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DISTRIBUTOR HAVING A CONTACT BLADE MOVABLE IN
RESPONSE TO ROTATIONAL SPEED
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FIG. 1

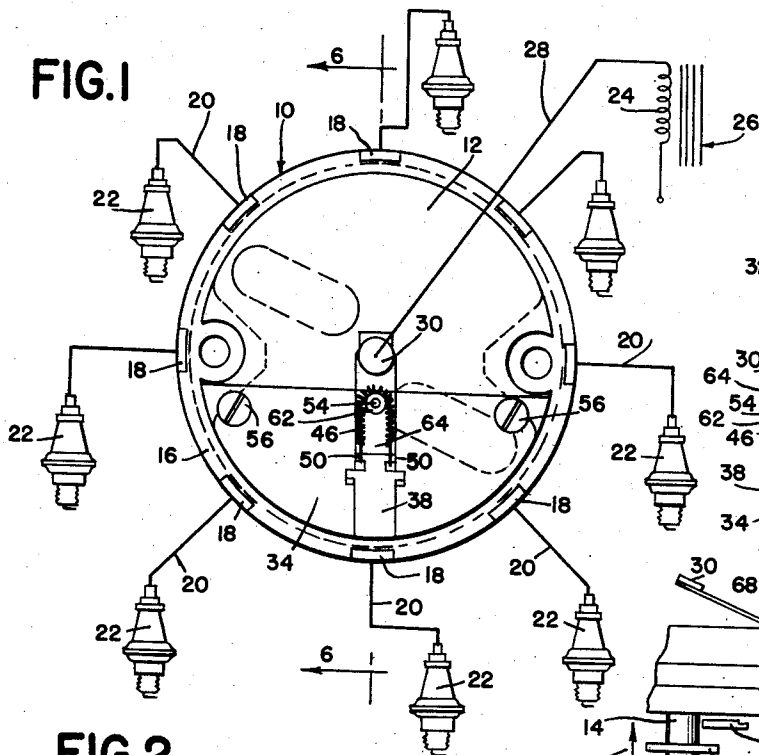


FIG. 6

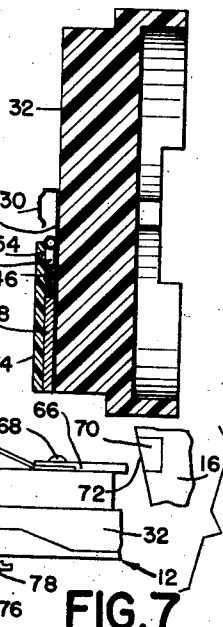


FIG. 2

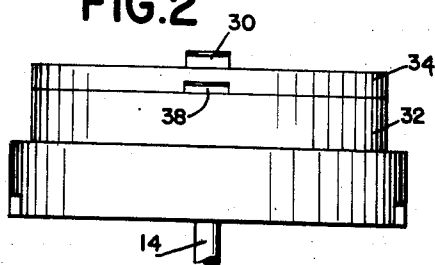


FIG. 7

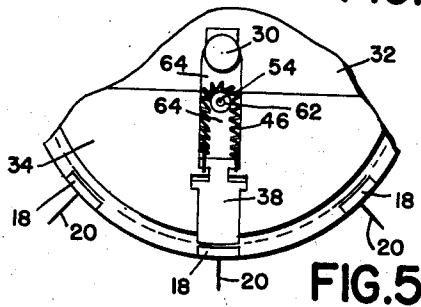


FIG. 5

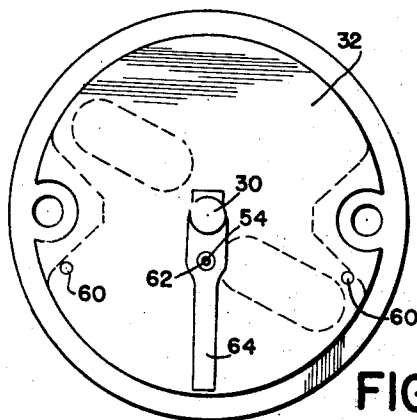


FIG. 3

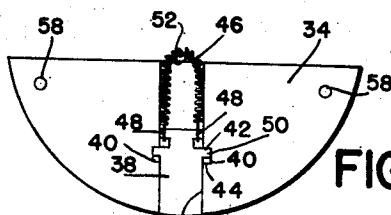


FIG. 4

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DISTRIBUTOR HAVING A CONTACT BLADE MOVABLE IN RESPONSE TO ROTATIONAL SPEED

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12 Claims. (Cl. 200-24)

This invention relates to a distributor for internal combustion engines wherein the gap between the rotor blade and the fixed electrodes is automatically varied as a function of the rotational speed of the rotor.

