Dec. 1, 1959 J. F. MARTIN 2,915,574

MAGNETO MECHANISM

Filed Aug. 1, 1957

FIG. 1

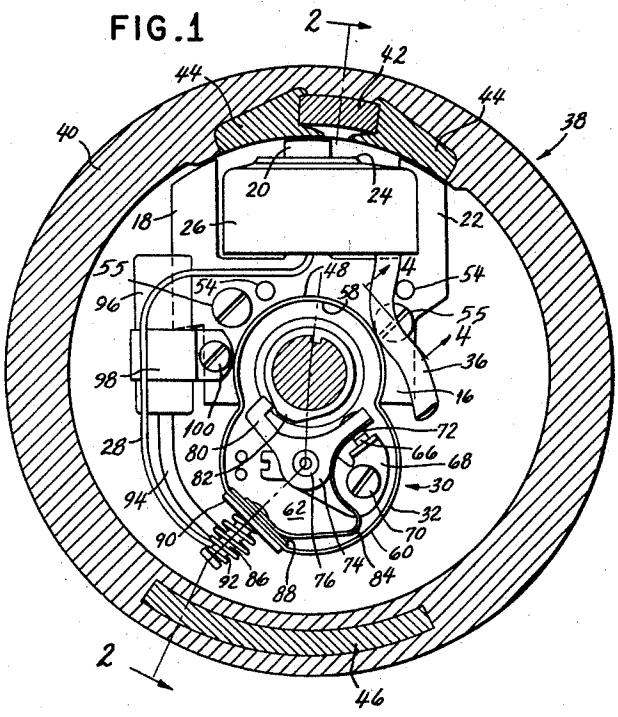


FIG. 2

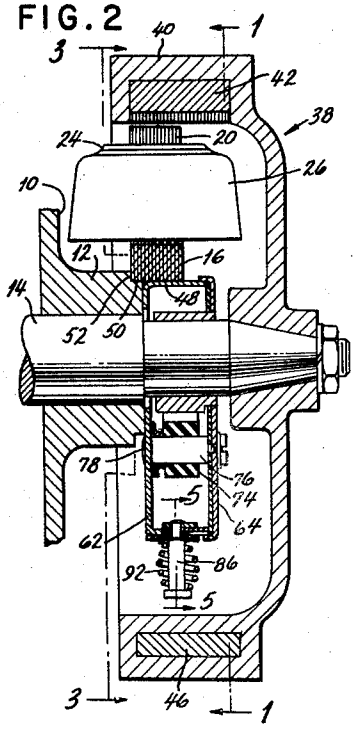


FIG. 3

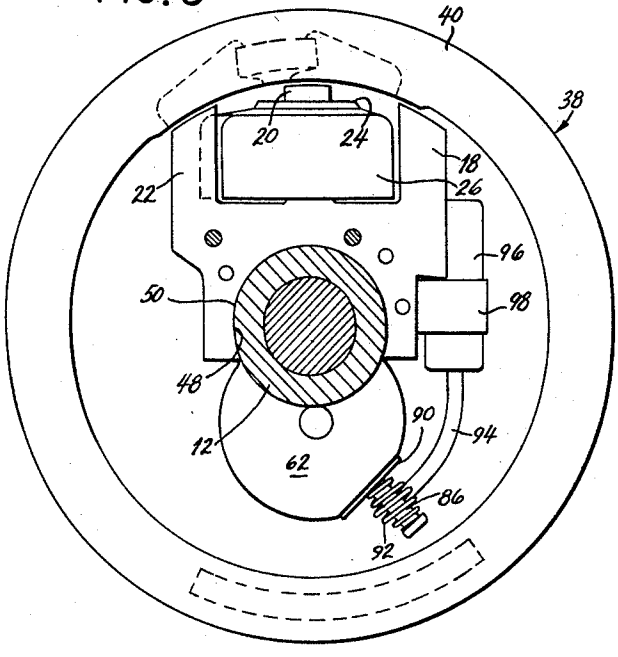


FIG. 4

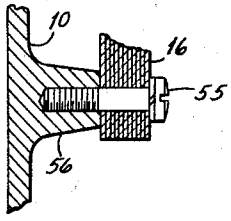
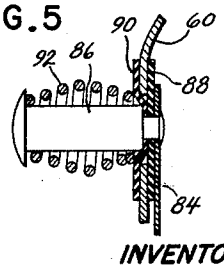


FIG. 5



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United States Patent Office

2,915,574

Patented Dec. 1, 1959

2,915,574

MAGNETO MECHANISM

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Application August 1, 1957, Serial No. 675,675

8 Claims. (Cl. 123—149)

The invention relates generally to a magneto of the flywheel type and it relates more particularly to a magneto and engine assembly which includes an improved mounting means for the stator and breaker mechanism of the magneto. A mechanism embodying the present invention is in some respects similar to that set forth in the copending applications of Russell E. Phelon, Serial No. 492,158 filed March 4, 1955, now Patent No. 2,847,490, and Serial No. 569,109 filed March 2, 1956, now Patent No. 2,847,492, and both entitled Magneto Mechanism.

