

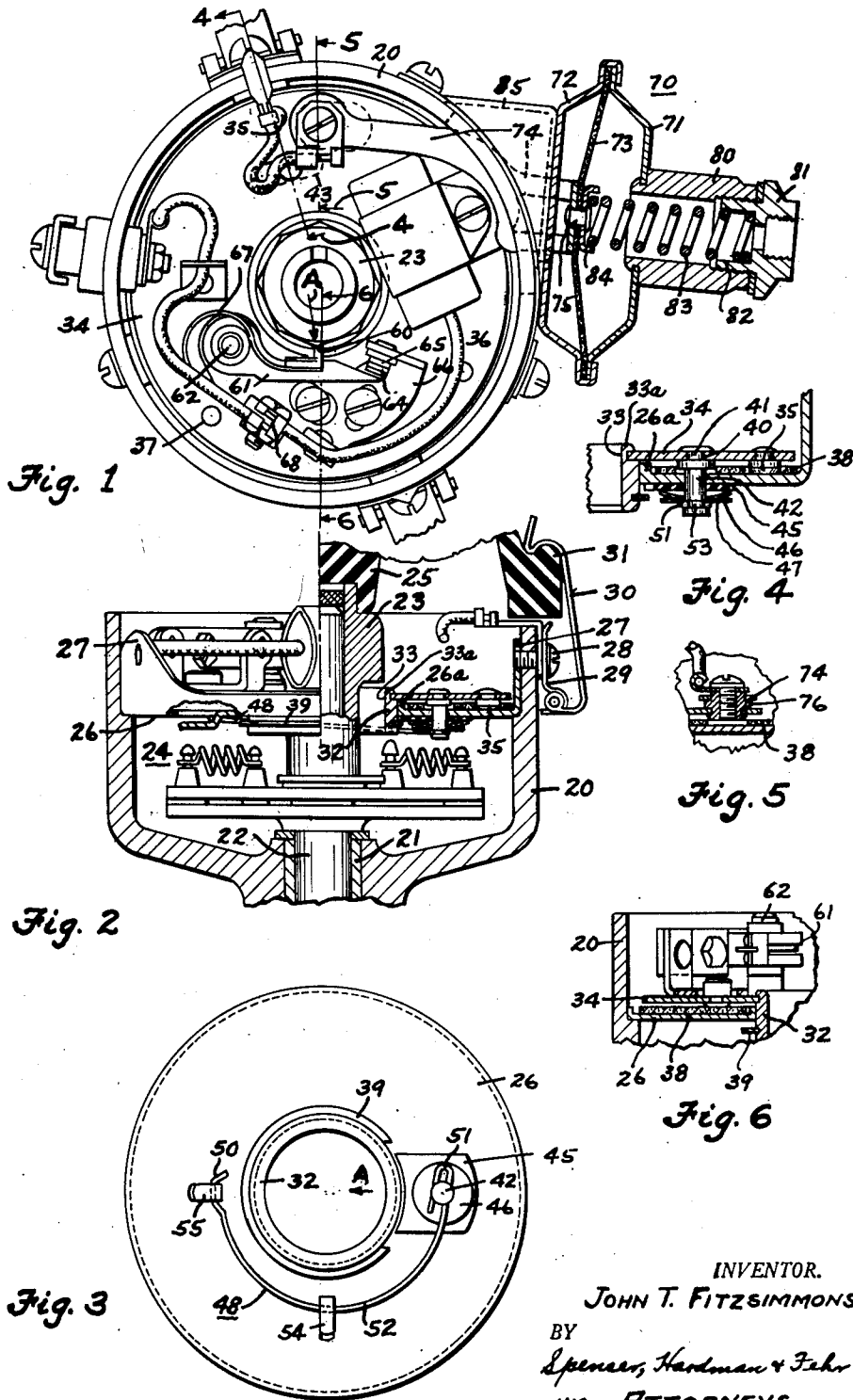
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IGNITION DEVICE

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IGNITION DEVICE

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This invention relates to ignition timer 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 rotatable 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. The rotatable plate is provided with a bearing sleeve member which is also capable of moving axially within a flange bearing member provided by a stationary plate. The rotatable plate also carries a circuit breaker device including a lever having a rubbing block which is actuated by the cam during rotation thereof. It has been found that when the rubbing block is struck by the cam the rotatable plate is urged to one side. In producing an ignition timer having the above construction the problem has been to take up any slack between the bearing members to prevent chattering when the cam strikes the rubbing block. It is an object of the present invention to provide a solution of this problem by means of spring means which will urge the rotatable plate toward one side and in the same direction which the rotatable plate is urged sidewise when the cam strikes the rubbing block.

