Sept. 9, 1924. 1,508,262

A. P. YOUNG

IGNITION GENERATOR

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Fig. 1.

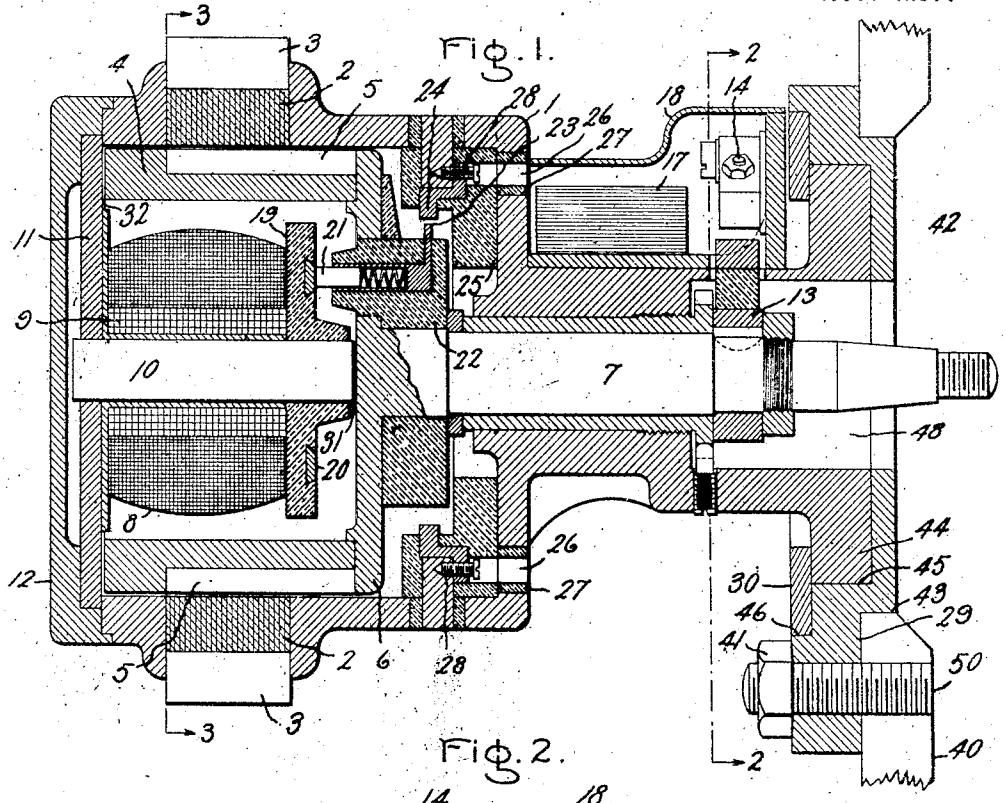
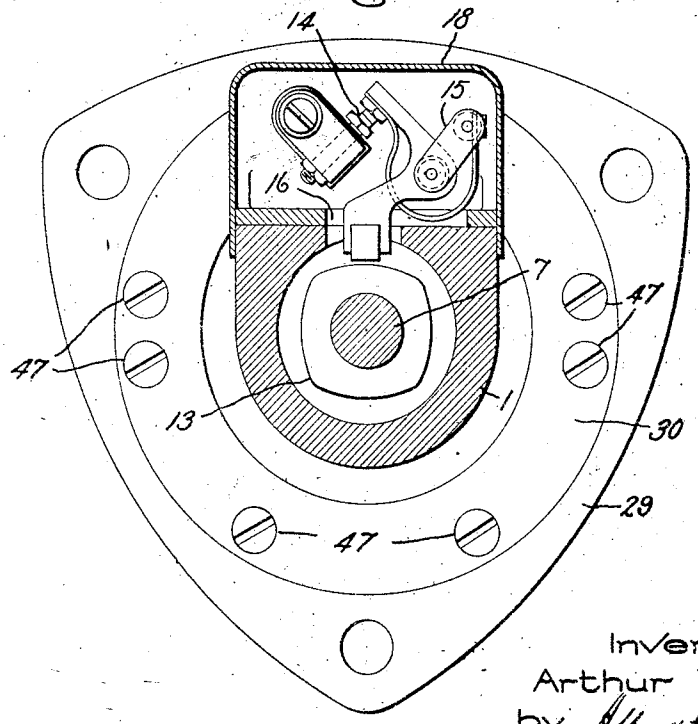


Fig. 2.



