June 29, 1948. J. L. ARTHUR 2,444,325

IGNITION DISTRIBUTOR

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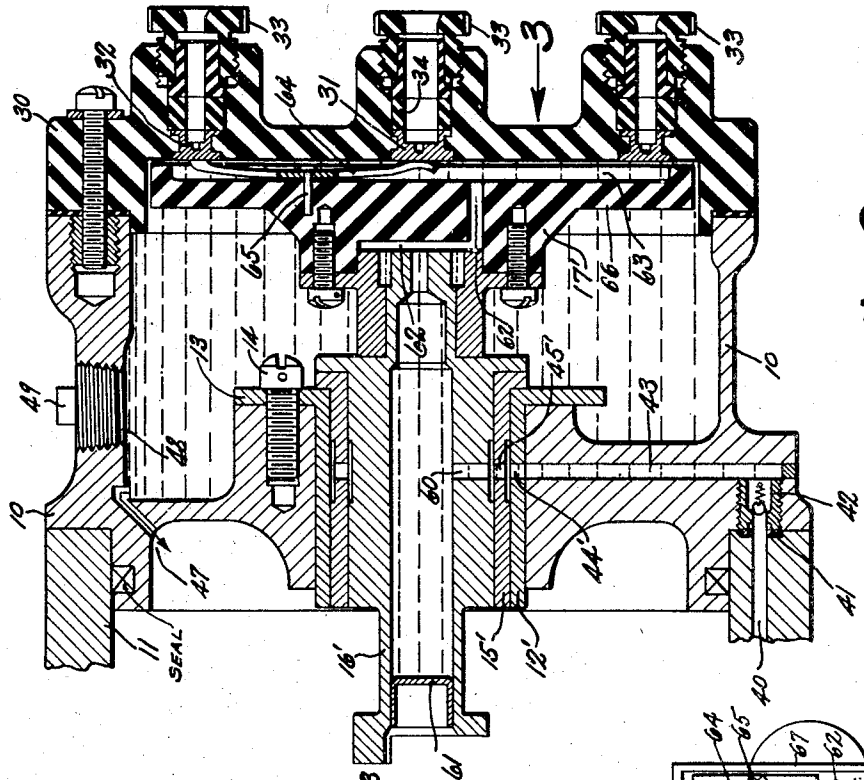