It is well known that the output of an ignition coil of the type employed for internal combustion engines is greatly reduced at elevated speeds. As a result of this condition, where the gap between the rotor blade and the fixed electrodes is fixed as in conventional engines, the selection of the fixed gap is a compromise between the desired large gap for starting conditions and a small gap for higher speed operating conditions.

It is among the objects of the present invention to overcome this limitation which has been prevalent in internal combustion engines until now by providing a distributor comprising a rotor, a blade carried by the rotor in an arcuate path, a relatively fixed electrode adjacent the path of the blade, the blade being movable relative to the path in response to its rotational speed, means limiting movement of the blade to maintain a minimum finite gap with the electrode, and means biasing the blade away from the electrode below a predetermined rotational speed.

According to one embodiment of the invention, the blade is movable radially relative to the rotor whereas in another embodiment the rotor is movable parallel to its axis of rotation. The electrode may have a surface proximate to the blade inclined relative to the axis of rotation. For multi-cylinder engines, a plurality of electrodes will be substantially uniformly spaced adjacent the arcuate path traversed by the blade.

The means for biasing the blade away from the electrode below a predetermined rotational speed may be a coil spring having its opposite ends connected to the blade. Below the predetermined rotational speed at which relative movement between the blade and electrode occurs, the portion of the blade proximate to the electrode is preferably substantially flush with the rotor. In accordance with a preferred embodiment of the invention, the blade is movable relative to the electrode in response to centrifugal force.

The means limiting movement of the blade preferably maintains a minimum gap within the range of 0.020 to 0.025 inch in conjunction with internal combustion engines whose nominal voltages are of the order of twelve volts or below. In such cases, the gap between the blade and electrodes under starting conditions is preferably within the range of 0.035 to 0.045 inch. As a rule of thumb, these gaps can be considered as approximating 0.022 and 0.040 inch respectively.

A more complete understanding of the invention will follow from a detailed description of the accompanying drawings wherein:

FIG. 1 is a partially diagrammatic plan view depicting a distributor together with certain cooperating components of an ignition system;

FIG. 2 is a front elevation of a rotor of the type depicted in FIG. 1;

FIG. 3 is a plan view of the rotor of FIG. 1 with the upper segment removed;

FIG. 4 is a bottom plan view of the upper segment of the rotor of FIG. 1 depicting a blade and restraining spring positioned therein;

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FIG. 5 is a fragmentary plan view of the rotor of FIG. 1 depicting the blade in its extreme projected position;

FIG. 6 is a sectional elevation taken along line 6-6 of FIG. 1; and

FIG. 7 is a fragmentary elevation, partially in section, depicting a modified form of distributor embodying the present invention.

The distributor 10 depicted in the drawings comprises a rotor 12 suitably applied to a distributor shaft 14 which ordinarily rotates at a speed equal to one-half that of the engine crankshaft. A distributor cap 16 is diagrammatically shown in FIG. 1 as carrying eight substantially equally spaced electrodes 18, each connected by a conductor 20 to a spark plug 22 of an eight cylinder engine which has been selected merely for purposes of example, since the invention is applicable to engines having any number of cylinders desired.

Also diagrammatically shown is the secondary winding 24 of a conventional ignition coil 26, the winding having one of its terminals connected by means of a lead 28, through the central tower of the distributor head 16 to the spring contact 30 carried by the rotor 12.

The body of the rotor is composed of insulating material and is surmounted by an insulating segment 34 providing a recess 36 in which the rotor blade 38 is slidably mounted between limits with respect to the rotor body. The recess 36 provides transversely extending notches 40 forming shoulders 42 and 44 which limit relative movement of the blade 38 between its retracted position where its gap with the electrodes is maximum to its projected position where the gap with the electrodes is a minimum. In the form of the invention depicted in FIGS. 1 to 6, the blade 38 is biased towards its retracted position by means of a bent coil spring 46 having its opposite ends 48 embracing transverse arms 50 formed on the blade 38. The loop 52 defined by the bent spring 46 is received over a pin 54 projecting upwardly from the body 32 so that the blade 38 will be urged toward its retracted position below rotational speeds at which outward movement of the blade is desired. The design of the spring in any case will depend upon the centrifugal forces developed within the range of speeds through which movement of the blade is desired.

