June 9, 1953 J. A. McKENNA 2,641,660

DISTRIBUTOR STABILIZER

Filed Aug. 17, 1951

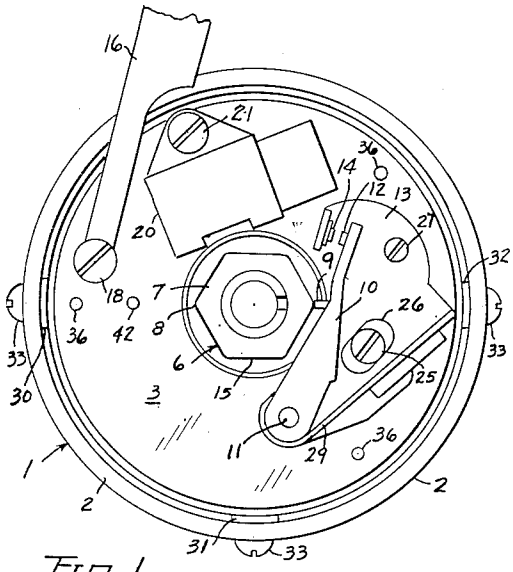


Fig. 1.

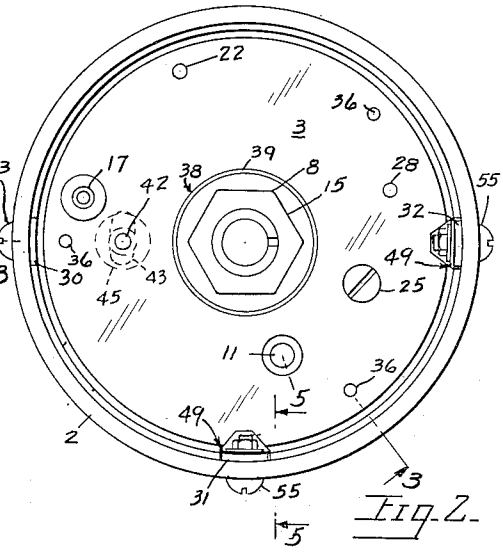


Fig. 2.

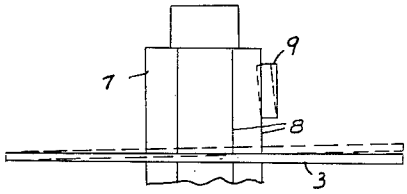


Fig. 4.

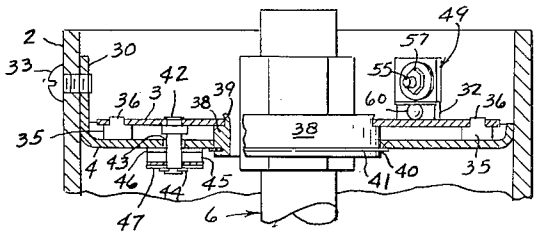


Fig. 3.

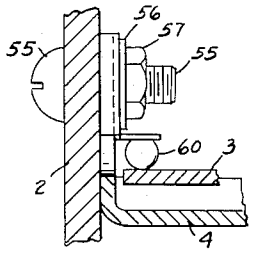


Fig. 5.

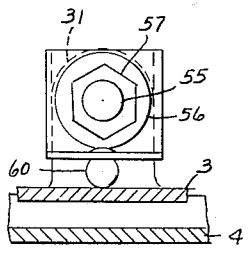


Fig. 6.

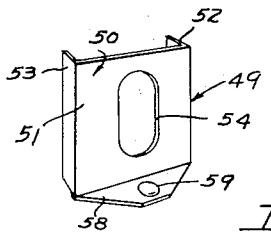


Fig. 7.

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DISTRIBUTOR STABILIZER

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5 Claims. (Cl. 200—19)

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This invention relates to a device for stabilizing the circuit breaker supporting plate in a conventional internal combustion engine distributor. More particularly the invention relates to a device for preventing tilting of the circuit breaker supporting plate with respect to the fixed plate on which the circuit breaker supporting plate is slidably secured.

