Jan. 7, 1947. W. L. CARLSON 2,413,743

DISTRIBUTOR CONSTRUCTION

Filed June 26, 1944

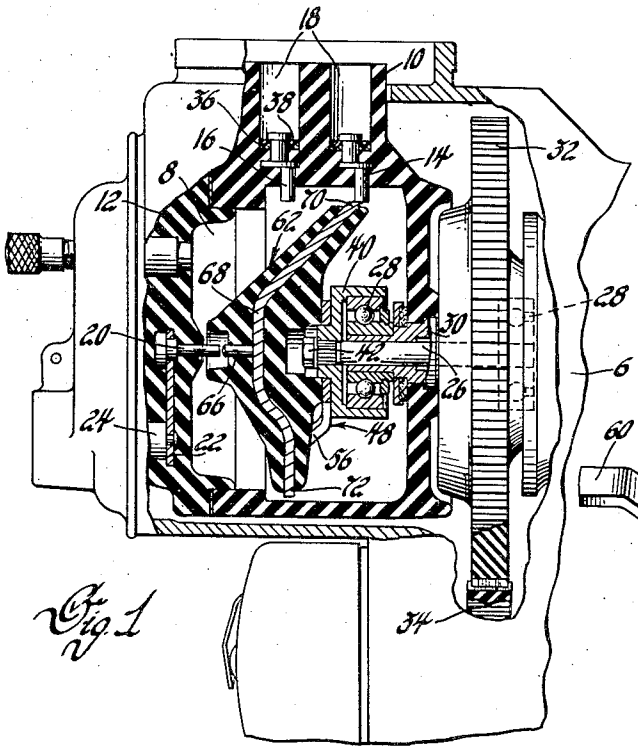


Fig. 1

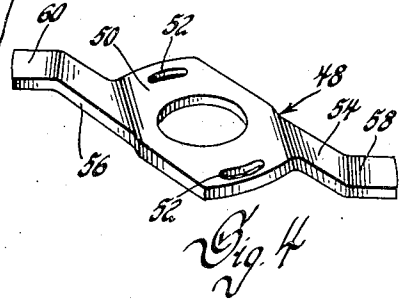


Fig. 4

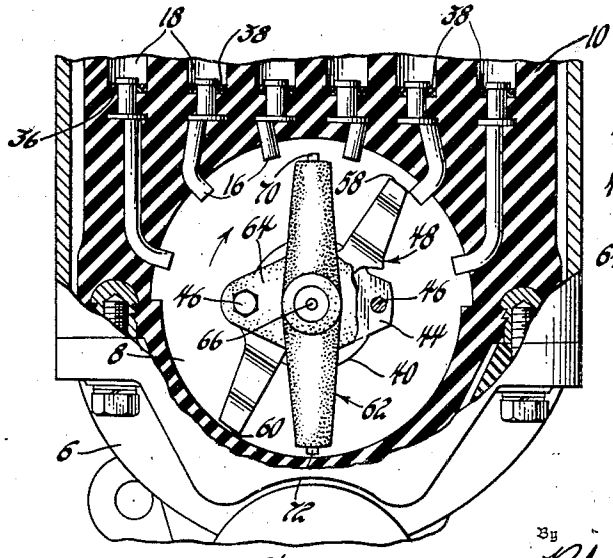


Fig. 2

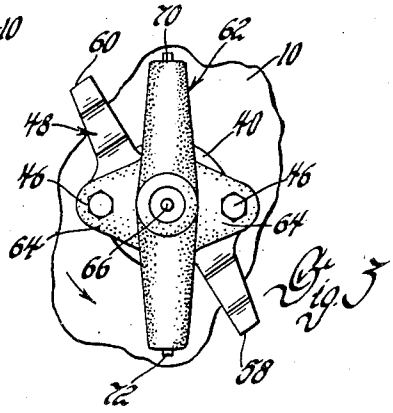


Fig. 3

Inventor:
Wilbur L. Carlson

By Blackmon, Spencer & Flint
Attorneys

Patented Jan. 7, 1947

2,413,743

UNITED STATES PATENT OFFICE

2,413,743

DISTRIBUTOR CONSTRUCTION

Wilbur L. Carlson, Rochester, N. Y., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application June 26, 1944, Serial No. 542,138

7 Claims. (Cl. 200—20)

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This invention relates generally to the construction of distributors and more particularly to certain features of construction which are of general use but especially desirable for use in magneto units adapted for airplane engine ignition systems.

