

L. J. FLINT.
MAGNETO GENERATOR.
APPLICATION FILED SEPT. 13, 1910.

1,062,089.

Patented May 20, 1913.

3 SHEETS—SHEET 1.

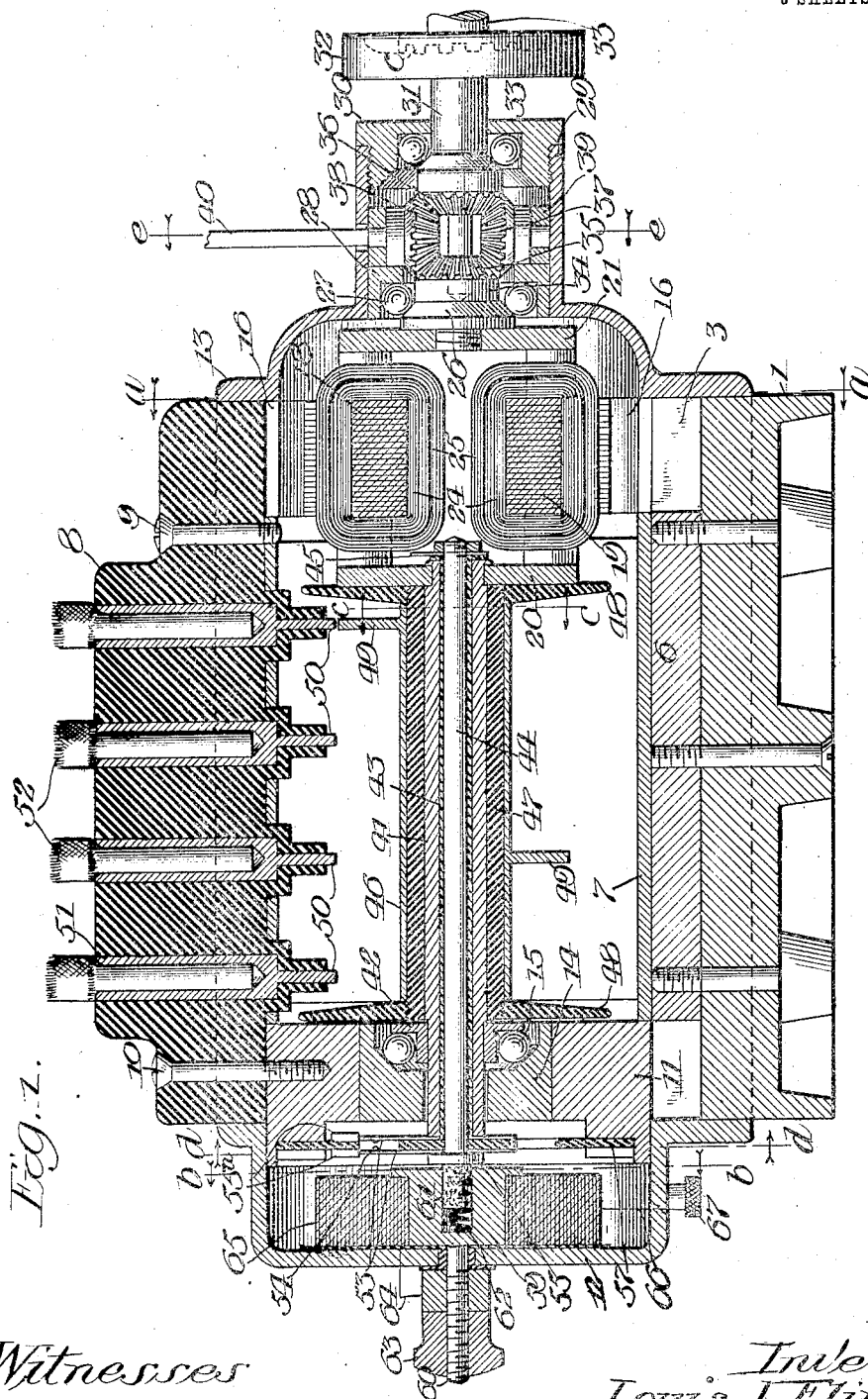


Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 2.