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Fig. 3.

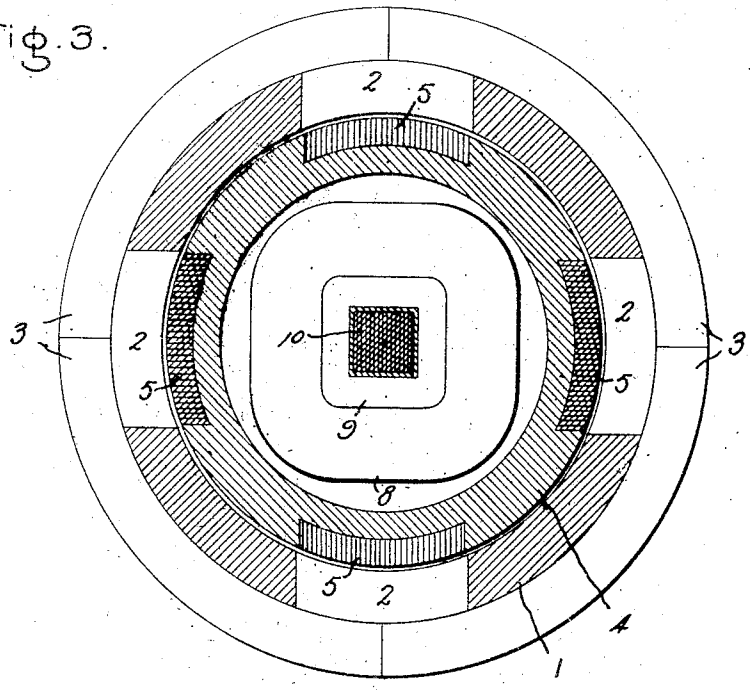
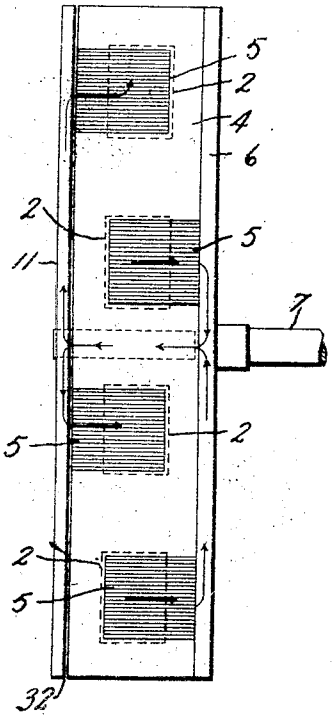


Fig. 4.



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UNITED STATES PATENT OFFICE.

ARTHUR PRIMROSE YOUNG, OF KENILWORTH, ENGLAND, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

IGNITION GENERATOR.

Application filed July 26, 1920. Serial No. 399,034.

To all whom it may concern:

Be it known that I, ARTHUR P. YOUNG, a subject of the King of Great Britain, and a resident of "Dovedale," Kenilworth, in the county of Warwickshire, England, have invented certain new and useful Improvements in Ignition Generators, of which the following is a specification.

This invention relates to ignition apparatus and more particularly to ignition generators of the magneto type.

One of the objects of the invention is to provide a machine of the above type which shall be compact in construction and which shall have relatively few parts that may be made and assembled at relatively small expense.

Another object is to provide apparatus of the above type which can be timed with facility and which shall be efficient in operation regardless whether the spark is advanced or retarded.

Another object is to provide a secure mounting for magnetos which shall be simple in construction and by the use of which the apparatus may be readily applied and removed from the engine.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings which illustrate a magneto electric machine constructed according to this invention, Fig. 1 is a view in longitudinal section of the machine, Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1, Fig. 3 is a sectional elevation on the line 3—3 of Fig. 1 and Fig. 4 is a developed plan of the rotor.