One of the objects of the invention is to provide a distributor which is of simple and compact construction having only a relatively few parts which can be readily manufactured and assembled.

A further object is to provide a distributor embodying a rotor with main running brushes and supplemental brushes affording a retarded spark on starting which is so constructed that the parts can be assembled in either of two positions to operate in either direction of rotation.

A still further object is to provide a construction of the distributor which is particularly adapted for use in magneto units for airplane engine ignition systems to insure the proper spark distribution with freedom from electrical breakdowns on operation at relatively high altitudes.

Other objects and the several advantages of the present invention will be set forth or will be aparent from the following description of the embodiment illustrated in the accompanying drawing, in which:

Fig. 1 is a fragmentary side elevation of a magneto unit with parts broken away and parts of the distributor in substantially vertical section.

Fig. 2 is a fragmentary front elevation with parts broken away and parts in section.

Fig. 3 is a fragmentary front elevation of the distributor rotor assembly showing an alternative relative location of the brushes.

Fig. 4 is an enlarged perspective view of the main distributor arm.

Referring first to the showing in Fig. 1, only those parts which are essential to an understanding of the features of construction of the present invention have been illustrated in detail and those parts not so illustrated may be of any desired conventional construction.

Although the present distributor construction may be otherwise employed, it has been diagrammatically indicated as associated with or forming a part of an inductor type magneto unit having a casing indicated at 6 which may house a generator, induction coil and interrupter mechanism of conventional construction.

The distributor is also preferably, although not necessarily, located within a completely sealed and insulated chamber indicated generally at 8 and is similar in this respect and in certain other features to be noted hereinafter to the construction which is the subject of my application Serial No. 405,743, filed August 7, 1941, of which the present application is a continuation-in-part.

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The distributor chamber 8 is formed by the housing 10 and cover 12 of molded insulation material such as Bakelite with spaced distributor contacts consisting of metal inserts molded in the housing 10. These contacts are arranged, as is also shown in my above-identified prior application, in two parallel arcuate rows in spaced transverse planes in the upper half of the distributor chamber. The inner row of contacts is designated at 14 and the outer row of contacts at 16 and bores 18 extend from the upper face of the housing 10 to the contacts to receive the separate conductors adapted to connect the contacts to the respective spark plugs of the engine.

The cover 12 is secured to and closes the front end of the housing 10 and is shown as having inserts molded therein including a contact portion 20 and a plate portion 22 with a bore 24 leading to the plate portion to receive a conductor adapted to be connected to a booster magneto or other external current source to furnish ignition current for starting purposes.

A distributor shaft 26 extends through the inner wall of the housing 10 and is mounted to rotate by means of the spaced ball bearings 28 on a sleeve 30 which is preferably molded as an insert in the housing 10. As is disclosed in my application Serial No. 405,743, the distributor shaft 26 is adapted to be electrically connected with the terminal of the high tension winding of the usual induction coil and is adapted to be rotated by a drive gear 32 of insulating material which meshes with a gear 34 mounted on the usual magneto rotor shaft.

As is also disclosed in my prior application, a shaft sealing means is preferably provided adjacent the outer end of the distributor shaft 26 to prevent the entrance of external air to the distributor chamber 8. This feature does not constitute an essential part of the present invention but is mentioned because of the showing herein of sealing means for the several contacts 14 and 16. Even through these contacts are molded in the housing 10 there is no assurance that the molding material around the contacts will form a gas-tight joint and it has been found desirable to insure against any chance of leakage by providing washers 36 of flexible material such as rubber around the exposed terminals of the contacts in the bores 18 with metal washers 38 having wedge or V-shaped lower faces which force the flexible washers 36 into tight engagement with

the contact terminals and housing upon spinning or staking over the upper ends of these terminals.

