

May 9, 1944.

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2,348,236

IGNITION TIMER

Filed Aug. 28, 1941

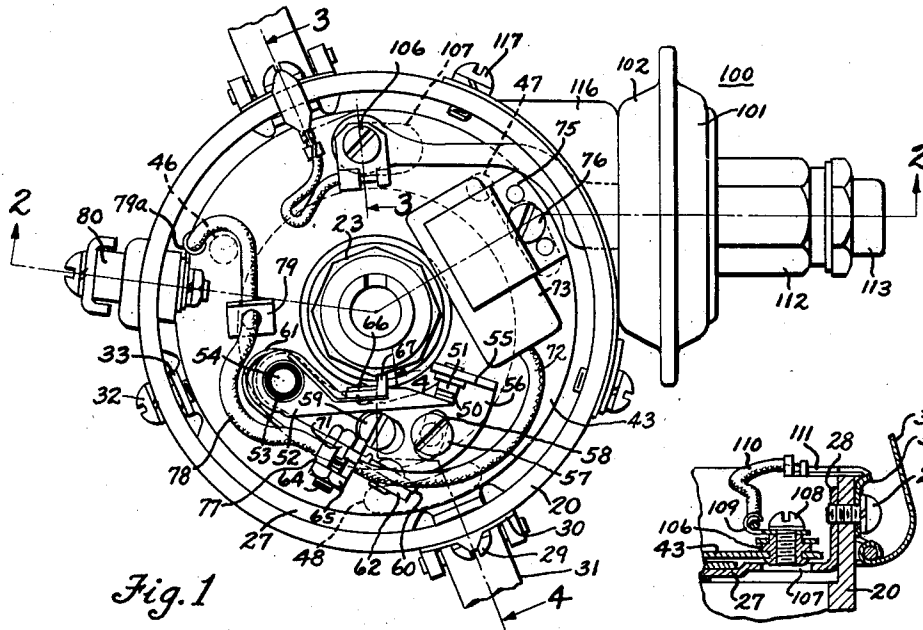


Fig. 1

Fig. 3

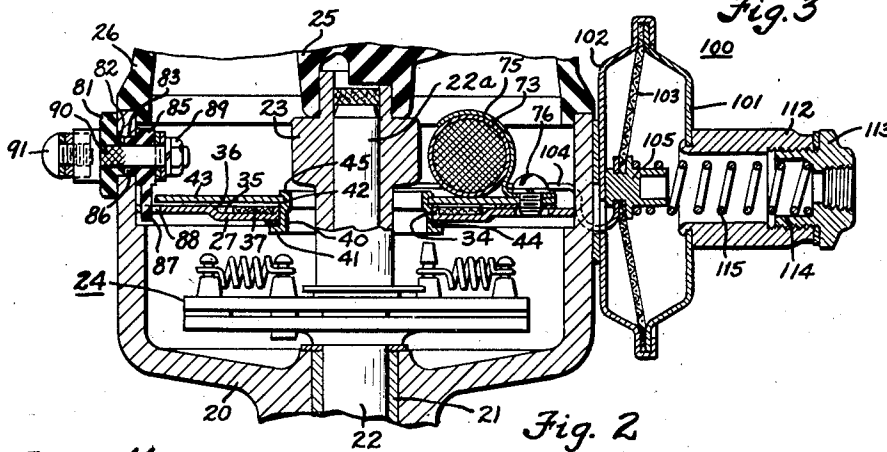


Fig. 2

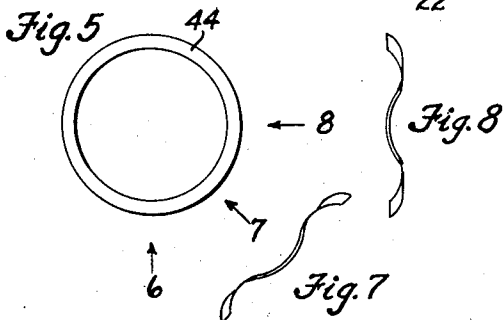


Fig. 6

Fig. 8

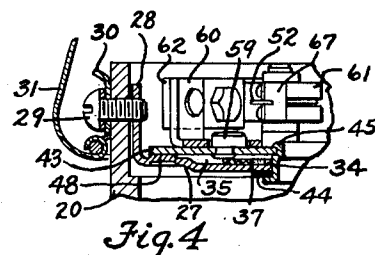


Fig. 4

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2,348,236

IGNITION TIMER

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Application August 28, 1941, Serial No. 408,571

10 Claims. (Cl. 200—31)

This invention relates to ignition timers for internal combustion engines and more particularly to the type of timer having automatic means responsive to engine intake suction for varying the ignition timer.

