F. BAIER.

MAGNETO ELECTRIC MACHINE.

APPLICATION FILED MAR. 7, 1910.

1,161,434.

Patented Nov. 23, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

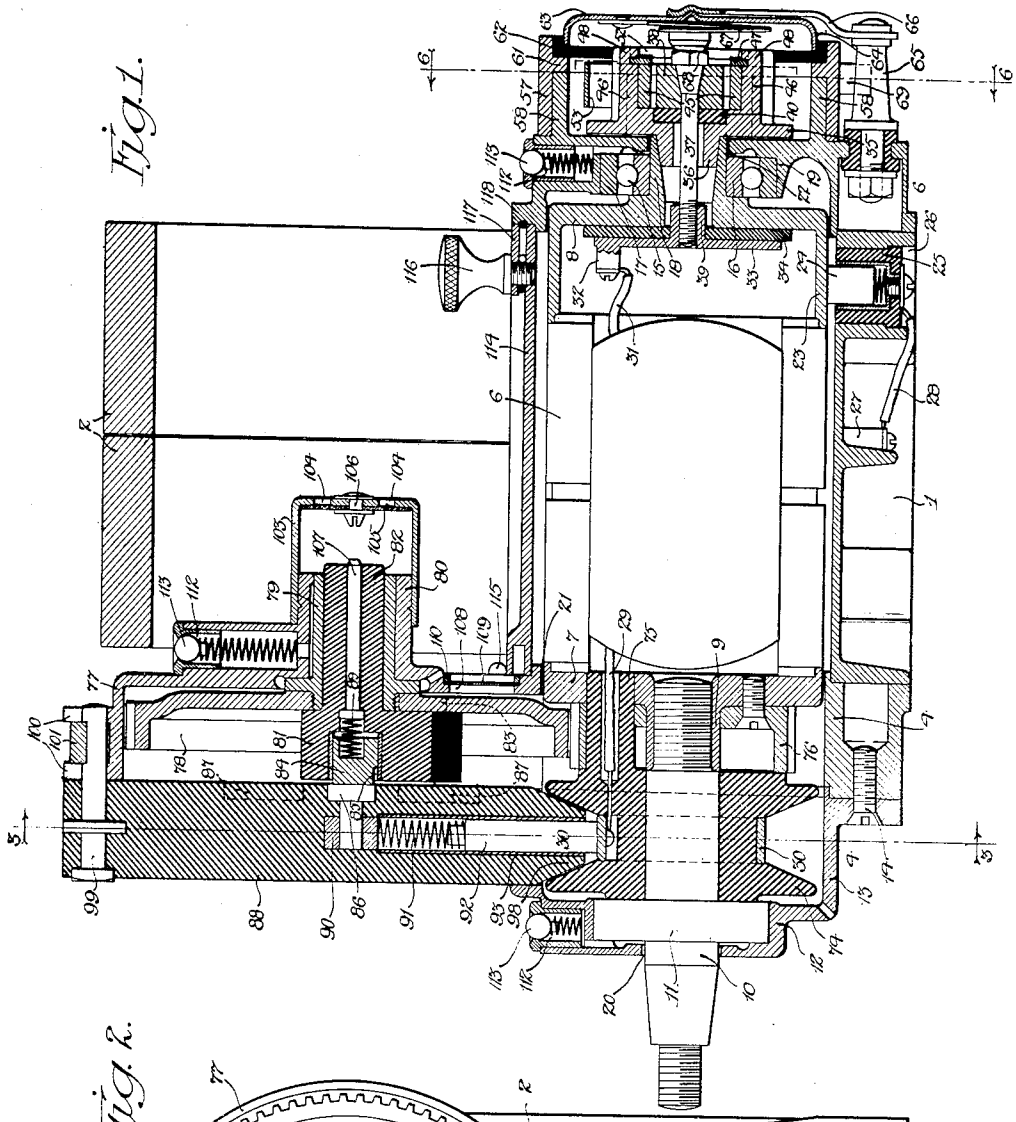
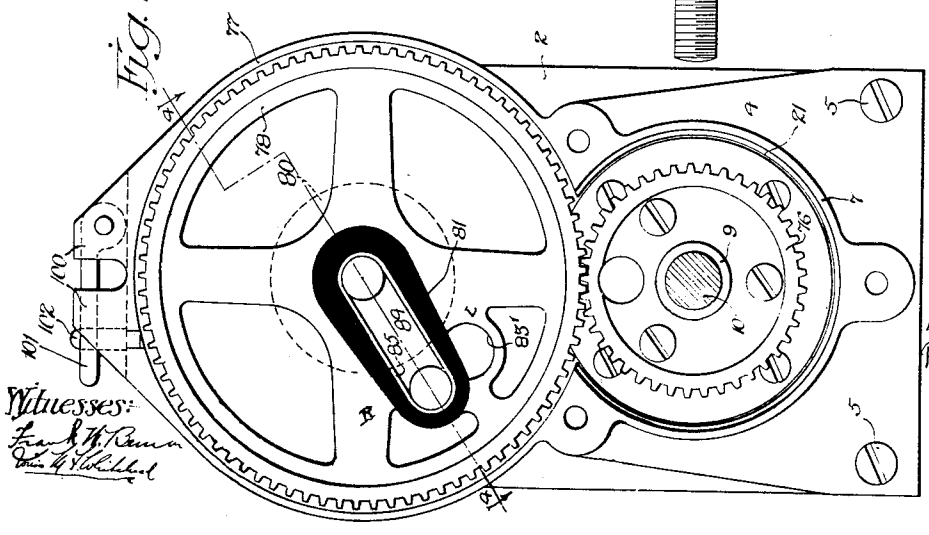


