Aug. 10, 1937. E. B. NOWOSIELSKI 2,089,759

ELECTRICAL APPARATUS

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Fig. 1

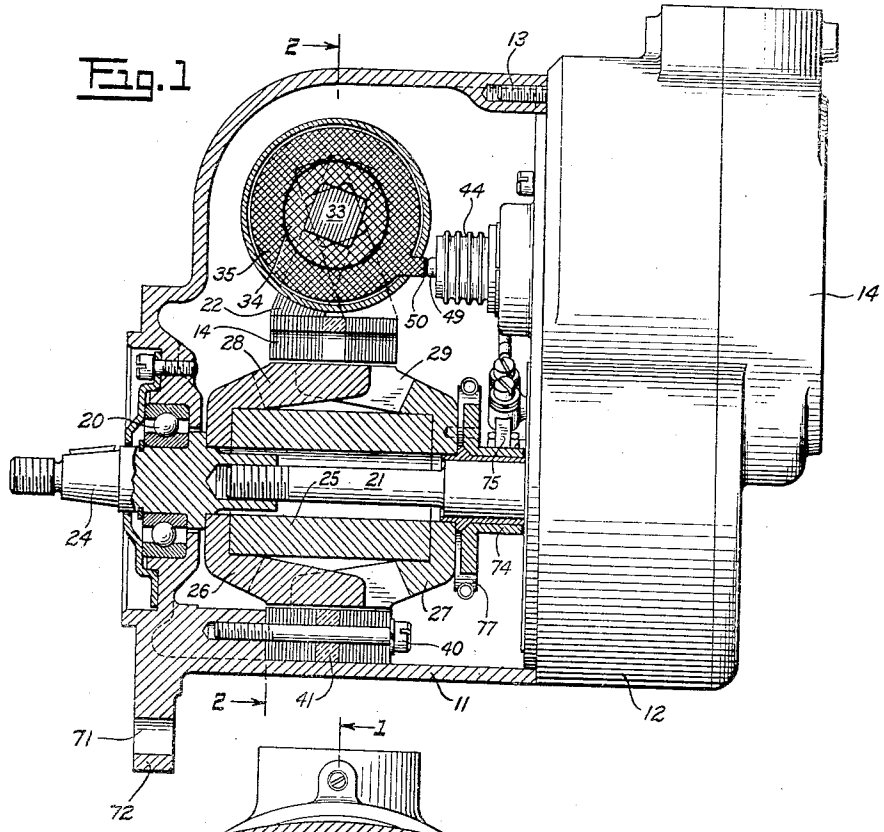
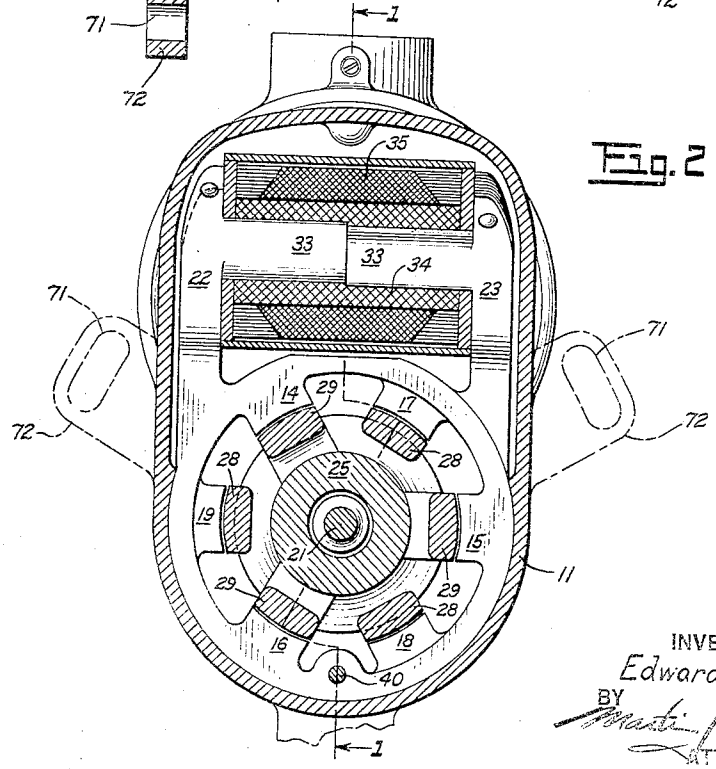


