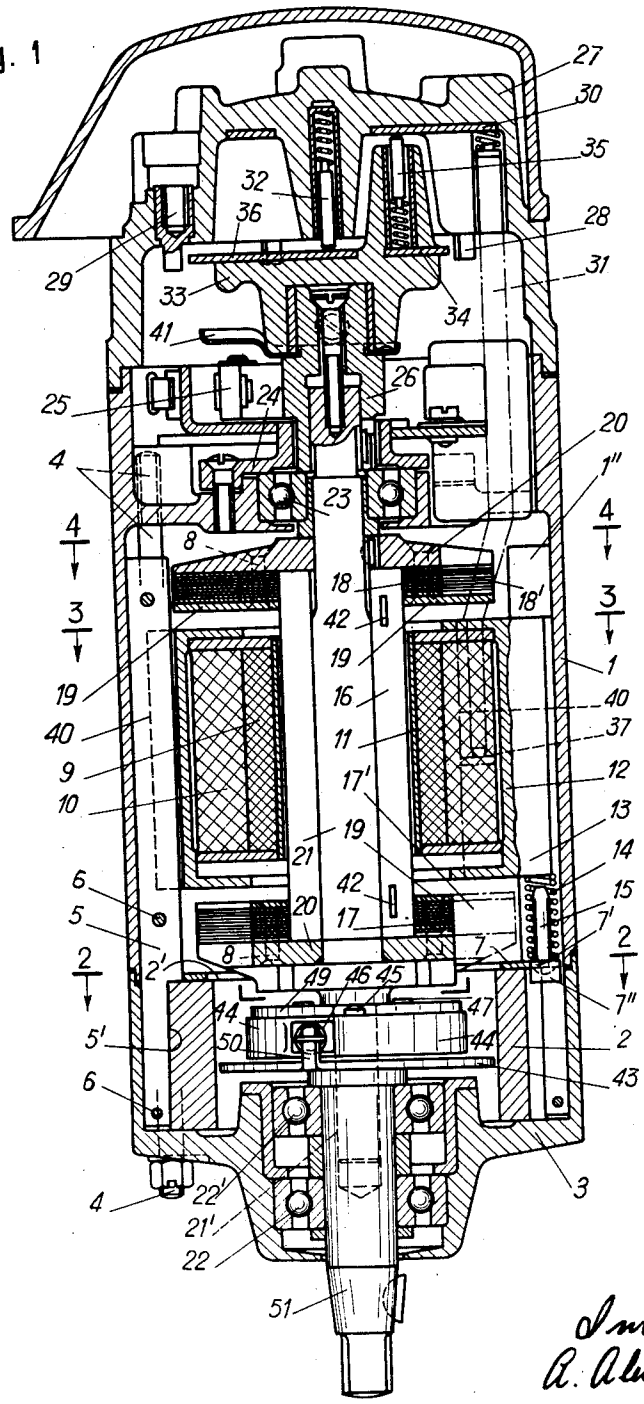
June 29, 1943. A. ALESSANDRI 2,322,994

IGNITION MAGNETO

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Fig. 1



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Fig. 2

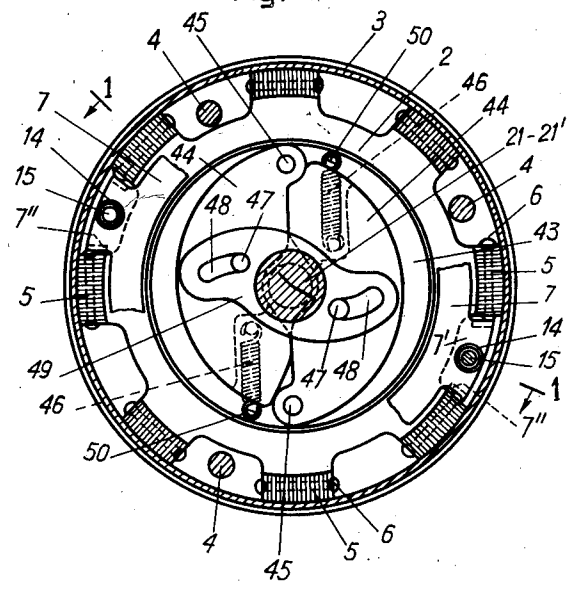


Fig. 3

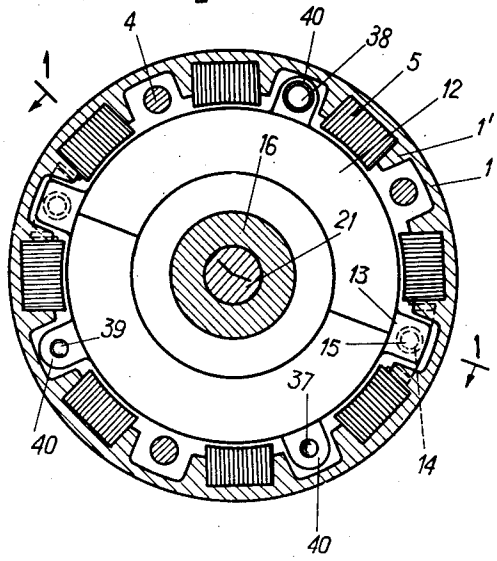
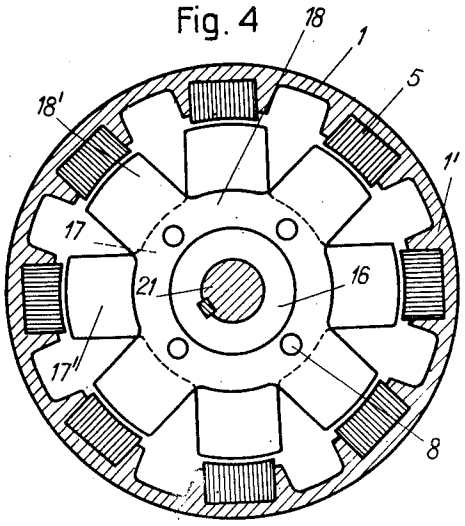


Fig. 4



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UNITED STATES PATENT OFFICE

2,322,994

IGNITION MAGNETO

Alessandro Alessandri, Milan, Italy; vested in the Alien Property Custodian

Application August 1, 1940, Serial No. 349,257
In Italy August 5, 1939

5 Claims. (Cl. 171—209)

This invention relates to ignition magnetos for internal combustion engines and more particularly to magnetos including a stationary magnet and winding and a rotary magnetic flux distributor.

In the magneto of this invention the magnet is of annular or star-shaped type and flux conveying rods extend from pole faces thereof substantially all along the same extent to cooperate with a rotary flux distributor which interlinks with an induced coil; said rotary distributor comprises star-shaped expansions spaced from each other in the direction of the length of said rods and having angularly staggered arms which are carried in succession in register with flux conveying rods connected with magnet poles having opposed polarities to produce reversals in the magnetic flux interlinking with the induced winding and to generate electromotive forces.

In this magneto the induced winding is located intermediate the spaced expansions of the flux distributor which in turn is located within the substantially cylindrical space confined by said parallel flux conveying rods; the magnet is located beyond the region occupied by the rotary flux distributor and the induced winding, to provide a space for location of an automatic ignition advance device.