Fig. 2.



Witnesses:
Frank H. Ramsay
Chas. G. Underhill

Inventor:
Friedrich Baier
By: Peirce & Fisher
Attys.

F. BAIER.

MAGNETO ELECTRIC MACHINE.

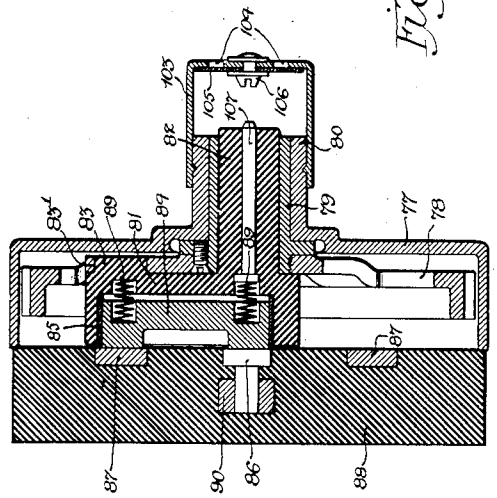
APPLICATION FILED MAR. 7, 1910.

1,161,434.

Patented Nov. 23, 1915.

3 SHEETS—SHEET 2.

Fig. 4.



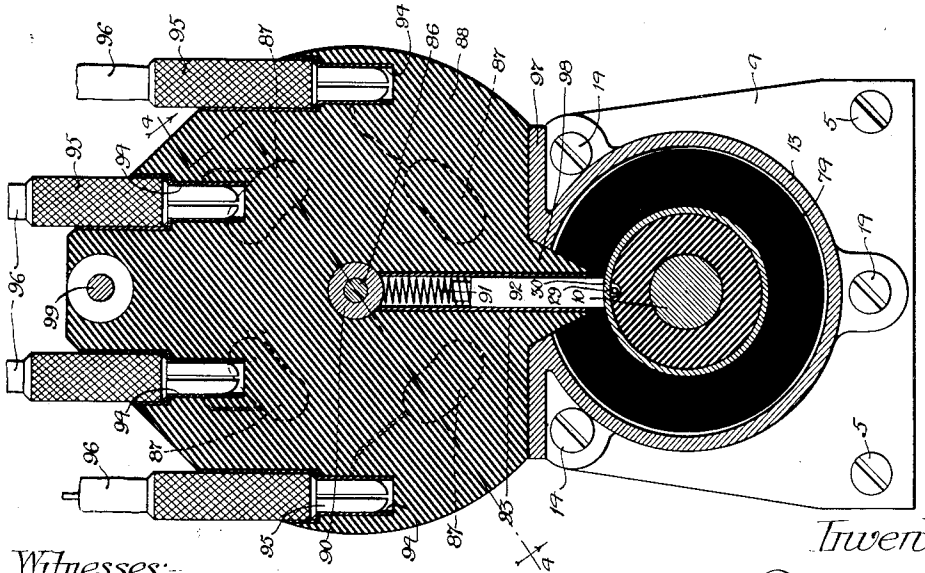


Fig. 5.

Witnesses:—
Frank W. Bemm
Paul E. Hollstead

Inventor:—
Friedrich Baier
By:—Peirce & Fisher
Attys.

F. BAIER.

MAGNETO ELECTRIC MACHINE.

APPLICATION FILED MAR. 7, 1910.

1,161,434.

Patented Nov. 23, 1915.

3 SHEETS—SHEET 3.

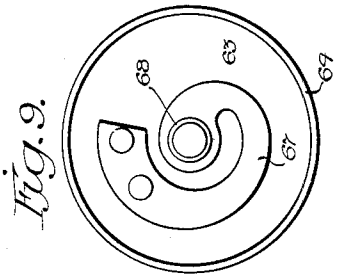


Fig. 9.