The general object of the present invention is to provide a magneto and engine assembly which is similar to those set forth in the said applications so far as concerns the provision of a stator core with an opening which receives and fits a hub on the engine frame or plate and which has a breaker mechanism having a box so located and shaped that a portion of said box has an interlocking fit with an opening in the core which opening may be the same opening that receives and fits the hub.

The drawing shows a preferred embodiment of the invention and such embodiment will be described, but it will be understood that various changes may be made from the construction disclosed, and that the drawing and description are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawing:

Fig. 1 is a transverse sectional view of a magneto embodying the invention, the view being taken along the line 1—1 of Fig. 2 and the breaker mechanism cover being omitted.

Fig. 2 is a longitudinal sectional view taken along the line 2—2 of Fig. 1.

Fig. 3 is a transverse sectional view taken along the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary sectional view taken along the line 4—4 of Fig. 1.

Fig. 5 is an enlarged fragmentary sectional view taken along the line 5—5 of Fig. 2.

Referring to the drawing, it will be apparent that the magneto shown is of the type wherein the rotor is carried by or is formed as a part of the flywheel and wherein the rotor surrounds, or at least partly surrounds, the stator. Within the scope of the present invention the rotor and the stator may be widely varied not only as to mechanical details but also as to magnetic circuits. Except as to the hereinafter described features of novelty, the rotor and stator structures as shown and described are intended to be merely exemplary.

The stator of the magneto and the breaker mechanism to which the invention more particularly relates are carried or adapted to be carried by an engine frame or plate 10 preferably having a hub 12 which provides a bearing for a rotatable shaft 14, the shaft extending through and projecting beyond the hub. The shaft 14 may be an extension of the crankshaft of the engine with which the magneto is to be used, and in any event it

is rotated in timed relationship with the engine. The stator comprises a magnetic core 16 which has parallel front and rear faces and is preferably laminated. Said core 16 is constructed and arranged to provide a plurality of circularly spaced poles having arcuate faces concentric with the axis of the shaft 14 and equidistant therefrom. As shown, the core 16 has three poles 18, 20 and 22, and primary and secondary coils 24 and 26 surround the intermediate pole 20. The primary coil has a relatively small number of turns, as for instance 175, and the secondary coil has a relatively large number of turns, as for instance 10,000.

The primary coil 24 is suitably grounded at one end by means not shown, and the ungrounded end of said coil is connected by means of an insulated conductor 28 with a suitable circuit making and breaking mechanism 30 enclosed within and supported by a box 32. Said mechanism 30 and said box 32 are hereinafter more fully described. The secondary coil 26 is also suitably grounded by means not shown, and it is provided at its ungrounded end with an insulated conductor 36 by means of which it is connectible with the spark plug of the engine.

The rotor of the magneto includes a flywheel 38 which is connected with the shaft 14 so as to be rotatable therewith. The flywheel is preferably formed of nonmagnetic material and it is shown as having a disc-like outer wall carrying an annular flange 40 which surrounds the before-described stator. The inner or internal face of the annular flange 40 is preferably cylindrical at least in part.

Located within a recess in the flange 40 of the flywheel is a permanent magnet 42 and two similar pole pieces 44, 44 which are formed of magnetic metal and which engage the magnet at opposite ends thereof. The inner faces of the pole pieces are arcuate and are located to move in close proximity to the outer faces of the stator poles 18, 20 and 22. The flywheel flange is provided with a counterweight 46 opposite the magnet and the pole pieces. As shown, the magnet and the pole pieces and the counterweight are held in place by the metal of the flange which is cast around them.

During each rotation, the magnet and the pole pieces therefor cooperate with the poles of the stator to establish a magnetic circuit in one direction through the center pole 20 and through the coils thereon and then to establish a similar circuit in the opposite direction. Thus the direction of the magnetic circuit is suddenly reversed and a maximum value of voltage is established in the primary coil 24. The breaker mechanism is timed to break the circuit in the primary coil at approximately the instant of maximum voltage there, thus generating a high voltage in the secondary coil 26 which is connected with the spark plug, not shown.

