

Oct. 17, 1939.

J. L. ARTHUR

2,176,164

IGNITION DISTRIBUTOR

Filed April 4, 1938

3 Sheets-Sheet 1

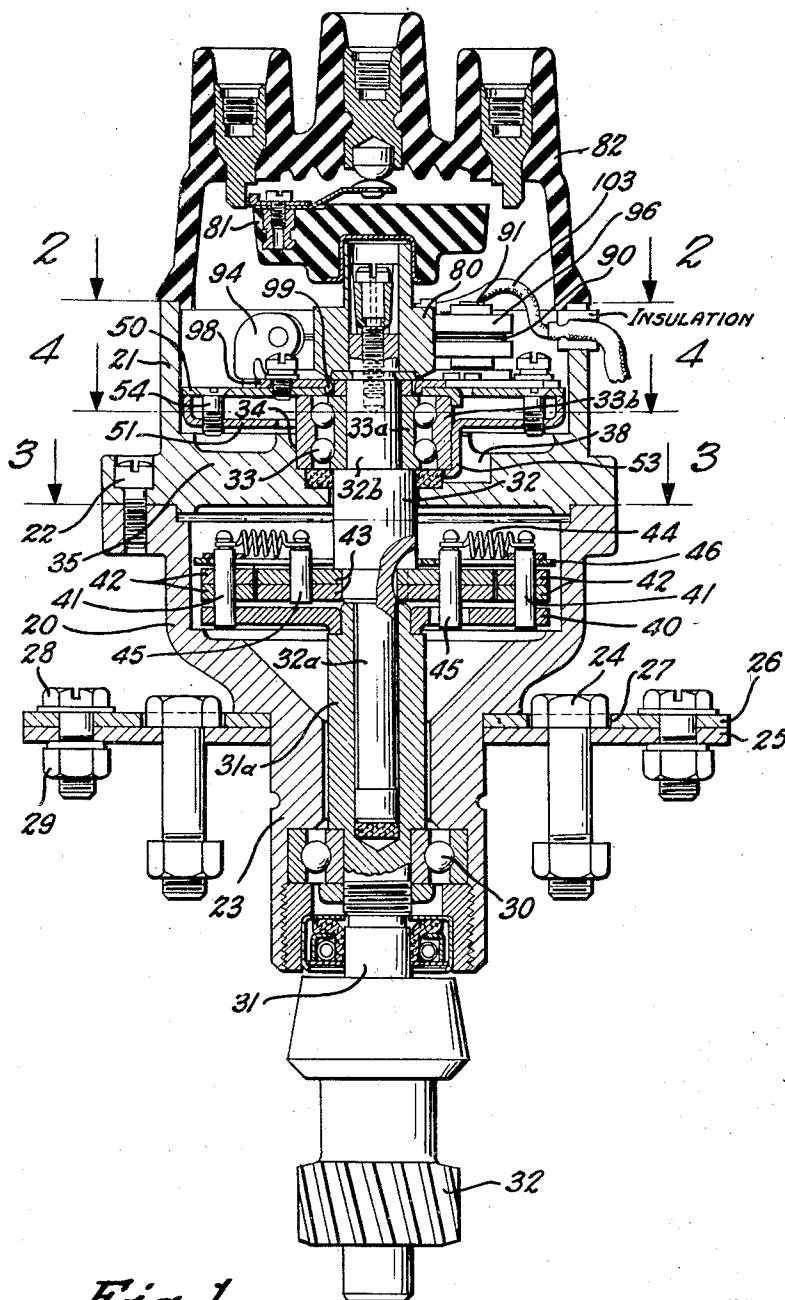


Fig. 1.

INVENTOR
James L. Arthur
BY
Spencer Hazdeman & Fehr
his ATTORNEY

Oct. 17, 1939.