An ignition timer adapted for automatic control in response to variations of engine intake suction is generally provided with a circuit breaker supporting plate which is adjustable by suction responsive means about an axis concentric with the axis of rotation of the ignition timer cam. In producing an ignition timer which will have this feature, the problem has been that of providing a suitable bearing for the adjustable breaker plate which will maintain concentricity with respect to the timer cam while at the same time providing freedom of movement. It is an object of the invention to provide a solution to this problem by means of a simple construction which is durable and which can be manufactured economically.

In the disclosed embodiment of the invention I accomplish this object by providing within the timer housing a stationary plate extending in a plane at right angles to the axis of rotation of the timer cam and having a central bearing whose axis is concentric with the axis of rotation of the timer cam. The bearing of the stationary plate receives a tubular bearing attached to the center of the circuit breaker plate. The width of the bearing attached to the circuit breaker plate is greater than the width of the bearing provided at the center of the stationary plate so as to permit a slight relative movement between the bearing parts axially thereof. A device which is located between the stationary plates and the bearing sleeve attached to the movable plate tends to urge the movable bearing axially relative to the stationary bearing in such direction as to urge the movable plate towards the stationary plate. However, the movable plate does not contact all portions of the stationary plate but only at three points of support provided by three spaced bosses engaged by portions of the movable plate near the periphery thereof. In other words the movable plate is supported by the stationary plate at three points of support located near the periphery of the movable plate so as to produce a support without introducing friction in amounts such as would interfere with the functioning of the engine suction responsive means which automatically rotates the plate in response to variations in engine suction. The movable plate is resiliently urged against the three points of support by a corrugated spring metal washer

which tends to urge the movable center bearing member axially relative to the stationary center bearing member while at the same time allowing freedom of movement rotatively between the center bearing member without introducing undue friction.

By resiliently urging the movable center bearings axially relative to the stationary center bearing the movable plate is caused to bear resiliently against the stationary plate thereby providing freedom of movement between the plates not withstanding the existence of slight irregularities in the contacting surfaces of the movable stationary plates at the peripheral portions of these plates.

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

In the drawing:

Fig. 1 is a plan view of ignition timer embodying the present invention.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a view of a hold-down spring used in the present invention.

Figs. 6, 7, and 8, respectively, are end views looking in the directions of the arrows 6, 7 and 8, respectively, of Fig. 5.

Referring to the drawing 20 designates a timer housing having a bearing 21 to support a shaft 22 driven by the engine. A shaft extension 22a protectively supports a cam 23 which is drivingly connected with the shaft 22 by a speed responsive device 24 which varies the relation between the cam 23 and the engine driven shaft 24 in response to the variations in engine speed. The cam 23 supports and drives distributor rotor 25 carrying a conducting member (not shown) for distributing sparking impulses to terminals (not shown) supported by a distributor cover 26.

The timer housing 20 supports therein a stationary plate or platform 27 at three points, two of which are diametrically opposite each other. The plate 27 is suitably supported within the housing 20 by suitable devices 28. This is accomplished by providing the plate 27 with ears 28 which are adapted to receive a free end of a screw 29. The screw also secures brackets 30 on the outside of the housing 20 which have open-

ings thru which the screws 29 project. These brackets hingedly support distributor cap clamps 31 which secure the distributor cover or cap 26 firmly upon the top of the housing 20. The plate 27 is also secured at a third point within the housing 20 by a screw 32 extending thru the housing and having screw threaded engagement with an ear 33 on the plate 27.

