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2,717,286

STABILIZING DEVICE

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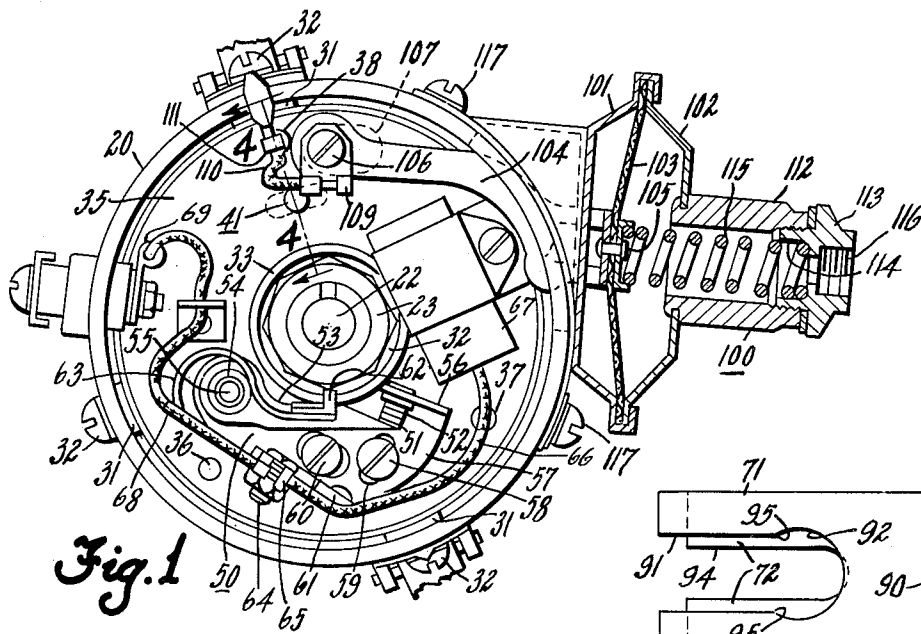


Fig. 1

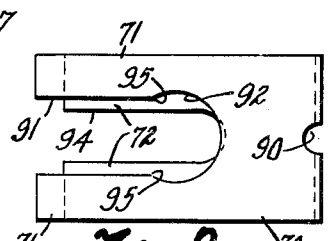


Fig. 2

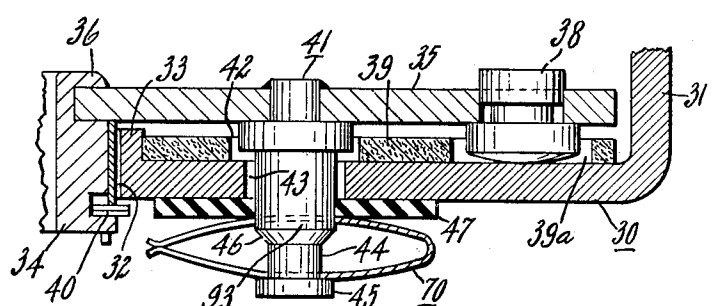


Fig. 4

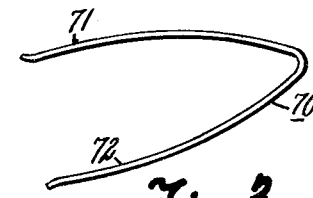


Fig. 3

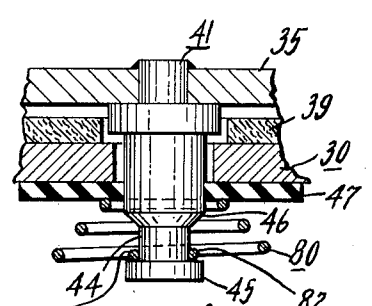


Fig. 6

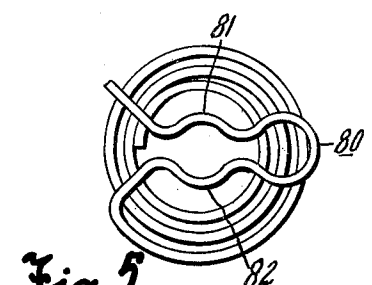


Fig. 5

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1

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STABILIZING DEVICE

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5 Claims. (Cl. 200—31)

This invention relates to improvements in ignition timers or distributors, particularly to the type having automatic means responsive to engine intake suction for varying the ignition timer.

