Oct. 2, 1951 G. H. DINGMAN 2,569,460

MAGNETO

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Fig. 1.

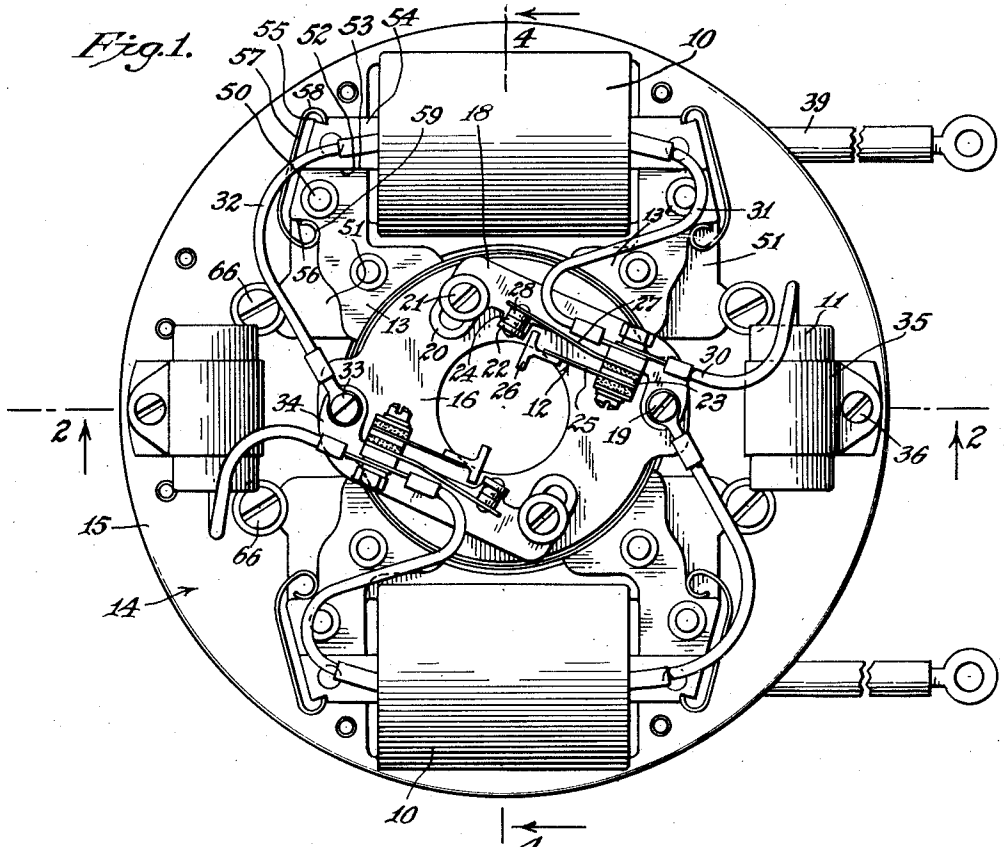
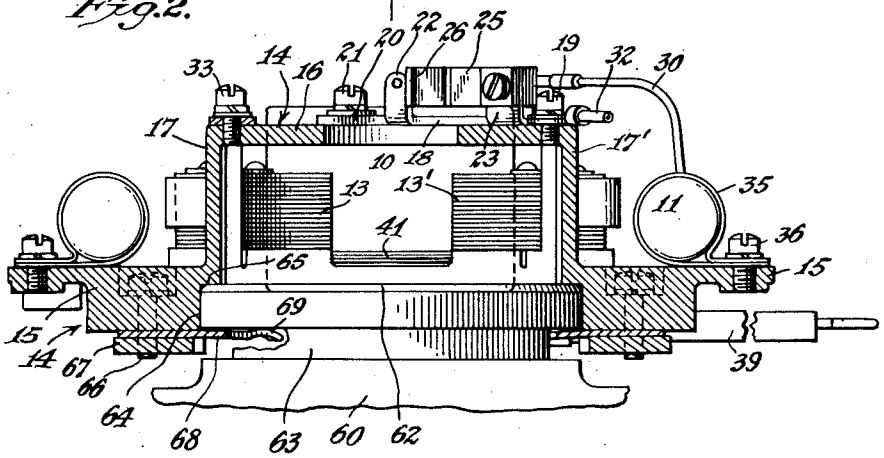


Fig. 2.



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MAGNETO

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Fig. 3.

