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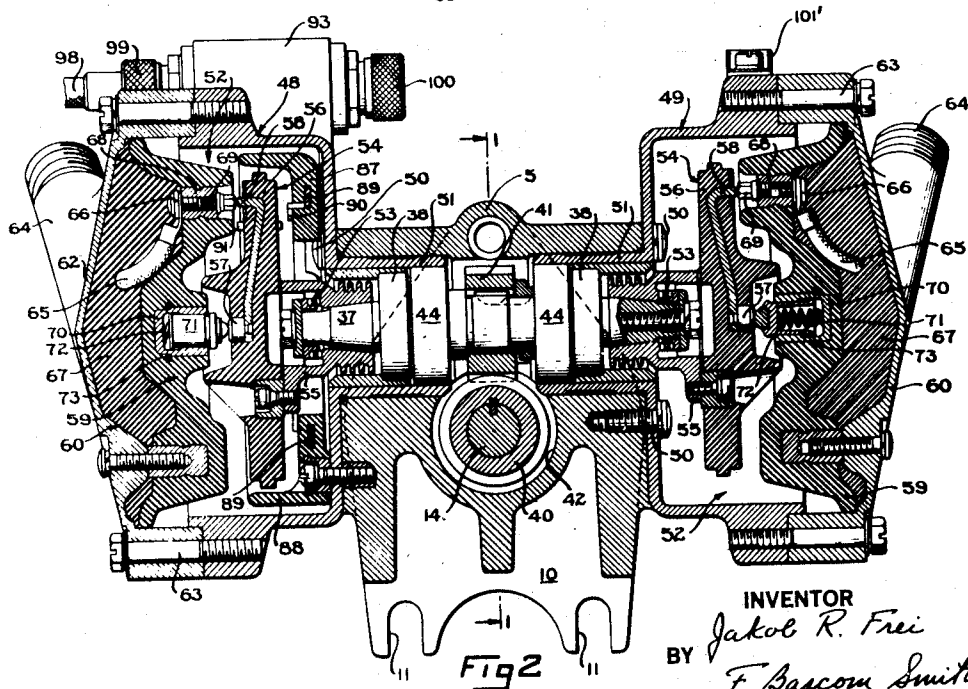
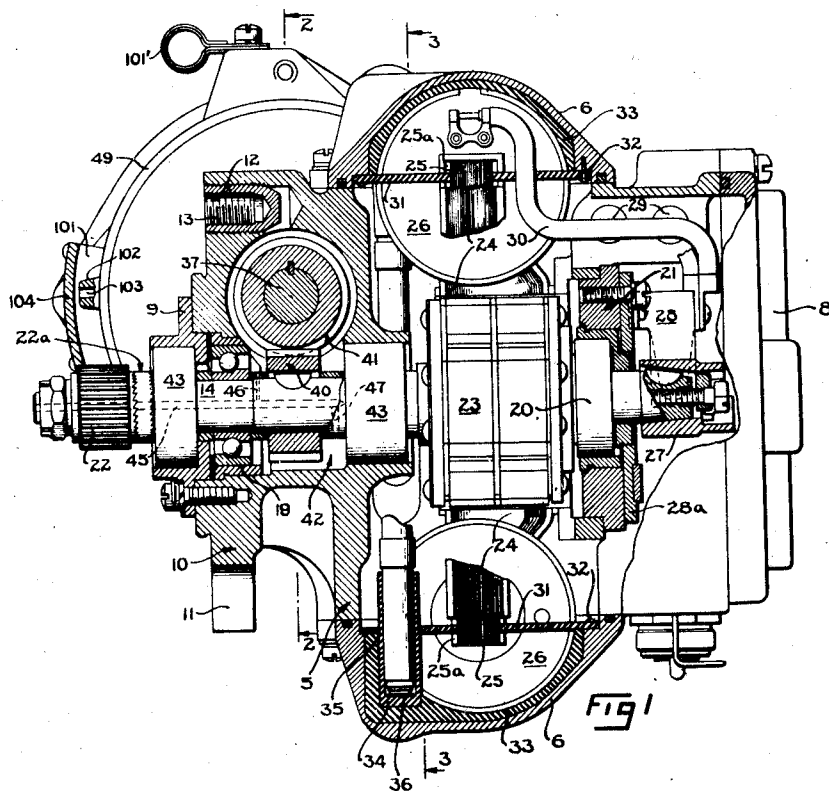
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MAGNETO

