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MAGNETO

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Fig. 1.

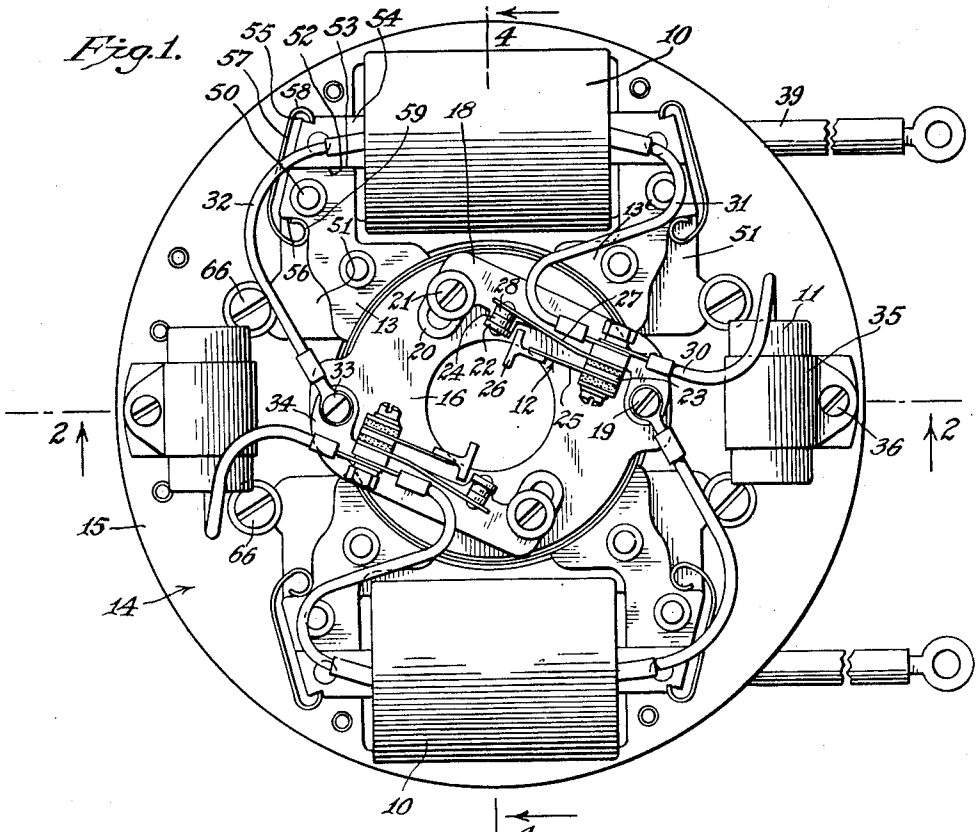
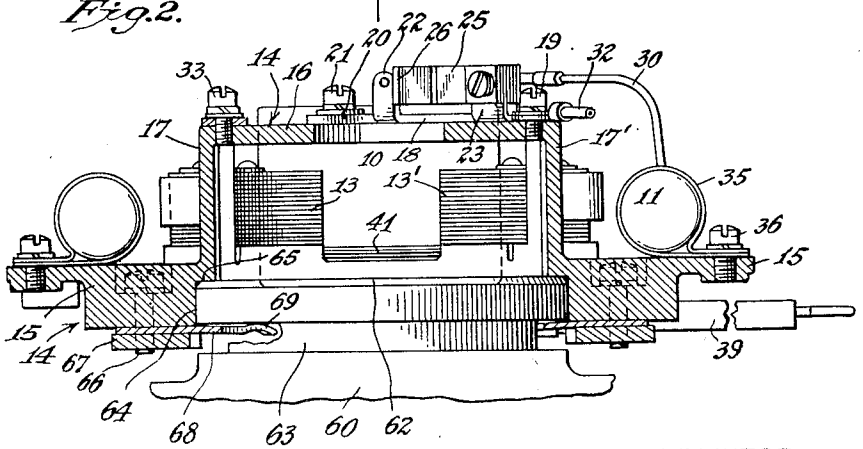


Fig. 2.



