Oct. 20, 1925.

1,557,976

P. BROWN ET AL

MAGNETO

Filed July 18, 1923

2 Sheets-Sheet 1

Fig. 1.

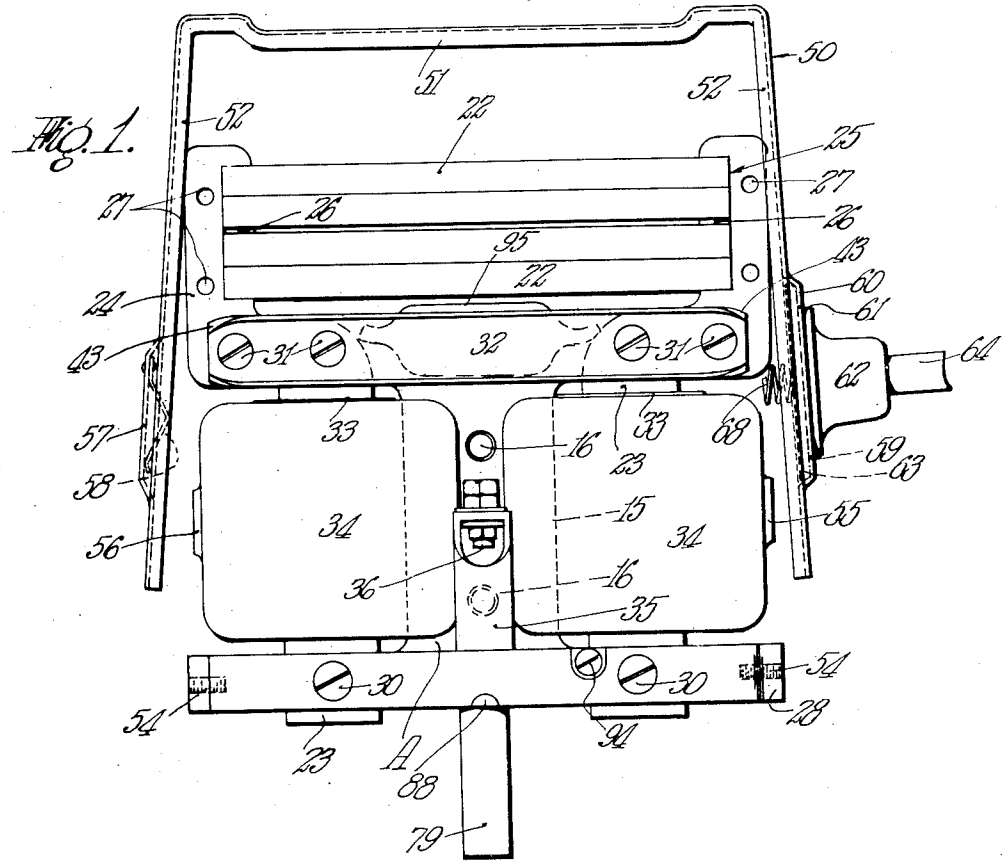
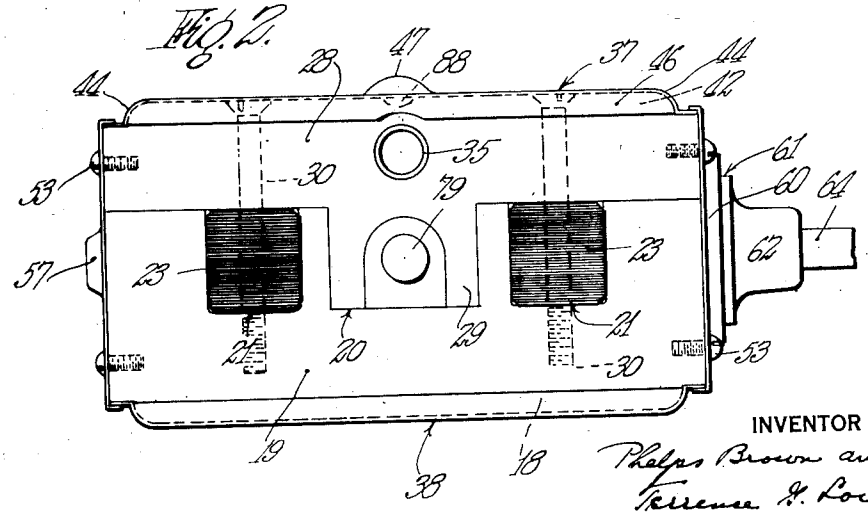


Fig. 2.



