July 9, 1935. L. P. KONGSTED 2,007,373

MAGNETO

Filed Nov. 14, 1933

Fig. 1.

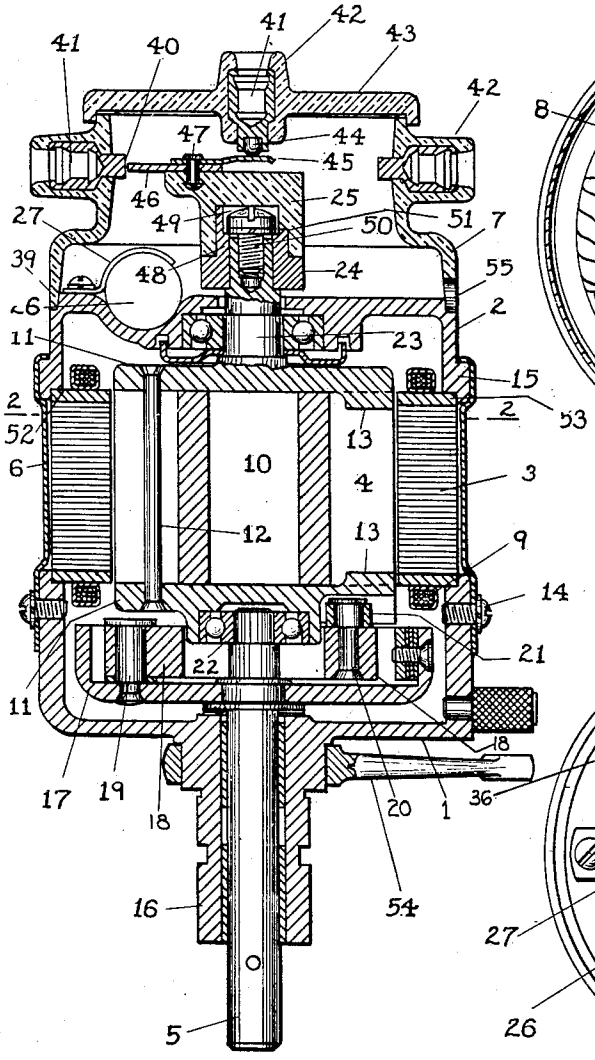


Fig. 2.

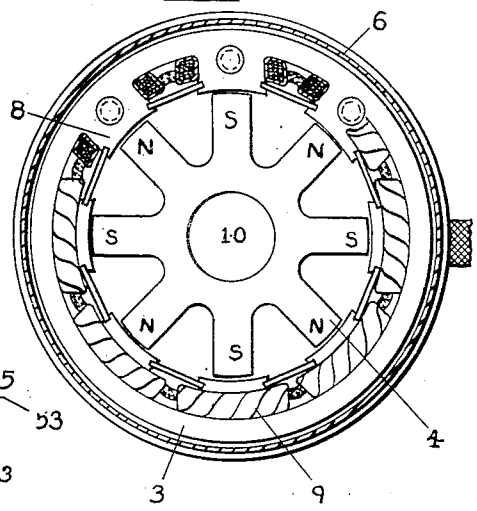


Fig. 3.

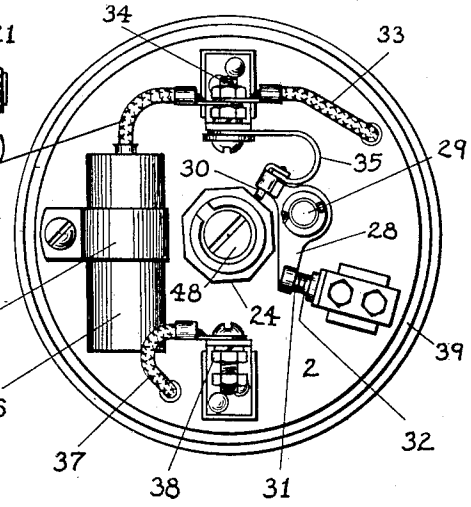
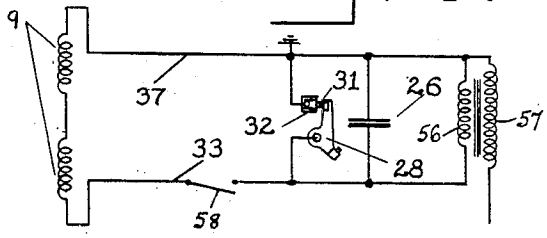


Fig. 4.



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MAGNETO

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Application November 14, 1933, Serial No. 697,925

6 Claims. (Cl. 171—252)

This invention relates to improvements in magnetos for the ignition systems of internal combustion engines and particularly to a magneto of the so-called timer type which is similar in appearance to timer distributors now employed with battery ignition systems.