The circuit breaker supporting plate in the distributor of modern automobiles is slidably supported on a fixed plate for oscillatory movement so that the firing time of the engine may be automatically adjusted to suit the speed of the engine. In earlier designs the circuit breaker supporting plate was customarily supported for oscillation with respect to the housing of the distributor by means of a plurality of balls carried by said plate and which balls were received within a race in the distributor housing. This older structure has been abandoned in many automobiles of more recent design for the type in which the circuit breaker supporting plate is slidably supported on a fixed plate and it is only to distributors of this latter type that the present invention is applicable.

This later type of distributor has the advantage of being relatively inexpensive, but an important disadvantage lies in the fact that it tends to become unstable, especially after the automobile has been in use for several hundred miles. This instability is due to the fact that the movable plate tends to tilt with respect to the fixed plate thereby causing the cam dwell angle to vary to a considerable degree resulting in uneven timing and a loss of power.

The main object of the present invention is therefore to overcome the objections inherent in distributors having a movable circuit breaker supporting plate slidably supported on a fixed plate.

Another object of the invention is the provision of a device which may be readily mounted in the distributor without modification of the latter in any respect.

Still another object of the invention is the provision of a device for preventing tilting of the circuit breaker supporting plate and which device may be readily adjusted to obtain optimum performance of the distributor.

Other objects and advantages will be apparent from the following specification and from the drawings wherein:

Fig. 1 is a top plan view of a distributor with its cap removed.

Fig. 2 is a top plan view of a distributor similar

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to Fig. 1, but with vacuum link, condenser and breaker points removed to show the structure of the movable circuit breaker supporting plate and also showing the invention in position.

Fig. 3 is a vertical cross-sectional view partly in elevation through the distributor of Fig. 2 as taken generally along lines 3—3 of Fig. 2.

Fig. 4 is a schematic elevational view of the cam, movable plate and cam follower illustrating the effect of tilting on the timing of the engine.

Fig. 5 is a cross-sectional view through the periphery of the distributor as taken generally along lines 5—5 of Fig. 2 and showing the invention in elevation.

Fig. 6 is a vertical cross-sectional view through the distributor at right angles to Fig. 5 showing the invention.

Fig. 7 is a perspective view of the invention with attaching screw and nut removed.

In detail, the distributor comprises a housing, generally designated 1 having cylindrical sidewalls 2 and a movable circuit breaker supporting plate 3 disposed in a plane perpendicular to the axis of housing 1 and slidably supported on a fixed plate 4 which is secured at spaced points around its periphery to the housing 1 (Fig. 3).

While the distributor is conventional, a clear understanding of the present invention requires a brief description of the same.

A cam shaft 6 projects upwardly through the distributor plates 3, 4 centrally of the latter and said cam shaft 6 is rotatably supported in bearings (not shown) spaced below plates 3, 4. A six cylinder cam shaft 6 is illustrated having a hexagonal cross-sectional cam 7, but it will be obvious that no essential difference will exist in engines having a greater number of cylinders.

The rises 8 of cam 7 are adapted to successively engage a cam follower 9 carried by an arm 10 which is pivotally supported at one end on a post 11 and which arm carries at its other end a contact 12. Also supported on movable plate 3 is a plate 13 which carries a fixed contact 14 adapted to be engaged by contact 12 when the cam follower 9 is on a dwell 15 of the cam 7. When the cam follower 9 is on a rise 8 of cam 7 as shown in Fig. 1, the contacts 12, 14 are separated.

Also secured to movable plate 4 is one end of the conventional link 16 which is connected at its other end to a source of vacuum (not shown) for oscillating movable plate 4 to advance or

retard the spark. The link 16 is pivotally secured to the plate 4 by pivot 17 and screw 18 (Figs. 1, 2).

The condenser 20 is stationarily secured to the movable plate 3 by screw 21 which is received in a threaded hole 22 in plate 3. For the purpose of adjusting the position of contact 12 with respect to contact 14 an eccentric screw 25 is provided in plate 13 which cooperates with a slot 26 in breaker plate 13. The plate 13 may be firmly fixed in the desired position by screw 27 which is threadedly received in hole 28 in movable plate 3. The arm 10 carrying the movable contact 9 is yieldably urged toward cam 7 at all times by flat spring 29.