INVENTOR

Phelps Brown and

Terrence St. Louis

BY Chapin Neal

ATTORNEYS

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MAGNETO

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Fig. 3.

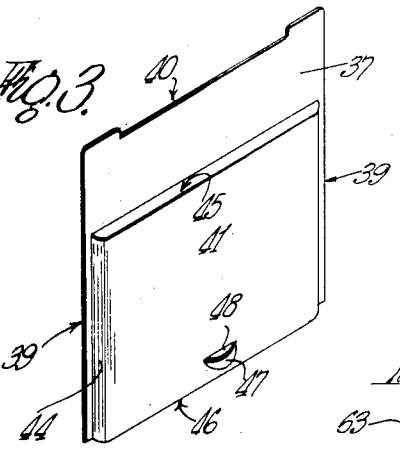


Fig. 4.

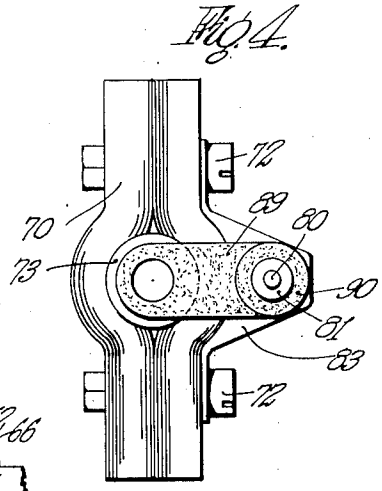


Fig. 6.

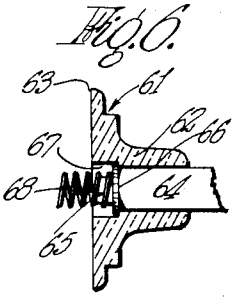


Fig. 9.

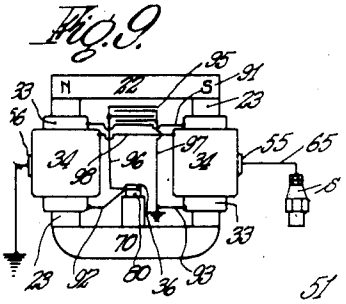


Fig. 7.

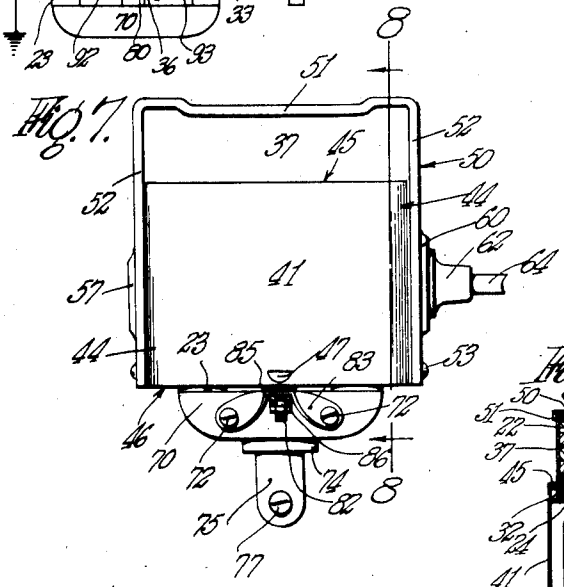


Fig. 5.

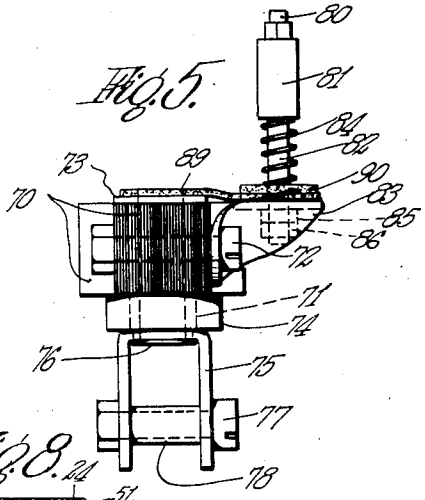
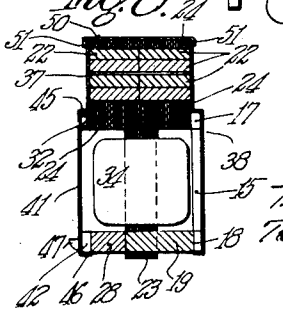


Fig. 8.