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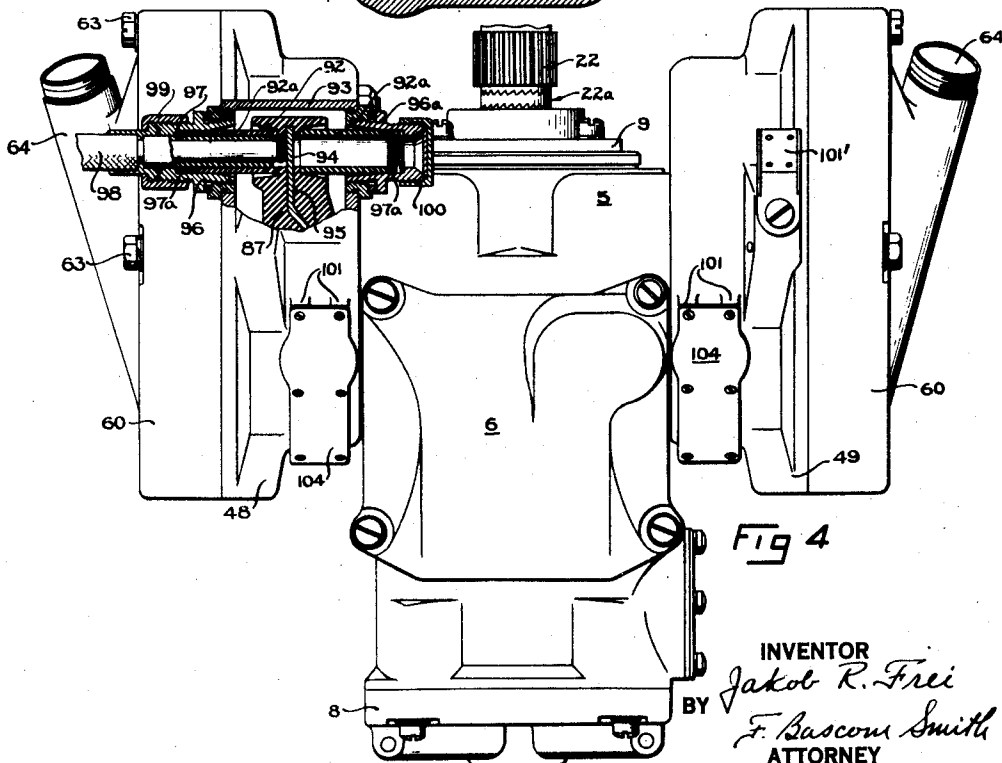
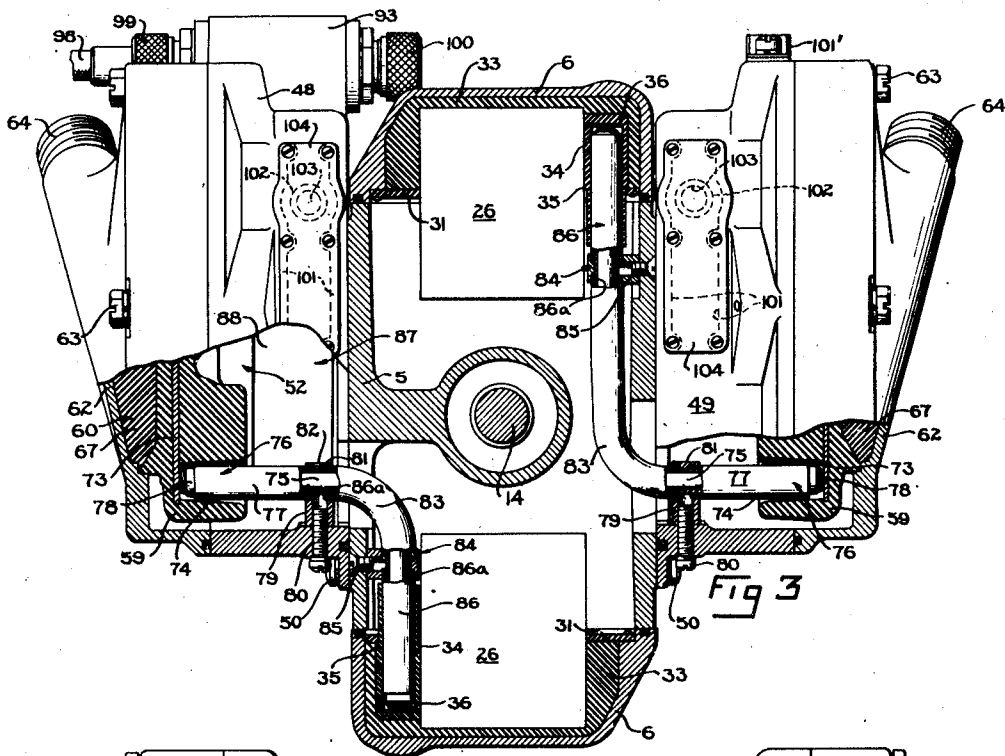
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MAGNETO

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This invention relates to ignition apparatus and more particularly to current-generating and distributing means adapted for use in connection with internal combustion engines.