An object of the present invention is to provide an ignition device having a three point bearing support for a movable plate which carries the circuit breaker mechanism with a device which will off-set the reaction of the actuating cam upon the rubbing block of the circuit breaker to avoid tilting of the movable plate about its axis of rotation. This object is accomplished by placing the rubbing block carried by the circuit breaker lever between two of the bearing supports for the movable plate and placing resilient spring means substantially opposite to the point of engagement of the rubbing block with the cam. The spring means functions to prevent the movable plate from tilting relative to the fixed plate due to the reaction of the rubbing block upon the cam, which point of reaction is above the plane of the bearing supports.

Another object of the invention is to provide a circuit breaker mechanism in a distributor wherein a movable plate is resiliently held against a stationary plate to prevent chatter of the movable plate upon the stationary plate, and at the same time, to provide freedom of movement of the movable plate on the stationary plate when the movable plate is actuated to vary the time of sparking impulses to the engine controlled by the distributor.

Another object of the invention is to provide in a distributor with removable spring means for retaining a movable circuit breaker plate on a fixed support and apply a light friction drag thereon to avoid chattering.

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 mechanism and showing in section the vacuum actuated means which automatically moves the movable plate that supports the circuit breaker mechanism.

Fig. 2 is a plan view of a leaf spring for use in the present invention.

Fig. 3 is a side view of the leaf spring shown in Fig. 2.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 1 showing the use of the leaf spring shown in Figs. 2 and 3.

Fig. 5 is a plan view of a coil spring for retaining the movable plate on the fixed plate.

Fig. 6 is a sectional view similar to that taken on line 4—4 of Fig. 1, but showing the use of the coil spring shown in Fig. 5.

Referring to the drawings, 20 designates a timer housing having a bearing means, not shown, which supports for rotation a cam shaft 22 upon which is mounted a

2

cam 23. The cam 23 is drivingly connected with the shaft 22 by a speed responsive device, not shown, which varies the angular relation between the cam and the engine driven shaft 22.

5 The timer housing 20 supports therein a lower stationary plate 30. In this instance the plate has three spaced ears 31 having tapped apertures to receive screws 32 which secure the plate 30 to the housing 20, as shown in Fig. 1. The stationary plate 30 has a central opening 32 defined by an annular bearing flange 33. The bearing flange 33 forms a journal for a bearing sleeve 34 to which is attached a movable or upper plate 35. The upper plate 35 is attached to the sleeve 34 by spinning over a portion of the sleeve against the upper face of the plate 35 as at 36. The plate 35 carries three buttons or bearings 36, 37 and 38 which support the upper plate 35 on the stationary plate 30. The bearing or buttons have spherical portions which make point contact with the lower plate so as to reduce friction to a minimum. A felt washer 39, saturated with a suitable lubricant, is supported on the lower plate 30. This washer provides lubricant for the upper face of the plate 30 and also on the bearing surfaces between the sleeve 34 and flange 33.

15 The upper plate 35 is held in assembled relation with the lower plate 30 by passing the sleeve 34 through the bearing flange 33 until the bearing buttons 36, 37 and 38 engage the upper face of plate 30. The lower end of the sleeve is provided with an annular groove to receive a C-shaped retainer washer 40. The buttons 36, 37 and 38 pass through openings 39a provided in the felt washer 39, as clearly shown in Fig. 4.

A circuit breaker assembly 50 is mounted on the movable plate 35 and comprises a movable contact 51 engageable with a stationary contact 52. The movable contact is attached to the free end of a lever 53 having an insulating sleeve 54 mounted on a pivot stud 55 fixed to the movable plate 35. The stationary contact 52 is attached to an ear 56 of a bracket 57 which is also pivoted on the stud 55 and is secured to the plate 35 by a screw 58 extending through an arcuate slot 59 in the bracket 57. The screw 58 has threaded engagement with plate 35. The bracket 57 may be turned about the pivot stud 55 by an eccentric 60 which is substantially mounted in the plate 30. The bracket 57 has an ear 61 to which a free end of a spring 63 is insulatingly attached by a screw and nut device 64. The other end of the spring 63 together with a rubbing block 62 are attached to the lever 53, the spring 63 urging the rubbing block toward the cam 23.