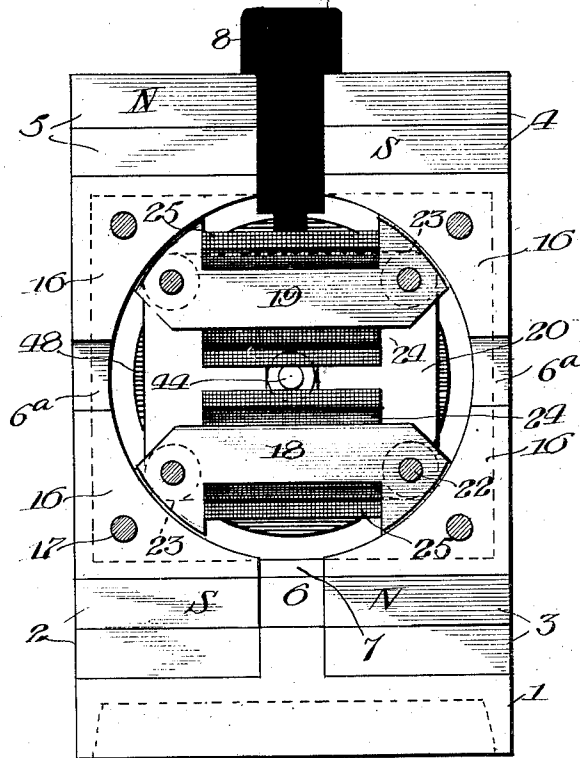


Fig. 3.

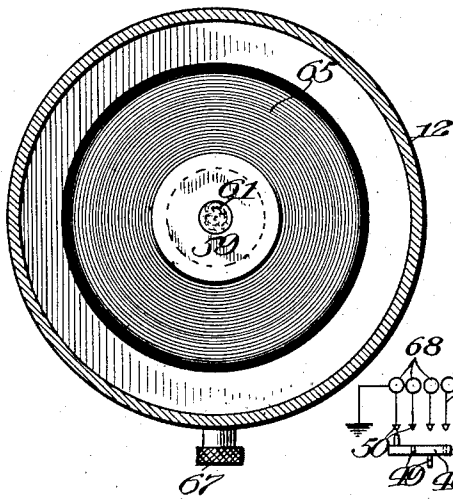


Fig. 4.

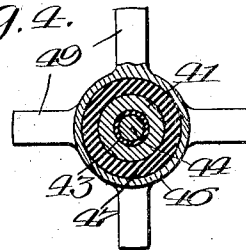
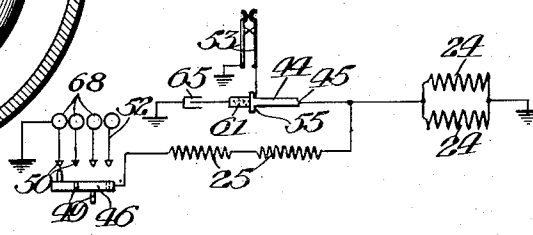


Fig. 5.