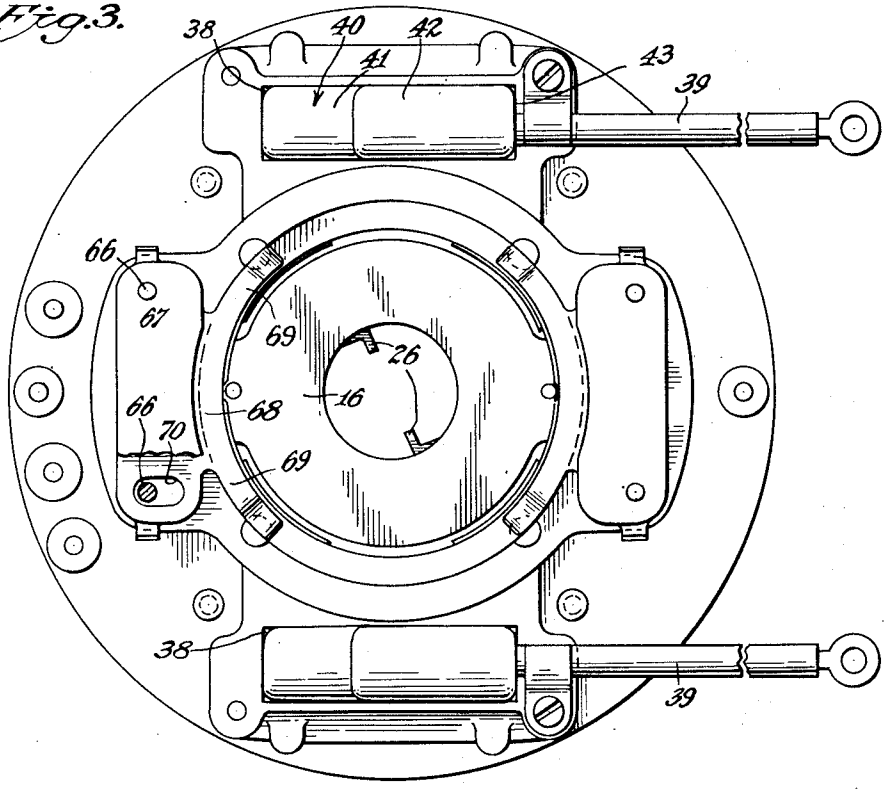

Fig. 4.

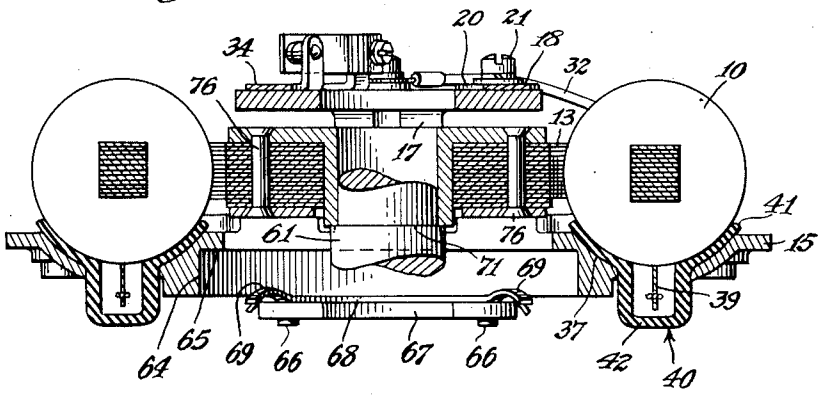

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Fig.5.

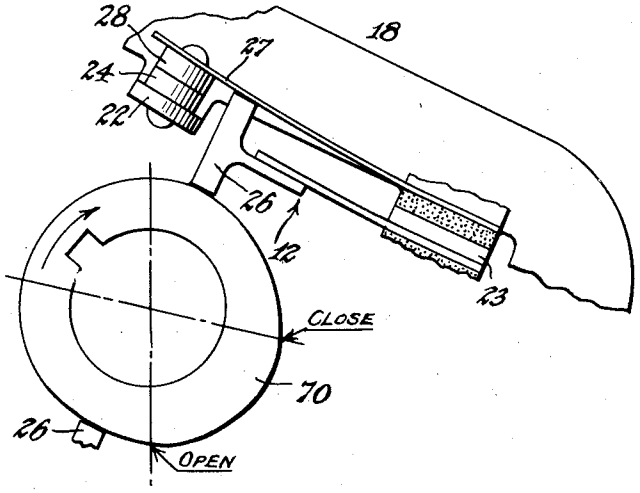


Fig.6.