In the disclosed embodiment of the present invention this object is accomplished by providing within the timer housing a stationary plate supported in a plane at right angles to the axis of rotation of the timer cam and having the central bearing whose axis is concentric with the axis of the timer cam. The bearing of the stationary plate receives a tubular sleeve bearing attached to the center of the rotatable plate, this sleeve is capable of moving axially relative to the stationary bearing. The outer dimension of the bearing sleeve carried by the rotatable plate is a trifle less than the internal dimensions of the flange bearing provided by stationary plate, consequently when the cam strikes the rubbing block it tends to urge the rotatable plate to one side to produce a slight lateral movement of the rotatable plate relative to the stationary plate. When this happens chattering between the bearing members results. This chattering is overcome by a spring device which is located and supported below the stationary plate. The spring has one end anchored to a part of the stationary plate and the other end hooked over a part ex-

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tending from the rotatable plate which projects through an elongated arcuate opening in the stationary plate and operates to urge the rotatable plate toward one side. This direction of the rotatable plate is in the same direction as the direction which the rotatable plate is urged sidewise when the cam strikes the rubbing block, while at the same time allowing freedom of movement rotatively of the bearing sleeve relative to the stationary bearing.

By resiliently urging the rotatable plate sidewise relative to the stationary plate the bearing sleeve of the rotatable plate is caused to bear against the bearing of the stationary plate thereby preventing chattering between the bearing member when the cam strikes the rubbing block.

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 top plan view of a circuit breaker and showing in section a vacuum actuated means which automatically moves the rotatable plate that carries the circuit breaker.

Fig. 2 is a sectional view, partly in elevation of the ignition device embodying the present invention.

Fig. 3 is a bottom plan view of the stationary plate showing the spring means and certain parts carried by the rotatable plate mounted thereon.

Figs. 4, 5 and 6 are sectional views taken on lines 4—4, 5—5 and 6—6, respectively, of Fig. 1.

Referring to Fig. 2 there is a timer housing 20 having a bearing 21, which supports for rotation, a cam shaft 22, upon which is mounted a timer cam 23. The cam 23 is drivingly connected with the shaft 22 by a speed responsive device 24 which varies the angular relation between the cam 23 and the engine driven shaft 22. The cam 23 supports and drives a rotor 25 carrying a conducting member, not shown, for distributing spark impulses to terminals, not shown, supported by a distributor cap or cover 31.

The timer housing 20 supports therein a lower stationary plate or platform 26 at several points. In this instance the plate 26 has three ears 27 having threaded apertures to receive the threaded ends of screws 28 which secure the plate 26 to the housing 20. Two of the screws attach brackets 29 on the exterior of the housing 20. These brackets hingedly support clamps 30 which hold the cover or cap 31 firmly on the top of the housing 20.

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The stationary plate 26 is provided with a central opening defined by an annular bearing flange 26a concentric with the bearing 21. The flange forms a journal for a bearing sleeve 32 having a reduced portion 33 to form a shoulder against which an upper plate or support 34 rests. The plate 34 is secured to the sleeve 32 by spinning over the reduced portion 33 against the upper face of the plate 34 as at 33a. Plate 34 carries three buttons or bearings 35, 36, and 37 which space the upper plate 34 from the lower plate 26. The buttons are provided with a convex surface which make point contact with the lower plate 26. By this arrangement friction between the buttons and the lower plate is reduced to a minimum. The annular felt member 38 is supported on the upper face of the stationary plate 26. This felt member is saturated with a suitable lubricant to lubricate the surface of the plate upon which the bearing buttons slide. The felt member also lubricates the bearing surfaces of the flange 31 and sleeve 32.

The upper plate 34 is held in assembled relation with the lower plate by passing the sleeve 32 through the bearing surface of the flange 26a until the lower end of the sleeve is beyond the lower face of the stationary plate 26. The lower end of the sleeve is provided with an annular groove to receive a C-shaped retainer washer 39.

The upper or movable plate 34 is provided with an aperture 40 the axis of which is on the same radial line which extends from the axis of the shaft 21 to the axis of one of bearings 35 and receives a reduced shank 41 of a stud 42. The stud 42 is fixed to the plate 34 by riveting over the shank 41 against the upper face of the plate 34. The lower end of the stud 42 passes freely through an arcuate slot 43 provided in the lower or stationary plate 26. The contour of the slot 43 is indicated by dotted lines in Fig. 1. An insulating washer 45, a curved washer 46 of spring metal, which overlie the slot 43, and a thin metallic washer 47, are mounted on the stud 42 and held in assembled relation on the stud by one end of a U-shaped spring 48.

The spring 48 is preferably made from music wire and has one arm to provide a detent or hook 50 while the other arm is bent upon itself to provide a U-shaped end 51. The ends 50 and 51 are connected by an integral yoke 52 which when in its normal state or unsprung condition hold the arms a certain distance apart. The uses of the spring is illustrated in Fig. 3. In order to retain elements 45, 46 and 47 in assembled relation on the lower end of stud 42 an annular groove 53 is provided to receive the U-shaped end 51.

