Nov. 29, 1949 E. F. HAUBERT 2,489,775

AUTOMATIC SPARK ADVANCING AND RETARDING MEANS FOR DISTRIBUTORS

Filed April 14, 1948

FIG. 1.

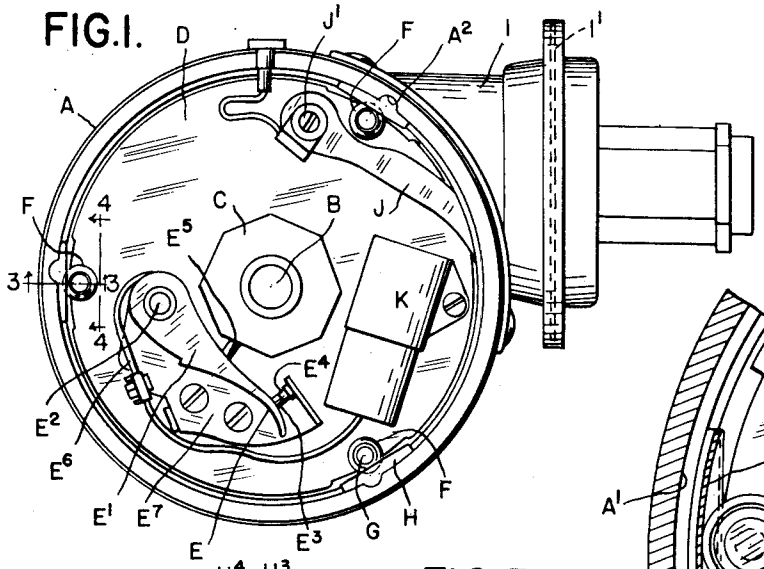


FIG. 2.

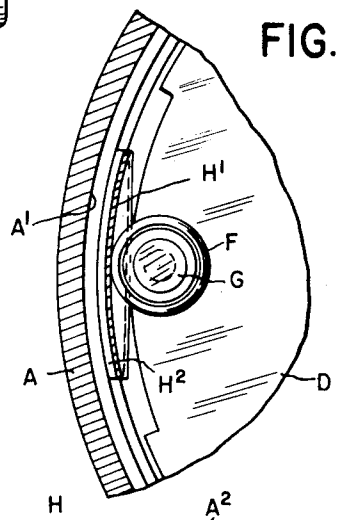
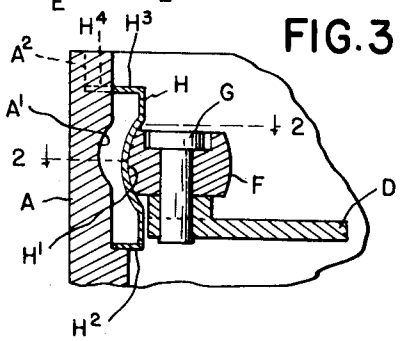


FIG. 3.



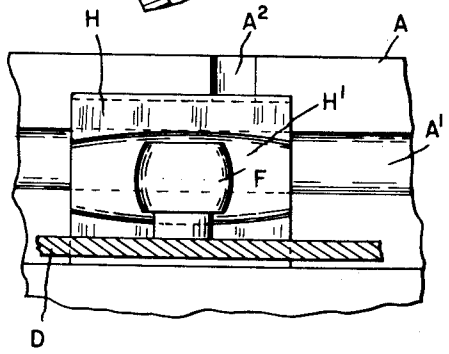


FIG. 4.

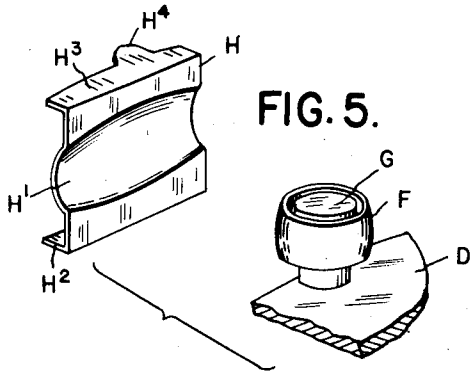


FIG. 5.