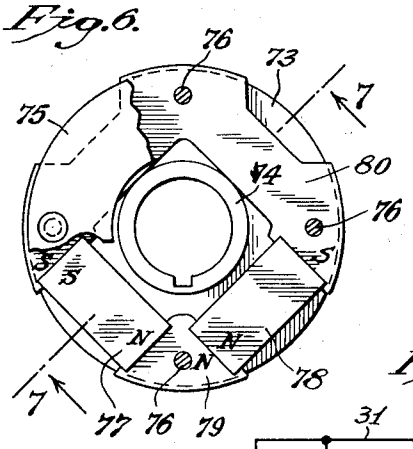


Fig.8.

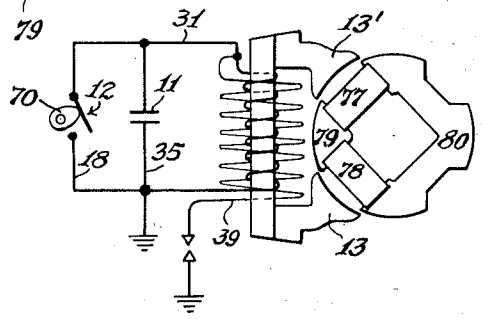
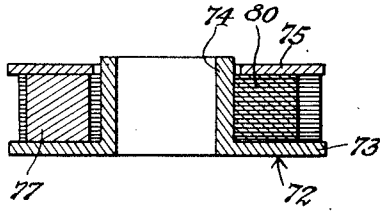


Fig.7.



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2,569,460

MAGNETO

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Application May 23, 1946, Serial No. 671,695

12 Claims. (Cl. 171—209)

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This invention relates to a magneto and particularly to the mechanical 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 a limitation.

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

Another object of the invention is to mechanically construct a magneto having a single lobe cam adapted to fire two cylinders alternately.

Another object of the invention is to provide a mounting for the parts of a magneto adapted to make the assembly of parts easy and efficient.

Another object of the invention is to devise a novel and superior mounting for magneto coils and a superior connection between the coils and the coil shoes.

Another object is to arrange a magneto rotor and cam and magneto stator shoes and circuit breaker in a compact, coaxial alignment.

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 that 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 novel 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 novel 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 novel 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 overlies 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 novel means to the stator shoes of the magneto. The mounting of the stator shoes and the mounting of the coil in combination therewith constitute an important feature of the invention. 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 also resides in the novel circuits established by this construction and in the construction of certain of the parts which contribute to the invention electrical conceptions. Certain of these are illustrated primarily in Figs. 5, 6, and 7 which are views, respectively, of the single lobe cam that is employed when alternate firing of the two magneto circuits is desired, and of the novel rotor whose construction is so important to the accomplishment of certain objects of the invention. The cam 79 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. By employing a cam of two lobes, the magneto can be made to fire the plugs simultaneously each 180° of arc.

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.

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 arrange-

ment. 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 compactness of the combination and the coordination of its parts.

A particular advantage is in the construction of the supporting frame and in the means for adjustably supporting it upon the casing of the machine.

Another advantage of the invention is in the novel means of mounting the several parts of the magneto upon each other and upon the frame.

A still further and important part of the invention resides in the electrical construction and the novel circuits and results obtained.

Another advantage of the invention is in the provision of a magneto circuit furnishing a single complete flux reversal in 180° and in 360°.

A still further advantage is in the alternate firing of two spark plugs from a single rotor. These spark plugs may be set in a single cylinder or in different cylinders in line.

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 apparent to those 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 a mounting plate having a depressed, apertured seat, a coil adapted for mounting in said seat, and a flexible hollow protector adapted to receive the coil in the seat having a protuberance adapted to project through said aperture in protective relation to a coil lead, said protuberance having an aperture in a flexible wall thereof through which the coil lead extends and in which it has a close fit.

2. A magneto comprising an apertured plate, a depression seat therein, a coil adapted to be mounted in said seat having projecting core ends, stator shoes carried by the plate, and means to join the said ends to said stator shoes, comprising notches in the ends and shoes and spring clamps adapted for seating in the notches.