The magneto of this invention further includes an arrangement for engaging the annular magnet with the flux conveying rods angularly, and a device for mounting the induced winding and for engaging said winding in position within the magneto frame.

An embodiment of this invention is illustrated by way of example on the annexed drawings and

Fig. 1 is a longitudinal section thereof on line 1—1, Figs. 2 and 3;

Fig. 2 is a transverse section on line 2—2, Fig. 1;

Fig. 3 is a transverse section on line 3—3, Fig. 1;

Fig. 4 is a diagrammatical plan view of the rotary flux distributor in cooperation with flux conveying rods.

In the illustrated embodiment the magneto includes a frame 1 of non-magnetic material which encloses an energising annular magnet 2 at one of its ends, said magnet being engaged in position by means of a cover 3 fastened on said frame 1 by means of bolts 4.

Flux conveying rods 5 are located in the frame 1 in register with the pole shoes of said magnet 2 and in position to extend along a cylindrical surface; said rods 5 have depressed regions 5' fitting on the magnet 2 and are embedded in ribs 1' of the frame 1 by casting. Each rod 5 consists of magnetic-metal lamination sheets which are inter-connected by means of rivets 6 and are located in planes substantially radial with respect to the axis of said cylindrical surface and of said flux distributor as hereinafter described.

The magnet 2 is engaged in position by means of an annulus 7 of non-magnetic material which abuts on the flat surface 2' of the magnet and provides extensions 7' having longitudinal lugs 7'' which engage adjacent pole shoes of the magnet 2 and also abut on side faces of adjacent rods 5 to engage the magnet with the whole of said rods 5 angularly.

The induced winding includes a primary coil 9 and a secondary coil 10 encircling said primary coil; the two coils 9 and 10 are enclosed in a casing consisting of an insulating internal sleeve 11 and an outer insulating shell 12.