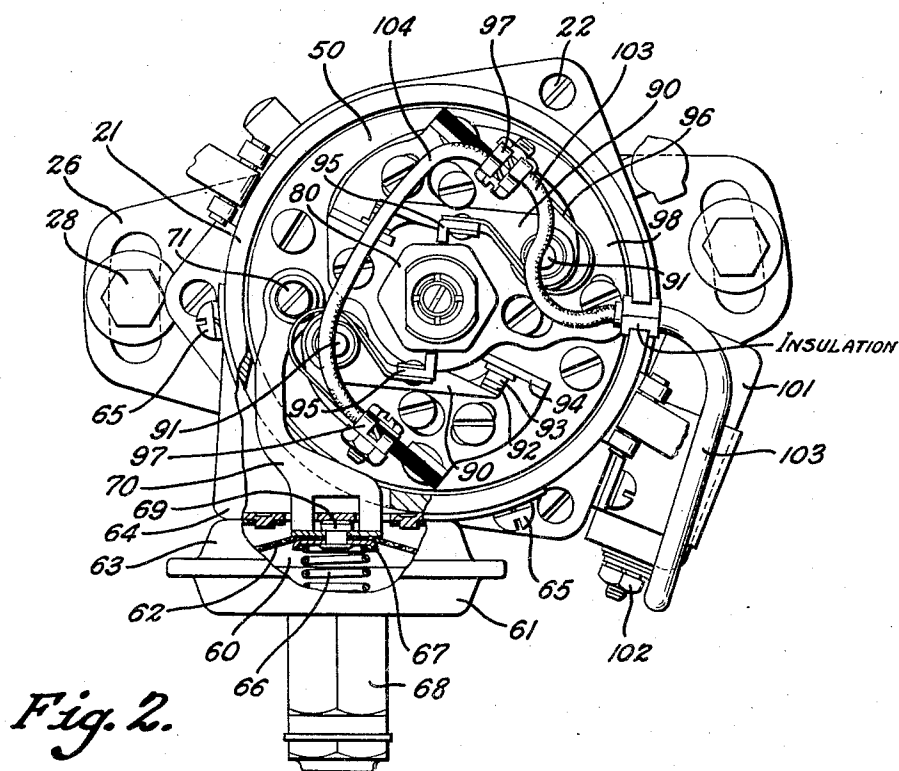
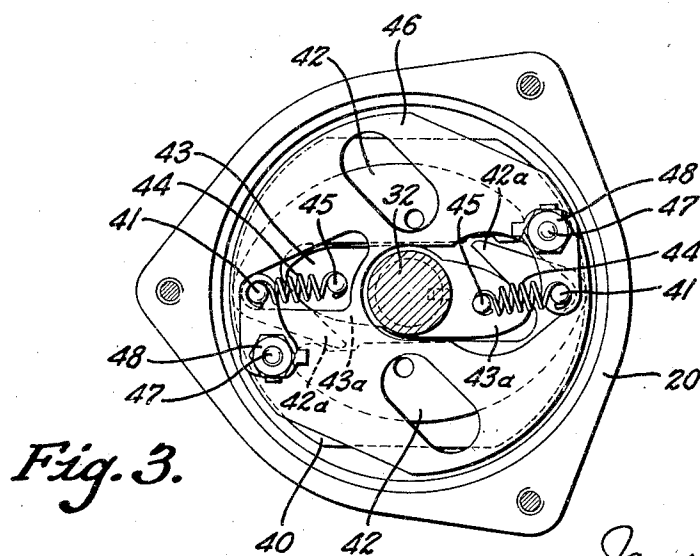
J. L. ARTHUR

2,176,164

IGNITION DISTRIBUTOR

Filed April 4, 1938

3 Sheets-Sheet 2



INVENTOR
James L. Arthur
BY
Spencer Hardman & John
his ATTORNEYS

Oct. 17, 1939.

J. L. ARTHUR

2,176,164

IGNITION DISTRIBUTOR

Filed April 4, 1938

3 Sheets-Sheet 3

Fig. 4.