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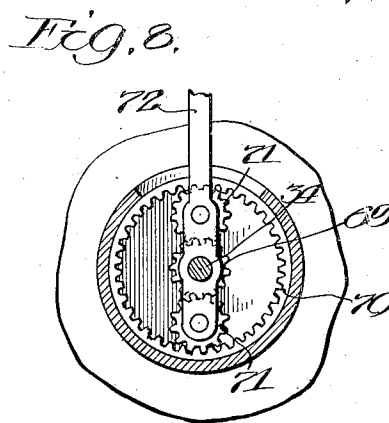
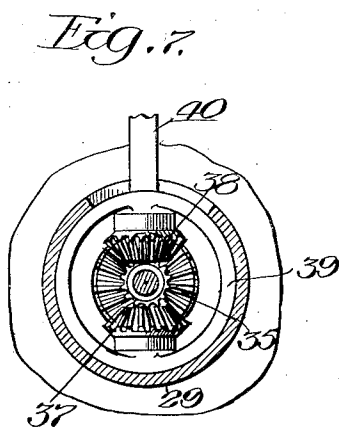
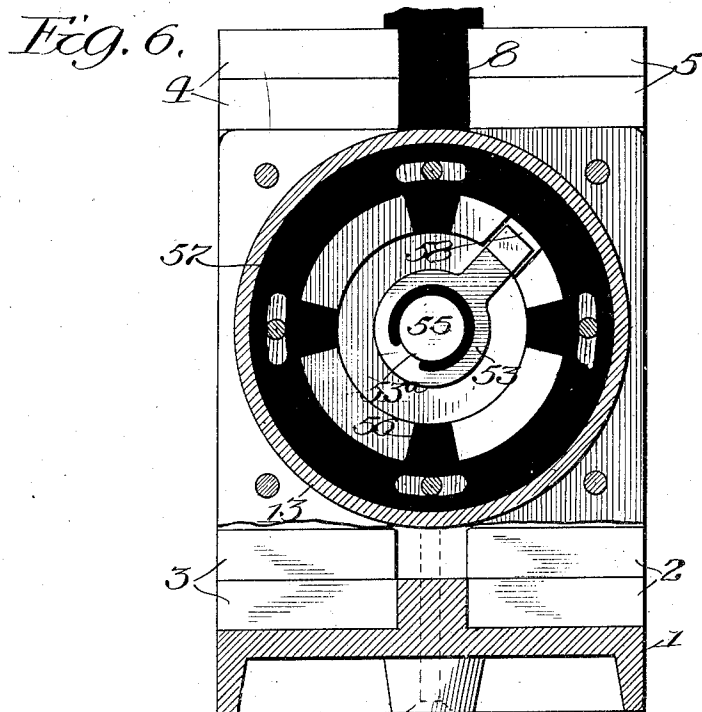
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3 SHEETS—SHEET 3.



Witnesses
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UNITED STATES PATENT OFFICE.

LOUIS J. FLINT, OF CHICAGO, ILLINOIS, ASSIGNOR TO GRIP NUT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MAGNETO-GENERATOR.

1,062,089.

Specification of Letters Patent.

Patented May 20, 1913.

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To all whom it may concern:

Be it known that I, LOUIS J. FLINT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Magneto-Generators, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to magneto generators and allied mechanism, and has for its object the provision of an improved device of this nature which shall be readily adaptable to the varying conditions of operation to which it may be subjected. For instance, if the device is used in connection with an internal combustion engine the means herein are of such character as to permit proper and efficient advancing or retarding of the spark, without sacrificing the strength of such spark, by the device being of such a character that irrespective of the time the spark may occur relative to the positions of the engine parts, said spark always occurs at the peak of the current wave furnished by the generator.

My invention further contemplates improved distributing mechanism whereby the spark is provided first for one cylinder and then another cylinder, and so on throughout the series of cylinders of a multiple cylinder engine.

My improved distributing mechanism is compact and forms in its preferred form part of the generator structure.

My invention also contemplates improved contact elements for causing the spark and improved means for minimizing the objectionable influences of the spark upon the contacts.

My invention further contemplates improved mounting facilities and construction of details with respect to electrical condenser apparatus for taking care of the discharge at the spark controlling contacts.

My invention further contemplates improved field construction for generators of this character and improved spark contact mounting means in connection with the field structure in the preferred form thereof.

My invention further contemplates new and improved constructional features and electrical features in connection with the armature of the generator, and in its pre-

ferred form comprises two separate and distinct armatures, each occupying in the preferred form one-half of the armature space, and each armature being provided with the necessary windings to effect the desired result.