50 The screw and nut device 64 also secures clip 65 having one end of a wire 66 attached thereto. The other end of the wire 66 is connected to one foil of a condenser 67. The other foil of the condenser 67 is grounded to the plate 35. A lead wire 68 has one end attached to the clip 65 and the other end of wire 68 is electrically connected to a terminal 69 insulatingly supported from the housing 20.

The upper plate 35 has attached thereto a stud 41, as shown in Fig. 4. It is to be understood that the stud 41 may be fixed to the plate 35 in any suitable manner. The axis of the stud 41 is on substantially the radial line which extends from the axis of the shaft 22 to the axis of the bearing button 38, see Fig. 1. The lower end of the stud 41 passes through elongated arcuate openings 42 and 43 of the felt washer 39 and plate 30 respectively. The lower end of the stud is provided with a groove or neck 44 to provide a shouldered portion 45. The upper end of the neck or groove 44 is tapered at 46. A bearing washer 47 is fitted over the stud 41 and engages the under side of plate 30. The washer 47 overlies the opening 43 of plate 30, as shown in Fig. 4.

3

It has been found that when the lobes of the cam 23 strike the rubbing block 62, the force is such that the plate 35 will rock on the bearings 36 and 37 and lift the bearing 38 from contact with the plate 30. This action results from the fact that the point of engagement of the cam 23 with the rubbing block 62 is substantially above the plane of bearing supports 36, 37 and 38 and radially outward of the axis of the bearing supports for the movable plate 35.

To prevent the plate 35 from tilting on the plate 30, a leaf spring 70 is disposed on the stud 41 between the shoulder portion 45 and the washer 47. This spring 70 is of approximately wishbone shape and comprises a bight portion from which extend arms 71 and 72 which are curved lengthwise. The central portion of the bight portion has an aperture 90 to increase resiliency of the spring. The leaf spring is adapted to lock on the stud 41. For that purpose, the arm 71 is provided with a longitudinally extending slot 91 extending inwardly from the free end of the arm. The inner end of the slot has an enlarged circular portion 92 of sufficiently large diameter to receive the portion 93 of stud 41. The width of the slot 91 is wide enough to receive the neck portion 44 only of the stud. The arm 72 is provided with a longitudinally extending slot 94 of sufficient width to receive only the neck portion 44 of the stud 41. When the spring 70 is assembled on the stud 41 the leaf spring is first compressed so that the arms 71 and 72 will receive the neck portion 44 of stud 41 and upon release of the spring arms, the arms 71 and 72 will expand toward their normal position on stud 41 with the enlarged portion 92 of the slot 91 encircling the portion 93 of the stud 41 to lock the leaf spring 70 in assembled relation on the stud by the shoulders 95 formed at juncture of the slot 91 and enlarged part 92 of the slot. The tension in the spring 70 is just sufficient to off-set the tilting force applied to the plate 35 by coaction of the cam 23 with the rubbing block 62 to hold the button 38 in contact with the plate 30. Thus, tilting and chattering between plates 30 and 35 is prevented.

A modified form of spring means to prevent tilting of the plate 35 relative to the plate 30 is shown in Figs. 5 and 6. In this instance there is shown a coiled spring 80 having one end thereof off-set with a U-shaped leg at right angles to the axis of this spring. The legs of the U-shaped portion are bent as illustrated in Fig. 5, for detachable fastening engagement with the neck portion 44 of the stud 41. As shown, the spring 80 has the U-shaped portion comprising the yieldable arms 81 and 82 having their intermediate portions bent to provide curved portions in opposed relation so as to fit snugly around the neck portion 44 of the stud 41. The ends of the arms are flared outwardly, as shown in Fig. 5 to facilitate assembly of the spring onto the stud 41.

When the type of spring shown in Fig. 5 is used with the stud 41, the smaller end of the spring is placed over the stud and then the U-shaped portion of the spring is positioned between the shoulder portion 45 and the tapered portion 46. When the U-shaped portion is moved toward the stud, the arms 81 and 82 will spread apart until the neck portion 44 is received between the curved portions to hold detachably the spring 80 in assembled relation with the stud. The function of the spring 80 is the same as that disclosed for the leaf spring.