With the spring 46 and blade 38 assembled in the recess or groove 36 formed in the segment 34, this sub-assembly will be applied to the rotor body 32 and secured thereto by means of screws 56 passed through openings 58 provided in the segment 34 in registry with openings 60 which have been tapped into the rotor body 32. Suitably secured to the rotor body 32, by means of a rivet 62 or the like, is a contact strip 64 carrying the spring contact 30 already referred to. The contact strip 64 serves as a bearing surface for the blade 38 with which it is always in contact regardless of the position assumed by the blade, providing circuit continuity between these two elements.

The retracted position of the blade 38 has been depicted in FIGS. 1 and 4 whereas its maximum projected position has been shown in FIG. 5 on a slightly exaggerated scale.

The modification depicted in FIG. 7 contemplates a rotor 32 of the type which moves as an entirety along its rotational axis as its speed changes. As viewed in FIG. 7, the rotor 12 and its shaft 14 move upwardly with an increase of speed and downwardly as speed decreases to a minimum. In order to provide the desired variation in gap between the blade 66 which is fixed thereto in this case, as by means of a rivet 68, the electrode 70 carried by the cap 16 has been shown as having a conical or otherwise inclined surface 72 proximate to the outermost surface of the blade 66. In FIG. 7 the rotor has

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been depicted as in its lowermost position. As speed increases, the rotor will move upwardly as depicted by the arrow 74 so that the distance between the blade 66 and the electrode 70 will decrease so as to provide an optimum gap for the higher speeds, limited by the engagement of a flange 76 carried by the shaft 14 with a fixed stop 78. Thus, it will follow that in the embodiment depicted in FIG. 7, the maximum gap between the blade and the electrode will occur at the lowermost position of the rotor and the minimum gap will occur at the uppermost position thereof. The gaps in this case as well as in the case of the preceding figures will preferably vary from a maximum value within the range of 0.035 to 0.045 inch to a minimum within the range of 0.020 to 0.025 inch, which may be referred to nominally as from 0.040 to 0.022 inch respectively.

These ranges of gaps are those preferred with ignition systems employing twelve volts or less as in current practice with the manufacturers of motor vehicles.

In the event that higher voltages are used in the future, the preferred gaps would be modified appropriately.

Whereas only two specific forms of the present invention have been exemplified with reference to the accompanying drawings, such variations as will be suggested to those skilled in the art are contemplated as coming within the scope of the appended claims.

I claim:

1. A distributor for internal combustion engines comprising a rotor, a blade carried by said rotor in an arcuate path, a relatively fixed electrode adjacent the path of said blade, said blade being movable relative to said path in response to its rotational speed, means limiting movement of said blade to maintain a minimum finite gap with said electrode, and means biasing said blade away from said electrode below a predetermined rotational speed.

2. A distributor according to claim 1 wherein said blade is movable radially relative to said rotor.

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3. A distributor according to claim 1 wherein said rotor is movable parallel to its axis of rotation.

4. A distributor according to claim 3 wherein said electrode has a surface proximate to said blade inclined relative to said axis.

5. A distributor according to claim 1 wherein a plurality of electrodes are substantially uniformly spaced adjacent said path.

6. A distributor according to claim 1 wherein said biasing means is a spring.

7. A distributor according to claim 1 wherein said biasing means is a coil spring.

8. A distributor according to claim 1 wherein said biasing means is a coil spring having opposite ends connected to said blade.

9. A distributor according to claim 1 wherein a surface of said blade proximate to said electrode is substantially flush with said rotor below said predetermined rotational speed.

10. A distributor according to claim 1 wherein said limiting means maintains a minimum gap within the range of 0.020 to 0.025 inch.

11. A distributor according to claim 1 wherein below said predetermined speed the gap between said blade and electrode is within the range of 0.035 to 0.045 inch.

12. A distributor according to claim 1 wherein said blade is movable relative to said electrode in response to centrifugal force.

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