April 30, 1929. R. A. OGLESBY 1,711,323

OSCILLATING MAGNETO

Filed June 23, 1926 2 Sheets-Sheet 1

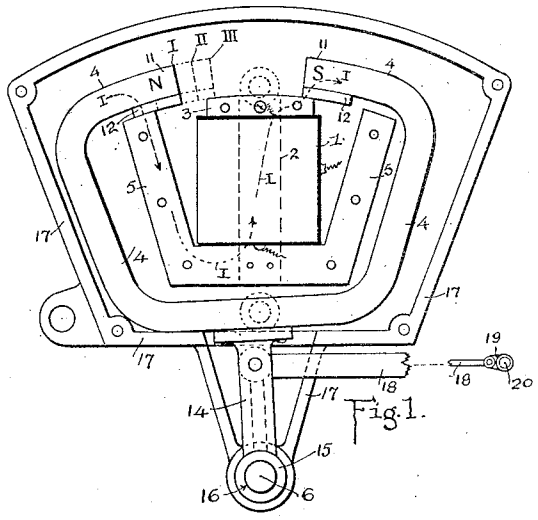


Fig. 1.

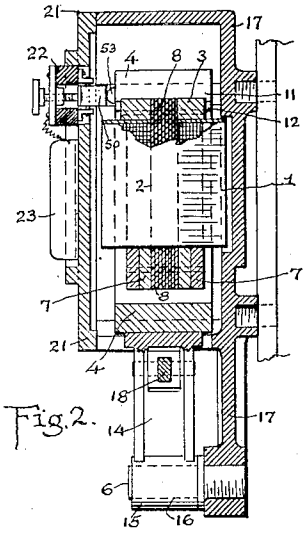


Fig. 2.

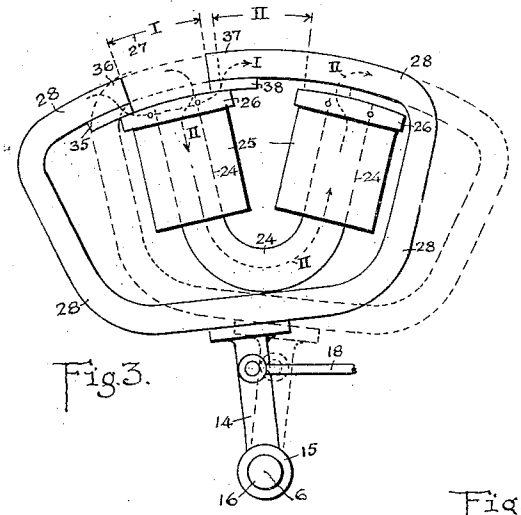


Fig. 3.

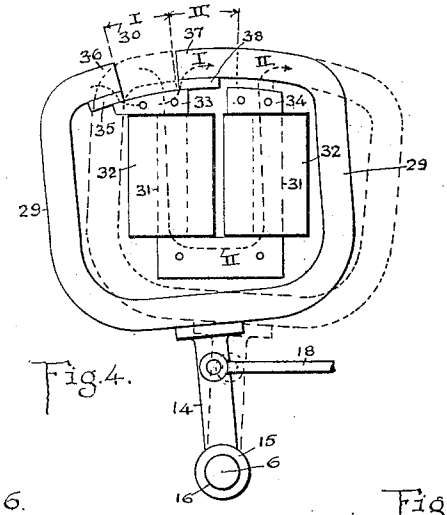


Fig. 4.

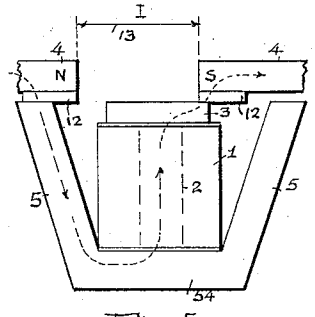


Fig. 5.

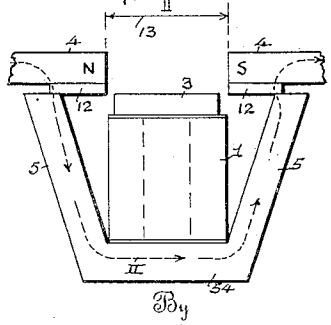


Fig. 6.

