Jan. 19, 1943. W. D. CROCKER 2,308,973

MAGNETO

Filed March 14, 1942

Fig. 1

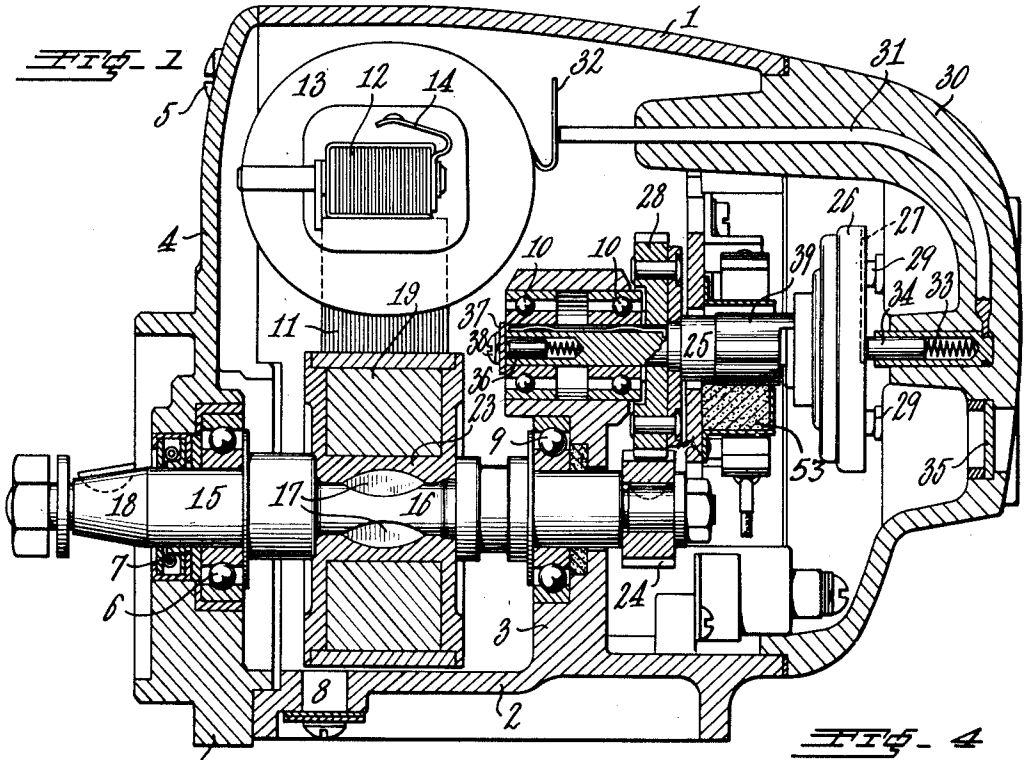


Fig. 2

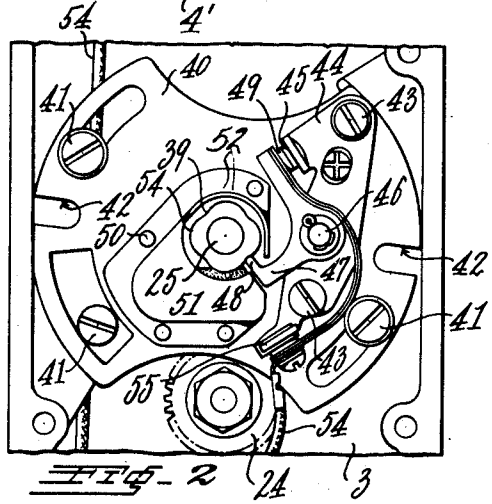


Fig. 3

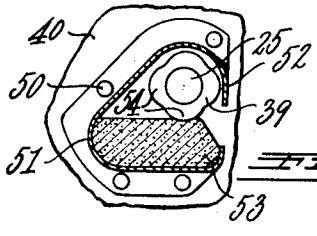


Fig. 4

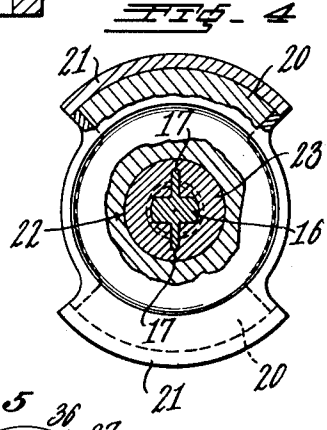
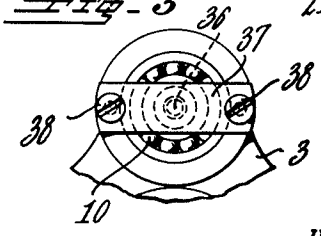