The fixed plate 4 on which the movable plate 3 is slidably supported is provided with three axially extending lugs 30, 31, 32 (Figs. 1, 2) for securing said plate to the walls 2 of the distributor. These lugs are threadedly apertured at points spaced above the movable plate 3 for receiving screws 33 which are passed through suitable holes in walls 2.

The movable plate 3 is provided at spaced points around its periphery with spacers 35 which serve to space the movable plate 3 from fixed plate 4 and which also serve to slidably support said movable plate. These spacers 35 are provided with a reduced diameter portion 36 which passes through a corresponding hole in plate 3 and is rigidly secured therein by crimping the adjacent material around said hole. As best seen in Figs. 2, 3 spacers 35 slidably support plate 3 at three spaced points around the periphery of the latter.

Plates 3 and 4 are centrally provided with a relatively large hole for receiving a sleeve 38 which is rigidly secured to plate 3 by flange 39 which is crimped against the walls of the hole in plate 3 as best seen in Fig. 3. At the side of sleeve 38 opposite the flange 39 is a peripherally extending slot 40 for receiving an annular spring retainer 41 for engaging fixed plate 4 for preventing lateral shifting of plate 3 relative to plate 4.

Also carried by movable plate 3 is a post 42 which is rigidly secured at its upper end to plate 3 and which passes through a slot 43 in fixed plate 4. A peripherally extending slot is provided in post 42 adjacent its lower end for receiving a retainer clip 44 and a spring washer 45 is interposed between said retainer and fixed plate 4 for yieldably urging movable plate 3 toward fixed plate 4. Washers 46, 47 are positioned on opposite sides of spring washer 45.

From the above described structure, it will be apparent that movement of the movable plate 3 upwardly in a direction away from fixed plate 4 is prevented only by the central sleeve 38 and post 42. In actual use the plate 3 tends to tilt with respect to plate 4 with the spacer 35 which is adjacent ear 30 as a pivot. This tilting of movable plate 3 may be caused by shocks transferred to the body through the wheels of the automobile or may be caused by the rapid impacts resulting from the engagement between the cam 7 and the cam follower 9. It has been also observed that the cam follower 9 will tend to rise upwardly along cam 7 when the speed of the engine is increased from a low to a high speed. This action of the cam follower tends to pull the plate 3 upwardly.

Whatever factors are involved in the tilting of movable plate 3 with respect to fixed plate 4, the result is undesirable. As best seen in the diagrammatic view of Fig. 4, when the plate 3 moves upwardly from the full line position to the dotted line position it is apparent that the cam follower moves inwardly to the dotted line position.

It is obvious that the result of this movement is to vary the dwell angle of the cam. In addition, it will be apparent that the contacts 12, 14 will open too early and the gap between contacts 12, 14 will widen. The result, insofar as performance is concerned is an irregular and uncontrolled variation of the timing with its attendant reduction in power.

The invention comprises a relatively light retainer or support generally designated 49. This retainer comprises a channel 50 having a web 51 and a pair of legs 52, 53. The web 51 is preferably just slightly wider than the width of ears 30, 31, 32 of fixed plate 4 so that the channel may be positioned against the radially inwardly facing sides of the ears with the legs 52, 53 alongside the side edges of said ears (Figs. 5, 6).

A slot 54 (Fig. 7) is formed in web 51 so that a screw 55 may be passed through said slot and also through the ear of the fixed plate and the wall 2 of the distributor. A lock washer 56 may then be placed over the shank of screw 55 and the channel 50 firmly secured to the ear of the distributor by nut 57.

Integral with the web 51 of channel 50 is a laterally extending portion 58 which is connected to web 51 adjacent the lower edge of the latter. This portion 58 is tapered inwardly in a direction away from web 51 and is provided with a downwardly opening recess or dimple 59 which is adapted to receive a portion of a ball 60 (Figs. 5, 6). This ball 60 is adapted to engage the upper side of movable plate 3 when the channel 50 is secured to an ear of the fixed plate 4. The pressure between the ball 60 and the upper side of plate 3 is preferably very light and it is not necessary that said ball revolve in use. The advantage of a ball is that a good point contact is obtained between ball and plate and there is practically no resistance created to oscillation of the movable plate. Slot 54 in web 51 permits the channel 50 to be adjusted to various distances from fixed plate 4 before said channel is secured.