One of the objects of the present invention is to provide a novel magneto-generator adapted for use in the ignition system of an internal combustion engine.

Another object of the invention is to provide novel means for connecting a source of booster current in the distributor circuit of an ignition system.

A further object is to provide novel current-generating means for energizing the dual ignition system of a bank of cylinders of an internal combustion engine.

Still another object is to provide a magneto having a novelly mounted ignition coil and novel means for effecting the connections between said coil and a distributor.

A still further object is to provide a magneto for energizing a dual ignition system, said magneto comprising novel means for mounting and driving a pair of distributors.

Another object is to provide a magneto wherein the parts are novelly constructed and assembled so that inspection and adjustment thereof are greatly facilitated and so that the length as well as the number of electrical leads within the magneto casing are materially reduced.

Still another object is to provide a magneto equipped with novel means for housing the motion-transmitting means, for example, between the rotor and distributor.

Another object is to provide a magneto embodying novel ventilating means for the interior thereof.

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 to define the limits of the invention, reference for this latter purpose being primarily had to the appended claims.

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

Fig. 1 is a side elevation, mostly in section and with parts broken away, illustrating one form of magneto embodying the present invention, the section being taken substantially along line 1-1 of Fig. 2;

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Fig. 2 is a sectional view of said magneto taken substantially along line 2-2 of Fig. 1;

Fig. 3 is an end elevation, mostly in section and with parts broken away, the section being taken substantially along line 3-3 of Fig. 1; and

Fig. 4 is a top plan view, with parts broken away, and shown in section to illustrate a form of booster connection embodied in the present invention.

The single embodiment of the invention illustrated in the accompanying drawings, by way of example only, is a magneto adapted for energizing the dual ignition system of a bank of cylinders of an internal combustion engine. As shown, the same comprises a main housing or casing 5 having secured thereto similarly shaped top and bottom cover plates 6 and an end cover plate 8. Attached to the end of said housing opposite cover plate 8 is a plate 9 which constitutes a support for the magneto rotor. Means are also provided at this end for securing the magneto to the engine casing (not shown), said means comprising a depending flange 10 having slots 11 therein for engaging suitable supports on said engine casing and a threaded bore 12 for receiving a screw or stud bolt extending through a portion of the engine casing. Bore 12 is preferably provided in a separate hardened member 13 threaded or otherwise secured to housing 5. Mounted in the central part of housing 5 with the axis thereof extending horizontally is a rotor shaft 14 suitably journaled in bearings 19 and 20. Bearing 19, as shown, is supported in the end wall of housing 5 adjacent plate 9, while bearing 20 is mounted in a plate member 21 which is supported within said housing.

One end of shaft 14 extends through plate 9 and suitable means 22 are mounted on said end whereby said shaft may be coupled to the engine driving member (not shown) in the engine casing. Member 22 is preferably adjustably connected to the rotor shaft, such as by means of adjustable coupling means 22a of the type disclosed in Spengler U. S. Patent No. 2,266,283. Mounted on shaft 14 between bearings 19 and 20 is a multiple pole magnetic rotor 23 comprising a cylindrical circumferentially magnetized permanent magnet and laminated soft iron pole shoes adapted to cooperate in a manner well-known in the art with two pairs of laminated stator pole pieces 24, each pair of said pole pieces extending in diametrically opposite directions from said rotor to connect with one of the cores 25 of two ignition coils 26, which are mounted in housing 5 on opposite sides of said rotor in a novel manner

more fully described hereafter. Mounted on the right end of shaft 14, as viewed in Fig. 1, is a circuit breaker cam 27 adapted to actuate two circuit breaker units 28, only one being shown in Fig. 1, said units being disposed on opposite sides of said cam and comprising the usual contacts which are adapted to be periodically opened by the rotation of said cam. The circuit breakers may be of any suitable, well-known construction and, hence, are not shown in detail. For the purpose of adjustment, the circuit breakers may be adjustably mounted on a plate 28a which may in turn be mounted for angular adjustment on plate 21. A pair of condensers 29 are operatively mounted in housing 5 above circuit breaker units 28 and are connected across the circuit breaker points in the two current-generating systems energized by rotor 14, each of said systems comprising a pair of stator poles 24, one of coils 26 and one of circuit breaker units 28. Since the corresponding parts of the two current-generating systems are alike and similarly mounted, only one is described in detail and like numerals are applied to like parts of the two systems.

