April 8, 1958 T. A. ROBERTSON 2,830,140

IGNITION SYSTEM

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FIG. 1.

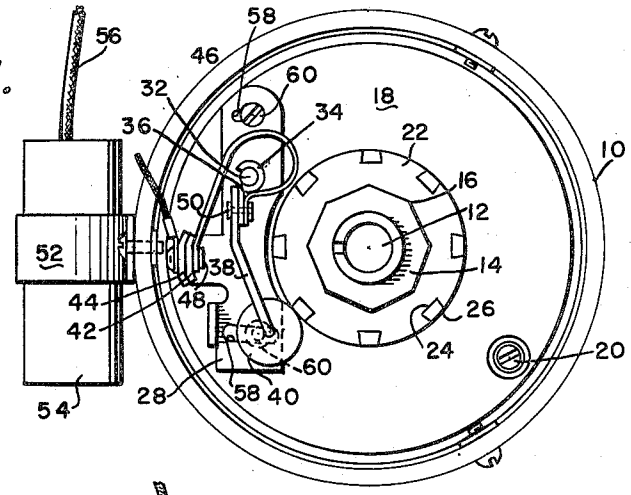
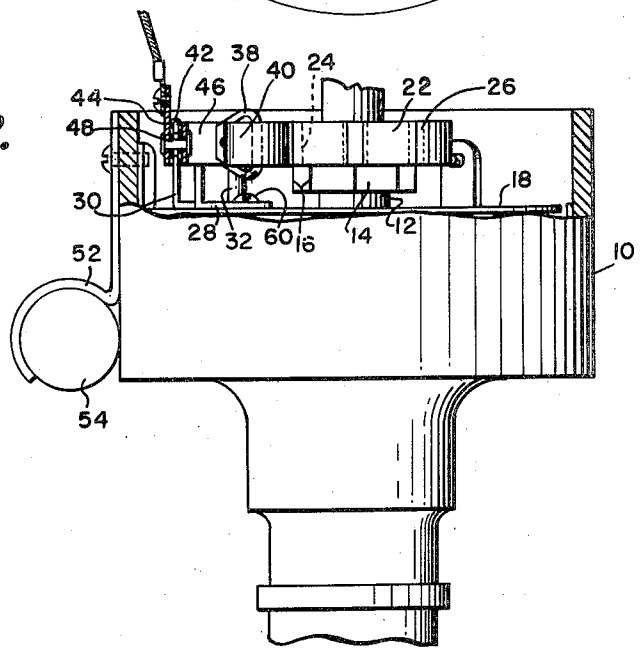


FIG. 2.



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IGNITION SYSTEM

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1 Claim. (Cl. 200—24)

This invention relates to ignition systems, and in particular to distributors for internal combustion engines.

Conventional distributors include a primary circuit make and break system utilizing a polygonal cam and breaker points, which are intermittently separated by cam action to interrupt the primary current to a high voltage coil and induce a secondary high voltage current. The high voltage surges are distributed sequentially to the spark plugs in the well known manner. Arcing between the points necessitates frequent cleaning, adjustment and replacement thereof, and the system is inherently unsatisfactory in high speed operation, due to "point float" and similar malfunction.

A principal object of the present invention is to provide an improved and superior make and break system for distributors, replacing the conventional cam and breaker points, and capable of optimum operation at all engine speeds.

Another object of the invention is to provide an internal combustion engine distributor system capable of long life, without adjustment, maintainence or loss of performance.

A further object is to provide a primary circuit make and break system for distributors which effects higher dwell time, particularly in high speed operation, and accordingly better spark for ignition. The dwell time, moreover, remains constant over long periods of usage.

A particular object is to provide a primary circuit make and break system utilizing rolling contact exclusively.

Yet another object is to provide an improved make and break system which may readily and conveniently be installed in conventional distributors, by simple replacement of parts. Other objects will be in part evident and in part pointed out hereinafter.

The invention and the novel features thereof may best be made clear from the following description and the accompanying drawings in which:

Figure 1 is a plan view of a conventional distributor, with dust cap and rotor removed, modified to incorporate a preferred embodiment of the present invention, and

Figure 2 is a side elevational view of the distributor of Figure 1, with the case broken partly away, and partly sectioned.

Referring to the drawings in detail, the figures illustrate a conventional internal combustion engine distributor casing 10, concentrically enclosing the upper end of the distributor cam shaft 12. The shaft 12 adjacent its upper end has a conventional polygonal cam 14 fixed thereon, the cam being provided with the usual lobes 16. The casing also encloses the conventional vacuum advance and retard plate 18 encircling the shaft 12 and disposed in a plane normal to the axis thereof. Screw 20 is where the vacuum advance lever is fastened and is not for locking plate in an immobile position.