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Fig. 3.

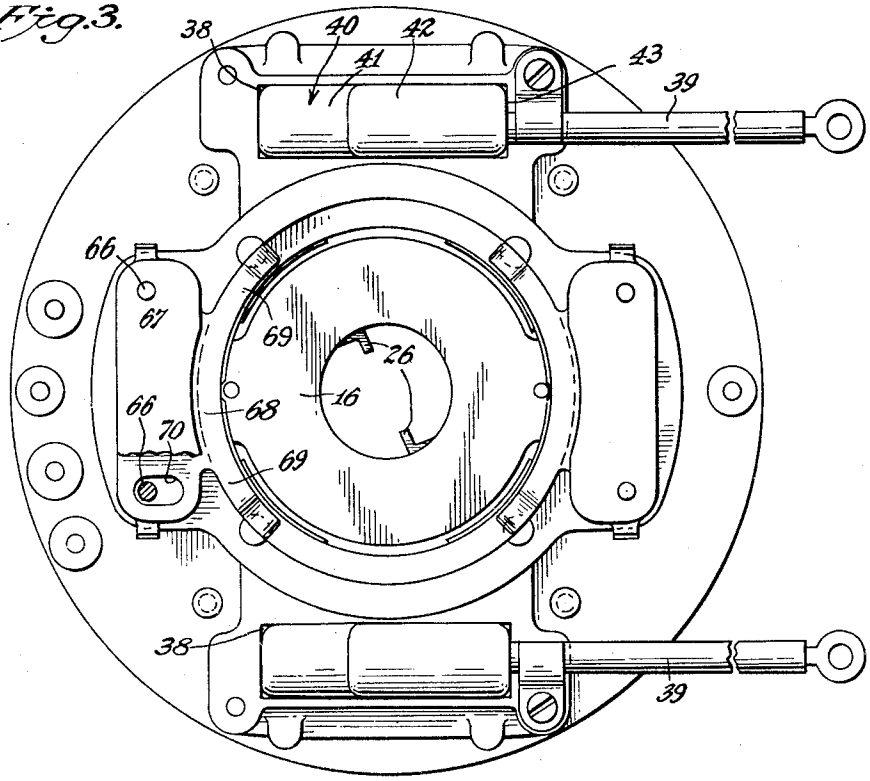
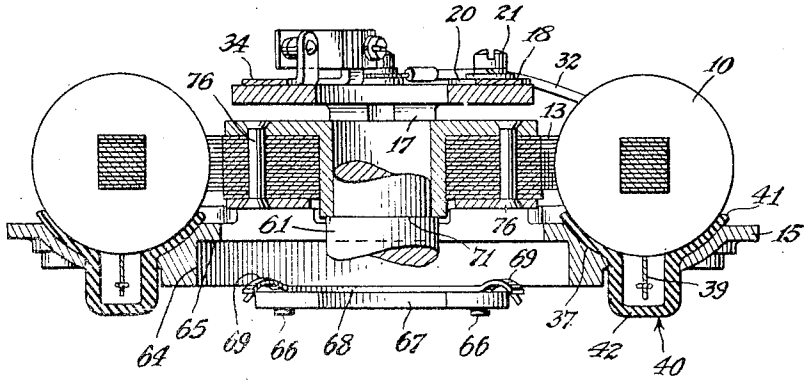


Fig. 4.



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Fig.5.