The casing 11, 12 has two ribs 13 engaging tangentially the internal ribs 1' of the frame 1 in which the rods 5 are embedded; said ribs 13 are engaged longitudinally by springs 14 located on studs 15 which are fast in the extensions 7' of the annulus 7 said springs 14 forcing the ribs 13 against radial projections 1'' of the frame 1. The casing 11, 12 with the winding 9, 10 located therein is thus engaged in the frame 1 angularly and longitudinally.

The rotary flux distributor cooperating with the rods 5 providing pole shoes and with the induced winding 9, 10 consists of a laminated sleeve 16 made of magnetic metal sheets extending in a direction parallel with the axis thereof and assembled by means of flat rivets 42.

Star shaped rims 17, 18 are located on the ends of said sleeve 16; said rims consist of magnetic-metal laminations transverse to their axis and are fastened by means of plates 19 and of rivets 8 to two heads 20 of non-magnetic material which are solid with a shaft 21 carrying the flux distributor; said shaft 21 is rotatable in a bearing 23 fitted in the frame 1 and an extension 21' thereof enters a central bore of the driving shaft 51 which is supported by the bearings 22, 22' fitted in the frame cover 3.

The two star-shaped rims 17, 18 are located with the respective arms 17', 18' staggered angularly (Fig. 4) through an angle equal to the angle embraced by two adjacent rods 5, said arms 17', 18' cooperating to provide magnetic paths as hereinafter described.

A flange 24 secured to the frame 1 supports the stationary part of the magneto breaker whose contact arm 25, illustrated diagrammatically in Fig. 1, is controlled by a cam 26 driven by the shaft 21; the breaker may be of any suitable type and it is not described in further detail being not concerned with this invention.

On the end of the frame 1 opposed to the end which encloses the magnet 2, a stationary head 27 belonging to a high voltage distributor is located; said head 27 contains stationary electrodes 28 extending from sockets 29 for connection with cables leading to several sparking plugs (not shown).

The head 27 contains an annular contact 30 connected with a cable 31 which extends from the secondary winding 10 as well as a central contact 32 intended to be connected to an auxiliary starting magneto.

The rotary high voltage distributor which is fast with the flux distributor and provides with it and the cam 26 the magnetc rotor, includes a hub 33 of insulating material which is engaged on the cam 26 and hence on end of the shaft 21 and is provided with a conducting arm 34 which is connected with the ring-shaped contact 30 by means of a brush 35; the hub 33 further includes an arm 36 connected with the central contact 32 which in turn is connected with a starting magneto as above suggested.

Electric connections are provided by means of sockets 37, 39 and a contact 38 located in ribs 40 projecting on the outside of the casing 11, 12 of the winding 9, 10; as above stated the socket 37 is connected with the high voltage end of the secondary winding 10 and has the cable 31 leading to the annular contact 30 of the head 27 nested therein.

A contact 38 carried by a further rib 40 (Fig. 3) is intended for ground connection and a socket 39 is connected with the ungrounded contact of the breaker by means of a cable, not shown, similar to cable 31; finally the arm 36 of the rotary distributor 33 cooperates with a grounded arm 41 fast with the shaft 21, to provide an excess-voltage spark-gap.

The advance of the ignition point is secured by means of a centrifugal governor inserted intermediate the driving shaft 51 and the rotor shaft 21, 21'; said governor is located in the space enclosed within the annular magnet 2. In the illustrated embodiment the centrifugal governor includes a disk 43 fast with the shaft 51 and having centrifugal masses 44 pivotally mounted therein at 45 and connected with return springs 46 engaged with studs 50 of the disk 43; fingers 47 of the masses 44 are engaged in and cooperate with cam slots 48 of a cross bar 49 fast with the rotor shaft 21, 21'.

In the operation, as an effect of the described arrangement of the flux conveying rods 5 and of the winding 9, 10 as well as of the flux distributor 16, 17, 18, one of the arms 17' of the star rim 17 and one of the arms 18' of the other star rim 18 are at the same time in front to two adjacent rods 5 (Fig. 4) extending from opposed poles of a section of the magnet 2. Consequently in respect of each section of said magnet 2 the magnetic flux path closes from a pole shoe of the magnet through the respective flux conveying rod 5, the arm 17' of the rim 17 in front thereof, the distributor sleeve 16 and the arm 18' of the rim 18 which is in front to the rod 5 extending from the opposed pole face of the concerned section of the magnet 2 the magnetic path thus closing in the magnet through the last named rod.