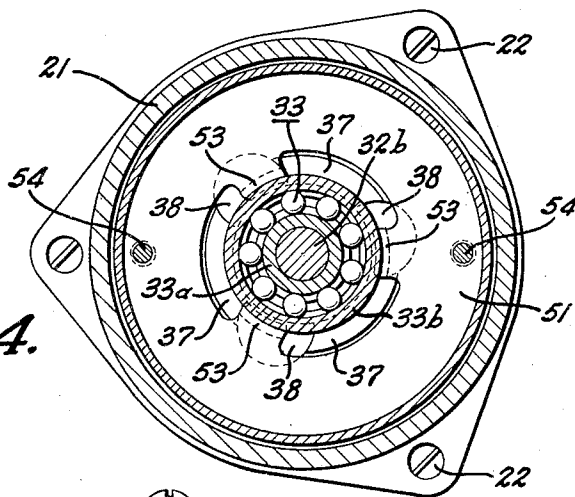
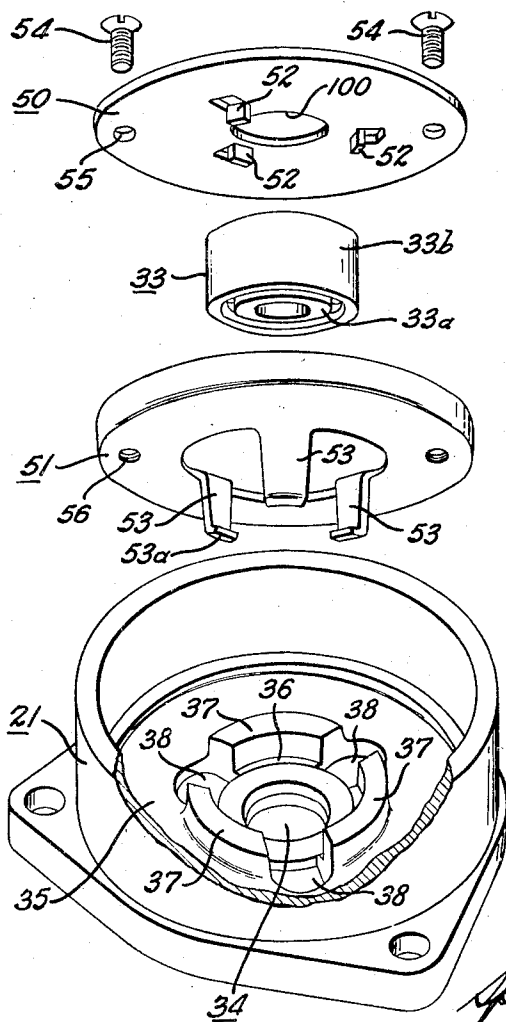


Fig. 5.

INVENTOR
James L. Arthur
BY
Spencer Hardman Fehr
his ATTORNEY.

UNITED STATES PATENT OFFICE

2,176,164

IGNITION DISTRIBUTOR

James L. Arthur, Anderson, Ind., assignor to
General Motors Corporation, Detroit, Mich., a
corporation of Delaware

Application April 4, 1938, Serial No. 199,881

3 Claims. (Cl. 200—19)

This invention relates to ignition distributors for internal combustion engines.

An object of the invention includes provisions for maintaining concentricity between the movable breaker plate and the adjustable breaker plate which carries the ignition circuit interrupter or timer and the shaft of the cam which operates the timer. Where relatively great accuracy of ignition timing is a requirement, it is necessary that the adjustable circuit breaker plate be rotated accurately about the axis of the timer cam shaft so that the relation between the shaft and the circuit breaker will be maintained constant for all positions of adjustment of the circuit breaker plate. In order to accomplish this object, I journal that portion of the timer cam shaft which is adjacent the cam in a ball bearing of conventional construction. The inner race of the ball bearing fits snugly around the cam shaft and the outer race is journaled for rotation in a recess provided by the distributor housing. The outer race is clamped between two members, one of which is the circuit breaker supporting plate. These clamping members provide means for locating the outer bearing race in a fixed position centrally of these members. In this way the breaker plate is supported for rotation about the axis of the ball bearing and therefore about the axis of the cam shaft.

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

In the drawings:

Fig. 1 is a longitudinal sectional view of an ignition distributor embodying the present invention.

Fig. 2 is a plan view thereof with the distributor cover removed taken on the line 2—2 of Fig. 1.

Figs. 3 and 4 are sectional views taken respectively on the lines 3—3 and 4—4 of Fig. 1.

Fig. 5 shows in perspective a disassembled group of parts including the circuit breaker plate, ball bearing and ignition timer housing.