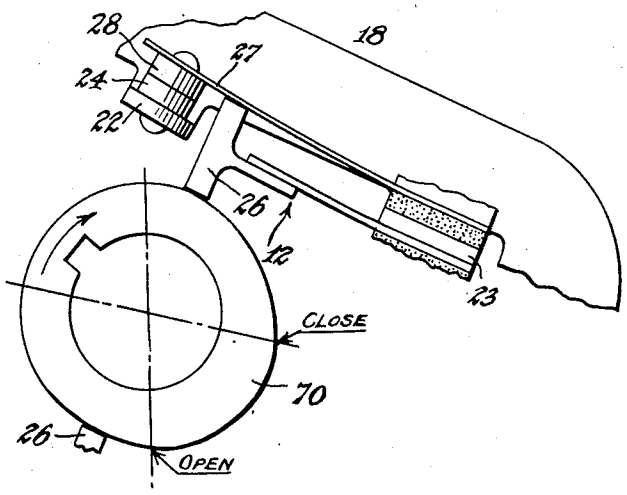


Fig.6.

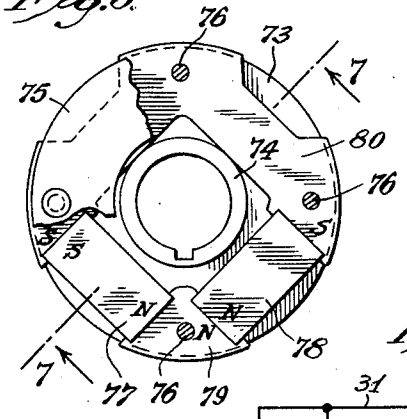


Fig.8.

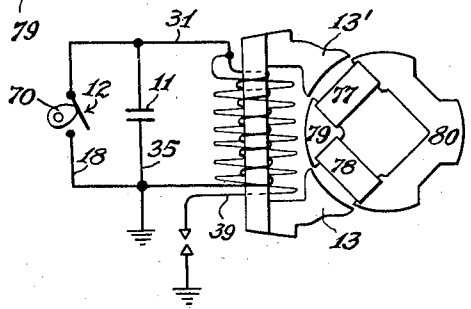
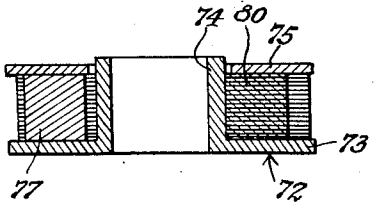


Fig.7.



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Patented Dec. 27, 1949

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UNITED STATES PATENT OFFICE

2,492,858

MAGNETO

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Application May 23, 1946, Serial No. 671,694

10 Claims. (Cl. 171—209)

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This invention relates to a magneto and particularly to the electrical construction thereof. The single embodiment of the invention herein particularly described is to be considered as an illustration of the novel conceptions of the invention and not as a limitation.

It is an object of the invention to electrically construct a magneto having a complete flux reversal within about 180 degrees and only one flux reversal in each revolution of the magneto rotor.

It is another object of the invention to electrically construct a magneto to fire two cylinders of an engine alternately.

Another object of the invention is to furnish a single spark in each revolution of the magneto rotor, or to furnish a spark each half revolution of a magneto rotor.

Another object of the invention is to construct a novel magneto rotor having an uneven number of poles of alternate magnetic sign.

Another object of the invention is to construct a magnetically unbalanced, but dynamically balanced, magneto rotor.

The above and further objects and novel features of the invention will more fully appear from the following detailed description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not intended as a definition of the limits of the invention, reference for this latter purpose being had primarily to the appended claims.

In the drawings, wherein like reference characters refer to like parts throughout the several views,

Fig. 1 is a plan view of a preferred structure with the cam and shaft, and the rotor omitted;

Fig. 2 is a section taken on the line 2—2 of Fig. 1;

Fig. 3 is a bottom plan view of the structure shown in Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 1;

Fig. 5 is a schematic detail plan view showing the cam and its operative relation to the breaker points located at diametrically opposite positions;

Fig. 6 is a bottom plan view of the rotor broken away to show concealed parts;

Fig. 7 is a section of same on the line 7—7 of Fig. 6; and

Fig. 8 is a diagram of the circuits.

