Sept. 6, 1938. L. H. SCOTT 2,129,633

MAGNETO GENERATOR

Filed April 29, 1937 2 Sheets-Sheet 1

Fig. 1

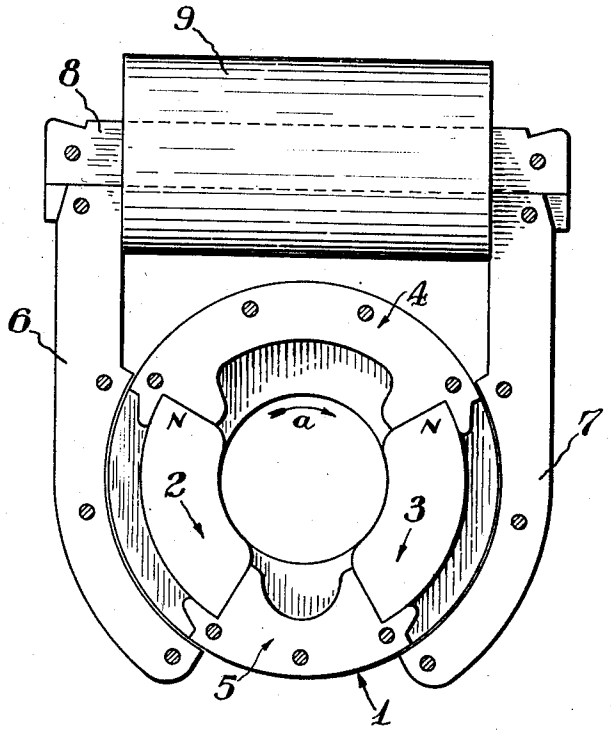
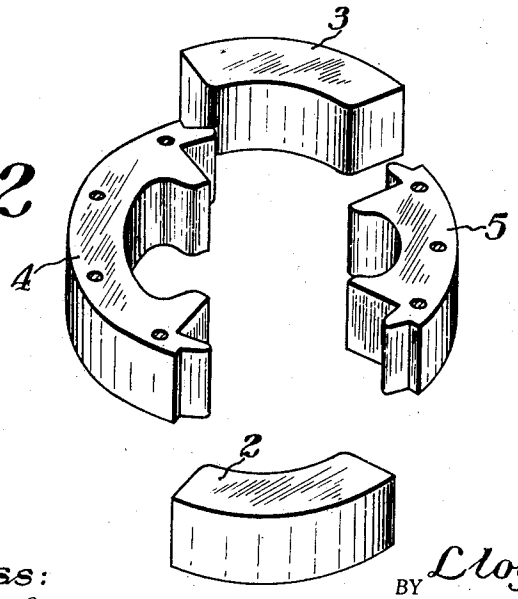


Fig. 2



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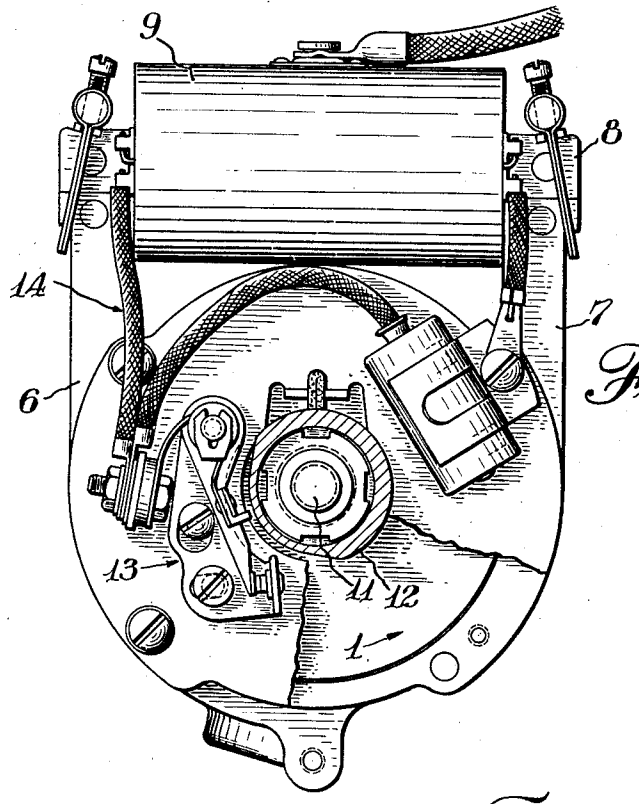