In the drawings I represent a main casing 1 of aluminum or other non-magnetic material to which four laminated pole pieces 2 are secured preferably by casting them in place. These pole pieces are secured to four arc-shaped permanent magnets 3 which surround the casing, and are arranged with their north and south poles as shown in Fig. 3. The outer end of the casing 1 contains an annular member 4 of aluminum or other non-magnetic material into the walls of which are secured, as for example by casting in place, laminated inductors 5. These inductors are staggered around the periphery of the ring 4 as shown in developed plan in Fig. 4. The member 4 is secured in any suitable manner to a steel flange 6 preferably formed integral with the main driving shaft 7 of the magneto. The primary and secondary windings numbered 8 and 9 respectively are wound on a laminated core 10 which is secured to a steel disc 11 preferably adjustably secured to a non-magnetic end cap 12 fastened on the end of the casing 1. The magnetic circuits can be readily traced from Fig. 4 in which it will be seen that the flux will flow from the two north poles through the two inductors connected to flange 6, thence through the armature core 10, steel disc 11 and the two inductors lying underneath the south poles. The flange 6 and the disc 11 would preferably be provided with a number of perforations or radial slots (not shown) to reduce eddy currents in them.

The above construction permits of the flux in the armature core being reversed every 90° so that by mounting a four-point cam 13 on the shaft 7 adapted to operate a make and break contact 14, it is possible to obtain four high tension sparks every revolution. The contact breaker is mounted on a bracket 15 secured to the main casing, one end of the lever carrying the moving contact projecting through an aperture 16 in the casing into engagement with the cam 13. A condenser 17 may be mounted on the casing 1 in close proximity to the contact breaker, and the breaker and condenser are enclosed by a thin sheet metal cover 18 which is easily removable to admit of access to the contacts for adjusting or other purposes. The primary and secondary windings are held in place at one end by means of a disc 19 of insulating material into the outer side of which is moulded a brass ring 20 which is electrically connected through the disc with the secondary winding 9. A brush 21 mounted in an insulating bushing 22 passing through the flange 6 collects the current from the ring 20 and distributes it through a small spark gap 23 to a distributing ring 24 moulded into an insulating disc 25. The high tension cables (not shown) are inserted into apertures 26 formed in the casing 1

and provided with insulating bushings 27. Contact is made between the ring 24 and the high tension cables by means of sharp pointed screws 28 which pass through the ring and enter the cables making contact with the conducting strands thereof.

Briefly stated, the electromagnetic construction comprises a stator including the permanent field 2 and the primary and secondary armature coils 8 and 9. The rotor comprises the inductor 5 which is rigidly mounted upon the driving shaft 7, said driving shaft carrying the breaker cam 13 and also carrying the distributor brush 21.

The magneto is preferably mounted upon the casing 40 of an engine, by means of a supporting plate 29 which is secured in place preferably by nuts 41 threaded upon corresponding studs 50 projecting from the engine casing. A pilot 43 is preferably provided integral with the supporting plate to snugly fit into an opening 42 provided in the engine casing. The stator casing 1 is preferably provided with an integral outstanding flange 44 which is rotatably fitted into a corresponding cylindrical recess 45 in the supporting plate. A retainer ring 30 preferably serves to clamp the stator frame flange 44 firmly into place within the supporting plate, the said ring preferably fitting into an annular recess 46 in the side of the plate opposite pilot 43, a plurality of screws 47 being preferably threaded through the retainer ring and into the supporting plate for maintaining the construction assembled. The free end of the inductor or rotor shaft 7 extends to the interior of the engine casing through a longitudinal opening 48 in the stator casing and the supporting plate, for cooperation with a part of the engine from which it is driven.

To effect timing of the magneto the stator casing of the magneto need merely be rotated about its axis to the appropriate extent by hand, the screws 47 being previously loosened somewhat to relieve the frictional hold of the retainer ring 30 upon the flange 44. By reason of the driving connection between the engine and the shaft 7 which latter carries the breaker cam and the distributor, these elements will be held against rotation and the cooperating ignition breaker contact on the stator will thus be displaced with respect to the cam and the inductor to bring about the timing desired. If desired, a lever (not shown) may be secured to the casing to enable it to be readily rotated. After timing has thus been effected, the screws 47 are, of course, again tightened.