The laminated core 16 has a relatively large opening 48 therein as best shown in Fig. 3, the opening receiving and engaging a portion of the hub 12 on the engine frame or plate 10. Said hub 12 is integral with the plate 10 and it has an outer or front face and it has a central axis coinciding with the shaft axis, and said hub is provided with a cylindrical periphery which is concentric with said axis and which is unobstructed at its front end. At least a portion of the interior surface of the core opening 48 directly engages said cylindrical periphery of said hub 12 so as to prevent any relative movement of said plate perpendicularly to the hub axis. Said hub 12 and core 16 are so related to each other that said core is longitudinally movable into its fully engaged position on said hub. As shown, the hub 12 has a portion 50 of reduced diameter and the core engages and fits the said portion. As illustrated in Fig. 2, a shoulder 52 is provided by the reduced hub portion 50 and this shoulder engages the core and locates it longitudinally. With the construction shown, the hub 12

serves to at least partly locate and to at least partly support the core **16**.

As mentioned hereinbefore, the core **16** is preferably laminated and, preferably, the laminations are held together by a plurality of rivets **54**, **54**. Means are provided for preventing rotative movement of the core **16** on the hub **12**. The portion **50** of the hub partly locates the core **16**, but it does not prevent rotative movement of the core and the entire stator around said hub. Such rotative movement is prevented by at least one screw **55** extending through a suitable hole in the core, and preferably there are two such screws. Bosses **56** are provided on the engine plate **10** which have their front faces in engagement with the rear face of the core. Said bosses have threaded holes for receiving said screws **55**, **55**. One screw and boss are shown in Fig. 4.

As best shown in Fig. 3, said opening **48** in the core **16** is so related to one edge of said core, preferably the bottom edge, that said hole intersects said edge. The relationship is such that at least one zone of the interior surface of the hole extends around the hub periphery through substantially less than 360° but nevertheless through substantially more than 180°, and as shown said surface at said zone so extends through about 270°. A portion of the periphery of the hub is exposed adjacent the lower edge of the core. The shoulder **52** is so located that only a small rear portion of the core **16** engages the cylindrical portion **50** of the hub, a major portion of the core **16** being at the front of the plane of the front face of the hub. Thus the engagement of the core with the hub not only prevents any movement of said core perpendicularly to the hub axis as before stated and as set forth in said applications, but it also provides a space directly below the core and closely adjacent the shaft for receiving the breaker mechanism or at least a portion thereof.

The inner portion of the before-mentioned breaker box **32** has an arcuate wall **58** which joins another portion **60** at reentrant angles. Said wall portion **60** is shown as being also arcuate, although this is not essential. The two wall portions **58** and **60** serve in conjunction with a rear wall **62** and with a detachable front cover **64** to enclose the breaker mechanism which is at least partly in the space or gap directly below and closely adjacent the core and behind the plane of the front face of said core.

In accordance with the invention, the arcuate box wall portion **58** enters and has interlocking engagement with an opening in the core **16**. Preferably and as shown, the arcuate portion **58** of the box wall enters and fits the aforesaid opening **48**, this being the same opening that receives and fits the hub portion **50**. As has been explained, the periphery of the interior surface of the hole **48** extends around the hub periphery through substantially less than 360° but nevertheless through substantially more than 180°. The arcuate wall portion **58** also extends through approximately the same angle which is less than 360° but is nevertheless substantially more than 180°. The box walls at the said reentrant angles are engaged by the core at the sides of the opening **48**. Inasmuch as the wall of the opening **48** and the arcuate wall portion **58** are substantially coextensive, the breaker box is held against transverse movements and also against rotative movements. Preferably the box wall portion **58** has a pressed fit within the opening **48**, the rear wall **62** of the box being seated against the front face of the hub **12**. No means additional to the core is required for preventing relative forward movement of the breaker box.