Fig. 2

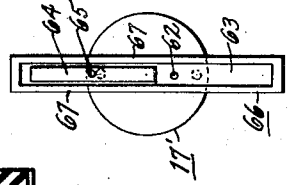


Fig. 3

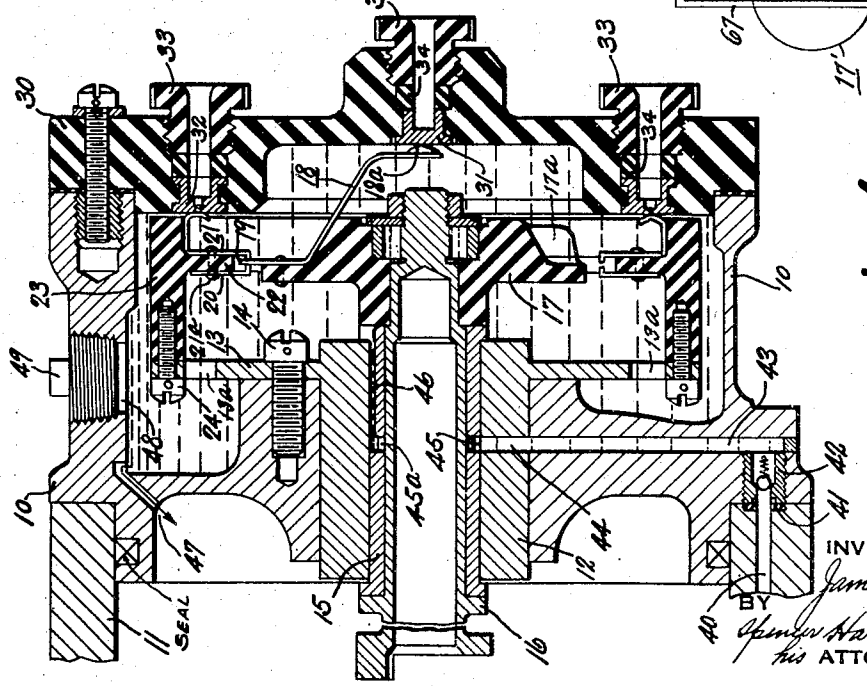


Fig. 1

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IGNITION DISTRIBUTOR

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This invention relates to ignition distributors particularly for airplane use.

Its object is to improve the operation of an ignition distributor which is required to operate at any altitude. This object is accomplished by completely filling the distributor housing with oil which has good dielectric properties and by providing for such movement of the oil within the distributor housing as will avoid alignment or the "chaining," due to electrical stress, of moisture globules which, if not disturbed, would provide a conducting path for current at high voltage. The agitation of the oil is insufficient to cause foaming which would impair the dielectric properties of the oil.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings

Figs. 1 and 2 are longitudinal sectional views of ignition distributors embodying different forms of the invention. Fig. 3 is a view of the rotor 17' of Fig. 2 looking in the direction of arrow 3 of Fig. 2 and is drawn to a smaller scale than Fig. 2.

In Fig. 1 there is shown an ignition distributor 10 adapted to be mounted within the tubular portion 11 of a part of the engine block, for example, the part which encloses the valve-operating cam shaft. The housing 10 supports a bearing frame 12 integral with a plate 13 through which screws 14 pass for securing the bearing frame to the housing. The bearing frame supports a bearing bushing 15 in which a distributor shaft 16 is journaled. Shaft 16 drives a distributor rotor 17 carrying a distributing blade 18, the outer end 19 of which is caused to pass between and to engage a plurality of pairs of contacts, each pair comprising contacts 20 and 21 secured to an annular ledge 22 integral with a non-conducting cylinder 23 attached by screws 24 to the plate 13.

The distributor housing 10 is closed by distributor cap 30 of insulating material molded around a center insert 31 and a plurality of inserts 32 arranged in a circular row coaxial with the shaft 16. These inserts are connectable with insulated wires which are held in place by the tightening of bushings 33 which compress resilient non-conducting washers 34 around the insulation of the wires. The inner contact 31 is in engagement with a button 18a provided by the rotor blade 18. Each of the contacts 32 is electrically connected with contacts 21 and through the metal rivets 21a with the contacts 20.

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Where the engine lubricating oil has satisfactory dielectric properties the engine pressure oil line is connected with a duct 40 from which oil under pressure flows through a seal washer 41, a check valve 42 and a passage 43 in the housing 10, through a hole 44 in the frame 12, through an annular groove 45 in the bushing 15 and through a longitudinal groove 46 therein to the interior of the distributor housing. Some oil flows from groove 45 through hole 45a to lubricate the shaft 16 and the interior of bushing 15. The housing is completely filled; and the excess escapes through a passage 47. If it is necessary to fill the housing with oil before it is filled by the circulation of the engine oil, such oil is introduced through an opening 48 closed by a filler plug 49.

The plate 13, the non-conducting cylinder 23 and the non-conducting cap 30 provide a chamber in which oil enters near the center thereof from the groove 46. Oil flows generally radially from the central portion of this chamber toward the cylinder 23 and passes out through holes 13a in plate 13, there being a number of these holes equally-spaced in a circular row. As the oil thus circulates radially, its movement is intercepted by a vane 17a of the rotor 17 and, to a lesser extent, by the blade 18. The agitation of the oil as it moves generally radially prevents the chaining of moisture globules which, if allowed to chain, would provide a path of relatively low resistance for the high tension current and might divert the sparking impulse from the proper spark-plug directly to ground through some metallic part of the distributor housing or indirectly to ground through some other spark-plug in a cylinder then under relatively low pressure. The agitation is of a mild nature sufficient to prevent chaining of moisture globules but insufficient to cause foaming of the oil. All of the oil in proximity to the end portion 19 of the blade 18 and the rows of contacts 20 and 21 is kept in motion in currents which constantly change in direction so that alignment of moisture globules under electrical stress will not occur.