INVENTOR
Phelps Brown and
Terrence G. Louis
BY Pfeiffer & Neal
ATTORNEYS

Patented Oct. 20, 1925. 1,557,976

UNITED STATES PATENT OFFICE.

PHELPS BROWN AND TERRENCE G. LOUIS, OF SPRINGFIELD, MASSACHUSETTS; SAID LOUIS ASSIGNOR TO WICO ELECTRIC COMPANY, OF WEST SPRINGFIELD, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

MAGNETO.

Application filed July 18, 1923. Serial No. 652,356.

To all whom it may concern:

Be it known that we, PHELPS BROWN and TERRENCE G. LOUIS, citizens of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Magnetos, of which the following is a specification.

This invention relates to improvements in magnetos and is especially directed to improvements in the mechanical construction of the magneto proper, as distinguished from the actuating mechanism, and mode of operation thereof.

The general type of magneto, with which this invention is concerned, is that wherein an armature is moved toward and away, and preferably although not necessarily into contact with, magnetic poles. The magneto includes a source of magnetic flux, usually permanent magnets; cores usually two in number and connected to the poles of the magnetic source; windings, preferably, although not necessarily, both primary and secondary, carried usually by the cores; a movable armature, preferably, although not necessarily, sliding in a straight line to and from the cores; and a suitable interrupter mechanism associated with the primary winding and including a part movable with the armature.

The invention has for one object to provide an improved housing for all the stationary parts of the magneto, such as the magnetic source, cores, coils, and stationary parts of the interrupter mechanism, characterized by a substantially complete enclosure of all these parts against the ingress of dust, dirt, oil, and other foreign substances, and against mechanical injury.

The invention has for another object to provide an improved mounting for the moving parts of the magneto, such that they are readily accessible and conveniently mounted for quick assembly and removal, preferably as a single unit.

Another object of the invention is to provide simplified and improved means for lubricating the moving parts of the magneto.

Other objects of the invention relate to improvements in the construction and arrangement of parts and will more readily appear in the following description and in the illustrative embodiment of the invention in the accompanying drawings, in which—

Fig. 1 is a large scale front elevational view of a magneto embodying the invention,—the casing being partially removed and the moving parts entirely removed, the better to show other features;

Fig. 2 is a bottom plan view of the magneto, with the casing members applied thereto, but with the moving parts removed;

Fig. 3 is a perspective view of the front casing member;

Fig. 4 is a top plan view showing the unit assembly of the moving parts of the magneto;

Fig. 5 is a side elevational view of such unit assembly;

Fig. 6 is an enlarged sectional view showing construction and mounting of the spark plug wire;

Fig. 7 is a small scale front elevational exterior view of the complete magneto;

Fig. 8 is a cross-sectional view taken on the line 8—8 of Fig. 7; and

Fig. 9 is a diagrammatical view showing the electrical and magnetic circuits of the magneto.

Referring to these drawings in detail, the frame of the magneto includes a substantially H-shaped back plate A having a central, flat, vertical portion 15, provided with suitable means, such as the tapped holes 16, for attachment to an engine and upper and lower horizontal members 17 and 18, respectively. The upper member 17 is flat and substantially of the same thickness as the portion 15, but the lower member 18 has an integral part 19 which projects forwardly and right angularly therefrom and is provided with a centrally located and substantially U-shaped recess 20, and two other similar recesses 21, one on each side of the central recess. The extremities of the member 18 are rounded, as indicated in Fig. 2, and the extremities of the member 17 are correspondingly formed.

The magnetic source, as herein illustrated, comprises a series of permanent bar magnets 22. As shown, there are two groups of magnets arranged side-by-side as shown in Fig. 8, and each group consists of four magnets mounted in vertically stacked relation.