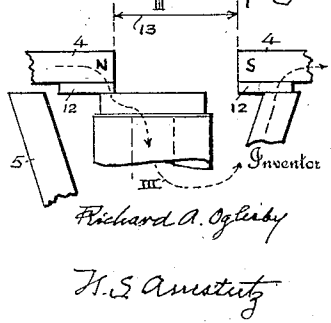


Fig. 7.

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OSCILLATING MAGNETO

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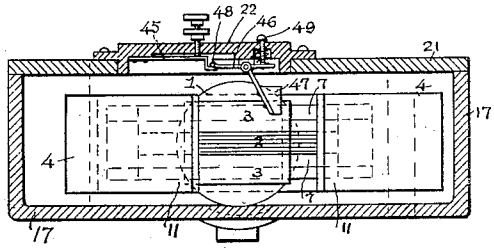


Fig. 8.

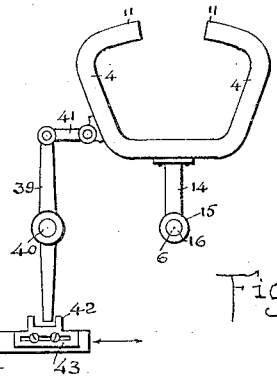


Fig. 9.

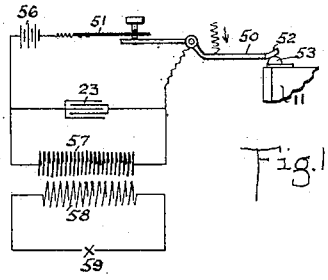


Fig. 10.

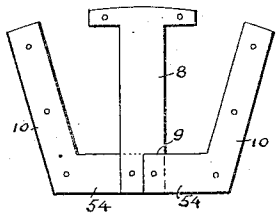


Fig. 11.

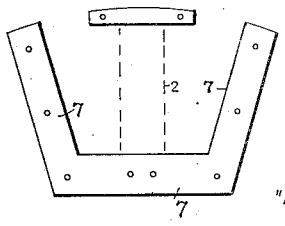


Fig. 12.

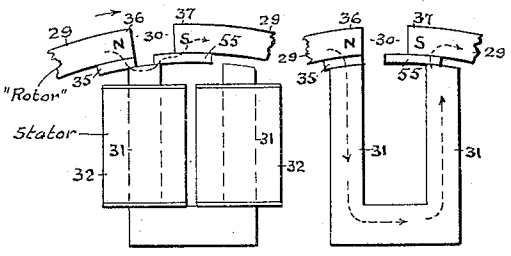


Fig. 14. Fig. 15.

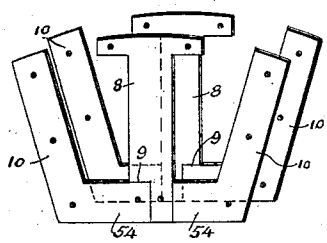


Fig. 13.

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By

Attorney

Patented Apr. 30, 1929. 1,711,323

UNITED STATES PATENT OFFICE.

RICHARD A. OGLESBY, OF SOUTH BEND, INDIANA.

OSCILLATING MAGNETO.

Application filed June 23, 1926. Serial No. 118,129.

My invention relates to improvements in oscillating magnetos and it more especially consists of the features pointed out in the claims.

The purpose of my invention is to provide an oscillating magneto of relatively small compass and which, in equivalent results, is equal to larger diameter rotating magnetos now found in actual practice; that because of my novel construction I am enabled to obtain an exceedingly rapid change of magnetic flux; that may be formed symmetrically in respect to the stator poles of reversing flux magnetos; or that may be made unsymmetrical in the arrangement of the oscillating permanent magnet to produce a uni-directional magnetic flux; that may provide mechanical or magnetically controlled circuit breakers; and that may also provide an adjustable oscillating control which permits a variable timing of the magneto.

With these and other ends in view, I illustrate in the accompanying drawings such instances of adaptation as will disclose the broad underlying features of my invention without limiting myself to the specific details shown thereon and described herein.

