Sept. 11, 1928. 1,684,343

M. M. CARDELLINO

IGNITION APPARATUS FOR INTERNAL COMBUSTION ENGINES

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Fig. 1

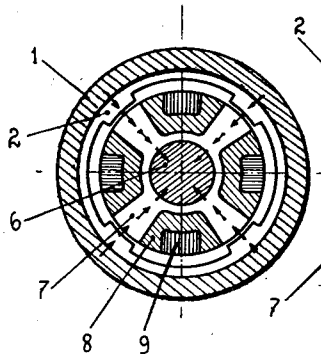


Fig. 2

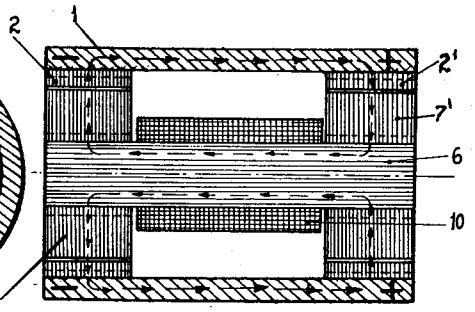


Fig. 3

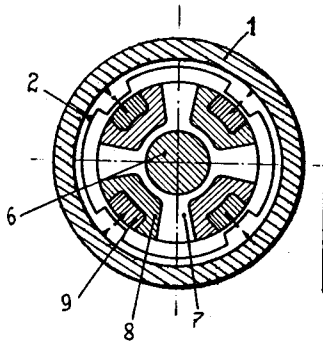


Fig. 4

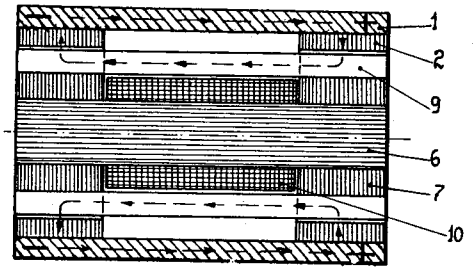


Fig. 5

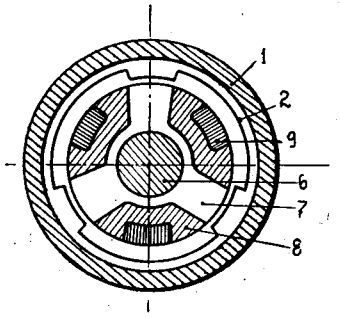
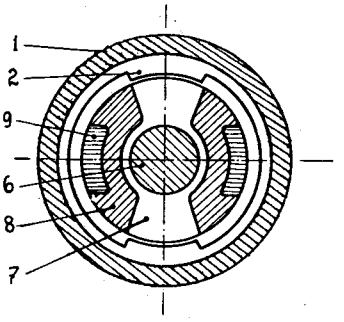


Fig. 6



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IGNITION APPARATUS FOR INTERNAL COMBUSTION ENGINES

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Fig. 7

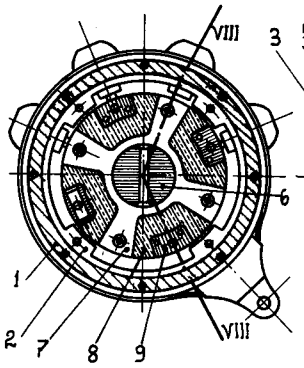


Fig. 8

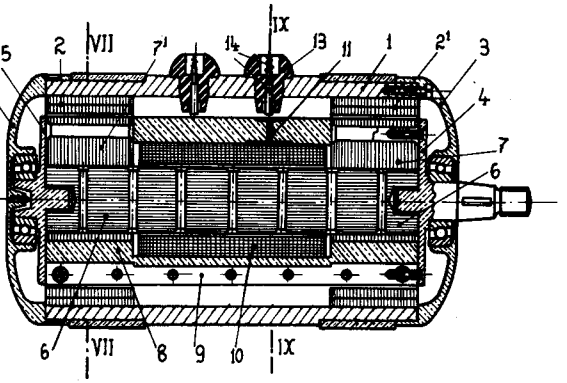


Fig. 9

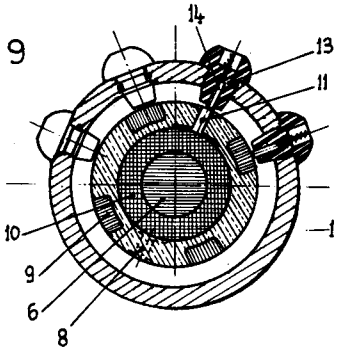
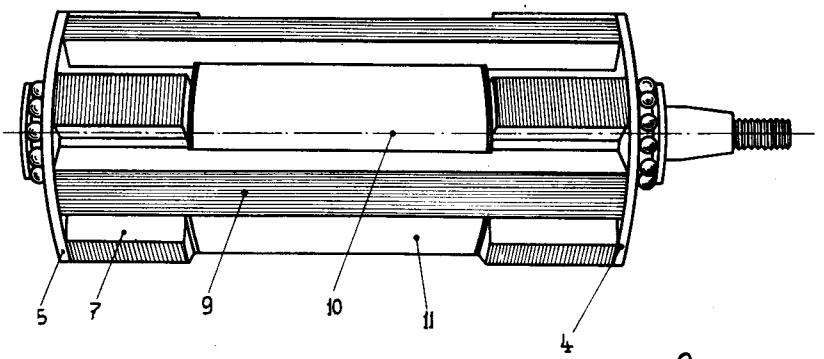


Fig. 10



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By Henry Mitchell Jr Atty.