I will explain my invention more in detail by reference to the accompanying drawings illustrating the preferred embodiment thereof, in which—

Figure 1 is a vertical longitudinal section through the center of Fig. 2 of a generator device and allied mechanism constructed in accordance with my invention; Fig. 2 is a sectional view on lines *a—a* of Fig. 1; Fig. 3 is a sectional view on lines *b, b* of Fig. 1; Fig. 4 is a sectional view on lines *c, c* of Fig. 1, all parts but the projecting spark prongs being left out; Fig. 5 is a detailed view of the circuit arrangements; Fig. 6 is a sectional view on lines *d, d* of Fig. 1 but having parts broken away to show the lower magnets; Fig. 7 is a sectional view on lines *e, e* of Fig. 1, one of the gear wheels being removed, and Fig. 8 is a detailed view of a modification of the mechanism illustrated in Fig. 7.

Referring more particularly to Figs. 1, 2 and 6 I illustrate a magneto generator constructed more particularly with reference to use in connection with a multiple cylinder internal combustion engine, although it is of course to be understood that features of my invention are not intended to be limited to such use.

The application as shown herein serves for purposes of illustrating one of the uses to which my invention may be put. I here illustrate a base 1, which carries a boxlike brass case 7 upon which are mounted four sets of permanent magnets by means of screws passing into the case, each set comprising two similarly polarized magnets, these four sets being illustrated respectively at 2, 3, 4 and 5, opposite end views of the magnets appearing in Figs. 2 and 6. The magnets thus are shown to extend parallel to the armature shaft the entire length of the box 7 and overhang said box at the ends. The magnets are removable from the case, however, and are interchangeable so that they may be arranged to give a bipolar effect whenever it is desired. It is one of the important features of my device that it operates equally well with either a four pole

or a two pole field. This multipolar field structure in combination with my particular armature hereinafter described produces a spark at lower speeds than has heretofore
 5 been possible. This is advantageous both in starting and in reducing the wear on the armature when running. A non magnetic distance piece 6 is interposed between the permanent magnets to form a closed structure.

10 The casing 7 has round holes in its opposite ends and is mounted upon this structure between the two sets of magnets 2 and 3, which are mounted below, and permanent
 15 magnets 4 and 5, which are mounted on top of the casing. The box 7 has sides about one-eighth of an inch thick, the end walls of the box being pierced with round holes of the same diameter as the interior cross
 20 section of the box, through which the revolving elements are inserted, leaving, however, triangular shaped webs surrounding the holes at the four corners of the box. Between the space left vacant by the magnets
 25 4 and 5 I insert horizontally a strip of insulation 8, fastened by means of a screw 9 to the box-like structure 7 and the screw 10 to an end piece 11 carried by the parts 1 and
 30 7, the piece 8 being of the same length as the magnets. Inclosing end caps 12 and 13 complete the outside inclosing portion of the device. The end piece 11 acts as heel or
 35 yoke for the permanent magnets 2, 3, 4 and 5, serving to close the magnetic circuit and is provided upon its interior with a metallic bearing 14 having the balls 15 and serving to support the rotary part of the structure, as will appear more clearly hereinafter.
 40 The permanent magnets end at the right hand extremity of Fig. 1 in pole pieces 16, which are the same size and shape as the triangular webs above mentioned, and are bolted to the structure 7 by the bolts 17 which pass through the flange of end cap 13,
 45 the pole pieces 16 and the triangular webs at the end of the box 7. The pole pieces 16 are separated by non magnetic distance pieces 6^a in addition to pieces 6 and 8. An armature is arranged for rotation between
 50 the pole pieces, which armature is constructed of two separate and distinct independent halves structurally and consists of two sets of laminations 18 and 19 respectively bolted to end pieces 20 and 21 by the
 55 bolts 22. Lugs 23 are arranged between the end pieces 20 and 21, and the laminations 18 and 19. Lugs 23 are perforated to receive bolts 22. Each armature carries two windings respectively a primary 24 and a
 60 secondary 25. In the preferred form the primary windings are connected in parallel and the secondary windings in series, as will appear later. The end piece 21 has threaded to it a bearing portion 26 which through
 65 the interposition of balls 27 engages a bear-