3. A magneto comprising an apertured plate, a depression seat therein, a coil adapted to be mounted in said seat having projecting core ends, stator shoes carried by the plate, and means to join the said ends to said stator shoes, comprising sharp and rounded notches in the ends and shoes, and spring clamps having sharp and rounded ends adapted for spring engagement with said notches.

4. In combination with an engine having a casing and a rotatable shaft, a magneto generator comprising a frame having lesser and greater coaxial, offset mounting plates adapted to surround said shaft and being rigidly joined by circumferentially-spaced, axially-extending posts, a pair of stator shoes secured to the face of the greater plate, a coil positioned in a demi-cylindrical apertured seat formed in said greater plate between said shoes, a core extending through said coil and bridging said shoes, means engaging said core and shoes for resiliently holding the same together in assembled relation, means interposed between said coil and seat and having a hollow portion extending through the aperture in said seat for receiving a coil terminal and a cable connection thereto at the back of said greater plate, a magnetic rotor mounted on said shaft in the space between the planes of said plates in operative relation to said shoes, a circuit breaker connected in circuit with said coil mounted on the outer face of said lesser plate, a cam on said shaft for periodically actuating said circuit breaker, and means for securing said frame to said casing against axial movement relative thereto but for resisted angular movement about said shaft, said means including an axially extending pilot flange on the back of said greater plate and releasable resilient means secured to said frame and extending inwardly beyond the inner periphery of said flange to engage a radial flange on said casing.

5. In a magneto generator, a metallic frame having a plate-like portion with a slotted, substantially demi-cylindrical depression therein, a thin-walled cradle of flexible material, such as rubber, lining said depression and having a hollow, apertured portion projecting through the slot in said depression, a coil seated in said cradle having a terminal extending into said hollow portion, and a cable extending through and closely engaged by the edges of the aperture in said hollow portion and connected to said terminal.

6. In apparatus of the class described, a rigid frame having a slotted, substantially demi-cylindrical surface, a thin-walled cradle of flexible material, such as rubber, engaging said surface and having a bulge in the contour of its wall projecting through the slot in said surface, a cylindrical coil seated in said cradle and having a terminal extending into said bulge, and a cable connected to said terminal and extending through a close-fitting aperture in the wall of said bulge.

7. In apparatus of the class described, a rigid mounting plate, a pair of stator poles secured to said plate, the latter having a slotted depression between said poles, a thin-walled cradle of flexible material, such as rubber, lining the walls of said depression and having a hollow bulge extending through the slot in said depression, a coil seated in said cradle and having a terminal extending into said bulge, a core in said coil bridging the upper ends of said poles, and means for clamping the core to said poles comprising a stiff leaf spring having the ends thereof bent inwardly for engagement with the upper surface of said core and downwardly facing ledges on said poles.

8. In a magneto generator, a pair of stator poles, a coil having a core bridging the ends of said poles, and a stiff leaf spring traversing the end of said core, said spring being curled at its ends for direct engagement with a notch in the upper surface of said core and a downwardly facing ledge on one of said poles to yieldably hold said pole and core in assembled relation.

9. In a magneto generator, a pair of stator poles, a coil having a core bridging the ends of said poles, and means for clamping the core to said poles comprising a leaf spring traversing the end of said core and having a substantially semi-circular bend at one end with the end edge thereof in engagement with a notch in the surface of said core and a circle-like bend at the other end in engagement with a filleted notch in one of said poles.

10. In apparatus of the class described, a pair

of stator poles having downwardly facing ledges thereon, a coil core bridging the upper ends of said poles, and means for clamping the core to said poles comprising a stiff leaf spring having one end bent to engage an upwardly and outwardly extending portion of the upper surface of said core and the other end curled to engage the downwardly facing ledge on one of said poles.

11. In apparatus of the class described, the combination of a stator pole having a downwardly facing ledge thereon, a coil core engaging the upper end of said pole, and a stiff leaf spring curled at its ends and engaging the upper surface of said core and the downwardly facing ledge on said pole.

12. In a magneto generator, a support, spaced stator poles mounted on said support, a coil having projecting core ends engaging and magnetically connecting said stator poles, and means connecting each end of the core to one of said poles comprising oppositely facing notches in said core end and pole and a spring clamp having curved ends with one end edge of the spring engaging one of the notches and a curved surface adjacent the other end of the spring engaging the other notch, the spring being under tension to hold the core and pole in engagement.

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