The cores are indicated at 23 and, following preferred practice, they are made up of laminations, as shown in Fig. 2, and are of generally square cross-section to fit into the recesses 21, above described. These cores may be suitably connected to the poles of the magnets 22 in any suitable manner, and one simple and advantageous manner is illustrated in Fig. 1 and 8. The core laminations, are formed with an integral extension, and on each side thereof other laminations 24 are applied to build out the extended portion of the core so that it is coextensive in width with the magnetic source. The core extensions have the same shape as the laminations 24 and all are so formed as to provide a substantially U-shaped recess 25 into which one end of the magnetic source may be received. The magnets are held in these recesses 25 by shims, or wedges, 26 applied between the magnets of each group to spread them apart and force them into intimate contact with the laminations described. The laminations 24 are clamped together, with the upper extensions of core 23 therebetween, by rivets 27.

The cores 23, are connected to the frame A in the following manner. As above described, their lower ends are received in the recesses 21 and thereby held in proper spaced relation. A frame member 28, having a centrally located tongue 29 to enter the recess 20, serves to clamp the cores 23 to the member 19,—this member 28 being secured to the latter by screws 30, which pass through member 28 and cores 23 and are threaded into member 19. The cores are further clamped to frame A by screws 31, which like those just described pass through the cores and are threaded into the member 17 of the frame. These screws 31 also pass through the laminations 24 and through a channel member 32, which is arranged on the front face of the two groups of laminations 24 and serves to hold them in proper spaced relation.

The electrical windings preferably comprise primary and secondary windings, subdivided into sections and each section including a primary coil 33 and a secondary coil 34 encompassing the same. These sections are applied, one to each core, in encompassing relation, and are located between the magnetic source and the connected members 19 and 28, which completely overlie and underlie the coils, respectively, and protect them from injury from above and below.

The interrupter mechanism includes, as stationary parts, a tube 35 which passes upwardly through and above the member 28 and is suitably held therein, as by a driving fit. This tube, as shown, lies forwardly of the cores 23 and equidistantly therefrom, whereby it is brought out close to the front of the magneto for convenient access, when and as desired. The tube 35 carries at its upper end a stationary breaker point 36, adjustably secured thereto, and the tube is cut away near its upper end to permit inspection of this point.

The members 19 and 28 closely fit together and form the bottom closure of a magneto housing, which completely encases all other parts described, except for the protruding lower ends of cores 23, and the interrupter tube 35, which latter is closed by other means, as will later appear. The front and rear faces of the magneto are closed by plates 37 and 38, respectively, each of which is of a generally similar nature. The plate 37 has straight, parallel sides 39 which are separated by a distance substantially equal to that between the outermost edges of the two sets of laminations 24, or substantially equal to the length of member 28. The upper edge 40 of plate 37 is cut to conform to the contour of the upper end of the magneto and its lower edge is such as to substantially coincide with the lower edge of member 28, when the plate is applied to the magneto, as shown in Fig. 7. The plate 37 is furthermore pressed outwardly, as indicated at 41, to a distance substantially equal to the thickness of the channel 32, or the forward outwardly protruding portion 42 of the member 28, which is formed similarly to the member 18 with rounded ends. The channel 32 is bent at its ends, as at 43, to approximate the rounded ends referred to, and the pressed out portion 41 merges into the body of the plate, along its vertical intersections therewith, with rounded portions 44, which closely fit the corresponding portions on the members 32 and 42. The pressed out portion 41, along its upper and lower horizontal edges, is connected to the plate by flat lip portions 45 and 46, which are so spaced as to closely engage, respectively, the upper face of channel 32 and the lower face of member 28, as best shown in Fig. 8. The arrangement is such that when the plate 37 is applied in place it tightly fits over the channel 32 and member 42 and is frictionally held in place. The rear plate 38 is formed in the same manner and closely fits the members 17 and 18 and is similarly held in place. The rear plate 38 will, of course, have openings to register with the holes 16 described, to permit fastening screws to be applied. The front plate 37 has a special provision in the nature of a trough 47 struck outwardly from the portion 41 and separated from such portion at its upper edge to form an opening 48, which, as will appear, is provided for the purpose of supplying oil to lubricate the working parts of the magneto.