Figure 1 is a front elevation of an oscillating single coil magneto with the cover plate removed showing a reversing flux magneto.

Fig. 2 is a side elevation of Fig. 1 in section on the vertical center line.

Fig. 3 is a similar view to Fig. 1 of a magneto having angularly positioned coils showing a non-reversing flux magneto.

Fig. 4 is a view similar to Fig. 3 showing a unidirectional flux magneto with an unsymmetrical field and a pair of magnets on the stator.

Fig. 5 is a diagrammatic view showing the relative position of the parts when the flux through the coil is flowing outward, indicated by the arrows.

Fig. 6 is a diagrammtic view showing a change in position of the magnet to a point where there is no flux flow through the magnet, as shown by the arrows.

Fig. 7 is a diagrammatic view showing a further advance in movement of the magnet to produce a reversed flux flow, inward, indicated by the arrow.

Fig. 8 is a front elevation of Fig. 1 showing the casing and cover in section, and a magnetic circuit breaker.

Fig. 9 is a diagrammatic elevation of an adjustable form of a magnet actuating device to change the timing of the spark.

Fig. 10 is a diagrammatic view showing a purely mechanical form of circuit breaker.

Fig. 11 is a detached view of the stator magnet core parts.

Fig. 12 is a detached elevation of the core retaining plates.

Fig. 13 is a detached isometric view showing how the laminated core parts are assembled.

Fig. 14 is a diagrammatic view showing an alternative disposition of the polar extremities to that shown in Fig. 4.

Fig. 15 is also a diagrammatic view showing a change in position of the polar extremities of Fig. 14.

In actually carrying out my invention I may use such alternatives of form, dimension and arrangement of parts as the exigencies of practical service may demand, without departing from the spirit of my invention.

In the manufacture and use of magnetos of the ordinary rotating magnet type in which the stator or armature is usually placed within a ring-shaped magnet, it is found impractical, from an economic standpoint, to make magnets of this type of quite large diameters so as to secure a very high peripheral speed at a relatively low number of revolutions per minute. With my novel oscillating magneto I attain all the advantages of a large diameter magneto of the ordinary type without incurring any of the disadavantages that would be inherent in the rotor-stator type of magneto. This is specially important because the cost of manufacture is reduced and the space occupied by the magneto is also reduced while at the same time the efficiency is greater due to the fact that the flow of the magnetic flux through the stator or armature windings is changed very rapidly.

The armature or stator of the magneto, shown in Fig. 1, is formed by placing the primary and secondary windings on a single spool 1 whose core 2 at its outer end has attached a pole piece 3 which has its outer face formed on a circular arc that is dimensionally shorter than the air gap of the permanent magnet 4. To the other end of the laminated core 2, extensions 5 are secured in close magnetic relation as shown in Figs. 1, 11 and 13. These extensions 5 stand radially in respect

to the center 6 on which the permanent magnet 4 oscillates and they terminate the same radial distance from the center of movement 6 as the pole piece 3 of the spool 1. The two extensions 5 of the core are built up by means of permeable plates 7 on each side of the laminations 8 to which they are attached in any suitable manner. The laminations 8 of the core 2 are alternately notched at their lower end to accommodate the laminated extensions 10 grouped in alternating sequence. The core laminations are placed with their notched portions alternately pointing in opposite directions as shown in Fig. 13.

The permanent magnet 4 of Fig. 1 is U-shaped with its free ends 11, extending toward each other at a radial distance from the inner face of its permeable pole pieces 12 to the center of oscillation, that is slightly in excess of the radial dimension of the permeable polar extremities 3 and 5 of the spool or coil 1 of the stator. The air gap 13 between the ends of the magnet 4 is, as stated, larger than the arc of the pole piece 3 of the coil. The magnet 4 is attached to a non-magnetic rocker arm 14 provided with an eye 15 for the reception of a fulcrum pin 16 that is secured to the casing 17 in which the magneto is enclosed.

As shown in Fig. 1, a link 18 at one end is pivoted to the rocker arm 14 and at the other end it may be connected to an eccentric or a crank 19 on the main engine shaft 20 so as to produce a to and fro movement of the magnet 4, once for each revolution of the shaft 20 or otherwise as desired. In this type of magneto the circular dimension of the magnet pole pieces 12 is less than the circular arc between the pole piece 3 of the spool and an adjacent edge of the side extensions 5. The casing 17 has a cover 21 to which a circuit breaker 22 and condenser 23 is attached.