The presently preferred breaker mechanism includes a stationary breaker point **66** carried by a bracket **68** secured by a screw **70** to the rear wall **62** of the box and thus grounded. The mechanism includes a movable breaker point **72** carried by a rocker arm **74** mounted on a longitudinal pivot pin **76**. The pin **76** has a portion

78 which has a reduced diameter and is entered in a hole in the rear box wall **62**. The rocker arm **74** has an extension **80** which is engaged by a cam **82** on the shaft **14**, said cam being so located that a substantial portion thereof is behind the plane of the front face of the core **16**. This position of the cam **82** is made possible by the location of the core plate with only the rear portion thereof in engagement with the hub. Said rocker arm **74** is shown as being so located that the extension **76** thereof engages the cam **82** about midway of its length, at least a portion of said arm also being behind said plane through the front face of the core. A spring **84** serves to bias the rocker arm to move the point **72** into engagement with the point **66** and the spring, or an auxiliary conductor associated therewith, serves to provide an electrical connection between the conductor **28** and the breaker point **72**. The conductor **28** and the spring **84** are electrically connected with each other by a conducting pin **86** which extends through the box wall **60** and is insulated therefrom by insulating washers **88** and **90**. Surrounding the pin **86** is a coil spring **92** adapted for the engagement of wires between the coils thereof. Said wire **28** is so engaged.

By means of a conductor **94**, shown in Figs. 1 and 3, a condenser **96** is connected in parallel with the breaker mechanism in accordance with customary practice. As shown, the condenser is attached to the core **16** by means of a clip **98** held by a screw **100**.

During each rotation, the magnet and the pole pieces therefor cooperate with the poles of the stator to establish a magnetic circuit in one direction through the center pole **20** and through the coils thereon and then to establish a similar circuit in the opposite direction. Thus the direction of the magnetic circuit is suddenly reversed and a maximum value of voltage is established in the primary coil **24**. The breaker mechanism is timed to break the circuit in the primary coil at approximately the instant of maximum voltage there, thus generating a high voltage in the secondary coil **26** which is connected with the spark plug, not shown.

This invention claimed is:

1. A magneto and engine assembly comprising in combination, a stationary engine plate having an aperture therein, a rotatable shaft having a portion extending through said aperture and projecting beyond said engine plate, a magnetic core formed of laminated metal and shaped to provide a plurality of poles having faces equally spaced from a central axis, said core having a relatively large opening therein with its peripheral surface conforming to a portion of a cylinder which opening is so located adjacent one edge of said core that its periphery extends through an angle of substantially more than 180° but substantially less than 360° so as to provide a gap in said core at said edge thereof, means for holding said core in a fixed position on said engine plate with said core axis coincident with the axis of the shaft, primary and secondary coils surrounding one of the poles of the core and coperating with said core to constitute a stator, a breaker cam on said shaft located with a major portion thereof behind the plane of the front face of the core, a box partly within said gap and having an arcuate wall entered in the front portion of said core opening and fitting said opening through an angle of substantially more than 180°, a breaker mechanism located in and carried by said box and electrically connected with said primary coil and operable by said cam which breaker mechanism is located with at least a portion thereof in said gap in the core and between the front and back planes of said core, and a rotor carried by the projecting portion of said rotatable shaft and including a magnet and pole pieces movable in close proximity to said pole faces of the stator.

2. A magneto and engine assembly comprising in combination, a stationary engine plate having an aperture therein, a rotatable shaft having a portion extending

through said aperture and projecting beyond said engine plate, a magnetic core formed of laminated metal and shaped to provide a plurality of poles having faces equally spaced from a central axis, said core having a relatively large opening therein with its peripheral surface conforming to a portion of a cylinder which opening is so located adjacent one edge of said core that its periphery extends through an angle of substantially more than 180° but substantially less than 360° so as to provide a gap in said core at said edge thereof, means for holding said core in a fixed position on said engine plate with said core axis coincident with the axis of the shaft, primary and secondary coils surrounding one of said poles of the core and cooperating with said core to constitute a stator, a breaker cam on said shaft located with a major portion thereof behind the plane of the front face of the core, a box having an arcuate wall entered in the front portion of said core opening and fitting said opening through an angle of substantially more than 180°, said box also having additional walls outside of said core opening and joining said arcuate wall with re-entrant angles at the sides of said gap, a breaker mechanism located in and carried by said box and electrically connected with said primary coil and operable by said cam which breaker mechanism is located with at least a portion thereof in said gap in the core and between the front and back planes of said core, and a rotor carried by the projecting portion of said rotatable shaft and including a magnet and pole pieces movable in close proximity to said pole faces of the stator.

3. A magneto and engine assembly as set forth in claim 2, wherein said arcuate wall of said box has a press fit with the periphery of said opening in the core.

