April 13, 1937. E. B. NOWOSIELSKI 2,077,255

MAGNETO GENERATOR

Filed April 21, 1934 4 Sheets-Sheet 1

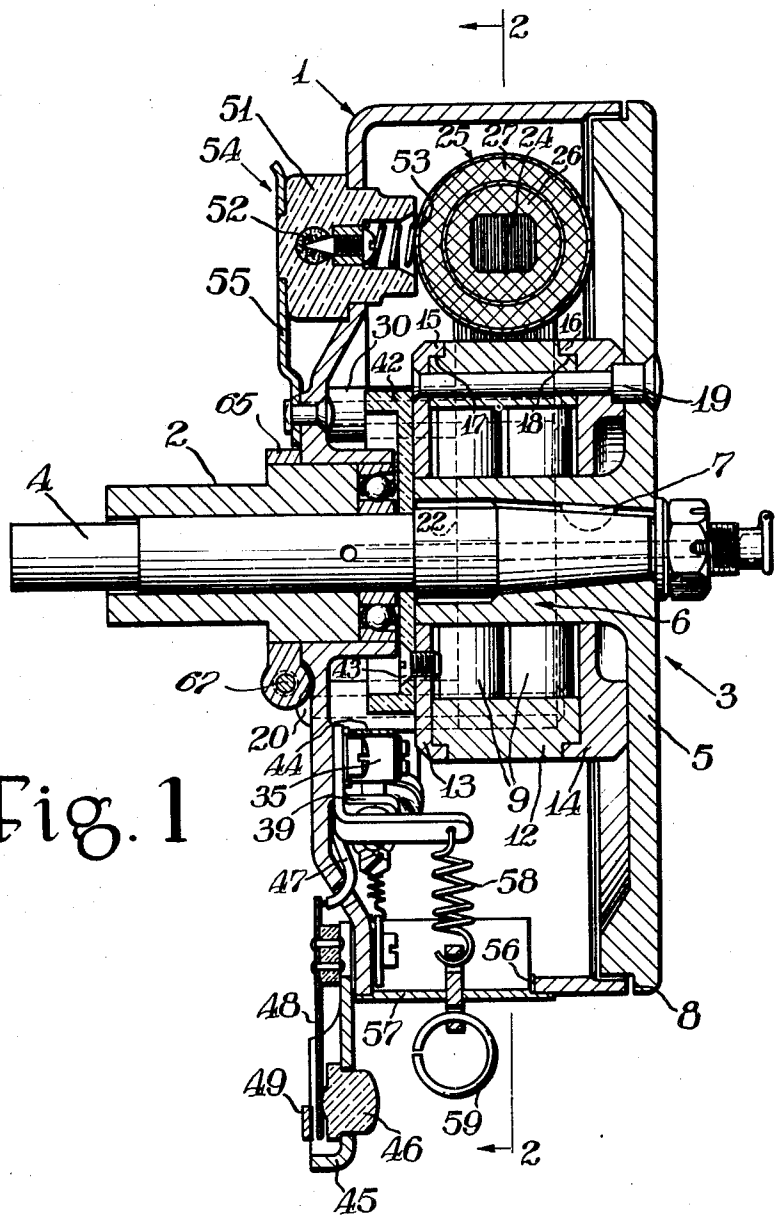


Fig. 1