The ignition distributor comprises housing members 20 and 21 which are secured together by screws 22. Member 20 has a shank 23 which is adapted to extend through a bore into the engine frame and is to be secured thereto by a frame of an engine, not shown, to which is secured the shoulders 24, a plate 25 upon which rests an adjustable plate 26 which is secured to the housing member 20. Plate 26 is provided with elongated openings 27 which provide clearance for the heads of shoulders 24. The plate 26 is secured

to the plate 25 in various positions of adjustment by means of clamping screws 28 cooperating with nuts 29. Screws 28 pass through arcuate holes in the plate 26, these holes being concentric with the axis of the shank 23. Shank 23 supports a ball bearing 30 in which a shaft 31 is journaled. Shaft 31 carries a gear 32 which meshes with a gear, not shown, driven by the engine. Shaft 31 has a tubular part 31a which receives the lower end 32a of a timer cam shaft 32, the upper end 32b of which fits into the inner race 33a of a ball bearing 33. The outer race 33b is journaled for rotation within a recess 34 provided by the bottom wall 35 of the housing 21. Recess 34 is bounded by an annular boss 36, see Figs. 1 and 5, segmental bosses 37 which are interrupted by pockets 38. The inner cylindrical surfaces of the arcuate bosses 37 are machined to provide a smooth running fit with the outer race 33b of the ball bearing 33.

The shafts 31 and 32 are connected by a means located within the housing 20, and vary the angular relation between the shafts 31 and 32 in response to speed. This speed responsive means comprises, as shown in Figs. 1 and 3, a weight plate 40 secured to the upper end of the shaft portion 31a and supporting studs 41 upon which weight members 42 are pivoted. Weights 42 are provided with arms 42a engageable with arms 43a of plates 43 secured to the shaft 32. Springs 44 are attached to studs 41 and to studs 45 attached to the arms 43a to restrain outward movements of the weights 42 due to centrifugal force. The weights 42 are confined between the plate 40 and a cover plate 46 supported upon studs 47 which cooperate with nuts 48 to secure the cover 46 in position.

Referring to Fig. 1, it will be noted that the outer bearing race 33b is clamped between a circuit breaker plate 50 and a clamping plate 51. As shown in Fig. 5, plate 50 is provided with three equi-distant tanks 52 which fit snugly around the outer race 33b in order to locate the plate 50 coaxially with the bearing 33. The clamping plate 51 is provided with three equi-distant lugs 53 which also fit around the bearing race 33b in order to locate the plate 51 coaxially with respect to the bearing 33. The lugs 53 have inturned ends 53a which are shaped to engage the bottom end surface of the bearing race 33b as viewed in the drawings. The plates 50 and 51 and the bearing 33 are secured together by screws 54 which pass through plain holes 55 in the plate 50 and which engage threaded holes 56 in the plate 51. When the screws 54 are tightened, the

bearing race 33b will be securely clamped between the plates 50 and 51 which are then located coaxially with respect to the bearing 33. The pockets 38 provided in the housing member 21 are substantially wider than the lugs 53 and the plate 51 in order to provide for limited movement of the plate 50 with respect to the housing 21. By virtue of this construction an antifriction bearing of the conventional type used to support the timer cam shaft is utilized also to support the circuit breaker plate and thus maintain it concentrically with respect to the shaft in all positions of adjustment of the circuit breaker plate.

Referring to Fig. 2, the circuit breaker plate 50 is adjusted by a device which operates in response to variations in suction in the engine intake manifold. This device includes a suction chamber 60 located between a cup-shaped housing member 61 and a flexible diaphragm 62 which together with the member 61 is secured in the periphery to a member 63 attached to a bracket 64 which is attached by screws 65 to the housing 21. The diaphragm is urged into the normal position shown in Fig. 2 by spring 66 bearing at its upper end against a washer 67 and at its lower end against a shoulder (not shown) provided in a tubular part 68 with which the engine intake manifold is connected by a pipe (not shown). The washer 67 and the diaphragm 62 are secured by rivet 69 to an arm 70 having a pivotal connection with the plate 50 provided by screw 71. As the engine intake suction varies, the position of the diaphragm 62 and plate 50 will be varied in order to adjust the timing of the ignition automatically in accordance with the requirements of the engine.