The stationary plate or platform 27 is provided with a central opening defined by a flange 34 provided with a bearing surface concentric with the bearing 21. The plate 27 is deformed to provide an annular groove 35 between the flange 34 and a shoulder 36 which marks an off-set between essential and peripheral portions of the plate 27. In Fig. 1 the shoulder 36 is indicated by the dash-line circle. The groove 35 receives a felt washer 37 which when saturated with lubricating oil will be substantially flush with the top surface of the flange 34.

The center bearing flange 34 provides a journal for a rotary center bearing 40 having a width substantially greater than the width of the stationary bearing 34, this width being the distance between a flange 41 of the bearing 40 and a shoulder 42 against which a movable plate 43 bears when the plate 43 and bearing 40 are assembled. However, before these parts are assembled there is placed around the bearing 40 a corrugated washer 44 of thin resilient metal preferably spring steel having a non-stressed width substantially greater than the distance between the flange 41 and the plate 27 when assembled as shown in Fig. 2. After the washer 44 has been placed around the bearing 40 the bearing 40 is placed thru the bearing 34 also thru a central opening in movable plate 43 until the latter rests upon the shoulder 42 of the bearing 40. While the bearing 40 is supported with its flange 41 resting upon a fixed supporting block the upper edge portion of the bearing 40 is swedged over as indicated at 45 to secure the plate 43 to the bearing 40. The operation of swedging the edge 45 against the plate 43 causes the spring washer 44 to be compressed so that it is caused resiliently to urge the bearing flange 41 downwardly as viewed in Fig. 2 in order to cause the plate 43 to be urged downwardly against bosses 46, 47, and 48 provided by the plate 27 and extending a slight distance above the peripheral portion of the plate to the extent of something like .010". It is to be understood that the bosses 46, 47 and 48 could be provided by the plate 43. Thus the plate 43 is caused to bear resiliently upon the bosses 46, 47 and 48 by the resiliently urged spring washer 44 which urges the bearing 40 downwardly with respect to the bearing flange 34. However, there are spaces between the upper edge of the flange 34 of the plane surface of the plate 43 so that the lower surface of the plate 43 does not touch the plate 47 except at the bearing bosses.

The plate 43 is supported by plate 27 in a manner affording greater stability since the plate 27 provides a three point support for the plate 43 said point support being near the periphery of the plate 43 thereby resisting any tendency of the movable bearing 40 to wobble or sway with respect to the stationary bearing 34. Lost motion between the bearing 34 and 40 is taken up by the resilient washer 44 which causes pressure to be applied resiliently upon the bearing bosses 46, 47 and 48. Therefore as the plate 43 slides across these bosses the frictional resistance will not become excessive altho there may be slight irregu-

larities in the contacting surfaces of the plate 43 and the bosses 46, 47 and 48. The oil saturated felt washer 37 provides lubrication between bearings 34 and 40 and also at the plate receiving bosses 46, 47 and 48.

After the assembly of plates and bearings has been made in the manner described the assembly is mounted within the timer housing thru the use of screws 29 and 32. The circuit breaker 50 comprises a movable contact 50 engageable with a stationary contact 51. The movable contact 50 is fixed to the free end of a circuit breaker lever 52 having an insulating hub 53 mounted on a pivoted stud 54 fixed to the plate 43. The stationary contact 51 is attached to an ear 55 of the bracket 56. This bracket is pivoted on the stud 54 and is secured to the plate 43 by a screw 57 extending thru an arcuate slot 58 provided in the bracket 56. The screw 57 has threaded engagement with a tapped hole provided by the plate 43. The bracket 56 may be turned about its pivot by an eccentric 59 the shank of which is pivotally mounted in the plate 43 (Fig. 4). Bracket 56 has an ear 60 upon which is mounted the free end of a spring 61, the ear 60 supports an insulating block 62 to which the free end of the spring 61 is secured by a screw 64 and a nut 65. The other end of the spring 61 is attached to ears 66 together with a rubbing block 67 which is urged toward the cam 23 by the spring 61.

The screw 64 and the nut 65 also secure to the block 62 a terminal clip 71 attached to a wire 72 which is electrically connected with a foil of the condenser 73. The condenser 73 is attached to the plate 43 by a bracket 75 which is secured to the plate 43 by a screw 76, one foil of the condenser is grounded to the plate 43 thru the condenser casing 73 and a bracket 75 to the plate 43.