Referring to the numerals of the drawings, and particularly to Fig. 1, a magneto transformer is indicated by the numeral 10, its associated condenser by the numeral 11, its associated circuit

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breaker by the numeral 12, and its stator pole shoes by the numerals 13, 13'. These operative parts of the magneto are duplicated, but the initial description will be limited to them since the operation of the duplicates is identical, occurring, in the construction shown, 180° later.

The frame 14 of the magneto comprises a casting, which may be of aluminum or any other satisfactory metal or material of sufficient strength and the requisite conductivity, having coaxial annuli 15, 16 of which the smaller has outer dimensions approximating the inner dimensions of the larger and is supported therefrom by integral flat posts 17, 17'.

The smaller annulus 16 carries a metal arm 18 pivotally attached thereto by a screw 19 and having a slotted end 20 through which a set screw 21 passes, giving adjustability to the position of the arm and the breaker elements mounted thereupon. Two metal ears 22, 23 project upwardly from the body of the arm 18, the first of which serves as a support for breaker point 24 and the second of which serves as a support for spring 25 which carries on its end a T-shaped dielectric cam follower 26. The cam follower rides upon the cam carried by the shaft and is displaced by the lobe of the cam toward the spring breaker arm 27, which carries at its end a breaker point 28 which is normally in contact with breaker point 24, acting under the impulse provided by the cam to break the circuit through the points in the manner which will be understood by persons skilled in the art. The breaker arm 27 is electrically connected to the terminal of a cable 30 of the condenser 11 and to the terminal of a cable 31 that issues from the coil 10. The coil is grounded through the cable 32 affixed at its terminal to the screw 33 that attaches the supporting arm 34 of the other breaker to the frame or support 14. The condenser 11 is grounded and fastened to the frame by a strap 35 which encircles it and has its ends affixed to the plate 15 by a screw 36.

A mounting for the coil 10 is provided. As will be understood by persons skilled in the art, the coil has three leads, one to the primary, one to the secondary, and a joint lead to the ground. One of these leads is brought out, in the coil being described, through the circular wall of the coil and poses a problem of protection which has been cared for in a superior manner. A depressed and apertured seat 37 is provided, the curvature of which conforms to that of the coil. The depressed seat has two halves that are separated by an aperture or slot 38 that is seen from

the bottom in Fig. 3. The shape of the seat provides end abutments which act to retain the coil against endwise displacement. A high tension lead 39 projects from the wall of the coil and is received in the aperture in the seat.

In order that the lead and the coil itself may be protected against damage from the metal of the frame, from vibration, and from shock, a protective pad 40 is provided. That pad is preferably made from a flexible dielectric substance such as rubber having a flat or curved bed 41 that underlies the coil and conforms to the shape of the seat. A channel-shaped, depressed portion 42, having width about equal to the width of the aperture in the seat and length and depth sufficient to enclose the lead 39 is provided. An opening 43 is provided in the end of the channel-shaped portion 42, beneath the plate 15 through which the high tension lead is passed. The hole in the protective pad may be made to conform snugly to the lead so that vibration of the lead will not harmfully affect the connection to the coil.

The core of the coil is connected by superior means to the stator shoes of the magneto. Laminated stator shoes 13, 13' are bolted to the plate 15 by bolts such as 50 in such position that the curved portions thereof are in operative relation to the rotor of the magneto. Raised lands 51, formed integrally with the plate 15, serve to support the stator shoes. The shoes have flat ends 52 adapted to receive the flat sides 53 of the core 54 of the coil 10. Sharp notches 55 are provided in the upper ends of the core 54 and rounded notches 56 are provided in the sides of the stator shoes. Spring clamps 57 having sharp ends 58 and rounded ends 59 are adapted to clamp the ends of the core to the stator shoes in firm electrical connection while at the same time they maintain the coil in its seat in the plate 15. The rounded ends of the clamps are easily sprung into and out of position, but when in place form a firm connection that does not become accidentally disengaged.