In the form of magneto shown in Fig. 3 the magnet core 24 of the coils 25 is V-shaped, each end of the core 24 having an enlarged head 26, which in a circular direction is larger than the air gap 27 of the magnet 28 so that when the air gap is spanned by a pole piece 26 of a coil 25 there will be no flow of flux through the coil. This magnet 28 is supported on a rocker arm 14 similar to that used for the magnet 4 shown in Fig. 1. The air gap 27 of the magnet 28 is located unsymmetrically as shown in Fig. 3.

Both of the structures shown in Figs. 3 and 4 are non-reversing, that is, the flux flow through the coils is always in the same direction, while Figs. 5, 6 and 7 show the successive changes in position of the magnet 4 with respect to the pole 3 and the corresponding change in direction of flux flow of the magneto 4.

The other uni-directional flux magneto shown in Fig. 4 has a permanent magnet 29 that is more or less U shaped, somewhat similar to that shown in Fig. 1, but the air gap 30 is also positioned to one side—making an unsymmetrical arrangement of parts, similar to magnet 28 of Fig. 3, in contrast to the symmetrical relation of the parts shown in Fig. 1. The core 31 of the coils 32 is also U shaped. It has windings 32 on each leg of the core and arc shaped polar extensions 33 and 34 attached to their outer ends. The magnets 28 and 29 have pole pieces 35 of high permeability attached to the inner face of its short extensions 36 and similar pole pieces 38 attached to the inner face of their long extensions 37. The magnets 28 and 29 of Figs. 3 and 4 are also attached to rocker arms 14 similar to the magnet 4 of Fig. 1. The stator or armature pole pieces 26 and 33, when adjacent the air gaps 27 or 30, in circular dimension are slightly greater than the air gaps so as to completely bridge them when the magnets 28 and 29 are in their extreme left hand position as shown in Figs. 3 and 4. As soon as the magnets 28 and 29 move clockwise their right hand pole pieces 38 will only be in magnetic relation to the cores 24 and 31 of the right hand coils 25 and 32 of the stator and the left hand pole pieces 35 of the magnets 28 and 29 will be in magnetic relation with the cores 24 and 31 of the left hand coils 25 and 32. In this position flux will flow through the entire length of the cores 24 and 31. A reverse movement of the magnets 28 and 29 to the position shown in Figs. 3 and 4 will simply deflect the magnetic flux from the poles 35 of the magnets 28 and 29 through the polar extensions 26 and 33 of the left hand stator coils 25 and 32 onto the other pole pieces 38 of the magnets 28 and 29, thus no longer cutting the windings of the coils 25 and 32 by the flow of flux; in other words, so-called zero flux condition in the coils. From this it will be seen that the flow of magnetic lines through the cores 24 and 31 of the stator coils exemplified in Figs. 3 and 4 is always in one direction.

Any one of the magnetos shown in Figs. 1, 3 and 4 may be actuated as shown in Fig. 9 wherein a rocker arm 39 is fulcrumed at a point 40 between its ends and has one end attached by a pivoted non-magnetic link 41 to the side of the magnet. The other end of the rocker arm is actuated by one or the other of the projecting prongs 42 of an adjustable slide 43 when the slack between the prongs and the arm 39 is taken up. The plate 43 may be set to actuate the rocker arm 39 at an earlier or later moment and the slide 43 may be attached in any mechanical way at the desired timing ratio to a sliding or reciprocating shaft 44 of the engine.

In describing certain details of construction of the armature pole pieces in relation to the pole pieces of the magnet, I do not limit myself to the described relation of these parts for they may be transposed as desired (see Figs. 14 and 15) without departing from the broad features of my invention; that is, the

polar extremities of the armature coils and those of the magnet may be transposed.