By my invention an unlimited range of timing may be obtained without in any way interfering with the electrical performance of the magneto. With the ordinary rotating armature type of magneto or the polar type of magneto the range of adjustment is limited and at low speeds when timing adjustment is necessary any retardation of the spark causes a rapid falling off in the electrical performance of the machine. With the present construction it is possible to obtain an unlimited range of timing adjustment and at the same time to obtain the maximum electrical efficiency at all points. The form of magneto described also allows of the air gaps in the magnetic circuit being radially adjusted to a great degree of accuracy. The steel disc 11 with the core 10 attached may be provided with an adjusting screw passing through the outer cap of the casing. By movement of this screw the gap 31 between the flange 6 and the core 10 and also the gap 32 between the disc 11 and the rotor 4 may be simultaneously varied to any extent. I have not illustrated any particular means for varying the air gaps, but it will be understood that any convenient means may be adopted.

It will be seen from the drawings and the foregoing description that my preferred form of magneto is substantially circular in cross section and that flange 44 and the driving shaft 7 are both coaxial with the magneto. The magneto construction will thus be well balanced regardless in what position the stator is secured about the axis and so that timing adjustments can be effected in the manner above indicated without producing unbalanced strains either upon the electromagnetic elements of the apparatus or upon the mechanical supporting structure.

In order to apply the magneto to the engine, it is brought into engagement with the face of the engine casing, pilot 43 being placed into the opening 42 in the engine casing, the studs 50 on the latter passing through the openings in the supporting plate. The driving connection with the engine is readily established and nuts 41 are simply screwed in place upon the studs whereupon the mounting is completed. Timing is then effected in the manner already described.

I claim:—

1. An ignition generator unit comprising in combination, a stator, a rotor, cooperating ignition breaker elements mounted one on said stator and one on said rotor, a supporting plate for said stator adapted to be secured in face to face contact with an engine casing, said rotor having a driving shaft extending through an opening in said plate, said stator having a circular flange fitting in a corresponding cylindrical recess in said plate, and a retaining ring secured to said support for preventing separation of said stator from said recess.

2. In combination, an engine casing, an

ignition magneto comprising a rotor having a shaft extending to the interior of said casing to be driven from the engine, a stator having its mass substantially balanced about said shaft, said stator having a circular flange concentric with said shaft, a support plate secured to said engine casing and having a cylindrical recess for lodging said flange to support said magneto, a retaining ring for preventing separation of said stator and said plate and securing said stator against rotation, cooperating breaker elements mounted one on said stator and one on said rotor, said parts being constructed and arranged to permit a rotary adjustment of said stator about said rotor and in said recess for timing the ignition.

3. In combination, an inductor magneto comprising a stationary field and a stationary armature, a frame carrying said elements, an inductor rotatable between said field and said armature, a driving shaft connected thereto, an ignition breaker cam and a distributor rigid with said driving shaft, ignition breaker contacts mounted on said frame, a flange integral with said frame, a supporting plate having a recess for adjustably mounting said flange, and means for securing said supporting plate to an engine casing.

4. A magneto electric machine comprising an annular casing, permanent magnets arranged thereabout and having radial pole piece, a laminated armature core, primary and secondary windings carried thereby, a rotor comprising a driving shaft, a non-magnetic annular member rigid therewith and rotatable between said permanent magnets and said armature, and sets of laminated inductors carried by said non-magnetic member.

5. As an article of manufacture for magneto electric machines, a rotor comprising a driving shaft, a flange driven thereby, an annular member secured thereto and laminated inductors in the surface of said laminated member, some of said inductors being in contact with said flange.

6. In combination, an internal combustion engine, a magneto comprising a stationary field and a stationary armature, said magneto including a rotor connected thereto to be driven thereby at half engine speed, a driving shaft for said rotor, a number of equidistant laminated inductors carried by said rotor equal to the number of engine cylinders and a distributor carried by said rotor.

In witness whereof, I have hereunto set my hand this 23rd day of July 1920.

ARTHUR PRIMROSE YOUNG.