The plate 35 is rotated about its axis by a suction or vacuum 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 operatively connected with one end of a link 104 by a rivet 105. This link 104 passes through an opening in the housing 20 and is attached to the plate 35 by a bolt 106. The lower end of the bolt extends into a slot 107 in plate 30 to prevent rotative movement of plate 35 relative to plate 30. A clip 109 is electrically connected to a wire 110 that is connected to a clip 111

4

which is attached to the housing 20 forming a ground connection.

The shell 102 supports a sleeve 112 which carries bushing 113 having a recess 114 to receive a compression spring 115 disposed between the bushing 113 and the diaphragm 103. The spring urges the diaphragm 103 to the left as viewed in Fig. 1 to urge the link 104 in the position shown in Fig. 1. The bushing 113 has threads 116 to receive one end of a conduit, not shown, which is connected to the intake of an engine. The shell 101 of the suction device is 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.

What is claimed is as follows:

1. In an ignition timer, a friction drag device, comprising in combination, a pair of plates one movable relative to the other, a stud carried by one of the plates and projecting through a slot in the other plate, said stud having a first diameter portion projecting through said other plate and a second reduced diameter portion extending beyond said first portion and terminating in a head portion of larger diameter than said second portion, a substantially U-shaped leaf spring having a first slot in one leg portion thereof of a width not less than the diameter of said stud second portion but not so great as the diameter of said stud first portion with the inner end of the slot forming an opening of a diameter substantially the same as but not less than the diameter of said stud first portion and having a second slot in the second leg portion thereof of a width substantially the same as but not less than the diameter of said stud second portion, said slots extending inwardly of said legs from like edges thereof, said spring being positioned on said stud with said one leg portion engaging said stud first portion with said opening in said one leg portion partially encircling said stud first portion and with said second leg portion partially encircling said stud second portion, said opening in said one leg locking said spring on said stud.

2. In an ignition timing device having a movable plate supported upon a stationary plate for movement relative to the same with the movable plate supporting a circuit breaker having a rubbing block engaging an actuating cam of the timing device at a point substantially to one side of the plane of the movable plate causing a force reaction in the movable plate tending to lift the plate at the side thereof opposite to the point of contact between the rubbing block and the actuating cam with a resiliently acting device operably connected between said movable plate and said stationary plate at the side thereof substantially opposite to the point of contact between the rubbing block and the actuating cam of the ignition device urging said movable plate toward the stationary plate in opposition to the force reaction between the rubbing block and the actuating cam, the improvement in the resiliently acting device, comprising; a stud carried by the movable plate and projecting through a slot in the stationary plate, said stud having a first diameter portion projecting through said stationary plate and a second reduced diameter portion extending beyond said first portion and terminating in a head portion of larger diameter than said second portion, a substantially U-shaped leaf spring having a first slot in one leg portion thereof of a width not less than the diameter of said stud second portion but not so great as the diameter of said stud first portion with the inner end of the slot forming an opening of a diameter substantially the same as but not less than the diameter of said stud first portion and having a second slot in the second leg portion thereof of a width substantially the same as but not less than the diameter of said stud second portion, said slots extending inwardly of said legs from like edges thereof, said spring being positioned on said stud with said one leg portion engaging said stud first portion with said opening in said

5

one leg portion partially encircling said stud first portion and with said second leg portion engaging said stud second portion with the slot of said second leg portion partially encircling said stud second portion, said opening in said one leg locking said spring on said stud.

3. Apparatus in accordance with claim 1 in which a friction washer is positioned between the said one leg of said spring and the said other plate.

4. Apparatus in accordance with claim 1 wherein the slots in said leg portions extend longitudinally of the legs substantially to the median point of the leg length, and wherein a friction washer is placed between the said one leg and the said other plate with the said one leg urging said washer against said other plate and the second leg engaging said head on said stud.

5. Apparatus in accordance with claim 1 in which a friction washer is positioned between the said one leg

6

of said spring and the said other plate and wherein the slots in said leg portions extend longitudinally of the legs substantially to the median point of the leg length and the free ends of said legs engage each other when the said spring is placed on said stud whereby to effect transverse compression of said spring between the bight of the spring and the engaging leg ends to urge the friction washer between said one leg and said other plate into engagement therewith simultaneously with urging of said stud through said slot to retain the movable plate frictionally held against the stationary plate.

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