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Patented Nov. 29, 1949

2,489,775

UNITED STATES PATENT OFFICE

2,489,775

AUTOMATIC SPARK ADVANCING AND RETARDING MEANS FOR DISTRIBUTORS

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Application April 14, 1948, Serial No. 20,975

5 Claims. (Cl. 200—31)

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The invention relates to automatic spark advancing and retarding means for distributors used in connection with multi-cylinder internal combustion engines, and the instant invention is an improvement in a particular type of construction heretofore used for this purpose. The said construction comprises essentially an annular plate located within the housing of the distributor and surrounding the rotary shaft. On this plate is mounted the circuit opening and closing switch which is arranged in operative relation to a cam on said shaft. There is also provided means for rotatably adjusting said plate alternatively in opposite directions thereby advancing or retarding the cam relative to the switch operated thereby. The annular plate is mounted within the housing by providing the latter with an annular groove in its inner face forming a ball race and by mounting on the plate a plurality of lugs at circumferentially distributed points, which lugs have grooved raceways in their outer surfaces between which and the raceway in the housing are placed balls. Thus in operation when the annular plate is rotatably adjusted, the balls will roll a short distance in the raceways thereby forming an anti-friction bearing and support for said plate. It has been found, however, that such movement will in time wear the raceway in the housing, which wear is augmented by inertial shocks to which the mechanism is subjected during use. This is detrimental to the operation of the mechanism, and there is no way of curing the defect other than by replacing the entire housing.

It is the object of the instant invention to overcome this defect and by means which is also capable of application to a worn structure to recondition the same. To this end the invention consists in the construction as hereinafter set forth.

In the drawings:

Fig. 1 is a plan view of the construction with the cover removed;

Fig. 2 is a section on line 2—2, Fig. 3;

Fig. 3 is a vertical cross-section on line 3—3, Fig. 1;

Fig. 4 is a section on line 4—4, Fig. 1; and

Fig. 5 is a perspective view showing the roller and resilient bearing plates disengaged from each other.

A is a cylindrical housing for the distributor. B is the rotary shaft and C is the cam mounted upon the shaft. D is an annular plate within the housing A surrounding the shaft and located in a plane adjacent to the cam. The plate

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D has mounted thereon a circuit opening and closing switch E, which is in operative relation to the cam C. This switch comprises an oscillatory arm E' mounted on a pivot E^2 and having at its free end a contact E^3 in registration with the stationary contact E^4 and intermediate its ends an insulator lug E^5 for bearing against the cam being yieldably pressed thereagainst by a spring E^6. All of these parts are mounted on a plate E^7 which is adjustably secured to the annular plate D so as to permit of timing the operation of the switch by the cam. The annular plate D is usually mounted within the housing A by the means above described, which includes a grooved raceway A' in the housing A and balls engaging said raceway and also grooved lugs on said plate. As such construction is unsatisfactory, I have replaced it by the following.

In place of the grooved lugs on the annular plate D, I have mounted on said plate a plurality of rollers F which are journaled on headed pins G. The rollers are convex in peripheral cross-section and are adapted to engage grooves H' in resilient thin plates H mounted on the housing A. In mounting the plates H, I make use of a feature of construction of the mounting previously employed. Thus the housing having the annular grooved raceway A' therein is further provided with axially extending entrance slots A^2 to permit of engaging the balls with said raceway while they are also in engagement with the grooved lugs on the plate. There are three of these entrance slots A^2 which are equally spaced from each other around the housing A. There are also three equispaced rollers mounted on the plate D and, therefore, the resilient plates H may be anchored to the housing by portions engaging said entrance slots A^2. More in detail the plates H are die-fashioned to form the grooves H' therein, which latter extend in an arc concentric with the axis of the shaft B. At their inner and outer ends these plates have segmental angle flanges H^2 and H^3 for fitting against the inner face of the housing A, and the flange H^3 has a projecting lug H^4 for fitting in the entrance slot A^2. When the parts are assembled, the plates H may be engaged with the rollers F before the annular plate D is placed within the housing A so that when said annular plate is moved axially within the housing, the lugs H^4 will be simultaneously moved into the slots A^2. When thus positioned the plates H are held against displacement in any direction and the depth of the

flanges H^2 and H^3 is such as to tension the plates so as to resiliently press the same against the rollers F. Thus the annular plate D is mounted in resilient bearings within the housing A which will cushion the inertial shocks while at the same time permitting free movement of the rollers F in the grooves H'.