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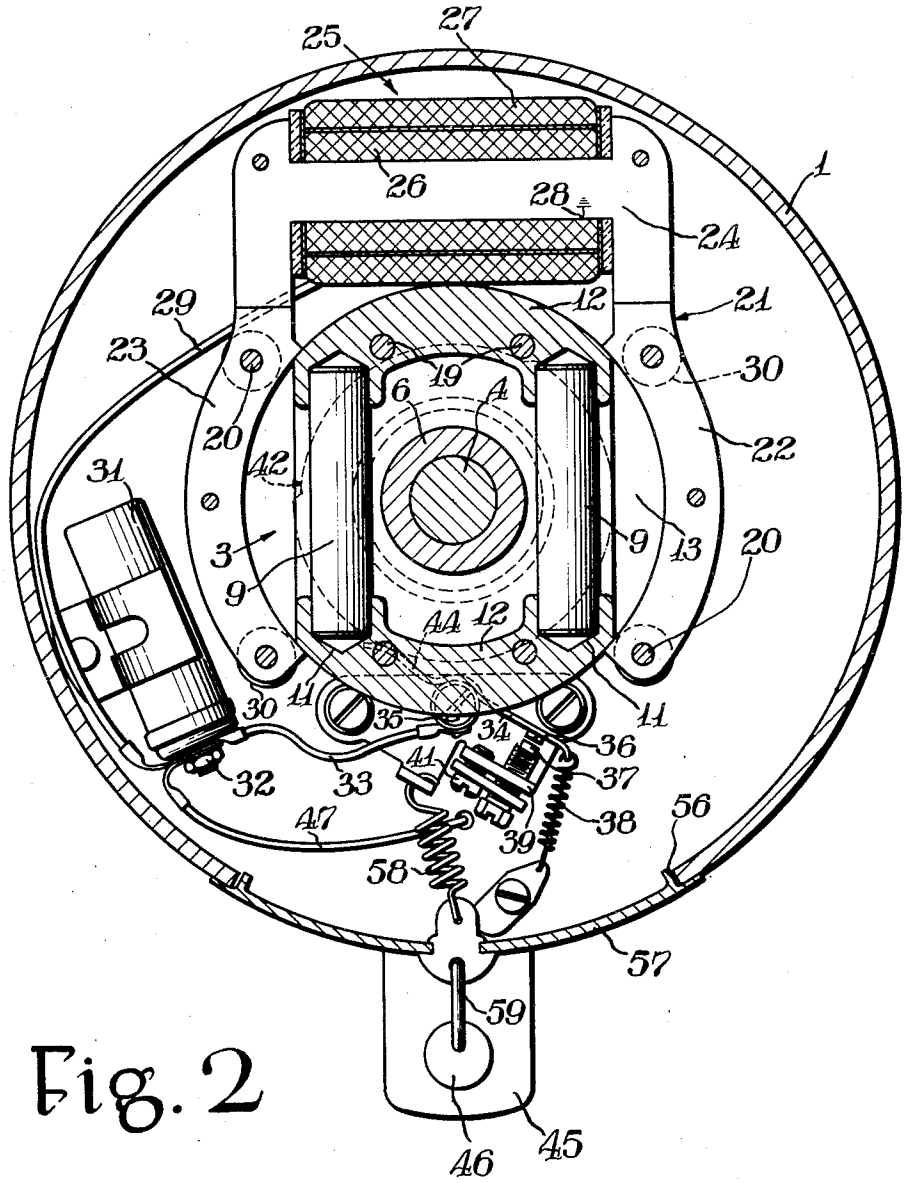


Fig. 2

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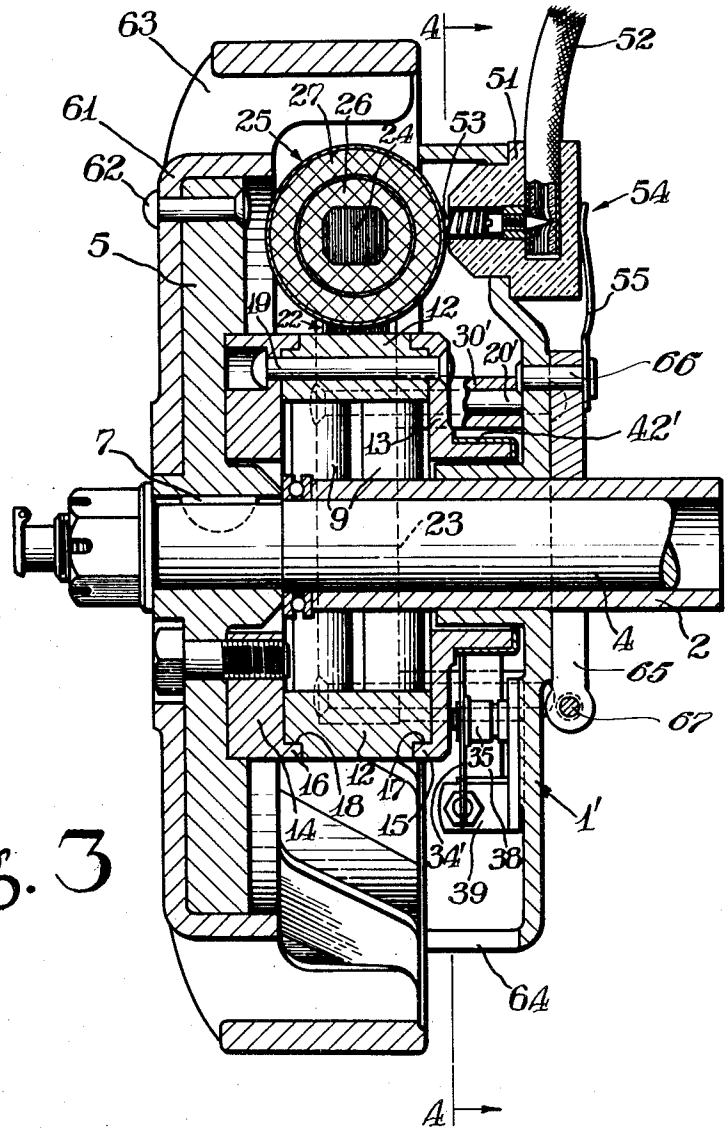


