged or provided with a collar at 10, having a flat upper face 11. This face serves as a support for the distributer or flier hereinafter described.

The primary circuit closing and opening devices are particularly shown in Fig. 2. Two vibrating levers or vibrators of any sort 12 and 13 are pivoted respectively at 14 and 15 on the frame or casing 1. The vibrator 12 is employed exclusively for dynamo or magneto ignition which I will generally refer to as dynamo ignition, and the vibrator 13 is employed exclusively for battery ignition. The construction and arrangement of these levers is adapted to their special functions.

The vibrator 12 is forked or bifurcated, as shown at 12′ in Fig. 1, so as to be capable of forking or straddling the cam 9. A roller 16 is journaled between the two members 12′ of the fork, and this roller is quite small, as shown in Fig. 2, for a reason which will be hereinafter stated. By virtue of this arrangement of having the vibrator 12 forked and straddling the cam, it is possible to have the roller 16 as small as desired.

17 indicates a compression spring for normally impelling the vibrator 12 toward the cam 9, and 18 denotes an arm of the vibrator carrying contact 19. The fixed contact 20 is formed on the stem of a thumb wheel 21, threaded at 22, into a metallic base 23. This base is supported by the frame or casing 1, but is insulated therefrom by a plate of insulating material 24. 25 denotes a spring impelled plunger engaging a fluted portion 26 of the thumb wheel stem so as to hold the latter in any position to which it is adjusted. It is evident that as the cam 9 rotates, the vibrator 12 will be impelled outward and intermittently break the contact between the points 19 and 20. The vibrator 13 is likewise spring impelled toward the cam by a spring 27, and carries a roller 28 to engage said cam.

29 denotes an arm of the vibrator 13 having a contact 30. The contact 30 moves toward and from a contact 31 on a spring blade 32. 33 indicates the metallic base on which said spring blade is supported, and 34 indicates a thumb wheel, having a stem 35, threaded into the base 33 and fluted at 36 so as to be engaged by a spring pressed plunger 37. By turning the thumb wheel 34, the contact 31 is moved into a position to be engaged sooner or later by the contact 30. The base 33

is insulated from the casing 1 by a plate 38 of insulating material similar to the plate 24 of the base 23.

40 designates the upper casing which is made principally of hard rubber or insulating substance. In order to have this upper casing firmly and removably attached to the lower casing, I propose to have the upper casing permanently formed or molded on a ring 41, with a depending web 42, which surrounds the frame or casing 1.

43 denote studs which project downward from the ring 41 through the casing 1 so as to receive nuts 44 by which the upper casing can be locked in place.

The upper casing has a circular chamber 45 of as great diameter as practicable, and on the inside surface of the upper casing at this enlarged zone I arrange a plurality of segments 46 corresponding in number to the number of cylinders of the explosion engine. 47 denote screws by which these segments are held in place, the inside of the screws being peened over to prevent their vibrating loose.

48 indicate threaded studs received in holes 49 in alinement with the segments 46, and 50 indicate short spiral springs by which an electric connection is made between the studs and segments. These studs are anchored in place by additional studs 51, which have reduced lower ends 52, passing through holes 53 in the studs 48.

54 indicate pins for holding the studs 51 in their proper relation.

The studs 51 serve as a means for holding in place a cover plate 55, also of insulating material, and having a central metallic bushing 56, which receives a spring impelled plunger 57. This plunger has a shoulder 58 which prevents its being displaced from the cover when the latter is removed.

The flier or distributer blade is contained within a cylindrical insulating block 59, which is chambered or recessed out, as shown at 60, the wall being interrupted on one side, as shown at 61.

62 denotes a blade projecting laterally from the block 59 through the cut-away part 61 of the wall.

63 indicates a spring blade which is capable of slight upward movement in an axial direction, but has its downward movement limited by the blade 62. This spring blade 63 traverses a circular path and engages the segments 46 successively in its movement.

64 indicates a clamping plate for holding the spring blade 63 in place. The plunger 57 moves downward on this clamping plate and serves therefore the double purpose of keeping the block 59 on the face 10 and establishing a secondary terminal connection with the spring blade 63. The face 11 of the half time shaft has pins (not shown) thereon to engage the block 59. The details of these pins are fully shown in my companion case, Serial No. 336,860, and need not be specifically described in this case.