ing portion 28 provided in the end piece 13. A projecting sleeve 29 of said end piece 13 accommodates the bearing portion and likewise accommodates the second bearing portion 30 designed to hold a driving shaft 31,
 70 through the interposition of a coupling 32 driven from a shaft 33. In the form shown herein the shaft 33 is designed to be driven at what is called cam shaft speed of the engine served by this device. The hub or
 75 bearing portion 26 ends in a shaft extension 34, which carries a gear wheel 35 and the shaft 31 carries a gear wheel 36. The gear wheels 35 and 36 are miter gears and the gear 36 drives the gear 35 through the
 80 interposition of two supplemental miter gears 37 and 38 mounted in a ring or collar 39 in a manner to permit of its rotation about the axis of the shafts 34 and 31 through the
 85 agency of a handle 40. The object of this structure is to permit a relative angular displacement of the armature and its associated mechanism with respect to the driving shaft 31, thus to permit advancing or retarding
 90 the spark without sacrificing the occurrence of said spark at the peak of the wave as supplied by the generator.

When the handle 40 is moved about the axis of the shaft 31, shaft 31 remaining stationary the miter gears 37 and 38 are carried along and thereby rotate the shaft 34
 95 which carries with it the armature and its associated mechanism, thus securing the angular displacement desired. The end piece 20 is fastened to a hollow shaft 41, which
 100 hollow shaft by means of the bearing portion 42 is rotatably mounted within the bearing 14. Through the hollow shaft 41 and insulated therefrom by means of the sleeve 43 is a conductor 44 which conductor
 105 at its right hand extremity has a contact clip 45 adapted to receive the connections from the armature windings, the other armature terminals, two in number, finding
 110 outlets, one respectively to the frame of the machine which is considered the ground, and the other respectively to a hollow shaft 46 carried by the shaft 41, but suitably insulated therefrom through the insulating
 115 sleeve 47 and the insulating segments 48, 48. These connections are indicated diagrammatically in Fig. 5, which will be described later. The shaft 46 carries four spark discharge points 49, displaced respectively 90
 120 degrees about the periphery of said shaft and longitudinally displaced to cooperate with corresponding spark contact points 50, mounted within the insulating strip 8. The
 125 spark contact points 50 end in suitable wire receiving sockets 51 to receive the wires 52 which go to the cylinders of the engine which is to receive the current for spark purposes from my improved device. It will
 130 be seen that the spark points 49 periodically come opposite the spark points 50, one after

the other in rotation, and thus supply sparking current to cylinders of an engine in rotation.

The sparking devices commonly called the distributor, are mounted within and practically form part of the generator structure, being accommodated inside of the permanent magnets of the device and thus occupying what might ordinarily be considered waste space. The conductor 44 carries two contact springs 53, 53, one of the contacts 53 being shown in Fig. 6 where a portion of the spring 53 at its center is broken away so as to provide a holding portion only at 53^a between a plate 55 forming part of the conductor 44 and the shaft 41 between which said springs through the interposition of a washer of insulation are clamped. The left hand spring 53 is thus connected to the conductor 44 and the right hand spring 53 is connected to the conductor 41, which is the same as connecting it to the frame of the machine, consequently the ground. Springs 53 are normally in contact through their contact points 54, thus having the primary winding normally close circuited. These springs, however, carry at their extremities wiping devices 55^a, which are so arranged as to be separated periodically by insulating prongs 56 mounted upon an annular insulating strip 57 adjustably mounted and secured to the heel piece 11. During the rotation therefore, it will be noticed, there being four prongs 56, that the primary circuit is broken four times and this occurs at just the right time to permit the secondary windings to discharge between the contact points 49 and 50 of the particular contact points which are then in association. The prongs 56 are adjusted with respect to the contacts 55^a, so that the circuit is broken at the peak of the current wave, and since the contacts revolve synchronously, this relation is maintained permanently even when the spark is advanced or retarded. This is a valuable feature of my device as it permits the production of a spark at very low speeds. In connection with my means for controlling the time of sparking, it enables an operator to start the engine from standstill by merely shifting the lever 40, as hereinafter referred to.