Patented Sept. 11, 1928. 1,684,343

UNITED STATES PATENT OFFICE.

MICHELANGELO MARIA CARDELLINO, OF TURIN, ITALY.

IGNITION APPARATUS FOR INTERNAL-COMBUSTION ENGINES.

Application filed June 28, 1927, Serial No. 202,029, and in Great Britain July 21, 1926.

This invention relates to ignition magnetos of the kind having tubular magnets with pole pieces, in which new arrangements are provided in the construction of the rotor, of the pole shoes and in the winding, so that the apparatus can generate directly high tension currents without the use of contact breaker, condenser and transformer. The magneto is constructed to produce any desired number of sparks per revolution, that is, normally as many as the number of the engine cylinders; it has, therefore, no gear for operating the distributor, which is reduced to its simplest construction and forms one member with the rotor.

The annexed drawings illustrate the invention and show, by way of example, a constructional form of the apparatus producing eight sparks per revolution.

Figures 1 and 2 are diagrams of the magnetic circuits in the first working position;

Figures 3 and 4 are similar diagrams showing the magnetic circuits after a rotation of 45°;

Figures 5 and 6 are diagrams, similar to those of Figure 1, of two modified forms;

Figure 7 shows a section of a constructional form of the apparatus the section being through the line VII—VII of Figure 8, the latter being a section on the line VIII—VIII of Figure 7;

Figure 9 is a section on line IX—IX of Figure 8;

Figure 10 is a perspective view of the rotor.

With reference to the drawings, 1 denotes the tubular magnet of the apparatus carrying at its oppositely magnetized ends laminated pole shoes 2, 2′. Two supporting caps 3 secured at the two ends of the tubular magnet support by means of flanged plates 4 and 5 a laminated core 6 on the ends of which are mounted two star-shaped laminated pole shoes 7, 7′ having a number of teeth corresponding to that of the pole shoes 2.

The pole shoes 7 are embedded in an insulator 8 supporting laminated bars 9, the number of which is equal to the number of the teeth of the pole shoes 2 and 7 and each is arranged, between two teeth of the latter, around the core 6, thus forming a cylindrical cage. On the core 6 is wound a coil 10 having a large number of turns (in the case now considered 60,000 turns of 6/100 mm. are used) and occupying all the space comprised between the core 6 and the bars 9.

The space between the bars above the coil is conveniently filled with an insulating material so that the rotor has the appearance of a perfectly smooth cylinder.

One of the coil ends is grounded while the other end is connected with two electrodes 11 embedded in the insulating material and arranged at 180° to each other and rotating in two parallel planes in each of which are arranged four electric connections comprising an insulator 13 and a central electrode 14 projecting in such a manner that the rotating electrode 11 passes in close proximity thereto without touching it.

The apparatus works as follows:—

In the position shown in Figures 1 and 2 the magnetic circuit is formed by a tubular magnet 1, pole shoes 2, pole shoe 7, core 6, pole shoe 7′, pole shoe 2′, magnet 1 so that all the flux passes centrally through the coil.

When the rotor is displaced by 45°, from the described position in Figures 1 and 2, arriving in the position shown in Figures 3 and 4, the teeth of the pole shoes 7 are no longer in front of the teeth of the pole shoes 2, and their place is occupied by the bar 9 through which the magnetic circuit is closed cutting out the pole shoes 7, 7′ and the core 6.

The flux flows thus entirely outside the coil 10 so that a variation of induction in the coil is produced as the flux maintains the same direction with regard to the magnet. This operation takes place eight times each revolution therefore eight successive high tension impulses and consequently eight sparks will be produced.

The position of the electrodes 11 is such that when an impulse is produced, an electrode 11 will be opposite to an electrode 14 so that the high tension current is brought to the corresponding spark plug.

Each electrode 11 will successively feed the four corresponding electric connections during a half revolution and during the further 180° it works as a direct conductor between the coil 10 and magnet 1 while the second electrode feeds the other four electric connections.

If the magneto has to give a number of sparks other than eight each revolution, it will be sufficient to vary the number of teeth of the pole shoes 2 and 7 and bars 9; said number must always be equal to one half the

number of sparks to be produced at each revolution.

The number of the electric connections must, of course, correspond to the number of sparks to be produced at each revolution and their arrangement may vary according to requirements and design.

Thus, for instance, in a magneto producing twelve sparks at each revolution the simplest arrangement would be placing all the electric connections radially in a single plane and feeding them through a single electrode 11 but it will generally be preferred to place the electric connections in two rows each of six connections and feeding them through two electrodes placed at 180° or still better in three rows each of four connections fed by three electrodes placed at 120° to each other.

What I claim is:

1. A multi-polar ignition magneto for internal combustion engines comprising a rotor having a laminated iron core, a single winding on the core forming a coil, laminated pole shoes on the ends of the core having a number of teeth equal to half the number of sparks to be produced at each revolution, and laminated bars of the same length as the rotor arranged between each two teeth and constituting a cylindrical cage for the coil whereby the flux alternately closes within and without the coil, always in the same direction through the magnet.

2. A multi-polar ignition magneto for internal combustion engines, comprising a tubular magnet provided with laminated pole shoes without windings, a rotor having a laminated core arranged in the magnet, a single winding on the core forming a coil, laminated pole shoes on the ends of the core having a number of teeth equal to half the number of sparks to be produced at each revolution, and laminated bars of the same length as the rotor arranged between each two teeth and constituting a cylindrical cage for the coil whereby the flux alternately closes within and without the coil, always in the same direction through the magnet.

In testimony that I claim the foregoing as my invention, I have signed my name.

MICHELANGELO MARIA CARDELLINO.