Fig. 3

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Fig. 4

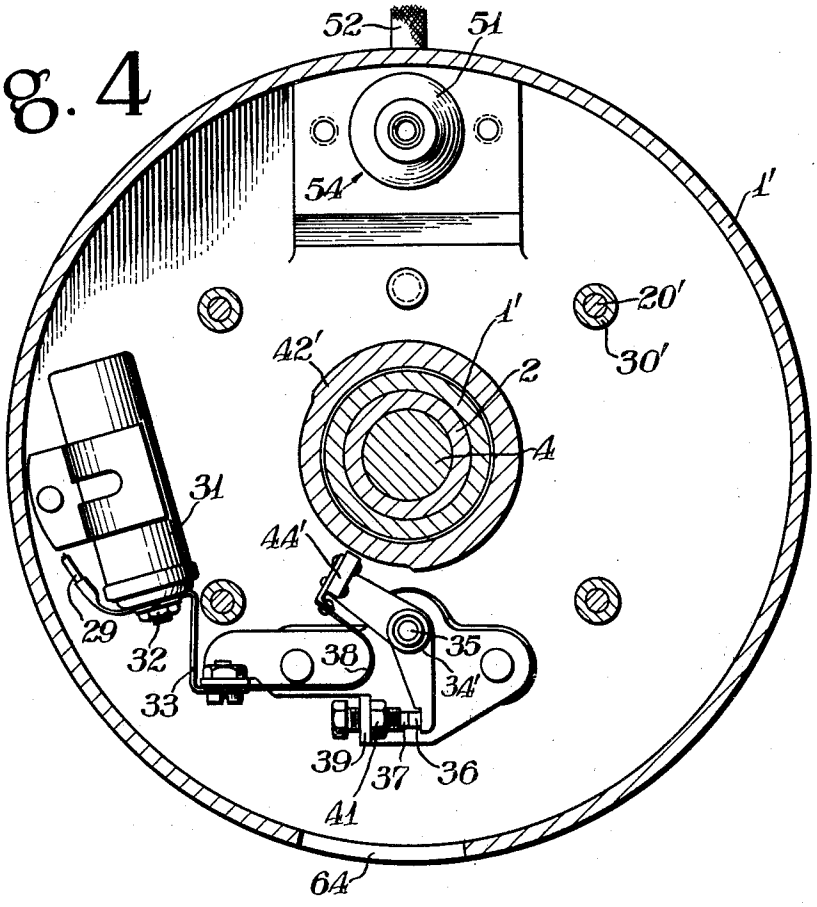
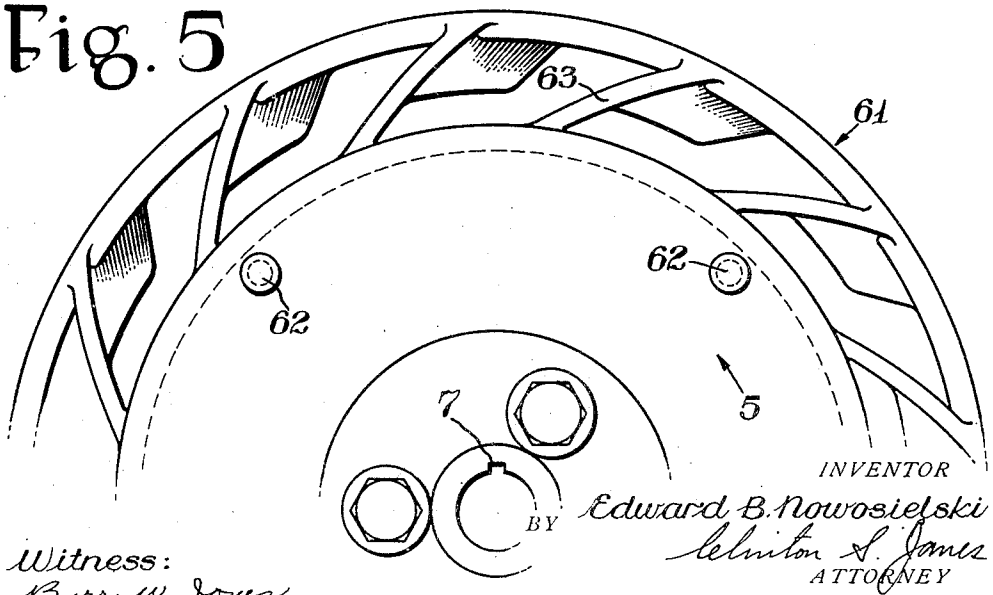