The improved construction of the springs 53 will be noticed as before described, this construction permitting of strong and efficient spring action to insure positive operation by providing a longer length over which the spring action may take place and by providing a construction which is susceptible to greater spring action. The heel piece 11 has at 58 an opening large enough to permit the springs 53 to be pulled through toward the right, referring more particularly to Fig. 1, so that after the insulating strip 8 has been loosened and removed from the machine,

and bearing 14 loosened, and the end cap 13 has been loosened, the entire rotatable structure of the device together with the end plate 13 can be withdrawn toward the right for inspection or repair, as the case may be. The disk or collar 55 is in electrical communication with a cylindric hub 59 terminating in a bolt 60 through the agency of a carbon brush 61 which is pressed against said disk 55 by a spring 62. The object of thus providing a contact is to permit the binding post 63 to carry a conducting wire 64 to a condenser 65 insulated from the hub 59 but carried thereby by being wound circularly thereon as shown more clearly in Fig. 3. The other terminal of the condenser by means of the wire 66 is fastened to a binding post 67 on the frame of the machine, thus being connected to what practically amounts to a ground connection, as before stated. This condenser eliminates the injurious influences of the spark between the contact springs 53, 53. The circuit arrangement will now be clear by referring more particularly to Fig. 5, in which the primary windings 24, 24 are shown as connected in parallel between the ground and the conductor 44, and the two secondary windings 25, 25 being shown as connected in series between the conductor 44 and the shaft 46. The primary circuit thus extends from the ground through the windings 24, conductor 44, the two springs 53 to the ground and the secondary circuit extends from the ground through the cylinders (diagrammatically) 68, spark points 50, and 49, shaft 46, secondary windings 25, 25, primary windings 24, 24, to thereby obtain a cumulative effect of the primary discharge and from there to ground.

The improved construction thus illustrated will be apparent from the description. In Fig. 8 is shown a modified form, in which the shaft 34 carries a gear wheel 69 and shaft 31 is associated with an annular gear 70 through the interposition of two adjusting gears 71, 71, movable through the agency of a handle 72 to thereby change the relative angular position of the gear 69 to the gear 70.

A very important feature of the structure thus disclosed resides in its ability to start the engine with which the magneto is connected. Suppose the internal combustion engine after running is stopped, then one or more of the cylinders is filled with fluid under compression. Now if it is desired to start the engine I simply move the spark controlling lever 40, which moves the spark contacts of one or more cylinders into sparking position and the charge is exploded thereby starting the engine.

While I have herein shown and particularly described the preferred embodiment of my invention, I do not mean to limit my

self to the precise construction and arrangement as herein set forth, but

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a machine of the character described the combination with an electrical generator, a casing therefor, a core fastened to said casing and a condenser wound about said core.

2. A device of the character described, an armature, permanent field magnets for said armature, and spark distributing apparatus mounted on the same shaft with the armature and arranged within and lengthwise of the field magnets.

3. A device of the character described having an armature, a spark distributing device mounted on the same shaft with and arranged to one side of said armature, and field magnets for said armature arranged about said spark distributing device.

4. A device of the character described having an armature, a spark distributing device movable with and arranged to one side of said armature, field magnets for said armature arranged about said spark distributing device, a shaft on which said armature and spark distributing device are mounted, and a heel piece for said magnets into which said shaft projects.