A bearing housing 40 is non-rotatably secured to the end of the distributor shaft 26 within the distributor chamber by means such as the nut 42 and this bearing housing is provided with threaded ears or lugs 44 projecting transversely from opposite sides thereof to receive a pair of bolts 46 to secure the distributor arms or brushes to rotate with the distributor shaft.

The main distributor arm 48 is shown in detail in Fig. 4 as consisting of a metal plate having a flat portion 50 with a central opening to receive a forwardly projecting portion of the bearing housing 40 and with diametrically opposite arcuate holes 52 to receive the securing bolts 46, and relatively narrow portions 54 and 56 which extend outwardly in substantially radial directions from the flat portion 50 and are bent axially to form the diametrically opposite running brushes 58 and 60 which are located at opposite sides of the plane of the flat portion to rotate in the spaced transverse planes of the rows of contacts 14 and 16 as will be hereinafter described.

The supplemental distributor arm, indicated generally at 62, is shown as formed of molded insulation material having centrally located ears 64 extending transversely on opposite sides of the arm 62 with openings to receive the securing bolts 46 and having inserts molded therein including an axially extending contact portion 66 and a diametrically extending portion 68. The opposite ends of the portion 68 are exposed to constitute the starting brushes 70 and 72 which are diametrically opposed but offset axially so that the brush 70 rotates in the transverse plane of the row of contacts 14 while the brush 72 rotates in the transverse plane of the row of contacts 16. The front end of the contact portion 66 is exposed and adapted to be only slightly spaced from the contact portion 20 in cover 12 to conduct the starting current to the brushes 70 and 72.

As shown in Fig. 2, the diametrically opposite starting brushes 70 and 72 of arm 62 are in an axial or longitudinal plane at right angles to a plane through the center of the ears 44 and securing bolts 46 whereas the portions 54 and 56 of arm 48 are angularly offset with reference to these planes to position the diametrically opposite running brushes 58 and 60 in circumferentially spaced relation to the brushes 70 and 72. This relationship is such as to obtain the desired degree of retardation of the ignition when using the starting brushes in accordance with conventional practice and is subject to a slight adjustment afforded by the arcuate elongation of the openings 52 in the arm 48.

It was heretofore stated that one of the objects of the present invention is to provide a distributor embodying a rotor with main running brushes and supplemental brushes affording a retarded spark on starting which is so constructed that the parts can be assembled in either of two positions to operate in either direction of rotation. Although designed particularly for use in dual ignition systems for airplane engines wherein a magneto unit is mounted on each side of the engine with drive connections to rotate the respective distributor rotors and other rotating parts of the units in opposite directions, it will be apparent that this feature is also desirable in the construction of distributors for more general use so that the same parts may be employed for original installation and service replacements regardless of the direction of rotation in any particular installation.

The distributor arms 48 and 62 are shown in Figs. 1 and 2 as assembled for right-hand or clockwise rotation indicated by the arrow in Fig. 2. The flat portion 50 of arm 48 is clamped between the bearing housing 40 and arm 62 by the bolts 46 in such a position that the running brush 58 is located in the same transverse plane as the starting brush 70 and spaced circumferentially ahead of the brush 70 so that the brushes 58 and 70 rotate in the plane of contacts 14, whereas the diametrically opposite running brush 60 and starting brush 72 are in a similar relative position to rotate in the transverse plane of the contacts 16.

In Fig. 3, the distributor arms 48 and 62 are shown as assembled for left-hand or counterclockwise rotation. In this position the arm 62 is assembled in the same manner as in Figs. 1 and 2 but the main distributor arm 48 has been turned over or reversed so that the running brush 58 is located in the same transverse plane as the starting brush 72 and the running brush 60 is located in the same transverse plane as the starting brush 70 with the running brushes spaced circumferentially ahead of the starting brushes in the direction of rotation indicated by the arrow. The brushes 60 and 70 rotate in the plane of contacts 14 and the diametrically opposite brushes 58 and 72, respectively, rotate in the plane of contacts 16.