An object of the invention is to provide a magneto that is simple in construction, inexpensive to make, efficient in operation and easy to service. A further object of the invention is to provide a magneto in which the generating windings are stationary and which has a magnet structure to serve as the rotor, the latter preferably being made from a cast magnetic alloy of high coercive force. The stator is laminated and provides cores for the generating coils, and the entire construction is assembled in a single housing which contains also a circuit breaker and distributor. The generating coils of the magneto are intended to be connected to a separate ignition coil, the low tension circuit of which is periodically interrupted by the circuit breaker and the high tension circuit of which is controlled by the distributor in the usual way. These and other objects and advantages of the invention are made clear in the ensuing description and the novel features are pointed out in the appended claims; but the right is of course reserved to make changes in details of construction without departing from the principle of the invention.

On the drawing:

Fig. 1 is an axial section through a magneto according to this invention; Fig. 2 is a section taken substantially on the line 2—2 in Fig. 1; Fig. 3 is a top view of the magneto with the distributor casing removed showing the plan of the circuit breaker; and Fig. 4 is a diagram of the circuits.

The housing of the magneto is made in two sections, the lower section 1 being preferably of cast iron and the upper section 2 preferably of die-cast aluminum. Between them is the laminated annular stator 3 surrounding the rotor 4 with radial projections of alternating polarity. The rotor 4 is cast from cobalt magnet steel or other magnetic material of high coercive force and is finished by grinding. It is driven by a shaft 5 at the cam shaft speed of a 4 cycle engine and the upper and lower sections, 2 and 1 respectively, are connected by a sleeve 6 of tubular sheet steel or brass which envelops the stator 3. The top of section 2 mounts the circuit breaker, to be described presently, and supports the distributor cap 7 of insulation.

The laminations of the stator 3 have internal projections or teeth 8 forming polepieces for the generating coils 9. The number of projections 8 and the number of magnet poles of the rotor 4 depend on the number of cylinders of the engine for which the magneto is intended, in this case eight. The rotor, which has a central hole at 10 for lightness, has on its upper and lower ends flanges 11 held together by rivets 12; by means of which the end flanges 11 are caused to grip the rotor 4 firmly between them. Each flange is provided with driving keys 13 of such size and shape that they fit tightly between the projections of the rotor, so that when the lower flange 11 is rotated the entire rotor is revolved. The two flanges 11 are of non-magnetic material such as die-cast bronze, and the keys 13, which are preferably four in number on each of these flanges, are integral with the respective flanges. The lower end of sleeve 6 is secured to section 1 by means of screws 14 and to the section 2 by spinning the upper edge over a rib or shoulder 15.

The lower section 1 of the housing has a bearing 16 for the drive shaft 5 and within this section the shaft 5 carries a cup-shaped plate 17 to which is secured the governor weights 18 on pivots 19. These weights are each pivotally connected to studs 20 secured to the bottom flange 11, the studs 20 being connected to the lower flange 11 as indicated at 21 in any suitable way. To receive the studs 20 the weights 18 may be slotted so that when the weights are moved outward from the center by centrifugal force the angular relation between the shaft 5 and rotor 4 is altered to adjust the time of the spark in the well known way. The upper end of shaft 5 is provided with a ball bearing in the lower flange 11. The upper flange 11 has a shaft projection 23 in line with the shaft 5 and received in a ball bearing in section 2. The upper part of shaft 23 passes through section 2 and carries the circuit breaker cam 24 and the distributor rotor 25 of insulation.

The outer face of section 2 has a concave seat for a condenser 26 held by a clip 27, and carries the metal circuit breaker lever 28 on an insulated pivot 29. This lever has a rubbing block 30 engaging the cam 24, and a contact 31 engaging the fixed contact 32. The coils 9 may be connected in series or parallel or series parallel with each other and one end of their circuit is connected by conductor 33 to binding post 34, this conductor passing through a suitable opening in the top section 2. Affixed to the insulated binding post

34 and to the end of the lever 28 is the circuit breaker spring 35 and the conductor 36 leading to the insulated terminal of condenser 26. The other end of the circuit of coils 9 is connected by conductor 37 passing through an opening in the top of the section 2 to a binding post 38 grounded on the section 2; and the other terminal of the condenser 26 is also grounded on this section. Hence whenever the contacts 31 and 32 engage each other the circuit of the coils 9 is complete and when the contacts 31 and 32 are separated this circuit is broken.

The top of the section 2 has an outside shoulder 39 to receive the rim at the lower open end fo the distributor cap 7, which has high tension terminals 40 projecting inside thereof and enlarged at their outer ends to provide sockets 41 embedded in the bosses 42 of the cap for receiving the sparkplug cables. The upper end of cap 7 is closed by a plate 43 having a similar central boss 42 and socket 41, the inner end of this terminal carrying a brush 44 which contacts with a spring 45 secured to the distributor terminal 46 and rotor 25 by rivet 47. The cam 24 has a hollow projection 48, the outer end of which is counterbored at 49 to provide a shoulder for screw 50 and lock washer. This screw enters a threaded bore in shaft 23 and, when tightened, holds the cam fast on the shaft. The rotor 25 is hollow to receive the projection 48 and is keyed to the projection on the cam as shown at 51.