Coil 26, which includes the usual primary and secondary windings mounted in a casing of insulating material, has one end of each of said windings grounded and the ungrounded end of the primary winding connected by a cable 30 to the insulated contact of circuit breaker 28 and to the insulated or ungrounded terminal of condenser 29 in a manner well-known in the art, whereby the contacts of the circuit breaker are connected in series with the primary winding and in shunt with the condenser. Novel means are provided for mounting coil 26 to insure a good connection between the ends of core 25 and the ends of stator poles 24 and to render said coil readily removable for inspection. As shown, a plate 31 of pressed fiber or other suitable material encompasses said coil in a plane substantially parallel to the axis of the coil, said plate having overlapping engagement with laminae 25a at opposite sides of core 25. Plate 31 has the edges thereof engaging an under-cut portion of the inner face of cover plate 6 and is rigidly secured to said cover plate by suitable means, such as rivets or screws 32. The ends of core 25 are set in suitable recesses (not shown) formed in cover 6 so that the coil 26 is supported and held in spaced relation to the walls of said cover. The space around the coil is preferably filled with a suitable insulating compound 33, such as a polymer of cashew-nut-shell-oil. The outer surfaces of the ends of core 25 are machined in the same plane as the edge of the open face of cover plate 6 so that when the latter is secured to housing 5, the ends of core 25 engage the ends of stator poles 24, thereby making a good contact and completing the magnetic path through the rotor.

Connected to the ungrounded end of the second winding of coil 26 is a novel terminal comprising a socket 34, which is preferably formed separately from the coil housing and which opens in the direction of the interior of housing 5. To securely position said socket in cover plate 6, an external shoulder 35 is preferably formed thereon for engagement with plate 31. Mounted at the bottom of said socket to connect with the output end of the secondary or high tension winding of the coil is a metallic contact 36.

Extending transversely through housing 5 is a distributor shaft 37 (Figs 1 and 2) journaled in a pair of bearings 38 and drivably connected to

rotor shaft 14 by suitable drive means comprising a pair of intermeshing helical gears 40 and 41 keyed or otherwise secured to shafts 14 and 37, respectively. It is to be understood that shaft 37, which is shown mounted above shaft 14 to extend on both sides of the latter, could be formed in two sections for rotation about an axis which intersects with the axis of said rotor shaft, said sections being disposed on opposite sides of the latter shaft and being connected therewith, for example, by bevel gear drives.

To maintain gears 40 and 41 properly lubricated and to prevent leakage of the lubricating oil, a transmission chamber 42 is formed in housing 5 for containing said gears, and suitable oil seals 43 (Fig. 1) are mounted on shaft 14 on opposite sides of gear 40 while oil seals 44 (Fig. 2) are mounted on shaft 37 on opposite sides of gear 41, thereby preventing oil from escaping from chamber 42 along either of said shafts. Chamber 42 is normally filled with lubricating oil to a level below the axis of rotation of shaft 14 and novel means are provided for preventing the building up of pressures in excess of atmospheric within said chamber. As shown, said means comprise an axial passage 45 extending substantially centrally through shaft 14 and communicating at one end with the exterior of the magneto housing. Connecting passage 45 with the interior of chamber 42 are a pair of radial passages 46 and 47 which are preferably axially spaced and extend in diametrically opposite directions from passage 45. Accordingly, when shaft 14 is stationary, one of passages 46 and 47 has the outer end thereof immersed in the lubricating oil while the other has the outer end thereof communicating with the air space in chamber 42 above said oil and, therefore, connects said space to the atmosphere on the exterior of the magneto housing, thereby maintaining the pressure in said chamber equal to the atmospheric pressure surrounding the magneto. During operation, when shaft 14 is rotating, oil is prevented from escaping through passages 46 and 47 into passage 45 because of the effect of centrifugal action on oil which tends to enter the radial passages. If desired, the passages 45-47 may be incorporated in shaft 37, so that more oil may be retained in chamber 42 when the magneto sets in the position illustrated in the drawings.

A pair of housings 48 and 49 (Fig. 2) containing the distributors are secured to main casing 5 by suitable means, such as screws 50, on opposite sides of said casing so as to receive the ends of shaft 37, each housing having a sleeve-like pilot portion 51 extending into an opening in casing 5. Current distributor mechanisms 52 mounted in said housings are preferably of like construction and are similarly connected to opposite ends of shaft 37 and to the above-described dual current-generating systems, and accordingly only one of said mechanisms is hereafter described in detail.