A terminal clip 77 is also attached to the block 62 by the bolt 64 and the nut 65 having a wire 78 passing thru a bracket 79 attached to the plate 43. The end of the wire 78 has a clip 79a electrically connected to an insulating terminal 80. This terminal is insulatingly supported by the housing 20 by an insulating washer 81 having a projection 82 extending into an opening 83 in the housing 20. An insulating washer 85 having a projection 86 projects into the opening 83 and abuts the projection 82 of the washer 81. The projections 82 and 83 insulatingly support the terminal 80 from the housing 20. The washer 85 is provided with an extension 87 which projects downwardly into a slot 88 in the plate 27. A nut 89 cooperates with the terminal 80 to secure the wire terminal clip 79 and also to clamp the insulating washers 81 and 85 against opposite sides of the wall of the housing 20. The washer 81 is mounted around the knurled portion 90 of the terminal 80 so that, after the nut 89 is tightened rotation of the terminal 80 is effectively resisted. Therefore a screw 91 used to attach a wire to the terminal 80, can be turned, but the terminal 80 will not be rotated.

In order that the plate 43 may be turned relative to the housing 20 without hindrance by reason of electric connections, wire 78 connecting the spring 61 with the terminal 80 is provided with a certain amount of slack. Therefore this wire is supported intermediate its end by the bracket 79 attached to plate 43. The plate 43 is rotated by a suction responsive device 100 comprising a housing made up of shells 101 and 102 having their peripheries clamped together and against a diaphragm 103. The diaphragm is con-

connected with one end of a link 104 by rivet 105 the other end of the link is attached to a bolt 106 which is non-rotatably attached to the plate 43 (Fig. 3). The lower end of the bolt 106 extends into an arcuate opening 107 to permit rotative movement of the plate 43 relative to the plate 27. A screw 108 secures a terminal clip 109 to the bolt 106. The clip 109 is electrically connected to a wire 110. This wire is also connected to a clip 111 which is soldered to the housing 20 forming a ground connection between plate 43 and the housing 20.

Shell 101 supports a sleeve 112 carrying a bushing 113 having recesses 114 to receive a compression spring 115 disposed between a bushing 113 and a rivet 105. The spring 115 urges the diaphragm 103 to the left (Fig. 2) to urge the link 104 in the position shown in Fig. 1. The bushing 113 is provided with a top wall to receive one end of a conduit not shown which is connected to the intake of the engine. The shell 102 of the speed responsive device 100 is secured to a bracket 116 attached to the housing 20 by screws 117.

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. In an ignition device for an internal combustion engine having a housing; a cam rotatably supported by the housing; a circuit breaker operated by the cam; and a plate for supporting the circuit breaker, the combination with said plate, of means laterally supporting the plate near its periphery; means rotatably supporting the plate at its central portion; and means about the rotatable supporting means resiliently urging the plate against its peripheral supporting means.

2. In an ignition device for an internal combustion engine having a housing; a cam rotatably supported by the housing; a circuit breaker operated by the cam; and a plate for supporting the circuit breaker, the combination with said plate, of a three point support for laterally supporting the plate near its periphery; means rotatably supporting the plate at its central portion; and means about the rotatable supporting means resiliently urging the plate against the three point supporting means.

3. In an ignition device for an internal combustion engine having a housing; a cam rotatably supported by the housing; a circuit breaker operated by the cam; and a support assembly for the circuit breaker, the combination with said support assembly of a pair of relatively movable plates one of which is fixed relative to the housing means for supporting the other plate centrally of the fixed plate and permitting relative angular movement therebetween one of said plates providing bosses engageable with the other plate substantially at its periphery; and resilient means about the supporting means for urging the movable plate toward the fixed plate whereby the movable plate is prevented from wobbling relative to the fixed plate.