Fig. 5



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2,308,973

MAGNETO

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Application April 14, 1942, Serial No. 438,908

6 Claims. (Cl. 171—209)

This invention relates to single cylinder and multicylinder magnetos, and particularly to various elements thereof contributing to a highly efficient and durable unit for electric ignition of the combustible mixtures in internal combustion engines.

The primary object of the invention is to provide in magnetos of various kinds, a one-piece cast frame which comprises a tunnel-shaped housing with its opposite drive and rear ends open for substantially the full height thereof in order that the detachable drive end plate therefor may not only support the drive end bearing for the magnetic rotor but, optionally, may have various forms for different flange mountings and for base mountings in accordance with the requirements of the engine drive, and which also comprises an integral interior bracket which is readily cast with the housing and machined for accurately supporting both the rear end bearing for the magnetic rotor and the interrupter assembly. Preferably, this bracket may also support a bearing for the distributor rotor in case the magneto is of the multicylinder geared distributor type.

Another object is to provide in single or multicylinder magnetos of the geared or gearless distributor types of various kinds, and with any suitable type of frame, an improved cam lubricating means having an oil guard, by means of which not only is the cam adequately lubricated at all times over long periods of operation in service but also the interrupter contacts are guarded from the deposit thereon of oil slung from the cam as a result of its rotation.

Other objects providing simple, inexpensive, compact and durable elements in magnetos of these general types and kinds will be apparent from the following description of the preferred embodiment of the invention applied, as an example, to a four-cylinder magneto of the geared distributor type, taken in connection with the accompanying drawing in which,

Fig. 1 is a central vertical section, partly in elevation, of a typical multicylinder magneto of this kind within the invention; Fig. 2 is an elevational view, from the rear end of the magneto, of the interrupter assembly mounted on the magneto bracket in adjustable position for timing; Fig. 3 is a sectional elevation of the lubricator for the cam and the oil guard for the interrupter contacts; Fig. 4 is an end view of the magnetic rotor, partly broken away to show certain parts thereof in section; and Fig. 5 is an end elevation of the grounding means for the distributor shaft.

Referring to the drawing, the magneto has a one-piece die cast frame of zinc or aluminum alloy, or formed of other non-magnetic material. The frame comprises a housing 1 with a base 2 and with opposite drive and rear ends open for substantially the full height of the housing at the respective ends thereof, and also comprises an interior bracket 3 upstanding integrally from the base nearer the rear end of the housing and wholly within the ends thereof. The housing is tunnel-shaped formed by side members upstanding from the base and a top joining the side members. Over the drive end of the magneto is fastened the one-piece drive end metal plate 4 which is fastened to the housing by a plurality of screws as 5, and which supports a ball bearing 6 and oil seal 7. This detachable drive end plate may be of any form suitable for rigidly mounting the magneto on the engine to properly accommodate the engine drive for the magneto. In the form shown it has suitable flanges as 4' perforated with holes or slots to accommodate bolts for fastening the drive end plate to the engine for flange mounting the magneto on the engine. In another form, the flanges may be omitted from the end plate and the base 2 of the magneto fastened by bolts located as at 8 to the engine for base mounting the magneto on the engine. This magneto housing 1 with bracket 3 may be readily cast and both faces of the bracket may be accurately machined as a result of the open ends of the frame. The bracket 3 supports a ball bearing 9 and two upper ball bearings 10 forming a bearing for the distributor shaft 25 hereinafter described. Also cast as an insert within the housing 1, nearer the drive end of the housing, is the stator magnetic structure comprising steel laminations 11 having pole pieces and upstanding arms supporting the laminated core 12 of the ignition coil 13, which is removably held in magnetic contact with the arms by springs as 14 pressing against abutments formed interiorly of the frame. Such a stator magnetic structure, except that it is fastened to the frame by screws, is shown in greater detail in my U. S. Patent 2,243,418.