Fig. 2



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Fig. 3

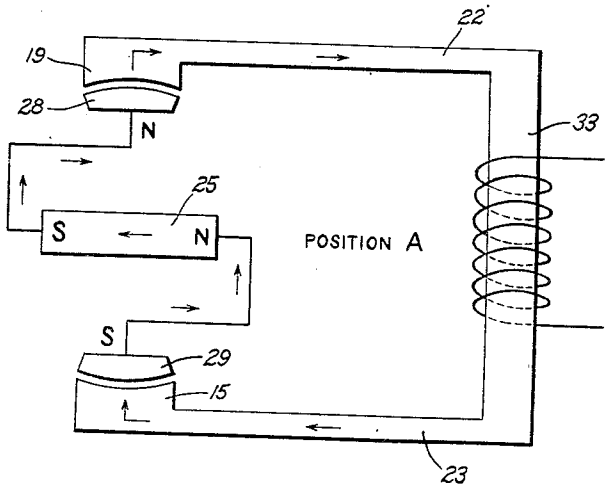
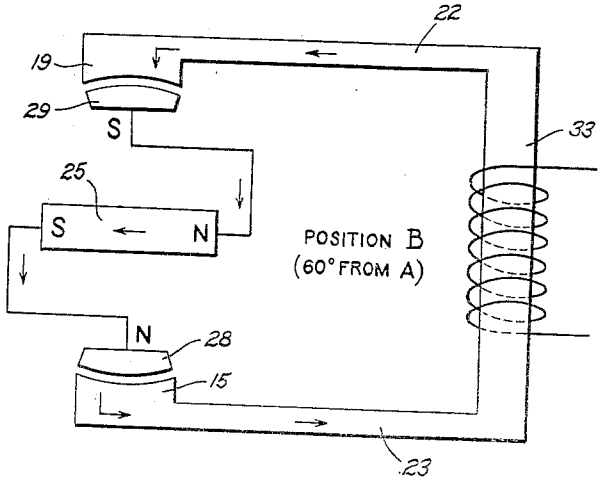


Fig. 4



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UNITED STATES PATENT OFFICE

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ELECTRICAL APPARATUS

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Application June 11, 1935, Serial No. 26,053

7 Claims. (Cl. 171—209)

This invention relates to magneto-electric generators, and more particularly to a high tension magneto of the type used for ignition purposes in internal combustion engines.

One of the objects of the present invention is to provide a novel device of this character which is of simple and compact construction, but efficient and powerful.

Another object of the invention is the provision of a novel magneto of the inductor type in which a single straight bar of permanently magnetized material is used; and instead of being mounted in the stationary frame, the single bar magnet is mounted in the inductor rotor assembly, and the method of such mounting is another feature of the invention.

In the embodiment illustrated in the accompanying drawings the single bar magnet is in the form of a cylindrical tube or sleeve having its ends secured in inductor plates of opposite polarity, and rotatable as a unit to produce an alternating magnetic circuit by cooperation with stationary laminated pole pieces having faces disposed adjacent the path of rotation of the interdigitated polar projections of the said inductor plates, whereby an alternating current is generated in a stationary inductor coil within which a core is formed by the abutting ends of the pole pieces constituting the armature. It is to be understood, however, that the accompanying drawings are merely illustrative and are not designed to indicate the limits of the invention, reference being had for this purpose to the appended claims, wherein are reflected other objects of the invention.