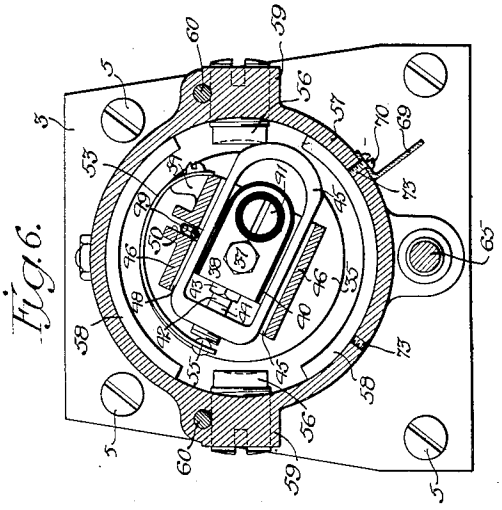


Fig. 6.

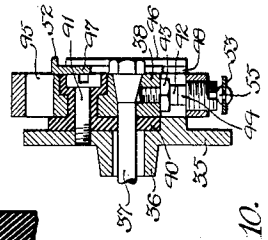


Fig. 8.

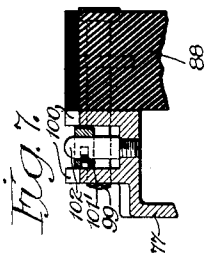


Fig. 7.

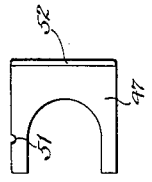


Fig. 10.

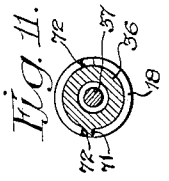


Fig. 11.

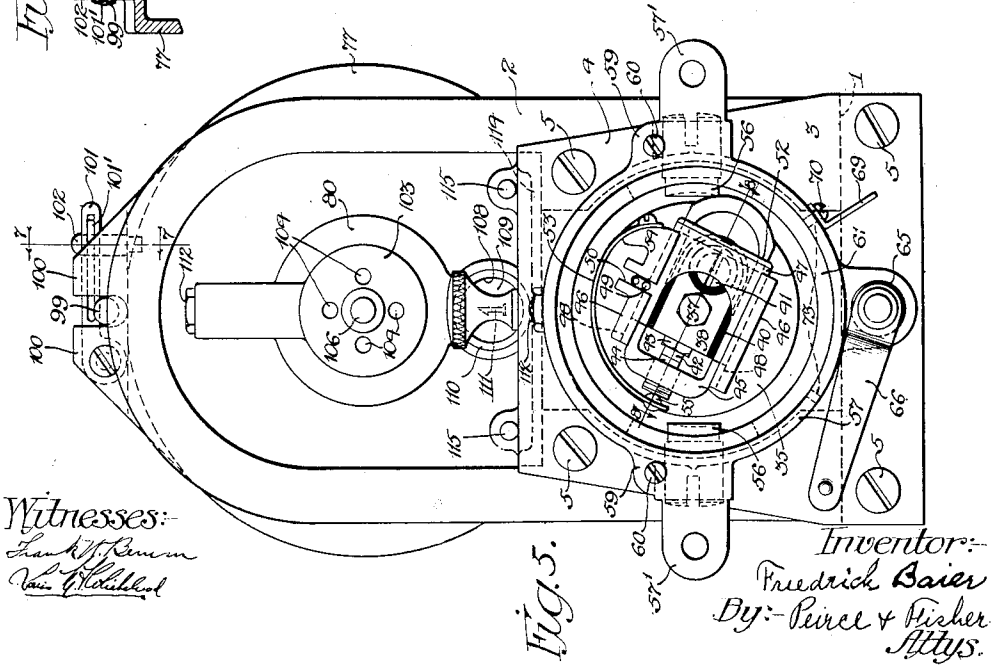


Fig. 5.

Witnesses:-

Frank W. Brown

Paul Goepel

Inventor:-

Friedrich Baier

By:- Peirce & Fisher

Attys.

UNITED STATES PATENT OFFICE.

FRIEDRICH BAIER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SWISS MAGNETO COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

MAGNETO-ELECTRIC MACHINE.

1,161,434. Specification of Letters Patent. Patented Nov. 23, 1915.

Application filed March 7, 1910. Serial No. 547,921.

To all whom it may concern:

Be it known that I, FRIEDRICH BAIER, a subject of the Emperor of Germany, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Magneto-Electric Machines, of which the following is a specification.

The invention relates to small, high tension magneto machines, such as are employed for supplying current to the igniters of the separate cylinders of an explosive engine.

The invention seeks to provide an improved, simplified construction which will operate with certainty and with little wear upon the parts and in which the different portions of the machine can be readily assembled and easily taken apart for repairs or the like.

With these and other objects in view, as will hereinafter appear, the invention consists in the features of improvement hereinafter set forth, illustrated in the preferred form in the accompanying drawings and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a longitudinal section of the improved machine. Fig. 2 is a view of the left-hand end of the machine with the parts of the distributer for the secondary circuit removed. Fig. 3 is a vertical section of the distributer on the line 3—3 of Fig. 1. Fig. 4 is a detail section on the lines 4—4 of Figs. 2 and 3. Fig. 5 is a view in elevation of the right-hand end of the machine with the end cover-plate removed. Fig. 6 is a detail section on line 6—6 of Fig. 1. Fig. 7 is a detail section on line 7—7 of Fig. 5. Fig. 8 is a detail section on the line 8—8 of Fig. 5. Fig. 9 is an inner face view of the cover plate. Fig. 10 is a detail plan view of a slide which holds the movable part of the primary circuit breaker in position. Fig. 11 is a detail section of parts hereinafter described.