4. A stator and breaker mechanism assembly for a magneto comprising in combination, a magnetic core formed of laminated metal and shaped to provide a plurality of poles having faces equally spaced from a central axis, said core having a relatively large opening therein with its peripheral surface conforming to a portion of a cylinder which opening is so located adjacent one edge of said core that its periphery extends through an angle of substantially more than 180° but substantially less than 360° so as to provide a gap in said core at said edge thereof, primary and secondary coils surrounding one of said poles of the core and cooperating with said core to constitute a stator, a box having an arcuate wall entered in the front portion of said core opening and fitting said opening through an angle of substantially more than 180°, and a breaker mechanism located in and carried by said box and electrically connected with said primary coil and operable by a rotatable cam which breaker mechanism is located with at least a portion thereof in said gap in the core and between the front and back planes of said core.

5. A stator and breaker mechanism assembly for a magneto comprising in combination, a magnetic core formed of laminated metal and shaped to provide a plurality of poles having faces equally spaced from a central axis, said core having a relatively large opening therein with its peripheral surface conforming to a portion of a cylinder which opening is so located adjacent one edge of said core that its periphery extends through an angle of substantially more than 180° but substantially less than 360° so as to provide a gap in said core at said edge thereof, primary and secondary coils surrounding one of said poles of the core and cooperating with said core to constitute a stator, a box having an arcuate wall entered in the front portion of said core opening and fitting said opening through an angle of substantially more than 180°, said box also having additional walls outside of said core opening and joining said arcuate wall with re-entrant angles at the sides of said gap, and portions of a breaker mechanism located in and carried by said box and electrically connected with said primary coil and operable by a rotatable cam which breaker mechanism is located with at least a portion thereof in said gap in the core and between the front and back planes of said core.

6. A magneto and engine assembly comprising in combination, a stationary engine plate including an outwardly projecting centrally apertured integral hub having a front face and having a cylindrical periphery concentric with the axis of the aperture, a rotatable shaft having a portion extending through the hub aperture and projecting beyond said front face, a magnetic core formed of laminated metal and shaped to provide a plurality of poles having faces equally spaced from the axis of the shaft, said core having a relatively large opening therein with its peripheral surface conforming to a portion of a cylinder which opening is so located that it receives and fits the cylindrical periphery of said hub through an angle of substantially more than 180° but substantially less than 360° so as to provide a gap in said core adjacent said hub, means cooperating with said hub for holding said core in a fixed position on said engine plate with only the rear portion of said core opening fitting said cylindrical hub periphery and with the front face of the hub behind the front face of the core, primary and secondary coils surrounding one of said poles of the core and cooperating with said core to constitute a stator, a breaker cam on said shaft located with a major portion thereof behind the plane of the front face of the core, a box partly within said gap and having an arcuate outer wall entered in the front portion of said core opening and fitting said opening though an angle of substantially more than 180°, a breaker mechanism located in and carried by said box and electrically connected with said primary coil and operable by said cam which breaker mechanism is located with at least a portion thereof in said gap in the core and between the front and back planes of said core, and a rotor carried by the projecting portion of said rotatable shaft and including a magnet and pole pieces movable in close proximity to said pole faces of the stator.

7. A magneto and engine assembly comprising in combination, a stationary engine plate including an outwardly projecting centrally apertured integral hub having a front face and having a cylindrical periphery concentric with the axis of the aperture, a rotatable shaft having a portion extending through the hub aperture and projecting beyond said front face, a magnetic core formed of laminated metal and shaped to provide a plurality of poles having faces equally spaced from the axis of the shaft, said core having a relatively large opening therein with its peripheral surface conforming to a portion of a cylinder which opening is so located that it receives and fits the cylindrical periphery of said hub through an angle of substantially more than 180° but substantially less than 360° so as to provide a gap in said core adjacent said hub, means cooperating with said hub for holding said core in a fixed position on said engine plate with only the rear portion of said core opening fitting said cylindrical hub periphery and with the front face of the hub behind the front face of the core, primary and secondary coils surrounding one of said poles of the core and cooperating with said core to constitute a stator, a breaker cam on said shaft located with a major portion thereof behind the plane of the front face of the core, a box having an arcuate outer wall entered in the front portion of said core opening and fitting said opening through an angle of substantially more than 180°, said box also having additional walls outside of said core opening and joining said arcuate wall with re-entrant angles at the sides of said gap, a breaker mechanism located in and carried by said box and electrically connected with said primary coil and operable by said cam which breaker mechanism is located with at least a portion thereof in said gap in the core and between the front and back planes of said core,

and a rotor carried by the projecting portion of said rotatable shaft and including a magnet and pole pieces movable in close proximity to said pole faces of the stator.

8. A magneto and engine assembly as set forth in claim 7, wherein said arcuate wall of said box has a press fit with the periphery of said opening in the core, and

wherein the box has a rear wall which engages the front face of the engine plate hub.

References Cited in the file of this patent

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