On reference to the drawings it will be apparent that the two relative positions of the starting and running brushes to adapt the same for rotation in either direction by a mere reversal of the distributor arm 48 as described hereabove is primarily dependent in the present construction upon the symmetrical form and relative location and mounting of the distributor arm 48. The portions 54 and 56 of arm 48 are so bent from the plane of the flat central portion 50 as to position the brushes 58 and 60 in parallel planes equally spaced from the plane of the portion 50 and spaced from one another a distance equal to the center line distance between the rows of contacts 14 and 16, and in both positions of assembly the flat portion 50 of arm 48 is clamped between the arm 62 and bearing housing 40 with this flat portion in a transverse plane midway between the transverse planes of contacts 14 and 16.

It will be understood that only a single embodiment of the present invention has been shown and described herein and other embodiments and many modifications will be obvious to those skilled in the art without departing from the spirit or scope of the invention as defined by the claims appended hereto.

I claim:

1. In a distributor, the combination with a plurality of fixed spaced contacts arranged in rows in spaced parallel planes, of a distributor rotor including a main distributor arm with diametrically opposite running brushes and a supplemental arm with diametrically opposite starting brushes with the opposite brushes of each arm arranged respectively in the spaced planes of said rows of contacts, and means whereby said arms may be assembled in either of two relative positions wherein the running brushes are circumferentially spaced on either one side or the other side of the starting brushes.

2. In a distributor, the combination with a plurality of fixed spaced contacts arranged in rows in spaced parallel planes, of a distributor rotor

including a main distributor arm with diametrically opposite running brushes and a supplemental arm with diametrically opposite starting brushes with the opposite brushes of each arm arm arranged respectively in the spaced planes of said rows of contacts, said main distributor arm being so formed that it may be mounted in either of two positions relative to said supplemental arm to selectively space said running brushes circumferentially on either side of said starting brushes.

3. In a distributor, the combination with a plurality of fixed spaced contacts arranged in rows in spaced parallel planes, of a main distributor arm comprising a metal plate with diametrically opposite running brushes, a supplemental arm comprising a member of insulating material with a metal insert providing diametrically opposite starting brushes, the opposite brushes of each arm being arranged respectively in the spaced planes of said rows of contacts, and means to secure said arms together with each running brush adjacent to and circumferentially spaced on one side of the respective starting brush that is in the same plane.

4. The combination set forth in claim 3 in which said main distributor arm is symmetrically formed whereby the same may be reversed relative to said supplemental arm to dispose the respective running brushes thereof on the other side of the adjacent starting brushes.

5. In a distributor, the combination with a plurality of fixed spaced contacts arranged in rows in spaced transverse planes, of a rotatable distributor shaft, a distributor arm comprising a metal plate with integral diametrically extending portions which terminate in axially spaced brushes, and means to secure said arm to said shaft and position each of said brushes to rotate in the plane of one of said rows of contacts.

6. In a distributor, the combination with a plurality of fixed spaced contacts arranged in rows in spaced transverse planes, of a rotatable distributor shaft, a distributor arm having diametrically opposite brushes in axially spaced relation, and means to secure said arm to said shaft with said brushes respectively in the spaced planes of said rows of contacts, said brushes being symmetrically arranged with reference to said arm whereby said arm can be bodily reversed in position and said brushes will still be arranged in the spaced planes of said rows of contacts.

7. In a distributor, a rotatable distributor shaft, a bearing for mounting said shaft including a bearing housing secured to one end of said shaft, a main distributor arm comprising a metal plate with diametrically opposite running brushes, a supplemental arm comprising a member of insulating material with a metal insert providing diametrically opposite starting brushes, and means to secure said supplemental arm to said bearing housing and clamp said main distributor arm between said supplemental arm and bearing housing.

WILBUR L. CARLSON.