For housing in the top and sides of the magneto, there is provided a single substan-

tially U-shaped member 50 the top and side walls of which are shaped to conform to the corresponding edges 40 and 39 respectively of the plates 37 and 38. The top and side walls of the U-shaped member have, along both edges, inturned lips 51 and 52, respectively, which overlap the plates 37 and 38 along the edges 40 and 39, respectively, as best shown in Fig. 8, when the member 50 is secured in place. The member 50 is held in place by screws 53 applied through the side walls of the member, near the lower ends thereof, such screws entering tapped holes 54 provided in the end faces of the bottom closure of the magneto, comprising the members 19 and 28.

The two secondary coils 34 have terminals 55 and 56 in the nature of brass buttons, which are disposed one adjacent each side wall of member 50, when the latter is secured in place, and means, carried by these side walls, are provided to make contact with the buttons. In the case of the button 56, the requirement is to connect it to the frame of the machine, or "ground" it. Accordingly, the adjacent side wall of member 50 is pressed outwardly, as at 57, in generally rectangular form, to provide a recess to receive a flat spring 58, which is secured at one end to the member 50 and is adapted, near its other end, to be pressed against the button 56, when the screws 53 are applied. The button 55 is adapted for connection to the spark plug and, in the adjacent side wall, a circular opening 59 is formed which is embordered by an annular portion 60 pressed outwardly from the side wall. The opening 59 is adapted to receive the portion 61 of an insulator 62 (Fig. 6) and, adjacent such portion, is a flange 63 which is received in the recess afforded by the pressed out portion 60,—the arrangement being such that the flange can freely turn in its recess but is restrained from axially outward movement. The insulator 62 has an axial opening therein to receive the spark plug wire, the insulating covering of which is shown at 64 and the core or wire at 65. On the wire 65 is soldered a ring 66 which is received and can freely turn in a counterbored portion 67 in the insulator. A coil spring 68 is suitably fastened to the end of wire 65, as by tightly encompassing the same in abutting relation with ring 66. The free end of spring 68 engages the button 55, when the member 50 is applied in place, and is compressed as the screws 53 are tightened up to make a firm contact with the button. It is to be noted that the wire 64 can swivel in the insulator and that the latter can swivel in the member 50. Also, the arrangement is such that pull on the wire is transmitted to the housing and cannot interfere with connection to button 55.

The armature is of the laminated type and is shown at 70 in Figs. 4 and 5. As there shown, the laminations are divided into two groups which are bent outwardly in substantially semi-circular fashion near their central portions to fit around a hollow bushing 71 and the two groups are clamped together to grip the bushing therebetween by through bolts 72, arranged one on each side of bushing 71. The latter has a flange 73 to engage the upper face of armature 70 and its lower end extends below the armature to receive a collar 74. Beyond the collar, the bushing 71 is turned down to a less diameter to pass through a central opening formed in the cross-bar portion of a U-shaped piece 75, of bent metal, which forms the fork adapted for connection to any suitable armature actuating mechanism, not shown. The end of bushing 71 is headed over upon the lower face of the cross-bar portion of the fork, as shown at 76 to bind the latter and the collar 74 in place, whereby the collar 74 is forced tightly against the lower face of armature 70 and the flange 73 is drawn tightly against the upper face thereof. The fork 75 has a bolt 77 passing through the spaced depending arms thereof and upon this bolt is a spacing sleeve 78. The axial opening in bushing 71 is such as to slidingly fit a cylindrical guide post 79, which is fixed to and extends downwardly from the tongue 29 of the member 28.