The magnetic rotor has a shaft 15 with circular end portions as shown and an intermediate portion 16 from which is swaged the diametrically opposite driving keys 17. This shaft is journaled in the ball bearings 6 and 9 and has the usual tapered end 18 for keying thereon the well known form of drive or impulse coupling or gear

(not shown) for driving the magneto from the engine whether the magneto is base mounted or flange mounted thereon. The magnetic rotor also has the cast magnet 19 of high coercive force as Alnico with diametrically opposite poles 20 to which are welded the plate pole shoes 21. This magnet has a central circular hole at 22 through which the shaft 15 extends, and the shaft is locked to the magnet by bonding material 23 such as zinc cast between the unmachined and rough bounding walls of the central hole 22 in the magnet and the shaft portion 16. The zinc is also cast around the front and rear surfaces of the magnet as shown. On the rear end of the shaft 15 is keyed the pinion 24. As a result of the rough bounding wall of the hole 22 in the cast magnet, and the keys 17 of the shaft, the bonding material 23 rigidly and durably locks the magnet 19 to the shaft portion 16 even though the hole 22 in the magnet is circular. If desired, however, that hole might be oval shaped or otherwise to further increase the strength of the bond between the magnet and shaft.

Journaled in the ball bearings 10 in the bracket 3 is arranged the distributor rotor comprising the shaft 25 and insulating disc 26 with distributor electrode 27 of the well known form. On this shaft is fastened the gear 28 meshed with the pinion 24 for driving the distributor rotor at the cam shaft speed of the engine for engines of the four-stroke cycle type. The distributor electrode cooperates sequentially with the four spring-pressed brushes 29 mounted in the distributor plate 30, which is detachably fastened over the rear open end of the frame 1 and has a metal insert 31 extending from the high tension terminal 32 of the ignition coil 13 to the metal holder 33 of the spring-pressed brush 34 which continuously makes electrical contact with the rotating distributor electrode 27. The distributor plate 30 also has a transparent window 35 for checking the timing of the distributor gearing in assembly.

In order to avoid passage of electrostatically induced current through the bearings 10, which otherwise would have a deleterious effect upon the grease therein, grounding means is provided to continuously ground by a short circuit the shaft 25 of the distributor rotor on the frame 1 of the magneto. This grounding means comprises a brush 36 arranged in a central axial cavity in the shaft and spring-pressed into continuous engagement with the metal plate 37 which is detachably fastened to the bracket 3 by screws 38 on opposite sides of the outer fixed race of the bearing 10 so as to electrically connect the shaft 25 to the frame 1 to effectively ground the shaft thereon at all times (Figs. 1 and 5). At the upper part of the rear face of the bracket 3 and arranged around the distributor rotor shaft 25, is an adjustably-timed interrupter assembly (Figs. 1 and 2) comprising a cam 39 fast on shaft 25, an interrupter plate 40 held in angularly adjusted position by screws 41 to the bracket 3 in timed relation set by a lever (not shown) fitted in either one of the two marginal slots 42 in the plate. On this interrupter plate 40 is fastened by screws 43 the adjustable plate 44 carrying the normally fixed interrupter contact 45, and also a pivot 46 for the spring-pressed deflecting lever 47 which has a cam follower 48 at one end and carries an interrupter contact 49 at the other end in cooperation with the fixed contact 45. Fastened to the interrupter plate 40 by rivets 50 is an integrally combined lubricant container and interrupter contact guard, comprising the container 51 and the contact guard 52 extending between the cam 39 and the contacts 45, 49. In this container is an oil-soaked wick 53 arranged to sequentially engage the lobes 54 of the cam. In this way, each lobe of the cam picks up a small amount of oil from the wick during each rotation, but, if at any time the quantity of oil on the cam is such as to be thrown off the cam by centrifugal force, that oil is intercepted by the guard 52 and kept off the interrupter contacts. Some of the oil intercepted by the guard may reach the pivot 46 of the deflectable lever to lubricate it, but, as a result of the shape of the guard and the location of the wick in a pocket formed at the bottom of the container 51, most of that oil flows back to the felt wick 53 to replenish the supply therein. The insulated wire 54 connects the primary circuit of the ignition coil 13 to the insulated interrupter terminal 55 from which it is conducted to the interrupter contact 49.