5. A device of the character described having an armature, a spark distributing device movable with and arranged to one side of said armature, field magnets for said armature arranged about said spark distributing device, a shaft on which said armature and spark distributing device are mounted and a conductor within said shaft to which the armature windings are connected.

6. A device of the character described having an armature, a spark distributing device movable with and arranged to one side of said armature, field magnets for said armature arranged about said spark distributing device, and cooperating spark points mounted between said magnets.

7. A device of the character described having an armature, a spark distributing device movable with and arranged to one side of said armature, field magnets for said armature arranged about said spark distributing device, cooperating spark points mounted between said magnets, and an insulating support for said spark points.

8. A device of the character described having an armature, a spark distributing device movable with and arranged to one side of said armature, field magnets for said armature arranged about said spark distributing device, a casing, and means comprising a removable distance piece whereby the said movable parts may be withdrawn without disturbing the field structure.

9. A device of the character described having an armature, a spark distributing device movable with and arranged to one side of said armature, field magnets for said armature arranged about said spark distributing device, a casing, spark controlling springs movable with said armature, and means comprising a removable distance piece whereby the said movable parts may be withdrawn without disturbing the field structure.

10. In a machine of the character described the combination with a cap, a condenser carried within said cap, a terminal for said condenser carried by said cap, and a framework to which said cap is detachably attached and carrying means for connecting with said terminal.

11. In a high tension ignition system in combination, an armature, a four pole field structure and an interrupter, said interrupter being connected to break said armature circuit four times during each revolution.

12. A device of the class described, comprising a non magnetic box, a plurality of permanent magnets mounted on said box, and an armature arranged within said box.

13. A device of the class described, comprising a non magnetic box, a plurality of permanent magnets mounted on said box, means whereby the position of said magnets may be changed at will, and an armature arranged within said box.

14. In a device of the class described, an armature, a plurality of pairs of permanent magnet poles for exciting said armature arranged around the perimeter of said armature and means whereby the position of said magnets may be changed to produce either a four pole or a two pole field.

15. In a device of the class described in combination, a plurality of pairs of permanent magnets, adjacent poles of which are of opposite polarity and an armature cooperating with said magnets, said armature being provided with a plurality of electric circuits.

16. A device of the class specified comprising magnetic members arranged to form a hollow structure, a rotary armature, and auxiliary devices for controlling the armature current carried by an axial extension of said armature and arranged within the hollow structure formed by said magnetic members.

17. A device of the class specified comprising magnetic members, a rotary armature, and a spark distributing device carried by an axial extension to said armature and located within said magnetic members.

18. A device of the class specified comprising magnetic members, a rotary armature, and a current interrupting device carried by an axial extension to said armature

and arranged within said magnetic members.

19. A device of the class specified comprising magnetic members, a rotary armature, and rotary auxiliary devices rotating with said armature and arranged within said magnetic members.

20. A device of the class specified comprising magnetic members, a rotary armature, and a spark distributing device rotating with said armature and arranged within said magnetic members.

21. A device of the class specified comprising magnetic members, a rotary armature, and a rotary current interrupting device rotating with said armature and confined within said magnetic members.

22. A device of the class specified comprising magnetic members, a rotary armature, and a spark distributing device in the form of a rotary member rotating with said armature and having spark contacts cooperating with spark contacts carried by said magnetic members.

23. A device of the class specified comprising magnetic members, a rotary armature, and a current interrupting device in the form of a rotary device rotating with said armature and comprising separable metallic contacts cooperating with contacts carried by said magnetic members.

24. A device of the class specified comprising magnetic members and a rotary member comprising a rotary armature, a rotary spark distributing device in the form of a rotary member rotating with the armature and having separated metallic spark contacts, and a current interrupting device also rotating with said armature and comprising separable spring contact fingers.