The machine frame comprises a base 1 upon which the horseshoe field magnets 2 are mounted. The opposite end portions of the frames 3 and 4 are secured to the base 1 and to the magnets by screws 5. The armature core 6 having the primary and secondary coils wound thereon is supported between two heads 7 and 8. The left-hand head 7 is provided with an outwardly projecting hub 9 within which the inner reduced end of a short shaft 10 is threaded. Near its outer end, the shaft 10 is provided with an enlarged journal 11 which engages a suitable bearing 12 formed upon a supplemental end portion or frame section 13 that is secured to the left-hand end piece of the machine frame by screws 14, (see Figs. 1 and 3). The right-hand head 8 is journaled in the right-hand frame piece preferably by means of a ball-bearing comprising a row of balls 15 and inner and outer collars 16 and 17 engaging the row of balls. The inner collar 16 is mounted upon an outwardly projecting annular flange or hub 18 on the head 8 and the outer collar 17 is mounted in a suitable seat 19 formed upon the inner face of the end frame piece 3. The armature is rotated from the shaft of the explosive engine by a drive gear mounted upon the outer end of the shaft 10 which projects through an opening 20 in the frame piece 13. The left-hand head 7 of the core extends through a circular opening 21 formed in the left-hand end section 4 of the frame and the annular flange or hub 18 of the head 8 projects through an opening 22 formed in the right-hand end portion 3.

The head 8 is provided at its periphery with a broad, inwardly projecting annular flange 23 which is engaged by a spring-held carbon brush 24. The brush is arranged within an insulating plug 25 set in a socket 26 formed in the base 1 and is connected to a binding post 27 on the base by a conductor 28 to thereby ground one end of each of the coils of the winding. The opposite end of the secondary coil is connected by a conductor 29 to the rotary contact 30 of the distributer and the opposite end of the primary coil is connected by a conductor 31 to a binding post 32 on a disk 33. This disk is secured to the inner face of the right-hand head 8 but is insulated therefrom by a separating layer 34 of suitable material, and the disk is connected to the primary circuit breaker.

The primary circuit breaker is mounted upon a disk 35 that is carried upon the hollow hub 18 of the head 8. The disk is pro-

vided with a central, inwardly projecting, conical boss 36 which fits into the outer end of the correspondingly shaped bore of the hub 18. A bolt 37 extends through a block 38 on the outer face of the disk 35, through the hollow boss 36 and hollow hub 18 and, at its inner end, is threaded into a central boss 39 on the disk 33 that projects within the inner end of the hollow hub 18. The block 38 is insulated from the disk 35 by a layer 40 of suitable material recessed into the outer face of the disk 35. The bolt connects the block 38 and disk 35 to the rotary armature of the machine in such a manner that they may be readily assembled or taken apart and also serves to electrically connect the disk 33 with the block 38. The block 38 is also preferably secured to the disk 35 by a screw 41 that is embedded in insulating material.

At one end the block 38 carries one of the contacts 42 of the primary circuit breaker. This contact is preferably removably threaded into the end of the block (see Fig. 8) and is provided with a rectangular flange 43 adapted to be engaged by a wrench or other suitable tool. The other contact 44 of the circuit breaker is adjustably threaded into one end of a rectangular frame 45. This frame sets over the block 38 and is arranged to slide diametrically across the face of the disk 35 between the two guide flanges 46 thereon. The movable member or slide 45 of the primary circuit breaker is removably held in place between the guides 46 by a U-shaped cover piece 47 which slidably engages guide grooves 48 in the outer edges of the flanges 46 and is held in position by a spring-clip 49 arranged in a recess 50 in one of the flanges 46 and adapted to engage a notch in one of the edges of the cover piece 47. The cover piece 47 is provided at one end with an out-turned rib 52 by which it may be readily moved into and out of position.