Of course the direction of the magnetic flux which flows in the sleeve 16 and interlinks with the induced winding 9, 10 is reversed each time an arm 17', 18' of the rims 17, 18 passes from a position in front to one of the rods 5 to a position in front to the subsequent one and thus reversals of the flux interlinked with the induced winding 9, 10 are obtained.

In the illustrated embodiment wherein the magnet 2 includes eight pole shoes and the rods 5 are eight by number, eight flux reversals and consequently eight sparks at each revolution of the rotor 17, 16, 18 are obtained.

The operation of the described magneto is made clear from the foregoing specification and is hereinafter summarized; during the revolution of the shafts 51 and 21, 21' and of the flux distributor 17, 16, 18, breaker cam 26 and high voltage distributor 33, 34 connected with said shaft 21, 21' periodical reversals of the flux flowing through the sleeve 16 and interlinking with the winding 9, 10 are obtained; the cam 26 actuates at proper time the breaker 25 to generate a high induced voltage which is distributed by the rotary distributor 33, 34 to stationary electrodes 28 and hence to the engine sparking plugs, the centrifugal governor 44, 47, 49 causing in known manner the respective angular motion of shafts 51 and 21, 21' for the ignition advance.

What I claim as my invention and desire to secure by United States Letters Patent is:

1. An ignition magneto for internal combustion engines comprising, a casing, a hollow ring-shaped magnet therein having a number of pole faces, coextensive magnetic flux conveying rods extending each from one of said magnet pole faces, a flux distributor having staggered arms spaced from each other along the direction said rods extend, an induced winding interlinking with said flux distributor, a spindle driving said flux distributor, a shaft for driving said spindle and an automatic advance governor intercoupling said shaft and spindle and located within said hollow ring-shaped magnet.

2. An ignition magneto for internal combustion engines comprising a casing having internal projections and longitudinal ribs, a hollow ring-shaped magnet located in said casing, said magnet having a number of pole faces, coextensive magnetic flux conveying rods extending parallel to each other and each from one of said magnet pole faces, a flux distributor having staggered arms spaced from each other along the direction said rods extend, said flux distributor being located within the space defined by said parallel rods, a shell located in said space and encircling a portion of said flux distributor intermediate said arms, said shell having longitudinal ribs engaging said casing ribs angularly and said casing projections endwise, resilient means bearing on said magnet and operative on said shell to hold it in position with said ribs thereof in contact with said casing projections, an annular induced winding located in said shell and interlinking with said flux distributor and means for driving said flux distributor.

3. An ignition magneto for internal combustion engines comprising, a casing, a hollow ring-shaped magnet therein having a number of shoes providing pole faces, coextensive magnetic flux conveying rods extending parallel to each other and each from one of said magnet pole faces, an

annulus positioned on said magnet and having extensions abutting against said magnet pole shoes and rods to interengage said magnet and rods angularly, a flux distributor having staggered arms spaced from each other along the direction said rods extend, said flux distributor being located within the space defined by said parallel rods, internal longitudinal ribs in said casing and internal projections in said casing intermediate said ribs at the ends thereof spaced from said magnet, a shell located in said space and encircling a portion of said flux distributor intermediate said arms, said shell having longitudinal ribs engaging said casing ribs angularly and said casing projections endwise, springs bearing on said annulus extensions and operative on said shell ribs to hold said shell in position with said ribs thereof in contact with said casing projections, an annular induced winding located in said shell and interlinking with said flux distributor, and means for driving said flux distributor.

4. An ignition magneto for internal combustion engines comprising a casing, a hollow ring-shaped magnet therein having a number of shoes providing pole faces, coextensive magnetic flux conveying rods extending each from one of said magnet pole faces, an annulus positioned on said magnet, wings on said annulus abutting against side faces of said magnet pole shoes and rods to interengage said magnet and rods angularly, a flux distributor having staggered arms spaced from each other along the direction said rods extend, an induced winding interlinking with said flux distributor, an automatic advance governor located within said hollow ring-shaped magnet, and means for driving said flux distributor.

5. An ignition magneto for internal combustion engines comprising a casing, a hollow ring-shaped magnet therein having a number of pole faces, coextensive magnetic flux conveying rods extending parallel to each other and each from one of said magnet pole faces, a flux distributor having staggered arms spaced from each other along the direction said rods extend, said flux distributor being located within the space defined by said parallel rods, a shell located in said space and encircling a portion of said flux distributor intermediate said arms, cooperating abutting parts on said casing and shell, an annulus between said magnet and rods, studs fast on said annulus and springs located on said studs and operative on said shell to hold it in position in said casing, an annular induced winding located in said shell and interlinking with said flux distributor and means for driving said flux distributor.

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