In the drawings:

Fig. 1 is a vertical longitudinal sectional view of the embodiment above described;

Fig. 2 is a transverse sectional view along the line 2—2 of Fig. 1; and

Figs. 3 and 4 are diagrams showing the magnetic circuit during different portions of the cycle.

In the form shown, the magneto of the present invention comprises a main casing or frame of suitable non-magnetic material such as aluminum, and consisting of sections 11 and 12 suitably attached as by means of the screws 13.

Sections 11 and 12 are provided with suitable anti-friction bearings, one being shown at 20, to support a shaft 21 journaled therein, with one end portion 24 projecting outside the casing and provided with suitable attaching means whereby the shaft may be driven from a rotary part of the engine.

A composite inductor rotor is mounted upon the shaft 21 to rotate therewith, and includes the permanently magnetized cylinder 25 mounted in a pair of inductor plates 26 and 27 having overlapping fingers 28 and 29 arranged in interdigital relation, the zone of overlapping being substantially adjacent the middle portion of the casing section 11. These inductors are formed of suitable magnetic material and the fingers thereof are adapted to rotate in sequence past arcuate pole pieces 14, 15, 16 and 17, 18, 19, the three first named being formed on the annular portions of laminae 22, and the latter three on the annular portions of laminae 23. The latter three (17, 18 and 19) are, therefore, spaced apart from the former three in both the axial and the angular directions.

A suitable induction coil having primary and secondary windings 34 and 35 is mounted crosswise of section 11 within the upper part thereof, and receives the abutting ends 33 of the L-shaped integral extensions of the annular portions of laminae 22, 23 above described. As shown best in Fig. 1, these abutting ends 33 are oppositely inclined, to a degree corresponding to the angle separating the plane of the pole pieces 14, 15, 16 from that of pole pieces 17, 18, 19.

By this novel method of forming the laminated armature and pole pieces, I achieve maximum magnetic power in a minimum of space, and simplify the manufacturing and assembling processes, since it is thereby made possible to first fasten the two annular laminated assemblies 22 and 23 in place (by screw means 40) and then wind the coils 34 and 35 directly to the ends 33 of said laminae. Between the two assemblies 22 and 23 I interpose a non-magnetic spacer 41 through which screw 40 also passes.

The number of inductor fingers is chosen to provide the proper number of flux reversals per revolution of the engine crankshaft, having in mind the gear ratio and the number of cylinders in the engine with which the magneto is to be used. In the form illustrated there are six inductor fingers 28 and 29 and the magneto is adapted to be used with a nine-cylinder engine, with a gear ratio chosen accordingly.

A rotary distributor spool 44 having a body of suitable insulating material is mounted within the housing 11, 12, being retained therein by suitable means as shown more completely in my co-pending application filed on even date herewith. A conductor extends centrally through the inner portion of spool 44 and is provided at its inner end with a spring pressed contact member 49 which is adapted to contact with the terminal

50 of the high tension winding of the induction coil.

The usual distributor block (not shown) may be mounted in the upper portion of the end section 14 in proximity to spool 44, and provided with the usual plurality of contact points with which the high tension spark plug cables (not shown) are adapted to connect.

Openings 71 are tapped in the ears 72 of section 11 whereby the magneto may be bolted upon a suitable bracket or shelf, with the shaft 21 in driving connection with a suitable rotatable part driven from the engine.

Referring to Figs. 3 and 4 it will be noted that the inductor fingers 28 are always of one polarity, while the inductor fingers 29 are always of the opposite polarity. During the operation of the device, if for instance, the inductor fingers 28 are north poles and fingers 29 are south poles, when a finger 29 is opposite the pole piece 15, a finger 28 will be opposite pole piece 19, and the flux will be from the pole piece 15 to the inductor finger 29, through the sleeve or tube 25 to the inductor finger 28, then to the pole piece 19, and through the core 33 of the induction coil back to the pole piece 15. When the rotor has turned through sixty degrees, (as shown in Fig. 4) so that an inductor finger 28 is opposite the pole piece 15 and an inductor finger 29 is opposite the pole piece 19, then the flux traverses the coil in a reverse direction. It will thus be seen that there are six reversals of flux through the coil during each revolution of the rotor.