The moving parts of the interrupter are carried by the armature 70 and thus all the moving parts are joined into a single unit for convenient assembly and removal. The movable breaker point, shown at 80, is suitably attached to a relatively long cylindrical guide 81, which slidingly fits in the tube 35 described. Fixed to this guide 81 is a depending stem 82, which loosely passes through the upper wall of a bracket 83, secured to one side face of armature 70 by the screws 72, already described. Between this wall and the lower end of guide 81 is a coil spring 84, which encompasses the stem 82 and on the latter, below said wall, is an adjustable abutment 85, in the nature of a nut threaded upon the stem, and a lock nut 86 to hold the abutment in its various positions of adjustment. The point 80 moves with the armature 70 in the upward flight thereof until it engages the fixed point 36, which engagement occurs before the armature engages the ends of cores 23, and thereafter the spring 84 yields to permit the armature to complete its upward flight. When the armature is seated on the ends of cores 23, a space will therefore exist between the abutment 85 and the adjacent overlying portion of bracket 83, whereby the breaker point 80 will not be separated from breaker point 36 until the armature has been disengaged from its cores and moved a predetermined distance in its downward flight.

While this is the operation, as at present preferred, the abutment 85 may be adjusted to change the operation, if desired.

For lubricating the moving parts of the armature and interrupter, oil is supplied to the opening 48. In back of this opening is the member 42, which coacts with the portion 47 to form a pocket open at its upper end. As an exit for such pocket, a recess 88 is formed in the lower edge of member 42, through which recess the oil passes and works its way out beneath the lip 46. A pad 89 of suitable material, such as felt, extends from stem 82, which it encircles, to the flange 73, being provided with an opening to receive the armature guide 79. Upon this pad, and encircling the stem 82, is a circular pad 90, of similar material, which picks up the oil emerging from lip 46, as described. The oil picked up by pad 70 permeates through all portions of both pads and lubricates the stud 79 and guide 81,—being conveyed to the interior of the tube 35 for the latter purpose. This action may be facilitated by a slight compression of the pads against the member 28 as the armature engages its poles, to squeeze out a little oil.

The electrical and magnetic circuits of the magneto are shown in Fig. 9. The coils 33 may be connected in series by a wire 91 connecting one terminal of each. The other terminal of one coil is connected by a wire 92 to the fixed breaker point 36 and the other terminal of the other coil is "grounded", as by connecting it to the frame of the machine by a wire 93, which may be attached to the member 42 by a screw 94 (Fig. 1). A condenser 95 is bridged across the breaker points, being connected by a wire 96 to the point 36 and by a wire 97 to the screw 94, whereby it is connected to the frame of the machine and thus to the breaker point 80. The location of this condenser is shown in Fig. 1, the condenser being preferably enclosed in a moisture proof casing,—that indicated being of rubber vulcanized along all seams. The coils 34 may be connected in series as by a wire 98 and the terminals 55 and 56 are connected, as described, to the frame of the machine and a spark plug *s*, respectively.

The operation of this type of magneto is generally well understood in the art and requires no detailed description herein, especially since the present invention is concerned primarily with features relating to its mechanical construction.

It should be particularly noted that this magneto is so constructed that its armature actuating mechanism is located entirely beneath the armature which admits of a substantially complete enclosure of the magnetic source, cores, coils, condenser and interrupter, except for the one relatively small passage necessarily provided to permit the lubrication of parts. This arrangement is important for the protection of parts from the weather, moisture, and the ingress of oil, grease, dust, dirt, and the like, and for the protection against mechanical injury to the parts. Also, the entire concealment of these parts within a neat and attractive casing greatly improves the appearance of the machine. The location of the armature and its guide 79 outside the casing and the connection of the moving parts of the interrupter with the armature into a unit assembly is also considered important. All working parts may be removed and replaced in an instant, and rendered accessible for inspection. The parts, requiring lubrication, can readily be examined to insure that they are receiving proper lubrication and the lubricating operation is rendered easy and convenient by the simple arrangement described for this purpose.

The invention has been disclosed herein, in an embodiment at present preferred, for illustrative purposes, but the scope of the invention is defined by the appended claims rather than by the foregoing description.

What we claim is:—

1. In a magneto, a frame, a source of magnetic flux, cores connected therewith, and coils associated with the cores, all supported from said frame, bottom housing means through which the ends of said cores protrude, front and rear housing plates on opposite sides of said means and contiguous therewith near their lower edges, and a substantially U-shaped housing member extending between the plates along their top and side edges and cooperating with said means and plates to incase said source and coils and the cores, except for said ends.