Fig. 5



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UNITED STATES PATENT OFFICE

2,077,255

MAGNETO GENERATOR

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Application April 21, 1934, Serial No. 721,745

12 Claims. (Cl. 171—209)

The present invention relates to a magneto generator and more particularly to a high tension generator adapted to furnish ignition current for internal combustion engines.

It is an object of the present invention to provide a magneto generator which is efficient and reliable in operation, simple and economical in construction and easily assembled and adjusted.

It is another object to provide such a device which is particularly adapted for operation at high rotative speeds without danger of distortion of the rotor or the setting up of excessive bearing pressures due to centrifugal force.

It is a further object to provide such a device which is arranged to be mounted directly on and to be driven at unit speed with the internal combustion engine and to incorporate the engine flywheel within itself.

It is another object to provide such a device in which the rotor of the magneto is built as a unit with the engine flywheel in such manner as to permit the use of a steel flywheel adapted for high speed rotation.

A further object is to provide such a device in which the breaker mechanism is fully enclosed but is conveniently observable during operation of the generator and is readily adjustable without disassembly of the magneto.

A further object is to provide such a device in which the stationary parts of the magneto are rotarily adjustable, and the means for conducting the high tension current from the magneto is also adjustable to permit the most convenient arrangement of the high tension wiring and prevent interference therewith by the bodily adjustment of the magneto.

Further objects and advantages will be apparent from the following description taken in connection with the accompanying drawings in which:

Fig. 1 is substantially a midsectional view through the axis of a magneto illustrating a preferred embodiment of the present invention;

Fig. 2 is a section at right angles thereto taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is a vertical section of a second embodiment of the invention in which the parts are arranged somewhat differently and provision is made for automatic cooling;

Fig. 4 is a section taken substantially on the line 4—4 of Fig. 3; and

Fig. 5 is a detail in elevation showing a portion of the flywheel illustrated in Fig. 3, with the arrangement of the cooling vanes thereof.

Referring first to Fig. 1 of the drawings, there is illustrated a magneto generator comprising a casing 1 of generally cylindrical shape having a bearing 2 adapted to be received in the casing of the engine, not illustrated, for which the generator is adapted to supply the ignition current. A rotor indicated generally at 3 is journalled within the bearing 2 and comprises a shaft 4 which may be the extended shaft of the engine or a stub shaft arranged to be coupled therewith. A flywheel member in the form of a disc 5 having an extended hub 6 is suitably keyed on the end of the shaft 4 as shown at 7 and is formed at its periphery with a shoulder 8 arranged to substantially close the open end of the casing 1.