The circuit breaker shown in Fig. 8 simply comprises a contact or breaker spring 45 which is actuated intermittently by a lever 46 fulcrumed between its ends, one end of which has an armature 47 and the other end a pin 48 for moving the breaker spring 45. A tension spring 49 may be used for normally holding the lever 46 at rest. The armature 47 is attracted whenever the oscillating magnet moves toward it and it is disengaged when the magnet again moves away. The pivoted arm 46 and breaker spring 45 are attached to the cover 21 of the magneto casing 17 in any desired manner so that the breaker spring 45 and the actuating pin 48 of the lever are insulated from the casing.

A purely mechanical form of circuit breaker may be used as shown in Fig. 10 in which a contacting lever 50 is pivoted to the casing in an insulated manner. The lever 50 is under tension of a spring adapted to normally hold the circuit of which it is a part, and an insulated breaker spring 51 closed. One end of the contacting lever 50 is inclined at 52 and it is disengaged intermittently from the breaker spring 51 by a non-magnetic projection 53 of the oscillating magnet.

The stator or armature portion of any of my oscillating magnetos is attached to an enclosing casing 17 in any desired manner and the casing itself may be secured to the engine in whatever position is found best adapted to the specific construction of the engine parts. It is immaterial whether the magneto be placed vertical as shown in the drawings, placed horizontal or in an inverted position as the magneto will function in any reasonable change of its angular position.

It is of course understood that in case the magnet were held stationary so as to become the stator and what I have described as the stator were rocked to and fro adjacent the air gap of the magnet this arrangement of parts would be considered an equivalent construction.

In Fig. 1 the successive positions of the magnet 4 are shown by the Roman numerals I, II and III from which it will be seen that in the position I, also shown in Fig. 5, the flow of flux is outward, in position II (Fig. 6) the flow is through the side extensions 5 and their lateral projections 54 without passing through the core 2, and in the position III (Fig. 7) the flux flow is inward.

In Figs. 14 and 15 the cores are headless and the magnet 29 has a short pole piece 35 on its termination 36 and a long pole piece 55 on its termination 37 as alternatives of the armature pole ends 33 and 34 of Fig. 4.

The usual circuit relations are shown in Fig. 10 wherein a breaker spring 51 is connected to a battery 56 and the primary 57 of a spark coil. The secondary 58 of this coil is connected to a spark plug 59. A condenser 23 is connected in parallel with the breaker contact.

What I claim is:

1. In a magneto, an oscillating permanent magnet having an air gap therein, a non-magnetic rocker arm support for the magnet, a casing enclosing the magnet, a stator supported by the casing and located inside of the magnet, and means for producing a to and fro movement of the magnet so as to alternately present its air gap in different positions to the stator.

2. In a magneto, an oscillating permanent magnet having an air gap therein, permeable pole heads attached to the magnet on each side of the air gap, a rocker arm supporting the magnet, a pivot on which the arm has movement, a stator comprising windings and associated pole heads positioned inside the magnet, a support therefor, and means for producing a to and fro movement of the magnet with the air gap in different positions adjacent the stator pole heads.

3. In a magneto, a permanent magnet having an air gap therein, a stator, a support therefor, cooperating polar ends of the magnet and stator, windings on the stator, a casing enclosing the magnet and stator, a removable cover for the casing, a circuit breaker unit supported by the casing, means for shifting the position of the casing independently of the magnet, and separate adjustable means for producing a to and fro movement of the magnet air gap into different positions in respect of the polar ends of the stator.

4. In a magneto, an oscillating permanent magnet having an air gap, a rocker arm support for the magnet, a pivot for the rocker arm, a casing enclosing the magnet, a pivotal support for the casing in axial alignment with the pivot of the magnet support, a stator supported by the casing and positioned inside the magnet, means for producing a to and fro movement of the magnet to alternately present its air gap in different positions to the stator, and separate means for changing the position of the casing on its pivot.

5. In a magneto, a permanent magnet having an air gap therein, a stator, a support for the stator, cooperating permeable polar ends of the magnet and stator, windings on the stator, a casing enclosing the magnet, a removable cover for the casing, a circuit breaker unit supported by the casing, means connected to a moving part of an engine for producing intermittent to and fro movement of the magnet, and an adjustable element between the latter means and the magnet.

In testimony whereof I affix my signature.

RICHARD A. OGLESBY.