4. In an ignition device for an internal combustion engine having a housing; a cam rotatably supported by the housing; a circuit breaker operated by the cam; and a plate for supporting the circuit breaker, the combination with said plate, of three bosses provided by a stationary plate for laterally supporting the circuit breaker plate near its periphery, one of the bosses being wider than the other two, said wider boss being

located near the circuit breaker; means rotatably supporting the circuit breaker plate at its central portion; and means about the rotatable supporting means resiliently urging the circuit breaker plate against the three bosses of the stationary plate.

5. In an ignition device for an internal combustion engine having a housing; a cam rotatably supported by the housing; a circuit breaker operated by the cam; and a support assembly for the circuit breaker comprising a pair of relatively movable plates, one of which is fixed relative to the housing, the combination with said support, of means for supporting the other plate centrally of the fixed plate and permitting relative angular movement therebetween; bearing means carried by the fixed plate and engageable by the movable plate substantially at its periphery; and resilient means interposed between the plates for urging the movable plate against the bearing means whereby the movable plate is prevented from wobbling relative to the fixed plate.

6. In an ignition device for an internal combustion engine having a housing; a cam operated by the cam; and a movable plate for supporting the circuit breaker, the combination with said movable plate, of means laterally supporting the plate near its periphery; a stationary bearing spaced from the plate; a bearing sleeve attached to the plate extending through the stationary bearing and having a bearing surface wider than the stationary bearing and having a flange spaced from the stationary bearing; and an undulated annular spring about the sleeve and located between the flange and the stationary bearing for urging the plate against its peripheral supporting means.

7. In an ignition device for an internal combustion engine having a housing; a cam rotatably supported by the housing; a circuit breaker operated by the cam; and a movable plate for supporting the circuit breaker, the combination with said movable plate, of a stationary plate supported by the housing and having a plurality of spaced bosses for laterally supporting the movable plate; a flange integral with the stationary plate spaced from the movable plate; a bearing sleeve attached to the movable plate extending through the flange of the stationary plate pivotally securing the movable sleeve to the stationary plate; a flange carried by the movable sleeve spaced from the flange of the stationary plate; and spring means about the sleeve and interposed between the flanges for urging the movable plate against the bosses to prevent wobbling of the movable plate.

8. In an ignition device for an internal combustion engine having a housing; a cam rotatably supported by the housing; a circuit breaker operated by the cam; and a movable plate for supporting the circuit breaker, the combination with said movable plate, of a stationary platform carried by the housing having a plurality of bosses for laterally supporting the plate near its periphery, and having an integral flange spaced from the plate; a bearing sleeve attached to the plate extending through the flange, pivotally securing the plate to the platform, said sleeve having a bearing surface wider than the flange; retaining means including a part of the sleeve and spaced from the flange for maintaining the plate in assembled relation with the platform; and resilient means about the sleeve and interposed between the retaining means of the sleeve

and the platform for urging the plate against the bosses to prevent wobbling of the movable plate.

9. In an ignition device for an internal combustion engine having a housing; a cam rotatably supported by the housing; a circuit breaker operated by the cam; and a plate for supporting the circuit breaker, the combination with said plate, of a stationary platform having three bosses for laterally supporting the plate near its periphery, one of the bosses being wider than the other two with the wider boss located near the circuit breaker, said platform also having an annular bearing flange at its central portion spaced from the plate; a movable bearing sleeve attached to the plate and extending through the flange and having a bearing surface wider than the flange, said sleeve also having a laterally extending rim spaced from the annular bearing flange of the platform; and resilient means about the sleeve and disposed between the rim and the bearing flange for urging the plate against the bosses of the platform to prevent wobbling of the plate.

10. A bearing unit comprising a pair of parallel thin metallic plates one of which is adapted to be fixed, said plates having aligned openings in the central portions thereof; a bearing sleeve extending through the openings of the plates, said sleeve having one end attached to one of the plates and having the other end extending through the opening of the other plate and bent radially outward over the other plate forming a flange spaced from said other plate for retaining the plates and the sleeve in loose assembled relation and permitting longitudinal and angular movement between the plates; bearing surfaces provided by one of the plates near the periphery of the movable plate; resilient means disposed between the flange and said other plate to thus resiliently bias the movable plate against the bosses to prevent the movable plate from wobbling; and means for actuating the movable plate.

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