Mounted on the end of shaft 37 and drivably connected thereto by means of an adjustable coupling 53 similar to coupling 22a is a rotatable distributor element or finger 54 comprising a mounting plate or hub 55 to which is secured an insulating block 56. Molded in the latter on the axis of rotation thereof is a center contact 57 which is electrically connected to a conductor 58 also molded in said insulating block. Cooperating with said rotatable element is a stationary distributor block 59 carried by a supporting member 60 which also serves as the cover plate for the distributor housing and forms one

end of a radio-shielding harness manifold. Member 60 preferably comprises a plate 62 secured by suitable means, such as screw 63 to the housing 48, and an outlet sleeve 64 integrally formed with said plate to constitute a portion of the manifold for leads 65, each of said leads being connected at one end to one of the distributor contacts 66 and at the other end to one of the spark plugs of the engine ignition system. A mass 67 of suitable insulating material, such as polymerized cashew-nut-shell-oil, fills the interior of cover 60 between the latter and block 59 as well as the interior of sleeve 64, said compound being preferably introduced in liquid form after leads 65 (one for each terminal 66) have been connected to contacts 66 and said block has been secured to said cover.

Distributor block 59 may be constructed in any conventional manner but is preferably molded with internally threaded metallic tubes 68 circularly arranged therein, said tubes being adapted to threadedly receive contacts 66 and terminal pins 69, the latter cooperating with contact 58 of the rotatable element 54 in a manner well-known in the art. Molded in block 59 at the center thereof is a metallic sleeve 70 having a contact pin 71 mounted therein for limited reciprocable movement and a spring member 72 located between the inner end of said contact pin and the bottom of said sleeve for biasing said contact into sliding engagement with central contact 57 of block 56. A metallic strip 73 (Fig. 3) of suitable conducting material is also embedded in block 59 and has one end thereof electrically connected to sleeve 70 (Fig. 2) while the other end thereof forms the base of a socket 74 (Fig. 3) formed in said block near the periphery thereof.

Novel means are provided for electrically connecting conductor 73 to the ungrounded end of the secondary winding of coil 26, said means insuring good contact, preventing flashovers and permitting the ready removal from main housing 5 of the ignition coil unit and member 60 with block 59. As shown, said means (Fig. 3) comprises an insulated conductor or cable 75 having one end thereof extending into a connector plug 76, which preferably includes an insulating sleeve 77, said sleeve being adapted to receive said conductor and means electrically connected to the end of the latter and to a flat contact spring 78. A bracket 79 rigidly secured to the distributor housing, for example, by a screw 80 has an annular portion 81 through which conductor 75 passes, said annular portion being provided with an internal flange 82. Sleeve 77 abuts against one face of said flange and is supported in a substantially horizontal position by said bracket in alignment with socket 74. Accordingly, when cover member 60 is operatively secured to the magneto housing, contact spring 78 engages contact 73 at the base of socket 74 and thereby connects one end of cable 75 to the center contact 71 of block 59. Mounted in the annular portion 81 of bracket 79 opposite sleeve 77 for engagement with the other annular face of flange 82 is one end of a metallic elbow 83, which is supported at its other end in a bracket 84 secured by a screw 85 to main housing 5, the latter bracket being similar to bracket 79 and having the annular portion thereof substantially aligned with socket 34. Cable 75 extends through elbow 83 and brackets 79 and 84 and is secured in a connector plug 86, which is similar in structure and operation to connector plug 76, the former connector being held by bracket

84 so as to extend into socket 34 and connect the end of said cable to contact 36 at the base of said socket.

The internal diameters of the insulating sleeves of plugs 76 and 86 and elbow 83 are preferably greater than the external diameter of cable 75, and the annular space surrounding said cable as a result thereof is filled with a mass 86a of suitable insulating compound, such as polymerized cashew-nut-shell-oil. This is preferably accomplished by assembling brackets 79 and 84, plugs 76 and 86, elbow 83 and cable 75 in operative relation to each other and then, through the threaded recesses in said brackets, forcing the insulating compound, under pressure and in liquid form, into the assembled structure. When the compound hardens, the assembly becomes bonded into a unitary structure, which is secured as a unit in the magneto housing by screws 80 and 85. It is to be noted that this unit automatically makes contact between coil 26 and distributor 52 when cover plates 6 and 62 are operatively positioned on the magneto housing and that said cover plates may be removed without the necessity of making any electrical disconnections except cable 30.

A source of booster current is connected in one of the two ignition systems of the above-described dual ignition magneto unit and novel means are provided for carrying out the connection, said means, as shown, being mounted for cooperation with the current-distributing mechanism contained in housing 48. An annular block 87 of insulating material, such as Bakelite or hard rubber, surrounds hub portion 55 of rotatable distributor element 54 and is rigidly secured to the inner face of housing 48, being located between said housing and finger 56. Block 87 is preferably cup-shaped with an annular flange 88 disposed between the periphery of finger 56 and the side wall of housing 48. Molded in block 87 is a metallic ring 89, which has a plurality of contact extensions 90 thereon, said extensions projecting from said block on the side thereof facing block 56 and each of said extensions being located opposite one of contacts 69. If desired, of course, the projecting portions 90 may form a continuous ring or be divided into any desired number of arcs, preferably having a radius equal to the distance of terminal 58 from the axis of rotation of finger 54.