The contacts 42 and 45 of the primary circuit breaker are normally held in contact by a spring 53 secured at one end to a lug 54 on one of the guide flanges 46 and at its other end having a rounded projection 55 which engages the outer end of the contact screw 44. The opposite end of the slide 45 of the circuit breaker is rounded and is arranged to be engaged by a pair of lugs or abutments 56 to separate the contacts 42 and 44 and open the primary circuit as the armature of the machine is rotated. The lugs 56 are carried upon an adjusting or spark timing device in the form of a ring 57 which extends over and is supported by two segmental flanges 58 (see Figs. 1 and 6) upon the outer face of the end frame section 3. The lugs 56 are preferably in the form of short screw-bolts and are adjustably threaded through radial openings in enlarged portions 59 at diametrically opposite portions of the ring 57. The inner ends of the lugs project inwardly between the ends of the segmental flanges 58 into position to engage the rounded end of the slide 45 of the circuit breaker. The inner end faces of the lugs or screws 56 are preferably concave, as indicated by dotted lines in Fig. 6, and locking screws 60 extend through the portions 59 at right angles to and adjacent the periphery of the screws 56 to hold the latter in adjusted position. The ring 57, carrying the lugs 56, can be moved back and forth to a limited extent to advance and retard the spark in the engine cylinders and adjacent its outer edge the ring is provided with two projecting lugs 57' by which it may be connected to a manually operable device for advancing or retarding the spark.

The spark timing ring 57 is provided near its outer edge with an inwardly projecting rib or flange 61 (see Figs. 1 and 5) which abuts against the outer edges of the segmental flanges 58 and an insulating washer or ring 62 is seated within the outer end of the ring 57 and against the rib 61. A cover plate 63 has an inturned edge or flange 64 which engages a seat formed upon the insulating washer 62. A post 65 is mounted upon the end frame section 3 below the timing ring but is insulated from the frame, as shown in Fig. 1. A spring finger or clip 66, mounted upon the outer end of the post 65, is arranged to centrally engage the cover plate 63 and hold the cover plate and timing ring in position. By swinging the spring clip or finger 66 to one side (as shown in Fig. 5) the cover plate and parts of the timing device and primary circuit breaker are accessible and can be readily removed for adjustment, repairs, or the like.

A spiral spring clip 67 fixed to the inner face of the cover-plate 63 is provided with a carbon contact 68 which engages the end of the bolt 37. The timing ring 57 is provided with a contact finger 69 projecting therefrom on one side of the post 65 and removably held in position on the ring by a screw 70. At the end of the movement of the timing ring to retard the spark, the contact 69 engages the post 65 so that the primary coil of the magneto is grounded through the bolt 37, contact 68, spring 67, cover plate 63, spring finger 66, post 65 and contact finger 69 to the timing ring 57 and to the ground or frame of the machine. The operation of the magneto is thus arrested at the end of the movement of the timing device in retarding the spark.

The parts of the primary circuit breaker and timing device are readily accessible and may be easily removed for repairs or the like. At the same time they are inclosed for protection. The arrangement of the slide 45 of the circuit breaker is such that the

contact points 42 and 44 move together and apart in a right line or in radial direction. This obviates unequal abrasion or wear of the engaging faces of the contact points and renders the magneto less liable to get out of order. The contact points and the circuit breaking lugs 56 are readily adjustable to effect the proper operation of the circuit breaker.

In automobiles and the like it is not always possible to locate the magneto on the same side of the engine shaft so that with different machines it is often necessary to drive the armature of the magneto either in one or the other direction. The present improved magneto is provided with means whereby the parts may be adjusted for either right-hand or left-hand rotation. For this purpose the parts of the circuit breaker on the disk 35 may be adjusted into either one of two positions by removing the cover plate 63 and slackening the bolt 37. These parts are held in either of two positions by a lug 71 (see Fig. 11) upon the hub 36 which is arranged to engage either one of two notches 72 formed in the outer edge of the hub 18 on the armature head 8. The contact finger 69 must also be shifted from one to the other side of the post 65 in accordance with the direction of rotation. For this purpose, the ring 57 is provided with two openings 73 for the screw 70 which holds the finger 69 in position.

The rotary or ring contact 30 of the distributer for the secondary circuit is mounted between the flanges of a grooved wheel 74 formed of insulating material and at the bottom of the groove, as shown, the wheel 74 is mounted upon the shaft 10 within the casing section 13 and is provided with an eccentric, integral stem 75 which extends through an opening therefor formed in the head 7 and also formed in a gear 76 fixed to the outer face of the head 7. The stem 75 is hollow and the conductor 29 which connects the secondary coil to the contact 30 extends therethrough.

The left-hand end piece 4 of the frame extends upwardly and forms a gear casing 77 within which is arranged a gear 78 which meshes with the teeth of the gear 76 on the armature. The gear 78 is provided with a bearing hub or bushing 79 which is journaled within a suitable bearing 80 upon the rear face of the gear casing 77. An insulating brush holder 81 is removably mounted upon the face of the gear 78. This brush holder is provided at one end with an inwardly projecting stem 82 which extends within the hollow hub 79 of the gear 78. At its outer end the insulating brush holder is provided with an inwardly projecting lug 83 which is arranged to engage one of two sockets 83′ (see Figs. 2 and 4) in the face of the gear, in accordance with the direction of rotation of the armature. If the armature shaft is rotated in right-hand direction, when viewed from the left as in Fig. 2, the parts will be in the position shown in the drawing. If the shaft is rotated in left-hand direction, the brush holder 81, primary circuit breaker and contact finger 69 will be shifted to their other positions.