It is obvious that with the construction as just described, the groove plates H will not become deformed as is the case with the annular raceways A' in the housing A. This is for the reason that said plates are always resiliently pressed against the rollers thereby avoiding any pounding action on the latter. Furthermore, the wear in the plate by the movement of the rollers is negligible. If, however, there should be any wear the worn plate can at any time be replaced by a new one.

The automatic means for rotatably adjusting the annular plate to advance or retard the spark forms no part of the instant invention. However, I have shown in the drawings a casing I mounted on the casing A and adapted to be connected to the intake manifold of the engine. A diaphragm I' within this casing is subjected to variable manifold pressure and this diaphragm is connected by a link J with a pivot J' on the plate D. Said plate D will, therefore, be oscillated by varying manifold pressures and will correspondingly advance or retard the spark. As the distributor construction is not a part of my invention, it is unnecessary to illustrate the same, but I have shown a condenser K which is mounted on the plate D and is suitably electrically connected to the switch E.

What I claim as my invention is:

1. The combination with a distributor housing, a rotary shaft extending centrally therein, an annular plate within said housing surrounding said shaft, a cam on said shaft, and a circuit closing and opening switch mounted on said plate in operative relation to said cam; of means for mounting said plate within said housing and operable during rotation of said shaft to absorb vibratory shock from the opening and closing of said switch, including a plurality of anti-friction elements carried by said plate, and a plate between each anti-friction element and said housing, said last-mentioned plate having a portion detachably anchored to said housing and having a resilient portion spaced from said housing and forming a flexible raceway for said anti-friction element.

2. The combination with a distributor housing, a rotary shaft extending centrally therein, an annular plate within said housing surrounding said shaft, a cam on said shaft, and a circuit closing and opening switch mounted on said plate in operative relation to said cam; of means for mounting said plate within said housing and operable during rotation of said shaft to absorb vibratory shock from the opening and closing of said switch, comprising a plurality of rollers directly mounted on said plate, and a plate between each roller and said housing, said last-mentioned plate having a portion anchored to the housing and having a flexible portion spaced from said housing and forming a yieldable raceway for said roller.

3. The combination with a distributor housing, a rotary shaft extending centrally therein, an annular plate within said housing surrounding said shaft, a cam on said shaft, and a circuit closing and opening switch mounted on said plate in operative relation to said cam; of means for mounting said plate within said housing and operable during rotation of said shaft to absorb vibratory shock from the opening and closing of said switch, comprising a plurality of rollers directly mounted on said plate, and a plate between each roller and said housing, said last-mentioned plate having spaced flanges bearing against the housing and having a resilient portion spaced from said housing and forming a raceway for said roller, one of said flanges having an anchoring engagement with said housing to prevent relative rotation thereof.

4. The combination with a distributor housing, a rotary shaft extending centrally therein, an annular plate within said housing surrounding said shaft, a cam on said shaft, and a circuit closing and opening switch mounted on said plate in operative relation to said cam; of means for mounting said plate within said housing and operable during rotation of said shaft to absorb vibratory shock from the opening and closing of said switch, comprising a plurality of rollers directly mounted on said plate, and a plate between each roller and said housing, said last-mentioned plate having spaced angle flanges at opposite edges thereof directly bearing against said housing and also having an intermediate grooved flexible portion spaced from said housing and forming a raceway for said roller, one of said flanges having a detent thereon engaging an axially extending groove in said housing during the assembly of the parts to form an anchor for said plate.

5. The combination with a distributor housing, a rotary shaft extending centrally therein, an annular plate within said housing surrounding said shaft, a cam on said shaft, and a circuit closing and opening switch mounted on said plate in operative relation to said cam; of means for mounting said annular plate and operable during rotation of said shaft to absorb vibratory shock from the opening and closing of said switch, comprising a plurality of pins projecting from said plate, a roller sleeve on each pin, and a plate between each roller and said housing, said last-mentioned plate having spaced angle flanges directly bearing on said housing, a resilient portion intermediate said flanges spaced from said housing and forming a raceway for said roller, and a detent on one of said flanges engaging an axially extending groove in said housing during the assembly of the parts to form an anchor for said resilient portion.

EUGENE F. HAUBERT.

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