Booster current is fed from contact members 90 to contacts 69 through a suitable conducting element 91 carried by block 56, said element extending axially through said block to project beyond both sides thereof. Element 91 is preferably mounted in advance of terminal 58 and is located the same radial distance from the axis of rotation of block 56 as said terminal so as to move in the same circular path as the latter. Accordingly, whenever element 91 is disposed between one of extensions 90 and one of contacts 69, booster current is fed through the distributor block to one of the spark plugs.

To connect a source of booster current to ring 89, novel means are provided and comprise a socket 92 (Fig. 4) molded as an integral part of block 87, said socket being located within a portion 93 of housing 48 projecting beyond the circular periphery of said housing. A metallic insert 94 molded in said block at the base of said socket is internally connected by a conducting strip 95 to ring 89, said strip, in the form shown, being integral with said insert. Socket 92 is in axial alignment with a pair of openings

in the sides of housing portion 93 and with threaded bushings 96 and 96a which define said openings. A plug connector 97, which constitutes an extension of a shielded cable 98 and may be of any suitable, well-known construction, slidably extends through left-hand bushing 96, as viewed in Fig. 4, into one end of socket 92 for contact with insert 94, said connector being held in position by a nut 99 threaded onto bushing 96 exteriorally of housing portion 93. Cable 98 is connected to a suitable source of high tension current, as for example a booster coil (not shown). The socket for plug 97 comprises, in addition to the recess 92 in block 87, an insulating tube 92a which extends from bushing 96 into said recess and is held in contact with block 87 by a spring 97a.

Bushing 96a, as shown, has a cap 100 threaded thereon although when two or more of the above-described magnetos are being used on a single engine, it may be desirable to connect the booster circuits thereof in parallel and to a single source of booster current, in which event a cable connector may also be plugged in through bushing 96a for contact with insert 94 at the base of the right-hand socket 92, 92a. The cable from said connector may then be supported by a bracket 100' on the upper end of housing 49, said cable extending therefrom to the booster socket of the next magneto to connect therewith in a manner similar to cable 98.

For the purpose of ventilating the distributor housings 48 and 49 and, hence, casing 5, novel simplified means are provided whereby water and other foreign matter are effectively prevented from entering with the air stream irrespective of the position of the magneto. As shown, each of said ventilating means comprises a pair of spaced, parallel walls 101 (Figs. 1, 3 and 4) which stand out from and are preferably integral with the wall of the distributor housing. Between and spaced from slightly bulged portions of said walls is a projecting boss 102 through the center of which a passage 103 is bored to the interior of the casing. A thin plate 104 is secured to the top edges of walls, such as by screws, and the outer end of said boss is slightly spaced therefrom, as best seen in Fig. 1. Thus, air may enter from either end of the enclosure 101, 104 and pass into the magneto casing through passage 103, the water and other particles being stopped by the boss 102.

There is thus provided novel apparatus adapted for use in the ignition system of an internal combustion engine for generating and distributing high tension current to the engine spark plugs. Novel means are provided in said apparatus for mounting the ignition coils and for electrically connecting the same to the distributor. Additionally, means are novelly combined with the distributor for supplying a booster current to the engine spark plugs when the generating means is ineffective. The magneto-distributor unit provided also incorporates a novel connection and means for lubricating the same between the magneto rotor and the distributor fingers. The unit also embodies novel ventilating means whereby effective ventilation is obtained without the entrance of foreign matter with the air.

Although only a single embodiment of the invention is illustrated and described in detail, it is to be expressly understood that the invention is not limited thereto. For example, the inventions may be embodied in a structure having a different type of rotor or breaker mech-

anisms and various changes may be readily made in the design and arrangement of parts illustrated without departing from the spirit and scope of the invention as the same will now be understood by 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. In apparatus of the class described, a casing, a magnetic rotor rotatably mounted in said casing, means at one end of the rotor shaft for operatively connecting the rotor to the drive member of an engine, cam means on the other end of said shaft, a pair of circuit breakers mounted in said casing for operation by said cam, a pair of ignition coils mounted in metallic covers removably secured to said casing on opposite sides of said rotor, means connecting the primary windings of said coils in circuit with said circuit breakers, stator means magnetically connecting the cores of said coils with said rotor, a pair of ignition distributors disposed on opposite sides of the rotor shaft at substantially right angles to the sides on which said coils are disposed, each of said distributors comprising a rotatable distributor finger and a stationary distributor block having a central terminal and a plurality of circularly arranged terminals embedded therein for cooperation with said finger, means drivably connecting said distributor fingers to said rotor shaft whereby said fingers are rotated about an axis extending at right angles to the axis of rotation of said shaft, said blocks being secured in metallic covers removably mounted on said casing, each of said blocks having a socket therein and an electrical conductor connected to the central terminal thereof and terminating in said socket, a socket associated with each of said coils in which the secondary winding of the coil terminates, and conducting means secured in said casing and having plug portions slidably extending into said sockets for operatively connecting the secondary windings of each of said coils to the conductor in one of said blocks.