Permanent magnets in the form of smooth cylindrical bars 9 are arranged in pairs as indicated in Figs. 1 and 2 on opposite sides of the axis of the rotor and are arranged to extend into openings 11 formed in pole pieces 12 of suitable magnetic material. The pole pieces 12 are retained in assembled relation with the magnets 9 by means of cheek plates 13 and 14 of suitable non-magnetic material having shoulders 15 and 16 extending into rabbets 17 and 18 formed in the edges of the pole pieces 12. The magnets, pole pieces and cheek pieces are mounted in assembled relation on the flywheel 5 coaxial therewith and are suitably rigidly fixed thereto as by means of rivets 9 traversing the cheek pieces and pole pieces.

The cheek piece 14 is formed as illustrated to space the magnets 9 from the flywheel 5 sufficiently to magnetically insulate the magnets from the flywheel. This permits the formation of the flywheel of steel whereby its tensile strength is sufficient to permit rotation at very high speeds such as are encountered for instance in outboard motor boat installations. The shape of the flywheel 5 in the form of a substantially flat disc, and the formation of the magnetic portions of the rotor of small diameter and rigidly confined, also permit the operation of the device safely at high rotational speeds.

Referring now more particularly to Fig. 2 of the drawings, a stator indicated generally at 21 is mounted within the casing 1 and comprises pole shoes 22 and 23 having internal surfaces concentric with and arranged to be closely adjacent to the external surfaces of the rotary pole pieces 12. The pole shoes 22 and 23 are suitably fixed in the casing 1 as by means of rivets 20, and are spaced from said casing by means of non-magnetic spacing elements 30 of such dimensions as to properly line up the pole shoes with the rotary pole pieces 12. The stationary pole shoes

22 and 23 are connected by a yoke 24 of magnetic material providing a core for an induction coil 25 having a primary winding 26 and a secondary high tension winding 27.

One end of the primary winding 26 is grounded as indicated at 28 in the usual manner, and the opposite end is connected by a lead 29 to one terminal 32 of a condenser 31, the opposite terminal of which is grounded on the magneto casing. A lead 33 connects the terminal 32 of the condenser to an insulated breaker arm 34 pivoted to the casing as indicated at 35 and carrying a movable contact 36 which is yieldably pressed against a fixed grounded contact 37 by suitable means such as a spring 38. Contact 37 is adjustably mounted in a bracket 39, and suitable locking means are provided as indicated at 41.

A breaker cam member 42 (Fig. 1) is rigidly mounted on the rotor as indicated at 43 and is arranged to be engaged by a cam follower 44 formed on the breaker arm 34 in such manner that the rotation of the cam 42 causes contacts 36 and 37 to be opened and closed. It will be understood that the cam 42 is so positioned on the rotor 3 that the contacts 36, 37 will be opened at the proper times to secure a suitably timed ignition spark in the engine. The timing of the spark may be manually adjusted by bodily rotation of the casing 1 about the shaft 4, and for this purpose a handle 45 is provided on the casing. Manually operable means for rendering the induction coil 25 inoperative is provided in the form of a push button 46 in the handle 45. The push button is adapted to ground a lead 47 from the condenser terminal 32 by means of a spring contact 48 which is caused to engage a fixed contact 49 on the handle 45 when the push button is depressed.

Means are provided for conducting the high tension current from the induction coil 25 to the ignition device of the engine comprising a terminal block 51 carrying an insulated conductor 52 which is connected to the high tension terminal 53 of the induction coil by a suitable swiveled connection such as indicated at 54. The terminal block 51 is swiveled in the casing 1 on an axis parallel to the axis of the casing and is yieldably maintained in the casing by suitable means such as a retaining spring 55. It will be noted that the swiveled mounting of the terminal block 51 permits the most convenient arrangement of the lead from the magneto to the engine ignition device and allows adjustment of the casing without bending the high tension lead.

In order that the breaker mechanism may be readily observed and adjusted without disassembling the magneto, an opening 56 is provided in the side of the casing, which opening is normally closed by a cover plate 57 yieldably held in place as by means of a spring 58 but which may be readily removed by suitable means such as a hand link 59. It will be appreciated that removal of the cover plate permits observation of the breaker points even while the device is in operation, and allows ready adjustment thereof by a suitable tool such as a screw driver.