As the blade passes between a pair of contacts 20, 21, the oil therebetween serving as a lubricant is a thin film through which the high tension current will pass.

In the form shown in Fig. 2 the oil from the engine is conducted from the passage 43 of the housing 10 through a hole 44' in the bearing frame 12' through a hole 45' in the bushing 15' and through a hole 60 in the shaft 16' which is hollow and is closed at the driving end by plug 61. From

the shaft the oil passes through a channel 62 provided in the distributor rotor 17' which is driven by the shaft 16'. The channel 62 leads to a groove 63 in the bar-like portion 66 of the rotor 17' (Fig. 3). The groove 63 receives a rotor blade 64 secured to the rotor 17' by a pin 65. The inner end of blade 64 engages the center contact 31 and the outer end of blade 64 wipes across the contacts 32. The bar-like portion 66 fits closely within the cap 30.

The walls of the groove 63 together with the inner walls of the cap 30 provide a chamber through which oil tends to circulate from near the axis of rotation of the rotor 17' generally in a radial direction. However, as the body of oil within the groove tends to move radially, such movement is being continually intercepted by cross currents which exist by reason of the fact that the body of oil is being rotated about the axis of the rotor 17'. Oil will pass from the groove 63 through the narrow space between the cap 30 and the long side edges 67 of the bar 66. All of the oil in proximity to the blade 64 receives agitation sufficient to prevent the chaining of moisture globules in a region which is subjected to electrical stress. Agitation is insufficient to cause foaming of the oil.

In both forms of distributors, the prevention of chaining of moisture globules is accomplished by fundamentally the same method. That method is to intercept by a mild agitation the generally radial flow of the oil in proximity to the distributor rotor. The distributor shown in Fig. 1 is one which provides for inspection of the distributor blade and distributing contacts in assembled relation when the cover 30 is removed. On account of this feature, the body of oil to be agitated is greater than in the case of the distributor shown in Fig. 2 when only a small body of oil is subjected to agitation at any instant. Therefore the rotor 17 of the distributor shown in Fig. 1 should have an agitating vane 17a.

While the embodiments of the present invention as herein disclosed, constitute preferred forms, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An ignition distributor having a high-voltage terminal and spark-plug cable terminals, distributing contacts respectively connected with the spark-plug cable terminals and arranged in a circular row, a shaft, a conducting blade insulatingly supported by the shaft for distributing high tension current from the high voltage terminal to the contacts, a housing for contacts and blade having an inlet near the shaft axis for admission of oil under pressure and an outlet at the uppermost part thereof for overflow of oil when the housing is full, a chamber within the housing receiving the oil entering the housing near the shaft axis and through which oil tends to flow generally in a radial direction outwardly from a region near the shaft axis, and means rotated by the shaft for causing a mild agitation of the oil flowing in the chamber in order to prevent chaining of moisture globules.

2. A distributor according to claim 1 in which the chamber is provided by a non-conducting cylinder which supports the distributing contacts, by a plate supported within the housing and having outlets near the interior wall of the cylinder and by a non-conducting cap supporting the distributor terminals, and in which the oil-agitating means is provided by a vane rotated by the shaft.

3. A distributor according to claim 1 in which the chamber is provided by the inner wall of a non-conducting cap supporting the distributor terminals and by a diametrically located, transversely extending groove provided by a bar-like rotor driven by the shaft, the distributing blade being located within the groove and attached to the rotor, the oil inlet conduit including a passage through the shaft and leading to the rotor, and a passage through the rotor leading to the groove near the axis of the shaft, and in which the oil agitating means includes the groove side edge surfaces which are closely spaced from the interior of the distributor cap.

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