2. In ignition apparatus of the class described, a casing, a magnetic rotor rotatably mounted in said casing, means at one end of the shaft of said rotor for drivably connecting the same to a source of power, a pair of ignition coils mounted in said casing, one of said coils being mounted above said rotor and the other below said rotor, means including said rotor for energizing said coils to produce high tension current in the secondary windings thereof, an ignition distributor connected to the secondary winding of each of said coils, said distributors being disposed on opposite sides of said rotor, and means for drivably connecting the rotatable parts of said distributors to said rotor shaft at a point between said rotor and said one end of said rotor shaft whereby said rotatable parts are rotated about an axis extending at right angles to the axis of rotation of said rotor shaft.

3. In ignition apparatus of the class described, a casing, a rotor rotatably mounted in said casing, means at one end of the rotor shaft for operatively connecting the same to the drive member of an engine, circuit breaker means including a cam on said rotor shaft mounted in said casing at the other end of said shaft, a pair of ignition coils mounted in said casing, one of said coils being above and the other below said rotor, means including said rotor for energizing said coils to produce a high tension current in the secondary windings thereof, a distributor con-

nected to the secondary winding of each of said coils, said distributors being mounted on opposite sides of said rotor, and means operatively connected with said rotor shaft intermediate the ends thereof for rotating a part of each of said distributors about an axis extending at right angles to the axis of rotation of said rotor.

4. In ignition apparatus of the class described, a casing, a magnetic rotor rotatably mounted in said casing, an ignition coil comprising primary and secondary windings operatively associated with said rotor, an insulating socket in which said secondary winding terminates, a metallic cover removably mounted over an opening in said casing, means for securing said coil and socket in said cover for removal therewith, a distributor comprising an insulating distributor block having a socket therein and a conductor terminating in said socket, a second metallic cover, means for removably securing the latter over an opening in said casing, means for securing said block in said second cover for removal therewith, and conducting means secured in said casing independently of said covers and having insulating plug portions at opposite ends thereof adapted to slidably extend into said sockets for conducting high tension current from said secondary winding to said distributor conductor, both of said covers being removable without disturbing said conducting means.

5. In ignition apparatus of the class described, a casing, a magnetic rotor mounted in said casing, an ignition distributor comprising a distributor block removably mounted in said casing, said block having a socket formed therein and an electrical conductor terminating in said socket, an ignition coil removably mounted in said casing and operatively associated with said rotor, a socket adjacent said coil and removable therewith, the secondary winding of said coil terminating in said last-named socket and the longitudinal axes of said sockets extending at right angles to each other, and a double-ended plug connector adapted to slide into and out of said sockets when said plug connector and ignition coil are installed or removed, whereby said secondary winding and said conductor are electrically connected.

6. In ignition apparatus of the class described, a casing, a magnetic rotor mounted in said casing, an ignition coil mounted in a cover which is removably secured to said casing, means including said rotor for energizing said coil, a socket secured in said cover adjacent said coil, the secondary winding of said coil terminating in the base of said socket, an ignition distributor comprising an insulating socket mounted in a cover removably secured to said casing, and a double-ended plug connector mounted in said casing so that the ends thereof slidably extend into said sockets when said covers are being installed in position on the casing, whereby said coil and distributor are electrically connected.

7. In a magneto for the ignition system of an internal combustion engine, a casing having an opening therein, a magnetic rotor in said casing, a metallic cover for said opening removably secured to said casing, a pair of stator poles in said casing operatively associated with said rotor, and an ignition coil mounted in said cover for removal therewith, the core of said coil having portions extending from opposite ends of said coil for abutting engagement with the ends of said stator poles, the engaging surfaces of said core and poles

being in the same plane as the engaging surfaces of said cover and casing.

8. In a magneto, a casing having an opening therein, a cover for said opening removably secured to said casing, an ignition coil having primary and secondary windings secured in said cover and removable therewith, a socket for a plug connector mounted in said cover adjacent said coil with the end of said secondary winding terminating therein, and means in said casing for energizing said coil to induce a high tension current in said secondary winding.