The apparatus hereinabove described forms an interdependent combination with the casing 60 (Fig. 2) of the apparatus from which the drive shaft 61 (Fig. 4) projects. The machine casing 60 has an annular flat top 62 and a groove 63 in the wall beneath the top. The frame 14 is internally provided with a groove 64, the upper face 65 of which serves as a shoulder to rest upon the top 62 of the casing. The annular wall of the groove has a diameter substantially equal to that of casing 60 and has a depth substantially equal to the distance between the top 62 and the groove 63, as illustrated particularly in Fig. 2. Bolts 66 are mounted in the plate 15 and screw threaded into plate 67. Between the plate 67 and the body of the plate 15 is an adjustable clamp 68 having circularly projecting arms 69 of curvature substantially conforming to that of groove 64. The arms 69 have offset, cam ends. The body portion of the clamp plate 68 has slots 70, as shown in Fig. 3, which permit it to be adjusted into clamping relation to the groove 63 of the casing 60. As many of these clamping plates may be provided as is necessary. Once they are adjusted with relation to the groove in the casing, they may be fixed in position by tightening the bolts 66.

Novelty particularly resides in the circuits established by this construction, and in the form and arrangement of certain of the parts which contribute to the inventive electrical conceptions. Certain of these are illustrated in Figs. 5 to 8, which are views, respectively, of the single lobe cam that is employed when alternate firing of the two magneto sets is desired, of the novel rotor whose construction is so important to the accomplishment of the objects of the invention, and of the circuit diagram of the magneto. The cam 70 is mounted on the end of the shaft 61, which projects through the annular plate 16 into operative relation to the circuit breakers. The single lobe of the cam is indicated by the words "Close" and "Open" in Fig. 5. This cam operates the two circuit breaker riders 26 alternately 180° apart so that the spark plugs served by the respective magneto units are fired alternately.

The magneto rotor is seated upon the shaft 61 beneath the cam and in operative alignment with the stator shoes. The shaft 61 has a seat 71 upon which the rotor rests. Both the cam and the rotor are keyed to the shaft.

The rotor is of novel construction which may be best comprehended from a consideration of Figs. 6 and 7. In Fig. 7, which is a section on the line 7—7 of Fig. 6, the numeral 72 indicates generally the frame of the rotor, which may conveniently be an aluminum casting having an annular plate 73 and a hub 74. The core pieces are laminated and are riveted to the plate 73 by means of brass cover plate 75 and rivets 76. Two magnets, 77 and 78, are arranged at 90° to each other, as indicated in Fig. 6, with their north poles in adjacent position. The north poles of the magnets are seated in appropriate grooves in laminated core piece or shoe 79 which is riveted to the plates 73 and 75. The other ends of the magnets are similarly seated in V-shaped core piece 80, mid-portions of which are cut out to provide three shoes. The middle shoe is substantially inactive so that there are provided by this arrangement a single north and two operative south poles, all of which are located within an arc of 180°. This produces a complete reversal of flux in the coil core once in each revolution of the rotor. There is also produced a distinct spacing between the periods of energization of the transformer coil.

A wiring diagram for single circuit is illustrated in Fig. 8, it being understood that a similar wiring diagram would be provided for the second magneto circuit. No attempt has been made in this diagram to time the cam with relation to the position of the magnets, the particular arrangement being chosen for clarity of representation rather than for operative accuracy. In this figure is shown the rotor with the top plate 75 removed and the cam and breaker displaced to the extremity of the diagram. The ends of the primary and secondary of the coil are connected to the circuit breaker 12 and to the condenser 11, both of which are grounded. The other end of the primary is connected to ground, and the other end of the secondary is connected to a spark plug, which is grounded on the other side of the gap. When the leading end of shoe 80 becomes aligned with the second stator shoe, the shoe 79 is aligned with the first stator shoe and flux passes through the core in one direction. When the shoe 79 reaches the second stator shoe, the following end of shoe 80 reaches the first stator shoe and direction of the flux through the core is reversed. The cam is set on the shaft to make the most efficient use of this arrangement. Adjustment can be made by pivoting the arms 18 to new positions. Additional adjustments can be

made by moving the frame 14 clockwise and counter-clockwise on the casing 60.