A carbon brush 84 is arranged within a metal-lined socket 85 in the outer face of the brush holder 81 and the outwardly projecting ends of the brush are arranged to engage a central contact 86 and a circular series of contact plates 87 upon the inner face of an insulating distributer block or plate 88; that is to say, the inner end of the brush 84 engages the central contact 86 and the outer end of the brush is arranged to successively engage the contact plates 87. Springs 89 are arranged within sockets in the adjacent faces of the brush 84 and the brush holder 81 and near the ends thereof to force the ends of the brush in engagement with the contact plates 86 and 87. The contact 86 is connected to a central metal piece 90 within the block 88 and this piece is electrically connected by a spring 91 to a carbon brush 92 arranged within a vertical metal-lined socket 93 in the distributer block and engaging the rotary distributer contact 30. The several contact plates 87 are electrically connected to a series of metal-lined plug openings 94 which are preferably vertically arranged in the periphery of the distributer block, as shown in Fig. 3. These sockets receive the plugs 95 of the conductors 96 which lead to the insulated terminals of the spark plugs of the several engine cylinders. The contact plates 87 are segmental, *i. e.*, elongated somewhat, so that they will properly operate when the magneto armature is driven either in right or in left hand direction.

At its lower end the distributer block 88 is provided with a flattened edge arranged to seat upon a flange 97 on the upper portion of the frame or casing section 13. At its lower, central portion, the block is provided with a depending part which extends through an opening in flange 97 into the groove of the insulating wheel 74. At its upper end the block 88 is provided with a bolt 99 embedded therein and which is arranged to extend between two pairs of lugs 100 upon the upper edge of the gear casing 77. A latch 101, pivoted between two of the lugs 100, is arranged to engage a notch in the side of the bolt 99, as shown in Fig. 1, and its free end is arranged to fit over a pin 102 (see Fig. 7) secured to the frame part 77 between the other pair of lugs 100. A spring finger 101′ on the latch 101 is arranged to engage a notch in the pin 100 and hold the latch against accidental disengagement. The distributer block and parts are securely held in position, but, by lifting the latch

101, the distributer block 88 can be readily removed, and then the brush 84 and brush holder 81 and the gear 78 can be removed and disengaged from one another.

A cup-shaped piece 103 fits over the end of the bearing 80. The end of this piece is provided with a series of sight openings 104 (see Figs. 1 and 5) which are covered by a transparent sheet of mica 105 that is held against the inner face of the end of the piece 103 by a central rivet 106. A conductor 107 extends through the stem 82 of the brush holder 81 and projects slightly beyond the inner end thereof in line with the rivet 106. At its inner end the conductor 107 is engaged by one of the springs 89 that also engages the brush 84, so that this conductor is connected to the secondary coil while the rivet 106 is grounded. The parts 107 and 106, therefore, form the terminals of the safety spark gap; that is to say, when the spark fails to pass between the terminals of the igniter of any cylinder it will then pass between the terminals 106 and 107 and avoid injury to any of the parts of the magneto. Moreover, by observing this spark through the sight openings 104 the operator is able to tell when the igniters of any of the cylinders are not working properly.

Below the bearing 80 the gear casing 77 is provided with a sight opening 108 having a sheet of mica 109 therein held in place by a screw ring 110. On its inner face the gear 78 is provided at one point with a numeral or indicating mark 111. When the parts are in the position shown in the drawings, this numeral will be in line with the sight opening 108, as shown in Fig. 5, and the magneto is in proper position to cause a spark in the igniter of the first cylinder of the engine. In coupling the magneto to the engine shaft, parts of the magneto are placed in the position shown in the drawings, which position can be readily attained by turning the armature shaft until the numeral or mark 111 is in line with the sight opening 108. The engine shaft is then turned until the piston in the first cylinder is at the upper end of its stroke. While the engine and magneto shafts are in these positions, the intermeshing drive gears are connected thereto. It should be noted that the distributer of the secondary circuit and the primary circuit breaker are at opposite ends of the machine and this arrangement reduces the number of parts and contacts and lessens the resistance of the machine. It, moreover, simplifies the construction of the parts and renders them more easily accessible.

The insulating distributer plate 88 is held snugly in position against the edge of the gear casing 77 so as to close the open side thereof. The distributer plate also closes the opening in the upper portion of the frame or casing section 13. By this arrangement the parts of the distributer are entirely closed and protected, but access is readily afforded thereto by releasing the latch 101 and removing the distributer plate from position. The other parts of the distributer may then be readily disassembled for repairs or the like. It should also be noted that the parts of the circuit breaker and timing device are inclosed and removably held in position by the cover plate 63 and the spring arm 66 in such a manner that ready access is afforded thereto. To prevent the accidental disengagement of the finger from the cover, the latter is provided with an indented or socket portion at its end which engages a projection at the center of the cover plate.