Fig. 3

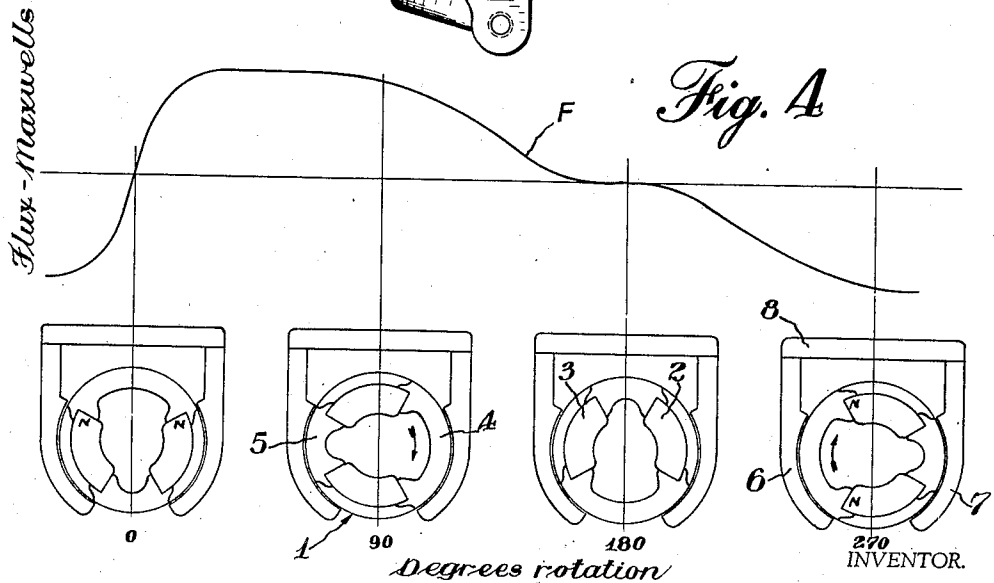

Fig. 4

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UNITED STATES PATENT OFFICE

2,129,633

MAGNETOGENERATOR

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Application April 29, 1937, Serial No. 139,773

5 Claims. (Cl. 171—209)

The present invention relates to a magnetogenerator and more particularly to an ignition generator for single cylinder high speed internal combustion engines.

In the operation of direct connected magnetogenerators for single cylinder high speed internal combustion engines such as disclosed in the copending application of Nowosielski Serial Number 133,853, filed March 30, 1937, it has been found that at high engine speeds a spark will sometimes be generated for each half revolution of the magneto rotor irrespective of the operation of the breaker mechanism. In other words, the reversals of flux through the magneto coil are so rapid that a spark is generated in the secondary thereof regardless of the breaker mechanism. This production of undesired sparks is particularly objectionable in the case of single cylinder two-cycle engines since such sparks occur at the time the fresh charge is being injected into the engine cylinder, and preignition with attendant loss of power is likely to occur.

It is an object of the present invention to provide a novel magnetogenerator arranged to produce but one spark per revolution, irrespective of the speed of rotation.

It is another object to provide such a device in which one of the reversals of flux caused by each rotation thereof is comparatively slow and gradual, so that an insignificant voltage is generated thereby in the coil.

A further object is to provide such a device in which the magnetic rotor and the cooperating pole shoes of the stator are formed asymmetrically whereby the reversals of flux caused by rotation of the rotor are alternately slow and rapid.

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

Fig. 1 is a plan view of the parts making up the magnetic circuit of a preferred embodiment of the invention;

Fig. 2 is a detail in perspective showing the parts of the rotor in disassembled relation;

Fig. 3 is a plan view of a magneto embodying the present invention, certain of the parts being broken away for the sake of clarity; and

Fig. 4 is a diagrammatic representation of certain of the operating characteristics of the device.

Referring first to Fig. 1 of the drawings, there is illustrated a rotor indicated generally by numeral 1 comprising a pair of arcuate permanent magnets 2 and 3 and a pair of arcuate pole shoes of suitable laminated magnetic material 4 and 5 joining like poles of the magnets and interlocking therewith to form a cylindrical rotor.

An external magnetic circuit is illustrated in the form of a pair of stator pole shoes 6 and 7 connected by a cross member 8 forming the core of an induction coil 9 of conventional type.

Fig. 3 illustrates a magneto embodying the above-described structure and further shows a drive shaft 11 on which is mounted a cam 12 adapted to operate a breaker mechanism 13 which is connected as usual by a lead 14 to the primary of the induction coil 9.

In the operation of the structure as so far described, it will be noted that rotation of the rotor 1 will cause the rotor pole shoes 4 and 5 to be presented alternately to the stator pole shoes 6 and 7 during each revolution of the rotor so that there will be two reversals of flux for each revolution. When this magneto is used for the ignition of a two-cycle single cylinder engine, the cam 12 and breaker mechanism 13 are so arranged that the primary circuit of the induction coil will be closed during one of the reversals of flux up to the time when the stored primary energy is at its maximum. The breaker mechanism is then opened by the cam, thus allowing a rapid change of flux in the primary of the coil and thereby generating a high voltage in the secondary of the coil to be used for ignition purposes in the usual manner.