In the operation of this device, rotation of the magnets 9 causes reversals of flux to take place in the external portion 22, 24, 23 of the magnetic circuit, thereby inducing an alternating current in the primary 26 of the induction coil 25 at such times as the contacts 36, 37 are closed to permit the flow of primary current. It will be understood that these contacts are timed to open at the time of maximum current flow whereby a high tension current is generated in the secondary 27 of the induction coil, which current is conducted by the lead 52 to the ignition device of the engine. Adjustment of the timing of the device in accordance with the operation of the engine is provided by rotary adjustment of the casing 1 by means of the handle 45. It will be understood that this adjustment is thus continuously under the control of the operator so that it may be varied to provide optimum engine performance under all conditions. Clamping means for frictionally maintaining the setting of this adjustment is preferably provided, and, as illustrated in Figs. 1 and 3, takes the form of a split collar 65 fixed to the casing 1 or 1' as by means of rivets 66, and adjustably tightened on the bearing sleeve 2 by means of a bolt 67. When it is desired to stop the engine, the push button 46 is depressed whereby the primary 26 of the induction coil is grounded, thus rendering the coil inoperative.

In the embodiment of the invention illustrated in Figs. 3, 4 and 5 of the drawings, the various parts of the rotor and stator are in general the same as in the embodiment previously described and are similarly numbered. A fan member 61 is suitably fixed to the flywheel 5 as by means of rivets 62 and is provided with vanes 63 so arranged as to cause a current of air to be set up in a direction to cool the magneto and the engine upon which it is mounted.

In this embodiment of the invention, the cam member 42' is formed integral with the cheek piece 13, and the cam follower 44' is formed by a block of insulation mounted on the breaker arm 34' which is formed as a bell crank lever in order to further facilitate observation and easy adjustment of the breaker points 36, 37.

The casing 1' in this embodiment of the invention is not formed to be closed by the flywheel 5, but openings 64 are formed in the periphery thereof permitting the flow of cooling air therethrough under the influence of the fan 61. The stator 22 is rigidly mounted on the casing 1' as by means of rivets 28' and spacers 30' whereby the stator is properly arranged in the plane of rotation of the rotating pole pieces 12.

Although certain embodiments of this invention have been shown and described in detail, it will be understood that other embodiments are possible and various changes may be made in the design and arrangement of the parts without departing from the spirit of the invention as defined in the claims appended hereto.

What is claimed is:

1. In a magneto generator for internal combustion engines a casing adapted to be mounted on an engine, a stator mounted in and fixed to said casing comprising pole shoes and a connecting core member, and a rotor comprising a shaft journalled in said casing and arranged to be driven by said engine, permanent magnets having pole pieces adapted to cooperate with said stator pole shoes to complete a magnetic circuit, a disc forming a closure for the casing and constituting an engine flywheel, and means for rigidly attaching said magnets to said disc within the stator.

2. In a magneto generator for internal combustion engines a casing adapted to be mounted on an engine, a stator mounted in said casing comprising pole shoes and a connecting core member, and a rotor comprising a shaft journalled in said casing and arranged to be driven

by said engine, cylindrical permanent bar magnets mounted symmetrically about the shaft having pole pieces adapted to cooperate with said stator pole shoes to complete a magnetic circuit, and a disc forming a mounting for the rotary magnets, a closure for the casing and constituting an engine flywheel.

3. A magneto generator for internal combustion engines including a casing, a shaft journalled thereon, a disc fixed to the shaft constituting both a closure for the casing and an engine flywheel, a magnetic rotor fixed to said disc within the casing concentric with said shaft including bar magnets mounted in pairs symmetrically about the shaft, pole pieces locating and confining said magnets, cheek pieces locating and confining said pole pieces, and means for rigidly mounting said cheek pieces on said disc; and a stator comprising pole shoes fixed rigidly to the casing extending around the rotor.