As a result of this construction it will be apparent that there is herein disclosed a one-piece frame for single cylinder or multicylinder magnetos which, whether the laminated pole pieces and upstanding arms of the stator magnetic structure are cast therein as inserts or are fastened thereto by screws, is readily cast with an open-ended housing and with an integral bracket which may be accurately machined for the necessary bearing or bearings and for fastening thereto the interrupter plate whether fixed or adjustably mounted. Also, it will be apparent that there is herein disclosed a simple construction of this kind in which the magneto may be changed from a type for base mounting on the engine to a type for flange mounting thereon in various ways, or vice versa, merely by providing a base 2 adapted to be fastened to the engine and a drive end plate 4 without flanges or with flanges 4' of appropriate form. It will also be apparent that there is herein disclosed for any type of single cylinder or multicylinder magneto, a lubricating means for the interrupter cam which supplies oil in small and adequate quantities to the lobe of the cam or sequentially to the lobes of the cam, combined with an oil guard for the interrupter contacts which prevents the deposit of oil from being slug off the cam to the contacts but permits such surplus oil to reach the pivot of the deflectable interrupter lever or to pass back to the oil container for further use. And furthermore it will be apparent that the interrupter assembly is mounted rearwardly of bracket 3 in position for inspection after removal of the distributor plate, and that in the multicylinder magneto herein specifically disclosed this assembly is located between gear 28 and insulating disc 27.

Although but one embodiment of the invention is herein disclosed, it is apparent that many variations and modifications may be made in various elements of magnetos of the general types herein referred to. For instance, the frame of the magneto need not be cast, and whether or not it is cast, the stator structure may be detachably fastened thereto. Also the magneto may be of the single cylinder type in which case a distributor rotor is usually not provided and the cam is mounted on the shaft of the magnetic rotor, or the magneto may be of the gearless distributor type in which case the distributor rotor and the interrupter cam are usually mounted on the shaft of the magnetic rotor and the bracket

is not provided with a support for a separate bearing for a distributor shaft. Also the magnetic rotor may be in the form of a flux distributor for the magnetic flux from one or more magnets in the stator structure of the magneto in which case the shaft of the magnetic rotor does not have to be bonded thereto in the way herein shown. Also the distributor may be of the jump spark type instead of the brush type herein shown. Also some or all of the bearings may be of the plain or roller type instead of the ball type. These and other variations and modifications of the elements of the magneto, and various combinations thereof, are intended to be included within the broad terms of the appended claims.

Having thus described the invention, what is claimed is:

1. In a magneto adapted to be fastened to and driven by an engine for supplying ignition currents thereto; a one-piece cast frame which includes a tunnel-shaped housing open at its opposite drive and rear ends for substantially the full height of the housing at its respective ends and having a base and which also includes an interior bracket supporting a bearing and upstanding integrally from the base nearer the rear end of the housing wholly within the ends thereof; a one-piece drive end plate which closes the drive end of the housing and is detachably fastened thereto and which supports a bearing; a stator magnetic structure which is fastened within the frame nearer the drive end thereof and which includes an ignition coil; a magnetic rotor journaled in said bearings in cooperation with the stator structure and adapted to be driven by the engine; a distributor plate which closes the rear end of the housing and is detachably fastened thereto and which has at least one sparkplug cable terminal cooperative with the coil; and an interrupter assembly which is fastened to the bracket rearwardly thereof and which is in position for inspection after removal of the distributor plate from the housing.

2. In a multicylinder magneto adapted to be fastened to and driven by an engine for supplying ignition currents thereto; a one-piece cast frame which includes a tunnel-shaped housing open at its opposite drive and rear ends for substantially the full height of the housing at its respective ends and having a base and which also includes an interior bracket supporting a plurality of bearings and upstanding integrally from the base nearer the rear end of the housing wholly within the ends thereof; a one-piece drive end plate which closes the drive end of the housing and is detachably fastened thereto and which supports a bearing; a stator magnetic structure which is fastened within the frame nearer the drive end thereof and which includes an ignition coil; a magnetic rotor journaled in the bearing of the drive end plate and a bearing of the bracket in cooperation with the stator structure and adapted to be driven by the engine; a distributor plate which closes the rear end of the housing and is detachably fastened thereto and which has a circular series of sparkplug cable terminals; a distributor rotor having a shaft which is geared to the shaft of the magnetic rotor and carries an electrode cooperative sequentially with the sparkplug cable terminals and which is supported in another bearing of the bracket; and an interrupter assembly which is fastened to the bracket rearwardly thereof between the distributor gearing and electrode and which is in position for inspection after removal of the distributor plate from the housing.