The operation is as follows: The potential or ungrounded battery terminal is connected to base 33 in an obvious way, and the potential or ungrounded dynamo terminal is connected to base 23. The ungrounded secondaries of the dynamo and battery coils are put in connection with the bushing 56 when it is desired to operate the respective coils. Spark plugs are connected to the various studs 53. Supposing the primary and secondary circuits of the battery are completed as above described, it is evident that as the half-time shaft 8 rotates the projections of the cam 9 will successively engage the roller 28 and impel the vibrator 13 to close the battery circuit at the points 30, 31. The larger the diameter of the roll 28, and the longer the peripheral portion of the projections 9′ of the cam, the longer will be the primary closure of the battery circuit. This closure can be increased up to perhaps 50° of rotation of the half-time shaft, it being evident that at least 10° must be left open when the flier or distributer is changing from one segment to another. In practice 40° or 45° of primary circuit closure for the battery is sufficient. When the circuit of the dynamo is completed, the battery circuit is, of course, simultaneously broken. The vibrator 12 is now impelled outward to break the circuit at the points 19 and 20, and it will be observed that this circuit rupture is an abrupt, positive and cam actuated one, so that it is secured with a maximum degree of suddenness. This is essential because the dynamo ignition is ordinarily obtained without a trembler on the induction coil, and one secondary discharge is relied upon, which is obtained by an abrupt rupture of a fairly strong current in the primary circuit. The self induction of a dynamo necessitates more abrupt rupture than in the case of a battery current. Contrary to the relations for the battery circuit closure, the dynamo circuit closure is made longer by diminishing the size of the roll 16. In order to diminish the size to a practical figure, I have adopted the construction which has already been described in detail. By having the roller 16 small and mounted in this way, it is possible to obtain 30° of circuit closure for the dynamo which is ordinarily required. As a result of the above described action, disruptive discharges occur in the secondary coils which are distributed to the appropriate spark plug by the flier or distributer 63, which is arranged to be in contact with one or another of the segments 46 for this purpose. By having the flier inclosed within the insulating block 59, it is possible to have a very much more compact arrangement of the parts since the wall 60 prevents a spark jumping to a wrong segment notwithstanding the fairly small diameter of the chamber 45. At any time the flier may be inspected by merely removing the cover 55 and the flier block 59, which is merely loosely engaged on pins, as above stated. When the flier is re-positioned, it is properly held in place by the spring plunger 57.

What I claim, is:—

1. In an ignition system for explosion engines, a pair of vibrators, and a single means for positively impelling both of said vibrators to respectively open and close separate circuits.

2. In an ignition system for explosion engines, a vibrator for interrupting a battery primary circuit, a vibrator for interrupting a dynamo primary circuit, and a single means for actuating both of said vibrators.

3. In an ignition system for explosion engines, a cam, a vibrator impelled thereby to open a dynamo primary circuit, and another vibrator impelled by the cam to close a battery circuit.

4. In an ignition system for explosion engines having a half-time shaft, a cam on said shaft, a vibrator having a roller impelled by said cam to open a dynamo circuit, and another vibrator having a roller impelled by said cam to close a battery circuit.

5. In an ignition system for explosion engines, a vibrator having a contact adapted to open a dynamo circuit, a spring supported contact, a second vibrator arranged to engage said spring supported contact to close a battery

circuit, and single means for positively impelling both of said vibrators into circuit opening and circuit closing relation respectively.

6. In an ignition system for explosion engines, a frame or casing, an upper casing of insulating material, a shell or ring having a peripheral depending web, permanently molded to said upper casing, and means for attaching said shell or ring to said frame or casing.

7. In an ignition system for explosion engines, a frame or casing, circuit interrupting means contained therein, an upper casing of insulating material, a flier or distributer contained therein, a shell or ring permanently molded to said upper casing and having a web depending about said frame or casing, and means for securing said shell or ring to said frame or casing.

8. In an ignition system for explosion engines, a block of insulating material having a recessed or chambered portion, a supporting blade projecting from said recessed or chambered portion, a spring blade also projecting from said recessed or chambered portion and adapted to complete different secondary circuits, said spring blade being limited in its axial movement by the supporting blade.

9. In an ignition system for explosion engines, a frame or casing having means for interrupting a primary circuit, an upper casing of insulating material supported by said frame or casing, a plurality of threaded studs in said upper casing, and additional studs having reduced portions extending through said threaded studs to lock them against removal.

10. In an ignition system for explosion engines, a plurality of segments, metallic studs adjacent thereto, and springs intermediate said studs and segments to establish electric connection therewith.

11. In an ignition system for explosion engines, a casing of insulating material, segments within said casing, said casing having a plurality of radial holes opposite said segments, threaded studs in said holes, and additional studs with reduced portions passed through said threaded studs to hold them against removal.

12. In an ignition system for explosion engines, a casing of insulating material, a plurality of studs therein, additional vertical studs passed through said first named studs to hold them against removal, and a cover plate on said vertical studs.

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

RICHARD VARLEY.

Witnesses:

FRANK S. OBER,

WALDO M. CHAPIN.