The rims of the sections 1 and 2 of the housing are shouldered at 52 to provied seats for the stator 3 and the end laminations are thick, as shown at 53, to engage these seats.

The housing of the magneto may have a hand lever 54 for manual timing in addition to the governor adjustment.

In Fig. 4, the separate ignition coil is indicated with primary winding 56 and secondary winding 57. One terminal of the primary is connected to the binding post 34 and for this purpose the distributor cap may have an opening 55. The other terminal of the primary is grounded at any suitable point as shown. The high tension terminal of the secondary is connected to terminal 41 and the other terminal is connected to the primary as shown or separately therefrom if desired. The circuit between the coils 9 and the lever 28 may include a hand switch 58 mounted on the magneto in any suitable position, or a primary grounding switch may be mounted at any convenient point on the engine or instrument board for depriving the engine of ignition by grounding terminal 34. Two generating coils 9 are shown in series.

The operation of the magneto, when connected to the separate ignition coil 56, 57, is as follows: As the rotor 4 is rotated one complete rotation, the flux through each stator projection 8 is reversed eight times. This reversal induces a voltage simultaneously and of the same wave shape in each of the coils 9, which may therefore be connected in series or parallel combinations to give a suitable primary current for the separate ignition coil. The interrupter 28 is opened successively at or near the point of maximum current by the lobes on the cam 24. The energy stored in the magnetic field is prevented from forming a destructive arc at the contact points 31 and 32 by the condenser 26, the energy being quickly transferred to the primary winding 56 of the ignition coil. The rapid change of flux in the core caused by the building up of the primary current in winding 56 causes a high voltage to be generated in the secondary 57 of sufficient intensity to produce a good hot spark at the sparkplug.

I find that with the proper design of generating windings 9 standard ignition coils, such as those now used for battery ignition systems, may be used without change. This, together with the simple construction of the timer, which has no high tension windings within it, makes this magneto an economical unit to manufacture. By using cast magnetic alloy having high coercive force, the rotor and thus the entire magneto is of suitable size and weight for mounting on a timer shaft as shown.

Though illustrated in Fig. 4 as connected across the primary circuit, the breaker lever may also be in series with the coils 9 and 56.

If desired, the projections of rotor 4 may have laminated pole-shoes secured to their ends in any suitable way.

The principal advantage of making the rotor in the shape of a casting resides in the large saving in the machining operations, since all that is necessary is to assemble the cast rotor and finish grinding it to the proper diameter. At least one magnetic alloy of high coercive force is adapted for castings. The high coercive force referred to is of the order, or higher than that, of 15% cobalt magnet steel.

Having thus described the invention, what is claimed is:

1. In a magneto of the timer type, a housing comprising upper and lower sections, a stator secured between said sections and bearing generating windings, a rotor in the housing surrounded by the stator, a sleeve uniting said sections, the rotor having a shaft projection passing through one of said sections, a circuit breaker on said section, a distributor casing mounted upon said section, said casing carrying fixed terminals, and a cam and an insulated movable terminal carried thereby mounted upon said shaft projection to be actuated by the rotor.

2. In a magneto of the timer type, a housing comprising upper and lower sections, a sleeve uniting said sections, a stator bearing generating windings secured between the sections, a rotor within the housing surrounded by the stator, the rotor having a shaft projection passing through one section, a cam and an insulated movable terminal mounted on said shaft projection, a circuit breaker on the outer end of said section to be controlled by the cam, an insulating distributor casing secured to said section, fixed terminals carried by said section in cooperative relation to said terminal and a cap for said casing having a central terminal with a tip inside said casing and a spring attached to the movable terminal bearing upon said tip.

3. A magneto comprising a magnet member with polar projections, a flange secured at each end of said magnet, a plurality of projecting keys on one of said flanges, said keys extending into apertures between said polar projections and establishing a firm driving connection therewith.

4. A magneto comprising a magnet member with polar projections, a flange secured at each end of said magnet, and a plurality of integrally formed keys on each flange, said keys extending into apertures between said polar projections and establishing a firm driving connection therewith.

5. A magneto comprising a magnet member having polar projections, a flange secured to said

magnet, and means for establishing a firm driving connection between said magnet and said flange, said means including a projecting key on said flange.

6. A magneto comprising a cylindrical magnet member having a plurality of radially projecting ribs, a non-magnetic flange secured at each end of said magnet, a plurality of projecting keys on said flanges and engaging said magnet, whereby a firm driving connection is formed.

LUDVIG P. KONGSTED.