The cam member 74 is preferably provided with six lobes which are arranged to operate an interrupter yoke 75 to open the primary circuit contacts during the time that the flux through the coil is changing most rapidly, and the heaviest current is flowing through the primary winding 34. The interruption of the primary current induces a current of high voltage in the secondary coil 35 which is conducted out through the proper cable to the ignition system of the engine, returning through the body of the engine and the casing of the magneto.

Reference character 77 designates an automatic spark adjuster claimed and disclosed more clearly in my copending application Serial No. 26,052 filed on even date herewith.

Although but one embodiment of the invention has been shown and described in detail, it is to be expressly understood that the illustrated embodiment is not exclusive, and various other embodiments will now suggest themselves to those skilled in the art, while changes may be made in the construction, arrangement and proportions of parts, and certain features used without other features, without departing from the spirit of the invention. Reference is therefore to be had to the claims hereto appended for a definition of the limits of the invention.

What is claimed is:

1. A magneto of the flux alternating type having a plurality of inductor fingers and a single magnet mounted to rotate therewith, an equal plurality of stationary pole pieces surrounding said inductor fingers, and spaced so that every inductor finger registers with a pole piece to participate in each flux alternation and means for maintaining a unidirectional magnetic path through said single magnet during rotation thereof as the flux alternates, said means including said pole pieces.

2. A magneto of the flux alternating type having a plurality of interdigitated inductor fingers and a single magnet mounted with its end and lateral surfaces in contact therewith, and means for maintaining a unidirectional magnetic path through said magnet during rotation thereof, said means including stationary pole pieces equal in number to the number of interdigitated fingers and extending around the circumference of said single magnet in co-operating relationship with said fingers.

3. In a device of the class described, a rotor constituted by a single magnet having its polar ends spaced along the axis of rotation and circumferentially spaced inductor fingers of alternate polarity surrounding said magnet and intersecting a common plane transverse to the axis of rotation, and means including a fixed armature core having multiplied polar ends spaced all the way around the rotor to enlarge the region of flux take-off between rotor and stator, and thus intensify the magnetic circuit through said inductor fingers and magnet.

4. In a device of the class described, a rotor constituted by a single magnet having its polar ends spaced along the axis of rotation and circumferentially spaced inductor fingers of alternate polarity surrounding said magnet and intersecting a common plane transverse to the axis of rotation, and means for completing a magnetic circuit through said inductor fingers and magnet said means including an armature having multiple pairs of axially spaced fixed polar ends cooperating alternately with the inductor fingers of each polarity.

5. In a device of the class described, a rotor constituted by a single magnet having its polar ends spaced along the axis of rotation and circumferentially spaced inductor fingers of alternate polarity surrounding said magnet and intersecting a common plane transverse to the axis of rotation, and means for completing a magnetic circuit through said pole shoes and magnet said means including fixed armature ends divided between opposite sides of said common transverse plane and extending all the way around said rotor to enlarge the region of flux take-off as they cooperate alternately with the pole shoes of each polarity.

6. In a device of the class described, the combination with a stator including a core and surrounding coil, of a rotor including a single magnet having its polar ends spaced along the axis of rotation and circumferentially spaced inductor fingers of alternate polarity surrounding and contacting both the lateral and end surfaces of said magnet and intersecting a common plane transverse to the axis of rotation, and means for completing a magnetic circuit through said inductor fingers and magnet, said means including fixed polar elements integral with said core and divided between opposite sides of said common plane.

7. A laminated magneto armature comprising a plurality of laminae each having an annular portion, an L-shaped portion and a plurality of polar projections extending radially inward from said annular portion, and each L-shaped portion being bent about a line approximately tangential to the adjacent annular portion, thus producing finished laminae of the same contour, and with a portion of each bent out of the plane of the remainder.

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