4. A magneto generator for internal combustion engines including a casing, a shaft journalled thereon, a disc fixed to the shaft constituting both a closure for the casing and an engine flywheel, a magnetic rotor fixed to said disc within the casing concentric with said shaft including smooth bar magnets mounted in pairs symmetrically about the shaft, pole pieces having openings locating and confining said magnets, cheek pieces having peripheral flanges locating and confining said pole pieces, and means for rigidly mounting said cheek pieces on said disc; and a stator comprising pole shoes fixed to the casing extending around the rotor concentric therewith.

5. A magneto generator for internal combustion engines including a casing, a shaft journalled thereon, a disc fixed to the shaft constituting both a closure for the casing and an engine flywheel, a magnetic rotor fixed to said disc within the casing concentric with said shaft including smooth bar magnets mounted in pairs symmetrically about the shaft, pole pieces having openings locating and confining said magnets, cheek pieces having peripheral flanges locating and confining said pole pieces, said disc having a concentric shoulder for receiving and locating one cheek piece, and means for rigidly attaching said cheek pieces to the disc; and a stator comprising pole shoes fixed to the casing extending around the rotor concentric therewith.

6. A high tension magneto generator for internal combustion engines including a generally cylindrical casing, a rotor journalled axially therein including a permanent magnet and a disc forming a cover for said casing, a cam on said rotor, a cam follower mounted in said casing, and adjustable breaker contacts operated by said cam follower, said casing having a removable cover plate arranged to provide for observation and adjustment of the breaker points without removal of the rotor.

7. A high tension magneto generator for internal combustion engines including a generally cylindrical casing, a rotor journalled axially therein including a permanent magnet and a disc forming a cover for said casing, a cam follower mounted in said casing, and adjustable breaker contacts operated by said cam follower, said casing having a removable cover plate arranged to provide for observation and adjustment of the breaker points without removal of the rotor, said breaker points and adjusting means therefor being so arranged that the engagement of the points may be observed and an adjusting tool may be operated through the opening provided by the removal of said cover plate while the magneto is in operation.

8. A magneto generator for internal combustion engines including a casing, a shaft journalled therein, a disc fixed to the shaft constituting both a closure for the casing and an engine flywheel, a magnetic rotor fixed to said disc within the casing concentric with said shaft, a stator comprising pole shoes mounted in and fixed to the casing extending around the rotor concentric therewith, breaker mechanism including a cam fixed on said shaft and a cam follower pivoted in said casing in position to cooperate therewith, and means for mounting the casing with provision for angular adjustment about the axis of said shaft to vary the relation of the cam and its follower.

9. In a high tension magneto generator for internal combustion engines a rotarily adjustable casing, a magnetic rotor journalled therein, a stator including an induction coil fixed in said casing, breaker mechanism for said coil including a cam follower fixed in said casing and a cam on said rotor, and means for manually adjusting the casing to vary the timing of the breaker mechanism, said adjusting means comprising manually operable means for grounding said coil.

10. In a magneto generator for internal combustion engines a rotor including permanent bar magnets mounted in spaced pairs on opposite sides of the axis of the rotor, pole pieces uniting like poles of said magnets, a steel disc forming a high speed engine flywheel, non-magnetic discs having peripheral shoulders extending over the pole pieces, and means for clamping the magnets and pole pieces between said non-magnetic discs and thereby rigidly mounting the magnets and pole pieces on the flywheel in spaced relation thereto.

11. In a high tension magneto generator for internal combustion engines a casing rotarily adjustable about an axis, a magnetic rotor journalled therein on said axis, a stator including an induction coil fixed in said casing, a high tension terminal block having an insulated conductor adapted to make a swiveled connection with the high tension terminal of said coil, and swiveled in said casing for pivotal movement on an axis parallel to the axis of the casing, and yielding means for holding said terminal block in the casing.

12. In a high tension magneto generator for internal combustion engines a casing rotarily adjustable about an axis, a magnetic rotor journalled therein on said axis, a stator including an induction coil fixed in said casing, a high tension terminal block swiveled in said casing for pivotal movement on an axis parallel to the axis of the casing and having an insulated conductor adapted to make connection with said coil and extending at an angle to the axis of the terminal block, and yielding means for holding the terminal block in the casing.

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