The bearing at the opposite ends of the armature and the bearing of the gear 78 are provided with oil openings 112 that are normally closed by spring-held check valves 113. A cover-plate 114 extends over the armature between the opposite edges of the magnets 2 and rests upon the ledges formed upon the end frame sections 3 and 4. Its inner edge extends beneath a pair of lugs 115 on the inner face of the gear casing 77. At its outer end it is provided with a handle 116 and a spring finger 117 which engages a notched shoulder 118 upon the upper end of the frame section 3 to releasably hold the cover plate in position.

It is obvious that many of the details of construction set forth can be varied without departure from the essentials of the invention as defined in the claims.

I claim as my invention:—

1. In a magneto, the combination with the armature shaft and insulated contact ring thereon, of an insulating distributer plate removably mounted on the magneto frame, and having a central contact and a circular series of contacts in its side face, a brush arranged in a socket in said plate, electrically connected to said central contact thereof and engaging said contact ring, and a rotating brush driven from said shaft for successively connecting said central contact to the contacts of said circular series, substantially as described.

2. In a magneto, the combination with the armature shaft and insulated ring contact thereon, of an insulating distributer plate mounted on the magneto frame and having a central contact and a circular series of contacts on its side face and a series of socket plugs in its periphery connected to the contacts of said circular series, a spring-held brush arranged in a socket in said plate, connected to the central contact thereof and engaging said contact ring, a rotary, spring-held brush for successively connecting said central contact to the contacts of said circular series, an insulating holder for said brush, a gear journaled on the ma-

chine frame whereon said brush-holder is mounted, and a drive pinion for said gear on said shaft, substantially as described.

3. In a magneto, the combination with the frame and an armature shaft journaled therein, said frame having a casing at one end thereof open at its upper outer portion, of an insulated contact ring on said shaft and within the lower portion of said end casing, an insulating distributer plate removably secured to said end casing and closing the open portion thereof, said plate having a central contact and a circular series of contacts on its inner face, a spring-held brush mounted in a socket in said plate, electrically connected to the central contact thereof and projecting from the lower portion thereof into engagement with said ring contact, a gear journaled in the upper portion of said end casing, a pinion on said shaft meshing with said gear, a brush-holder removably mounted on the outer face of said gear, and a spring-held brush in said holder and arranged to engage said central contact and successively engage the contacts of said circular series upon the inner face of said distributer plate, substantially as described.

4. In a magneto, the combination with the armature shaft and insulated ring contact thereon, of a distributer plate having a brush engaging said ring contact and having a central contact and a circular series of contacts on its face, an insulating, rotary brush-holder driven from said shaft, a brush carried by said holder for successively connecting said central contact with the contacts of said circular series, and safety-gap terminals, one of which is axially mounted on said insulated, rotary brush-holder and electrically connected to the brush therein, substantially as described.

5. In a magneto, the combination with the armature shaft and insulated ring contact thereon, of a distributer plate having a brush engaging said ring contact and having a central contact and a circular series of contacts on its face, a gear driven from said shaft, an insulating brush-holder mounted on said gear, a brush in said holder for successively connecting said central contact and the contacts of said circular series, a casing wherein said gear is journaled, a cup extending over the bearing of said gear, and safety-gap terminals one of which is axially mounted on said insulating brush-holder and electrically connected to the brush therein and the other on said cup, said cup having sight openings therein, substantially as described.

6. In a magneto, the combination with the armature shaft and ring contact thereon, of a distributer plate having a brush engaging said contact and having a central contact and a circular series of contacts on its face, a gear driven from said shaft, an insulating brush-holder thereon, and a brush carried by said holder for successively connecting said central contact with the contacts of said circular series, said gear having seats for supporting said brush-holder in either of two positions in accordance with the direction of rotation of said shaft, substantially as described.

7. In a magneto, the combination with the armature, of a primary circuit breaker, a support for said circuit breaker, and means for securing said support to said armature in either of two positions in accordance with the direction of rotation of said armature, substantially as described.

8. In a magneto, the combination with an armature, of a distributing brush and a primary circuit-breaker connected to rotate with said armature, and means for adjusting said brush and said circuit-breaker relatively to said armature to either one of two positions in accordance with the direction of rotation of said armature, substantially as described.

9. In a magneto, the combination with an armature having primary and secondary windings, of a frame wherein said armature is journaled, a supporting member connected to one end of said armature to rotate therewith, an oscillating timing member concentric with and adjacent said supporting member, a circuit breaker mounted on one of said members, the other of said members having lugs for operating said circuit breaker, said circuit breaker being interposed in a short circuit of said primary winding and comprising relatively fixed and movable contacts normally spring-held in engagement, a short-circuiting contact connected to and shiftable with said timing member, and a fixed contact mounted on the frame and arranged to be engaged by said short-circuiting contact at the end of the movement of said timing member, one of said latter contacts being insulated and electrically connected to said primary winding, substantially as described.