25. In a device of the class specified a rotary member comprising armature cores with windings, a spark distributing device comprising a sleeve like member having spark contacts separated from one another along the length of the sleeve, a current interrupting device having a series of contacting spring fingers angularly separated from one another, said armature distributing device and current interrupting device being located at different points along the axis of rotation of said rotary member.

26. In a device of the character specified, a rotary member comprising a pair of cross pieces 20, 21 and magnetic cores 18, 19 with coils extended between said cross pieces, a spark distributing device comprising a tubular member extending axially from said armature and provided with axially separated spark contact points, and a current interrupting device comprising a pair of contacting separable spring fingers carried by an axial extension of the armature and spark distributing device.

27. In a device of the character specified,

a rotary member comprising a pair of cross pieces 20, 21 and magnetic cores 18, 19 with coils extended between said cross pieces, a spark distributing device comprising a tubular member extending axially from said armature and provided with axially separated spark contact points, and a current interrupting device comprising a pair of contacting separable spring fingers carried by an axial extension of the armature and spark distributing device, in combination with cooperating spark contacts on the frame of the machine for cooperating with said spark distributing device contacts and means on the machine frame for separating said spring fingers of the current interrupting device.

28. A device of the class specified comprising a frame work composed of a series of magnetic members disposed longitudinally with reference to one another, means for supporting said magnetic members so as to form a hollow structure, a rotary member arranged within said hollow structure and having its axis of rotation extended lengthwise of said magnetic members, said rotary member comprising an armature and instrumentalities for controlling the current from the armature.

29. A device of the class specified comprising a frame work composed of a series of magnetic members disposed longitudinally with reference to one another, means for supporting said magnetic members so as to form a hollow structure, a rotary member arranged within said hollow structure and having its axis of rotation extended lengthwise of said magnetic members, said rotary member comprising a rotary spark distributing device and instrumentalities for cooperating with said spark distributing device to control the current thereof.

30. A device of the class specified comprising a frame work composed of a series of magnetic members disposed longitudinally with reference to one another, means for supporting said magnetic members so as to form a hollow structure, a rotary member arranged within said hollow structure and having its axis of rotation extended lengthwise of said magnetic members, said rotary member comprising a rotary current interrupting device and instrumentalities for cooperating with said interrupting device to control the current thereof.

31. A device of the class specified comprising a box-like structure, a set or series of bar magnets arranged around said box-like structure lengthwise of one another, a rotary member arranged within said box-like structure, a heel piece at one end of the box like structure magnetically connecting the ends of the magnets thereat and a non-

magnetic insulating member supported by said box like structure and provided with metallic terminals.

32. A device of the class specified comprising a series of bar magnets arranged lengthwise of but separated from one another so as to form a hollow structure, non-magnetic means for supporting said magnets, a rotary member in the interior of said structure, said rotary member having its axis of rotation extended lengthwise of said magnets and being provided with an armature cooperating with pole pieces on the ends of said magnets at one end of said structure and being also provided with a spark distributing device embodying axially separated spark distributing contacts and being also provided with angularly separated pairs of contact spring fingers, an insulating piece 8 having metallic sockets provided with metallic points projecting into the interior of said structure to cooperate with the contacts of said spark distributing

device, an annular ring provided with projections for separating said contact spring fingers, caps at the opposite ends of said structure for closing the same, means at one end for rotating said rotary member, a condenser at the other end having a connection with said rotary member adapted to permit rotation thereof while the condenser remains stationary, a heel piece for the ends of the magnets opposite the armature, a bearing piece 14 within the heel piece forming bearings for said rotary member, and means in said rotary member for connecting the armature windings properly with the distributing contacts, the circuit interrupter and the condenser.

In witness whereof, I hereunto subscribe my name this 8th day of September A. D., 1910.

LOUIS J. FLINT.

Witnesses:

MAX W. ZABEL,
A. L. JONES.