9. In a magneto, a casing having an opening therein, a cover for said opening removably secured to said casing, an ignition coil mounted in said cover for removal therewith, a socket for a plug connector mounted in said cover adjacent said coil, and a solid insulating material filling the space in said cover around said coil and socket.

10. In ignition apparatus of the class described, a casing, an ignition distributor element mounted in said casing comprising a plurality of circularly disposed insulating terminals and a rotating element adapted to successively cooperate with said terminals to conduct high tension current thereto, a stationary insulating block mounted in said casing and disposed on the opposite side of said rotating element from said terminals, a conducting ring embedded in said block, an insulating conducting member extending from one side of said rotating element to the other for cooperation at one end with said circularly disposed terminals and at the other end with said conducting ring, said block having a double-ended socket formed in a radially extending portion thereof in which a portion of said conducting ring terminates, and means for connecting said conducting ring to a source of high tension current from either end of said socket, said means including a connector plug extending into said socket and removably secured to said casing.

11. In ignition apparatus of the class described, a casing, an ignition distributor in said casing and means for ventilating said casing comprising a boss projecting beyond the outer surface of said casing, said boss having an opening extending from the outer end thereof to the interior of said casing, a pair of relatively vertical flanges extending outwardly from said casing on opposed sides and spaced from said boss, and a plate extending across the space between the outer edges of said flanges, said plate being spaced only a short distance from the outer end of said boss.

12. In ignition apparatus of the class described, a magneto housing, a rotor having a shaft mounted in said housing, means on said rotor shaft for drivably connecting the same to a driving member of an internal combustion engine inside the engine casing, said shaft extending through a compartment in said housing, a distributor shaft extending into said compartment, means for drivably connecting said shafts in said compartment, means surrounding said shafts for sealing said compartment against leakage, and means for ventilating said compartment comprising an axially extending passage in said rotor shaft communicating with the interior of said engine casing and two oppositely directed radially extending passages in said rotor shaft connecting said axially extending passage to the interior of said compartment.

13. In a magneto, crossed rotatable shafts, distributors at the ends of one of said shafts having parts rotated by said shaft, driving means and a

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circuit breaker operatively connected at the ends of the other of said shafts, and motion transmitting means connecting said shafts intermediate the ends thereof.

14. In a magneto having two rotatable distributor parts, a rotatable power transmitting part, and a rotatable circuit breaker part, crossed shafts operatively connected intermediate their ends for coordinated rotation and operatively connected at each end to one of said rotatable parts.

15. In a magneto, a plurality of electrical parts fixedly mounted in removable parts of the magneto casing and electrically connected to sockets similarly mounted, and means for electrically connecting the said parts comprising electrically interconnected plugs mounted on the casing and adapted to make electrical connection with the said sockets on assembling the said parts.

16. In a magneto, a plurality of electrical parts fixedly mounted in removable parts of the magneto casing and electrically connected to sockets similarly mounted, and means for electrically connecting the said parts comprising electrically interconnected plugs mounted on the casing and adapted to make electrical connection with the said sockets on assembling the said parts, said interconnected plugs comprising split protective sleeves abutting a shoulder in a supporting bracket.

17. A distributor having opposed terminals mounted in spaced, fixed parts and a movable part with oppositely disposed and electrically connected terminals adapted to rotate between said parts and cooperate with said fixed terminals, means to supply the terminals of one of said fixed parts with booster current, and means to connect the terminals of the other of said fixed parts to electrical apparatus adapted to use the said current.

18. A distributor according to the preceding claim in which the said means to supply the terminals includes a jack for withdrawal of energy.

19. In a multicylinder magneto having a frame, generator mechanism including a rotatable shaft and a stationary ignition coil, distributor mechanism which includes a rotatable shaft geared to the generator shaft and a distributor electrode fast on the distributor shaft and which also includes a plurality of stationary electrodes sequentially cooperative with the distributor electrode, and a connector which extends wholly interiorly of the magneto frame from the coil and past the generator shaft to the distributor electrode and which comprises a stationary cross conductor electrically connected to the coil and a sta-

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tionary conducting member in continuous electrical connection with both the distributor electrode and the conductor.

20. In a multicylinder magneto having a frame, generator mechanism including a rotatable shaft and a stationary ignition coil, distributor mechanism which includes a rotatable shaft geared to the generator shaft and a distributor electrode fast on the distributor shaft and which also includes a plurality of stationary electrodes sequentially cooperative with the distributor electrode in sparking connection therewith, and a connector which extends wholly interiorly of the magneto frame from the coil and past the generator shaft to the distributor electrode and which comprises a stationary conductor electrically connected to the coil and a stationary conducting member in brush connection with the conductor and in operative electrical connection with the distributor electrode.

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