3. In a magneto adapted to be fastened to and driven by an engine for supplying ignition currents thereto; a one-piece cast frame which includes a tunnel-shaped housing open at its opposite drive and rear ends for substantially the full height of the housing at its respective ends and having a base and which also includes an interior bracket supporting a bearing and upstanding integrally from the base near the rear end of the housing wholly within the ends thereof; a one-piece drive end plate which closes the drive end of the housing and is detachably fastened thereto and which supports a bearing and has integral flanges; a stator magnetic structure which is fastened within the frame nearer the drive end thereof and which includes an ignition coil; a magnetic rotor journaled in said bearings in cooperation with the stator structure and adapted to be driven by the engine; a distributor plate which closes the rear end of the housing and is detachably fastened thereto and which has at least one sparkplug cable terminal cooperative with the coil; and an interrupter assembly which is fastened to the bracket rearwardly thereof and which is in position for inspection after removal of the distributor plate from the housing.

4. In a multicylinder magneto adapted to be fastened to and driven by an engine for supplying ignition currents thereto; a one-piece cast frame which includes a tunnel-shaped housing open at its opposite drive and rear ends for substantially the full height of the housing at its respective ends and having a base and which also includes an interior bracket supporting a plurality of bearings and upstanding integrally from the base nearer the rear end of the housing wholly within the ends thereof; a one-piece drive end plate which closes the drive end of the housing and is detachably fastened thereto and which supports a bearing and has integral flanges; a stator magnetic structure which is fastened within the frame nearer the drive end thereof and which includes an ignition coil; a magnetic rotor journaled in the bearing of the drive end plate and a bearing of the bracket in cooperation with the stator structure and adapted to be driven by the engine; a distributor plate which closes the rear end of the housing and is detachably fastened thereto and which has a circular series of sparkplug cable terminals; a distributor rotor having a shaft which is geared to the shaft of the magnetic rotor and carries an electrode electrically connected to the coil and cooperative sequentially with the sparkplug cable terminals and which is supported in another bearing of the bracket; and an interrupter assembly which is fastened to the bracket rearwardly thereof between the distributor gearing and the distributor electrode and which is in position for inspection after removal of the distributor plate from the housing.

5. In a magneto, a frame supporting a bearing, a bracket fastened within the frame, a stator magnetic structure fastened within the frame and including an ignition coil, a magnetic rotor cooperative with the stator structure and having a shaft journaled in the bearing, a distributor plate having a sparkplug cable terminal cooperative with the coil, an interrupter assembly fastened to the bracket and comprising a cam driven by said shaft and interrupter contacts periodically operated by said cam, a combined cam lubricant container and interrupter contact

guard which is fastened to the bracket and nearly encircles the cam in proximity thereto and which comprises a container having a pocket formed in its bottom and an extension leading from the container and having a portion arranged between the cam and the interrupter contacts to form a guard for the contacts, and an oil-soaked wick located in the pocket of the container in position to be engaged by the cam.

6. In a multicylinder magneto, a frame supporting a bearing, a bracket fastened within the frame, a stator magnetic structure fastened within the frame, a magnetic rotor cooperative with the stator structure and having a shaft journaled in the bearing, a distributor rotor driven by the shaft, a distributor plate having sparkplug cable terminals cooperative sequentially with the distributor rotor, an interrupter assembly fastened to the bracket and comprising a lobed cam mounted on the same shaft as the distributor rotor and interrupter contacts periodically operated by the cam, a combined cam lubricant container and interrupter contact guard which is fastened to the bracket and nearly encircles the cam in proximity thereto and which comprises a container having a pocket formed in its bottom and an integral extension leading from the container and having a portion arranged between the cam and the interrupter contacts to form a guard for the contacts, and an oil-soaked wick located in the pocket of the container in position to be engaged sequentially by the lobes of the cam.

WILLIAM D. CROCKER.