10. In a magneto, the combination with an armature having primary and secondary windings, of a frame wherein said armature is journaled, a primary circuit breaker mounted on one end of said armature, an oscillating timing ring mounted on the adjacent end of said frame and extending about said circuit breaker, a cap plate closing the open end of said ring to thereby inclose said circuit breaker, said ring being concentric with said armature and having inwardly projecting lugs thereon for operating said circuit breaker, a short-circuiting contact connected to said ring, a coöperating fixed contact arranged to be engaged by said short-circuiting contact at the movement of said rings in one direction, one of said contacts being insulated and electrically con-

nected to the primary winding of said armature, substantially as described.

11. In a magneto, the combination with an armature, of a frame wherein said armature is journaled, a primary circuit-breaker secured to the end of said armature, a timing ring rotatably mounted on one end of said frame and extending about said circuit-breaker, said ring having lugs for operating said circuit-breaker, an insulated post on the frame electrically connected to the primary coil of the armature and a short circuiting contact on said ring arranged to engage said post, substantially as described.

12. In a magneto, the combination with an armature, of a frame wherein said armature is journaled, a primary circuit-breaker secured to the end of said armature, a timing ring rotatably mounted on one end of said frame and extending about said circuit-breaker, said ring having lugs for operating said circuit-breaker, an insulated cover plate on said ring extending over said circuit-breaker, engaging axial contacts on said circuit-breaker and on the inner face of said cover plate, an insulated post on the frame, a spring arm on said post for holding said cover plate and ring in position, and a short circuiting contact on said ring arranged to engage said post, substantially as described.

13. In a magneto, the combination with a rotating armature having primary and secondary windings, of a frame whereon said armature is journaled, a circuit breaker interposed in a short circuit of the primary winding thereof and mounted upon said armature to rotate therewith, said circuit breaker comprising relatively fixed and movable contacts normally spring-held in engagement, a timing ring concentric with said armature and mounted to oscillate on one end of said frame, said timing ring extending about said circuit breaker and having radial openings extending therethrough and lugs adjustably threaded through said radial openings and arranged to intermittently engage and operate the movable member of said circuit breaker, said lugs being adjustable in said radial openings to and from the axis of said armature, substantially as described.

14. In a magneto, the combination with the armature, of a casing at one end thereof, an insulated contact ring rotating with said armature, a distributing plate having a brush for engaging said contact ring, a central contact electrically connected to said brush and a circular series of contacts, a brush for connecting said central and said circular series of contacts, drive gearing for said brush, and an inclosing casing for said gearing having a sight opening therein, said gearing having an index arranged to register with said sight opening, substantially as described.

15. In a magneto, the combination with an armature, of a frame wherein said armature is journaled, a primary circuit-breaker comprising an insulated and a shiftable contact connected to one end of said armature, normally fixed lugs for operating said movable contact, an insulated ring contact upon the opposite end of said armature, an insulating distributer plate having a brush engaging said ring contact and provided on its face with a circular series of contacts and a central contact electrically connected to said brush, a brush-holder driven from said shaft, and a brush therein for successively connecting said central contact with the contacts of said circular series, substantially as described.

16. In a magneto, the combination of the frame and armature shaft journaled therein, said frame having a casing at one end open at its upper outer portion, an insulated contact ring on said shaft and arranged within the lower portion of said end casing, an insulating distributer plate removably secured to said end casing and closing the open portion thereof, said plate having a central contact on its inner face and a circular series of contacts about said central contact, a spring-held brush mounted in the socket in said plate, electrically connected with the central contact thereof and projecting from its lower portion into engagement with said ring contact, a gear journaled in the upper portion of said end casing, a pinion on said shaft meshing with said gear, an insulating brush holder mounted on the outer face of said gear and a brush mounted on said holder and arranged to engage said central contact and to successively engage the contacts of said circular series, substantially as described.

17. In a magneto, the combination of a frame, an armature shaft journaled therein, a casing at one end thereof open at its upper outer portion, an insulating distributer plate removably secured to said end casing and closing the open portion thereof, said plate having a central contact and a circular series of contacts on its inner face, a gear journaled in the upper portion of said end casing, a pinion on said armature shaft meshing with said gear, an insulating brush-holder removably mounted in seats on the outer side of said gear, a brush removably arranged in a seat in said holder and arranged to engage said central contact and to successively engage the contacts of said circular series upon the inner face of said distributer plate and springs interposed between said brush and said brush-holder for pressing the opposite ends of the brush into engagement with said central contact and

said circular series of contacts respectively, substantially as described.

18. In a magneto, the combination with an armature shaft, of a distributer plate having a circular series of contacts, an insulating rotary brush-holder driven from said shaft, a brush carried by said holder for successively engaging said contacts, and safety-gap terminals, one of which is axially mounted on said rotary brush-holder and electrically connected to the brush therein, substantially as described.

FRIEDRICH BAIER.

Witnesses:
KATHARINE GERLACH,
OTTILIE C. FREIBERG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."