In assembling the U-shaped spring 48 with the plate 26 and the stud 42, the arms are spread apart under tension of the yoke 52, the end 51 is fitted in the groove 53, of the stud 42, yoke 52 is inserted under a tongue 54 struck out from the normal plane of the plate 26, and the end 50 is inserted between an ear 55 struck from the normal plane of the plate 26 and the under face of the plate. When the spring is so assembled with the plate 26 and stud 42 it cannot return to its unsprung position thus a stress is exerted upon the yoke 52, to produce a tension therein causing the end 51 to move the stud 42 in the direction of the arrows A, Figs. 1 and 3, which is in the direction toward a rubbing block 60 secured to a circuit breaker lever 61. By this arrangement the spring 48 urges the rotatable plate 34 toward one side, through the stud 42, and in the same direction as the direction which the plate is urged

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sidewise when the lobes of cam 23 strike the rubbing block 60.

The circuit breaker 61 is mounted on the rotatable or upper plate 34 carrying a stud 62 providing a pivot for the breaker lever 61. Lever 61 carries a contact 64 engageable with a contact 65 attached to the bracket 66. A rivet secures to the breaker lever 63 one end of a leaf spring 67 and one arm of the L-shaped rubbing block 60. The other arm of the block 60 is adapted to engage the lobes of cam 23 as same as rotated in a counterclockwise direction. The spring 67 is connected at its other end with a terminal 68 insulatingly supported on plate 34.

The rotatable or upper plate 34 is rotated relative to stationary plate 26 by a suction device 70 comprising a housing made of shells 71 and 72 having their peripheries clamped together with the periphery of a diaphragm 73 therebetween. The central portion of the diaphragm is connected with one end of a link 74 by a rivet 75. The other end of the link passes through an opening in the housing 20 and is attached to a bearing 76 which is non-rotatably attached to the plate 34. The shell 71 supports a sleeve 80 carrying a bushing 81 having a recess 82 to receive a compression spring 83 disposed between the bushing 81 and a cup member 84 secured to the diaphragm by the rivet 75. The shell 72 of the vacuum responsive device 70 is secured to a bracket 85 attached to the housing 20.

While the embodiments of the present invention constitute 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 having a stationary plate supporting a circuit breaker adapted to be operated periodically by a cam, the combination comprising; a movable plate for mounting the circuit breaker and supported on the stationary plate, said movable plate having a journal bearing in the stationary plate adapted for limited oscillatory movement with respect to the stationary plate; means for holding the plates in assembled relation; and spring means for urging the movable plate toward one side to take up any slack in the bearing means.

2. In an ignition device having a stationary plate supporting a circuit breaker adapted to be operated periodically by a cam, the combination comprising; a movable plate for mounting the circuit breaker and supported on the stationary plate, said movable plate having a journal bearing in the stationary plate adapted for limited oscillatory movement with respect to the stationary plate; means for holding the plate in assembled relation, and spring means for urging the movable plate in the same direction as the cam operating force on the circuit breaker to take up any slack in the bearing means.

3. In an ignition device having a stationary plate supporting a circuit breaker adapted to be operated periodically by a cam, the combination comprising; a movable plate for mounting the circuit breaker and supported on the stationary plate, said movable plate having a journal bearing in the stationary plate adapted for limited oscillatory movement with respect to the stationary plate; a plurality of bearing bosses carried by one of the plates for laterally supporting the movable plate near its periphery; a stud carried by the movable plate and extending through an opening provided by the stationary plate; a

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spring washer mounted on the stud for urging the movable plate toward the stationary plate and also operating to prevent tilting of the movable plate when cam operates the circuit breaker; and a spring member for urging the movable plate toward one side to take up slack in the bearing means for preventing vibration, said spring having one end anchored to a stationary part and having the other end connected with the stud.

4. In an ignition device having a stationary plate supporting a circuit breaker adapted to be operated periodically by a cam, the combination comprising; a movable plate for mounting the circuit breaker and supported on the stationary plate; said movable plate having a bearing means journaled in the stationary plate and adapted for limited oscillatory movement with respect to the stationary plate; a stud carried by the movable plate and extending through an opening in the stationary plate, said stud being located substantially 180° from the location of the cam oper-

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ating force on the circuit breaker; a spring washer mounted on the stud for urging the movable plate toward the stationary plate to resist tilting movements of the movable plate relative to the stationary plate when the cam operates the circuit breaker; and a spring member for urging the movable plate toward one side to keep slack out of the bearing means, said spring having one end anchored to a stationary part and having the other end connected with the stud whereby the spring member urges the movable plate in the same direction as the cam operating force on the circuit breaker.

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