2. In a magneto, a frame, a source of magnetic flux, cores connected therewith, and coils associated with the cores, all supported from said frame, bottom housing means through which the ends of said cores protrude, front and rear housing plates on opposite sides of said means and contiguous therewith near their lower edges, and a substantially U-shaped housing member extending between the plates along their top and side edges and cooperating with said means and plates to incase said source and coils and the cores, except for said ends, said member having inturned lips to overlie the top and side edges of said plates.

3. In a magneto, a frame, a source of magnetic flux, cores connected therewith, and coils associated with the cores, all supported from said frame, bottom housing means through which the ends of said core protrude, front and rear housing plates on opposite sides of said means and continuous therewith, near their lower edges, a substantially U-shaped housing member extending between the plates along their top and

side edges and cooperating with said means and plates to incase said source and coils and the cores, except for said ends, said member having inturned lips to overlie the top and side edges of said plates, and means for removably securing said member to the ends of said housing means.

4. In a magneto, a frame, a source of magnetic flux, cores including parts to connect them at one end with said source and supported on one side of said frame near its upper end, bottom housing means connected with said frame near its lower end through which means the other ends of said cores protrude, said means being commensurate in length and width with the assembled source and parts and provided with a projection along its front edge, a cross-bar connecting said parts, a front housing plate having a pressed out portion to receive said cross-bar and front projection and frictionally hold it against movement, a similar rear housing plate similarly engaged with the upper and lower ends of said frame, both said plates lying contiguous with said source and bottom housing means, and a U-shaped housing extending between the front and rear plates along their side and top edges and cooperating with said plates and bottom housing means to encase said source and cores except for said protruding ends.

5. In a magneto, a frame, a series of flat bar magnets, cores, and means connecting them at one end to the ends of said magnets, said magnets, cores and means being supported from said frame near its upper edge and extending upwardly therefrom, bottom housing means coextensive in length and width with the assembled source and connecting means and underlying the same in spaced relation, a cross-bar connecting the cores below said magnets and projecting forwardly therefrom, a forwardly extending projection on the bottom housing means in parallel relation with said cross-bar, front and rear flat plates extending from the upper edge of the assembled source and its core connecting means to the lower edge of said bottom housing means and substantially equal in width to their length, a substantially U-shaped housing member, the cross-bar portion of which overlies said source and core connecting means and the legs of which fill the space between the side edges of said plates, the front plate being recessed to closely fit over said cross-bar and projection whereby it is frictionally held from movement and the rear plate being similarly recessed to receive the upper and lower edges of said frame and similarly held thereby, and means for detachably securing the ends of the legs of said U-shaped member to the ends of said bottom housing means.

6. In a magneto, a frame, a series of flat bar magnets, cores, and means connecting them at one end to the ends of said magnets, said magnets, cores and means being supported from said frame near its upper edge and extending upwardly therefrom, bottom housing means coextensive in length and width with the assembled source and connecting means and underlying the same in spaced relation, a cross-bar connecting the cores below said magnets and projecting forwardly therefrom, a forwardly extending projection on the bottom housing means in parallel relation with said cross-bar, front and rear flat plates extending from the upper edge of the assembled source and its core connecting means to the lower edge of said bottom housing means and substantially equal in width to their length, a substantially U-shaped housing member, the cross-bar portion of which overlies said source and core connecting means and the legs of which fill the space between the side edges of said plates, the front plate being recessed to closely fit over said cross-bar and projection whereby it is frictionally held from movement and the rear plate being similarly recessed to receive the upper and lower edges of said frame and similarly held thereby, means for detachably securing the ends of the legs of said U-shaped member to the ends of said bottom housing means, and lips provided on said U-shaped member to overlie the top and side edges of said plates.

7. In a magneto, having a magnetic source, cores connected therewith, and coils associated with the cores; a terminal provided on one of the coils, a detachable plate adjacent said terminal, having an opening, an insulator swivelled in said opening, a wire passing through the insulator, and a spring connected with said wire adapted to contact with said terminal.

8. In a magneto, having a magnetic source, cores connected therewith, and coils associated with the cores; a terminal provided on one of the coils, a detachable plate adjacent said terminal, having an opening, an insulator swivelled in said opening, a wire passing through the insulator, and having a swivelled connection therewith, and a spring connected with said wire adapted to contact with said terminal.