To the upper end of the cam shaft 32 is secured the ignition timer cam 80 which in turn supports and drives a distributor rotor 81 which cooperates with inserts in a distributor cap 82 in the usual manner. Cam 80 cooperates with one or more circuit interrupters. Fig. 2 shows two circuit interrupters connected in parallel. Each interrupter includes a lever 90 pivoted at 91 and carrying a contact 92 movable into and out of engagement with a contact 93 carried by stationary contact bracket 94 supported by the plate 50. Each lever 90 is insulatively supported by its pivot stud 91 and carries a non-conducting rubbing block 95 engageable with the cam 80. A leaf spring conductor 96 conducts current from a terminal conductor 97 to the lever 90 and urges the rubbing block 95 toward the cam 80 and the contact 92 toward the contact 93. The pivot stud 91 of the stationary bracket of the lower circuit interrupter as viewed in Fig. 2 are mounted directly upon the plate 50. The corresponding members of the upper circuit interrupter are mounted upon auxiliary plate 98 which is adjustably mounted upon the plate 50 and is maintained in concentric relation thereto. To accomplish this, the plate 98 is provided with a center annular flange 99 which extends into the central opening 100 of the plate 50 (see Fig. 5). Each stationary contact bracket 94 is adjustable about its companion pivot stud 91 and may be secured in the desired position of adjustment in the conventional manner. Likewise the plate 98 is adjusted with respect to the plate 50 and is secured in the desired position of adjustment relative thereto.

A condenser, the case of which is indicated by numeral 101 in Fig. 2 is secured to the distributor

housing and provides a terminal 102 connected on the inside of the condenser case 101 with one of the condenser foils, the other condenser foil being grounded on the case which is grounded on the distributor housing. A wire 103 connects the terminal 102 with the upper terminal 97 within the distributor housing and a wire 104 connects the upper terminal 97 with the lower terminal 97. In this way the two circuit breaker levers are connected with the single insulated terminal 102 and the circuit interrupters are thus connected in parallel, the levers 90 being insulated and the stationary contacts 93 being grounded.

In the arrangement shown in Fig. 2, the rubbing blocks 95 are diagrammatically opposite. This relation has been secured by an adjustment of the plate 98 relative to the plate 50. This is desirable in order to cause the pairs of interrupter contacts to separate at the same time, thus dividing up the primary current at break between two sets of contacts. This relation between the circuit interrupters having once been established, it is desirable that it be maintained for any position of the circuit breaker plate 50 to which it may be moved by the device responsive to engine intake suction. By reason of the connection of the plate 50 with the outer bearing race 33b, it is apparent that concentricity of movement of the plate with respect to the cam 80 is maintained. Therefore, for all positions of the plate 50, the rubbing blocks 95 will always be located diametrically opposite with respect to the cam 80 and their normal distance with respect to the center of the cam 80 will remain equal assuming that the wear on the two rubbing blocks 95 is the same.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, 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 for internal combustion engines comprising a housing, an antifriction bearing having its outer race rotatably journaled in the housing, a shaft carrying a timer cam and fixed within the inner race, a circuit breaker plate engaging an end surface of the outer race, a sub-plate attached to the breaker plate and engaging the opposite end surface of the outer race, means for securing the sub-plate to the breaker plate whereby the outer race is clamped between the two plates, a circuit breaker supported upon the breaker plate and having an arm operated upon by the cam; and means for adjusting the breaker plate, said plate rotating coaxially with respect to the cam by reason of the attachment of the plate to the bearing outer race.

2. An ignition distributor according to claim 1 in which the breaker plate is provided with tangs which extend along the outer cylindrical wall of the outer bearing race in order to locate the breaker plate centrally of the race.

3. An ignition distributor according to claim 1 in which the sub-plate is provided with spaced lugs which extend along the outer cylindrical wall of the outer bearing race and extend also in engagement with that end surface of the race remote from the end surface of the race which receives the circuit breaker plate.

JAMES L. ARTHUR.