According to the present invention, means are provided for rendering the second reversal of flux inoperative to produce a significant amount of voltage in the secondary of the coil. Referring to Fig. 1, it will be seen that this is accomplished by spacing the magnets 2 and 3 of the rotor at less than 180 degrees from each other so that the rotor pole shoe 4 subtends an arc considerably greater than the rotor pole shoe 5. The stator pole shoes 6 and 7 are also arranged in substantially the same angular relationship to each other as the magnets 2 and 3 whereby in the position illustrated and with the rotor turning in the direction of the arrow *a*, rotor pole shoe 4 is moved out of cooperative relation with the stator pole shoe 6 and into such relation with the stator pole shoe 7 at the same time that the rotor pole shoe 5 is being transferred from stator pole shoe 7 to stator pole shoe 6. A rapid reversal of flux through the external magnetic circuit is thus secured, and it is this reversal which is utilized to generate the ignition voltage in the in-

duction coil 9. When, however, the rotor has turned through substantially 180 degrees from its present position, the reversal of flux will be comparatively gradual since the long rotor pole shoe 4 continues to bridge the short lower gap between stator pole shoes 6 and 7 for a considerable length of time after the short rotor pole shoe 5 has left the stator pole shoe 6.

In Fig. 4 the graph F illustrates diagrammatically the flux traversing the external magnetic circuit during one complete revolution of the rotor, the four cardinal positions of which are illustrated diagrammatically in coordinated relation to the curve. In this diagram, the position of zero degrees is taken as the position of the parts illustrated in Fig. 1. It will be noted from the slope of the flux curve F that the flux in the external circuit is reversed very rapidly as the rotor passes through this zero position, and this reversal of flux is therefore used to generate ignition current. The maximum flux is secured at approximately the 90 degree position, and thereafter the flux decreases, passing through zero at the 180 degree position, but the time during which the flux is decreasing and increasing in the opposite direction is very much greater than in the first reversal thereof due to the fact, as above pointed out, that the rotor pole shoes do not move simultaneously out of cooperative relation with the stator pole shoes. It is obvious, therefore, that the reversal of flux at the 180 degree point will be comparatively ineffective with respect to the generation of voltage in the coil.

The cam 12 is preferably formed as illustrated to maintain the breaker 13 open until after the unused reversal of flux has taken place. This, however, has been found not to be strictly necessary since with the rotor and stator constructed as herein disposed, the unused reversal of flux is so gradual that it is substantially ineffective to produce undesired impulses in the coil at any normal operating speeds of the device.

Although but one embodiment of the invention has been shown and described in detail, it will be understood that other embodiments are possible and various changes may be made in the proportions and arrangements 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 high tension magneto, a two-pole rotor having pole shoes of unequal circumferential extent, and a two-pole stator, the pole shoes of which are so spaced circumferentially of the rotor that in one angular position of the rotor they substantially bridge the spaces between the pole shoes thereof.

2. In a high tension magneto, a two-pole rotor having pole shoes of unequal circumferential extent symmetrically arranged with respect to a diametral line of the rotor passing therethrough, and a two-pole stator having pole shoes of equal angular extent so spaced circumferentially around the rotor that at one angular position of the rotor they are located substantially symmetrically with respect to the spaces between the rotor pole shoes, but when the rotor is turned through a half revolution, the stator pole shoes are substantially unsymmetrically disposed with respect to such spaces.

3. In a high tension magneto, a rotor including a pair of equal arcuate magnets and a pair of unequal arcuate pole shoes connecting like poles of the magnets, a stator comprising a pair of arcuate pole shoes substantially equal in angular extent to said magnets and arranged to register therewith once in each revolution of the rotor.

4. In a high tension magneto for igniting an internal combustion engine, a magnetic rotor having unequal arcuate pole shoes separated by equal arcuate spaces, and a stator having arcuate pole shoes substantially equal in angular extent to said spaces, and separated by spaces, one such space being substantially equal to the angular extent of one of the rotor pole shoes and the other such space being substantially equal to the angular extent of the other rotor pole shoe.

5. In a high tension magneto for igniting internal combustion engines, a rotor and stator having pole shoes so unsymmetrically proportioned and arranged that at one angular position of the rotor the pole shoes of the rotor and stator are complementary to each other and form substantially a complete cylinder, whereas when the rotor is turned through a half revolution, certain of said pole shoes are substantially spaced from each other.

LLOYD H. SCOTT.