An advantage of this invention is in the electrical construction of the magneto.

Another advantage of the invention is in reversing the flux in the magneto core completely in 180° of rotor arc and only once in each revolution.

Another advantage of the invention is in the novel construction of the rotor.

Further advantages are in the relative arrangement and spacing of stator and rotor shoes.

A still further advantage is in the alternate firing of spark plugs from a single magneto.

Although only one embodiment of the present invention has herein been illustrated and described, it is to be expressly understood that the same is not limited thereto. Various changes may be made in the design and arrangement of the parts illustrated and in the materials used without departing from the spirit and scope of the invention, as will now be clear to persons skilled in the art. For a definition of the limits of the invention, reference is had primarily to the appended claims.

What is claimed is:

1. A magneto comprising stator shoes serving a coil core, a coil comprising primary and secondary about the core, means to connect the primary to a circuit breaker and a condenser in parallel, means to connect the secondary to a spark plug, and means to activate all said means comprising a rotatable single lobe cam adapted to operate the circuit breaker to open position during less than 90 degrees of each revolution thereof and coordinated therewith a magnetic rotor adapted to produce a single flux reversal in said core in each revolution.

2. A magneto as defined in claim 1 comprising a plurality of high tension spark generating stator sets served by a single magnetic rotor having flux reversing means substantially confined to one side thereof whereby there is produced alternate energizing of the stator sets upon rotation of the rotor, each of said sets including a circuit breaker alternately operated by the cam.

3. A magneto as defined in claim 1 comprising a plurality of high tension spark generating stator sets served by a single magnetic rotor having flux reversing means substantially confined to one side thereof whereby there is produced alternate energizing of the stator sets upon rotation of the rotor, the cam being adapted for rotation with the rotor to time the breakers of the said sets to a single opening in each revolution in coordination with the energizing of the sets.

4. A magneto comprising a plurality of high tension spark generating stator sets served by a single magnetic rotor having flux reversing means substantially confined to one side thereof whereby there is produced alternate energizing of the stator sets upon rotation of the rotor, and a cam adapted for rotation with the rotor to time the breakers of the said sets in coordination with the energizing thereof, said cam being adapted to operate each circuit breaker to open position during less than 90 degrees of each revolution of the cam.

5. A magneto comprising a plurality of pairs of stator shoes, and a rotor radially inward of said shoes and adapted for rotation in proximity to said shoes having a single pair of magnets arranged at about 90° to each other.

6. A magneto comprising a plurality of pairs of stator shoes, and a rotor radially inward thereof, cooperable therewith and having a pair of shoes of like polarity at about 180° and a single shoe of opposite polarity therebetween.

7. A magneto comprising two pairs of stator shoes equally spaced about the outer periphery of a rotor, and a rotor having a single pair of magnets both of which are located in one semicircle thereof, said rotor being radially inward from said stator shoes.

8. A magneto rotor comprising a hub having an annular flange, a V-shaped pole piece occupying about 180 degrees of arc having a plurality of shoes adapted for magnetic cooperation with stator shoes, a pole piece having a single shoe lying in the arc between the ends of said pole piece, a pair of magnets magnetically connected to said pole pieces, a plate encircling the hub opposite the flange, and means to join the plate, the pole pieces and the annular flange.

9. A magneto rotor as defined in claim 8 wherein the ends of the pair of magnets adjacent the single shoe pole-piece are of like polarity.

10. In combination a magnetic rotor as defined in claim 8 and a magnetic flux conducting stator comprising two pole shoes mounted externally of said rotor in operative relation thereto.

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