9. In a magneto, having a magnetic source, cores connected therewith and coils associated with the cores, a terminal provided on one of the coils, a detachable plate adjacent said terminals, having an opening, said plate being pressed outward away from said terminal to form a recess encompassing said opening, an insulator swivelled in said opening and having a flange to fit in said recess and prevent outward movement of the insulator, a wire passing through the

insulator, and a spring connected with said wire adapted to contact with said terminal.

10. In a magneto, having a magnetic source, cores connected at one end thereto, coils on the cores, and means connecting the cores beyond said coils; a substantially U-shaped housing member having its cross-bar portion in overlying relation with said source and its legs extending to and detachably connected with said means, terminals provided on each coil one adjacent each of said legs, and spring contact devices carried by the latter to engage said terminals.

11. A magneto, comprising, a back plate, a source of magnetic flux and cores connected therewith near one end, both supported from said plate near one end thereof, said cores extending away from said end, an integral extension provided on the back plate and extending right angularly thereto, seats provided in said extension to receive the lower ends of the cores, and a member cooperating with said extension to clamp the cores in said seats.

12. A magneto, comprising, a back plate, a source of magnetic flux and cores connected therewith near one end, both supported form said plate near one end thereof, an integral extension provided on the back plate and extending right angularly thereto, seats provided in said extension to receive the other ends of the cores, a recess provided in said extension between said seats, and a member cooperating with said extension to clamp the cores in said seats, said member having a tongue to fit within said recess.

13. A magneto, comprising, a back plate, a source of magnetic flux and cores connected therewith near one end, both supported from said plate near one end thereof, an integral extension provided on the back plate and extending right angularly thereto, a clamping member secured to said extension and cooperating therewith to clamp the cores near their other ends, said member and extension having interfitting parts and one thereof having seats to receive the cores.

14. In a magneto, a source of magnetic flux, cores connected therewith, coils on the cores, means entirely encasing said source, coils and cores except for short extensions which pass through and closely fit one wall of said enclosing means, an armature to periodically connect said core extensions, and guiding means carried by said enclosing means and entirely exterior thereto for slidably receiving said armature.

15. In a magneto, a source of magnetic flux, cores connected therewith, coils on the cores, means entirely encasing said source, coils and cores except for short extensions which pass through and closely fit one wall of said enclosing means, an armature to periodically connect said core extensions, a tube extending from said wall into the interior of enclosing means and carrying a breaker point, a bracket rigidly secured to a side face of the armature, a movable breaker point, and guiding means therefor carried by said bracket and adapted to closely fit and slide in said tube.

16. In a magneto, a source of magnetic flux, cores connected therewith, coils on the cores, means entirely encasing said source, coils and cores except for short extensions which pass through and closely fit one wall of said enclosing means, an armature to periodically connect said core extensions, guiding means carried by said enclosing means and entirely exterior thereto for slidably receiving said armature, and interrupter mechanism including a tube extending through said wall into the enclosing means and a movable element slidable in said tube and connected with the armature, said armature and movable element being normally held to the cores by magnetic attraction and being removable as a unit by breaking the magnetic hold thereon.

17. In a magneto, having a magnetic source, cores, and coils on the latter together with means enclosing them except for one end of each core, an armature movable toward and away from the cores, a guiding member for the armature on one wall of the enclosing means and entirely exterior thereto, an interrupter tube extending from said wall into the interior of said enclosing means, a movable interrupter member carried by the armature and slidably engaged in said tube, an absorbent pad carried by the armature and extending from said interrupter member to and encircling said guiding member, and a well provided in said enclosing means to feed oil to said pad.

18. In a magneto, having a magnetic source, cores, and coils on the latter together with means enclosing them except for one end of each core, an armature movable toward and away from the cores, a guiding member for the armature on one wall of the enclosing means and entirely exterior thereto, an interrupter tube extending from said wall into the interior of said enclosing means, a movable interrupter member carried by the armature and slidably engaged in said tube and an absorbent pad carried by the armature and extending from said interrupter member to and encircling said guiding member.

In testimony whereof we have affixed our signatures.

PHELPS BROWN.
TERRENCE G. LOUIS.