It will be noted that the ball 60 engages the movable plate 3 adjacent the periphery of the latter and for this reason maximum stability is achieved. In this connection it will be apparent that sleeve 38, being close to the center of the plate has little effect in preventing the undesirable tilting and the post 42, although further from the center of the plate, is only effective at one point.

In Fig. 2 only two supports are shown and these are installed on ears 31, 32 of the fixed plate 4. In practice only these two supports are essential because the post 42 is effective to hold down the portion of the plate adjacent ear 30. However a support may be installed on ear 30 if desired, it being seen from Fig. 2 that sufficient clearance exists between the reduced portion 36 of bearing spacer 35 and the periphery of the plate to accommodate ball 60. The size of ball 60 need not exceed .010 inch.

From the above description, it will be apparent that the invention is readily installed on a conventional distributor. All that is necessary is to remove screws 33 which secure the ears 31, 32 to the cylindrical wall 2 of the housing 1 and replace them with screws 55 and secure the retainers or supports 49 to the ears by washer 56 and nut 57.

I claim:

1. In a distributor for an internal combustion engine including a housing having cylindrical walls and a movable circuit breaker support plate

mounted in said housing for oscillatory movement about the axis of the latter and including a fixed plate secured to said housing transversely of said axis and slidably supporting said movable plate, a device for preventing tilting of said movable plate with respect to said fixed plate comprising: a support adapted to be secured to said fixed plate adjacent its periphery and a bearing element carried by said support and adapted to engage a portion of said movable plate adjacent its periphery and on the side of the latter opposite said fixed plate for preventing tilting of said portion away from said fixed plate.

2. In a distributor for an internal combustion engine including a housing having cylindrical walls and a movable circuit breaker support plate mounted in said housing for oscillatory movement about the axis of the latter and including a fixed plate secured to said housing transversely of said axis and slidably supporting said movable plate, a device for preventing tilting of said movable plate with respect to said fixed plate comprising: a support adapted to be secured to said fixed plate adjacent its periphery and a bearing element carried by said support and adapted to engage a portion of said movable plate adjacent its periphery and on the side of the latter opposite said fixed plate for preventing tilting of said portion away from said fixed plate, said bearing element comprising a ball, and a seat on said support adapted to receive said ball.

3. In a distributor for an internal combustion engine including a housing having cylindrical walls and a movable circuit breaker support plate mounted in said housing for oscillatory movement about the axis of said housing and including a fixed plate secured to said housing in a plane perpendicular to the axis of said housing and slidably supporting said movable plate, said fixed plate having axially outwardly extending ears at spaced points around its periphery for securing said plate to said housing, a device for preventing tilting of said movable plate with respect to said fixed plate comprising: a support adapted to be secured to one of said ears and a bearing element carried by said support and adapted to engage a portion of said movable plate for preventing movement of said portion away from said fixed plate.

4. In a distributor for an internal combustion engine including a housing having cylindrical walls and a movable circuit breaker support plate mounted in said housing for oscillatory movement about the axis of said housing and including a fixed plate secured to said housing in a plane perpendicular to the axis of said housing and slidably supporting said movable plate, said fixed plate having axially outwardly extending ears at spaced points around its periphery for securing said plate to said housing, a device for preventing tilting of said movable plate with respect to said fixed plate comprising: a support adapted to be secured to one of said ears and a bearing element carried by said support and adapted to engage a portion of said movable plate for preventing movement of said portion away from said fixed plate, means on said support for securing the same to said ear at various distances from said fixed plate.

5. In a distributor for an internal combustion engine including a housing having cylindrical walls and a movable circuit breaker support plate mounted in said housing for oscillatory movement about the axis of said housing and including a fixed plate secured to said housing in a plane perpendicular to the axis of said housing and slidably supporting said movable plate, said fixed plate having axially outwardly extending ears at spaced points around its periphery for securing said plate to said housing, a stabilizer for said movable plate comprising: a plurality of supports adapted to be respectively secured to said ears, means on said supports for adjustably securing the same to said ears at various distances from said fixed plate and bearing elements respectively carried by said supports for engaging said movable plate to prevent tilting of the latter relative to said fixed plate.

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