In accordance with the present invention, a metal disc 22 of suitable thickness, for example 5/16", is mounted on the cam 14, the disc 22 fitting closely thereon whereby

it is in electrical contact therewith. The disc 22 is provided with a plurality of axially extending peripheral slots 24, the slots being evenly spaced and corresponding in number and preferably in position to the cam lobes 16. In each slot is positioned an electrical insulating member 26, composed of non-laminated nylon or Teflon. The insulating members fill the slots 24 and are suitably retained therein, their outer surfaces corresponding to the periphery of the disc 22. The flush mounting of the insulating members, as will be apparent, effects a smooth and continuous peripheral surface on the disc. As illustrated, the slots 24 may be dovetailed, and the insulating members 26 correspondingly shaped, to insure retention of the insulating members during high speed operation.

At one side of the distributor shaft a support plate 28 is suitably mounted on the upper surface of adjustment plate 18. A lug 30 extends upwardly from the support plate 28, and inwardly and to one side of the lug a stud 32 extends from the support plate in upward direction. A suitably shaped pivot block 34, of insulating material, partially encloses the stud 32, and comprises an arm 36, to which is secured a yoke 38, which extends outwardly therefrom in direction generally tangential to the disc 22. At its outer end, yoke 38 mounts a metal contact roller 40 of relatively small diameter. The roller 40 is in electrical connection with the yoke 38 at all times, but is freely rotatable thereon, being mounted preferably by means of sealed anti-friction bearings.

The support plate lug 30 is adjoined on both sides by an insulating sheet 42. Adjacent the outer insulating layer is mounted a terminal block 44, and against the inner insulating layer is disposed one end of a leaf spring 46. A screw or rivet 48 engages the terminal and spring to the lug 30 and establishes electrical connection between the terminal and spring, both members remaining however insulated from the support plate by reason of the intervening insulating sheet 42. Spring 46 extends from lug 30 about stud 32, and its opposite end is engaged to the arm 36 of pivot block 34. A screw or rivet 50 engages both yoke 38 and spring 46 to the pivot block arm, and establishes electrical contact therebetween. The spring 46 is effective, as will be evident, to rotate the yoke 38 and its roller 40 toward the disc 22, whereby the roller is maintained in firm rolling contact with the disc.

Externally of the casing, a suitable bracket 52 may be mounted, to retain the usual condenser 54. A conductor 56 extends from the condenser to the terminal 44, in customary manner, and in operation a conductor (not shown) from the primary side of the high voltage coil of the system is also connected to the terminal 44, as will be readily understood.

In the preferred embodiment illustrated, the support plate 28 is provided with one or more slots 58, and screws 60 extending through the slots 58 are utilized to mount the support plate on the adjustment plate 18. This mounting provides for convenient positional adjustment of the support plate toward and away from the distributor shaft and the disc 22, whereby the effective tension of the spring 46 may be readily varied. As will be evident, other means may be provided for adjustment of the spring 46.

In operation, primary ignition current is conducted to the terminal 44 in the usual manner. In the present invention, this current is conducted through rivet 48 and spring 46, rivet 50 and yoke 38 to the contact roller 40. As is conventional, the distributor shaft is grounded, and the cam 14 and disc 22 are accordingly similarly grounded. In operation of the device, the shaft 12 and disc 22 rotate relative to the roller 40, and the primary circuit described is interrupted periodically by contact of the insulating members 26 with roller 40. The interruptions of the

circuit are accomplished substantially without arcing, and the make and break function of the disc and roller are maintained over long periods without pitting, erosion or the like.

The dwell time of the system is determined by the length of the disc segments between successive insulating members 26. It is found that insulating members 26 of relatively short peripheral extent, for example ⅛", function in the device with efficiency, whereby the intervening conductive disc segments are relatively long and the dwell time effected thereby is considerably higher than that possible with the use of breaker points.

As an outstanding feature of the invention, the dwell time remains constant over the entire operational speed range, and suitable ignition spark generation is maintained at high R. P. M. Moreover, the dwell time is not affected by wear. Since rolling contact only between roller 40 and disc 22 is involved, and arcing is substantially eliminated, the overall wear on the system is exceedingly small. Any wear which does occur over long periods is automatically compensated by the action of spring 46.

As will be evident, the embodiment illustrated is particularly adapted for ready replacement of conventional breaker point systems. The disc 22 illustrated, for example, is adapted to fit over the usual cam, preferably with a force fit. The spring 46, roller 40 and associated elements may be supplied as a sub-assembly, which may be substituted for the conventional breaker point subassembly merely by mounting the support plate 28. The adjustability of the support plate may be utilized to increase spring pressure for high speed operation and to compensate for wear. In normal and high speed operation, the system has been found to operate efficiently for 25,000 miles and more, without adjustment and without malfunction.

It will thus be seen that there has been provided by this invention a structure in which the various objects hereinbefore set forth, together with many practical advantages, are successfully achieved. As various possible embodiments may be made of the mechanical features of the above invention, all without departing from the scope thereof, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawings is to be interpreted as illustrative, and not in a limiting sense.

I claim:

A distributor including a rotary cam shaft, a casing concentrically enclosing the upper end of said shaft, a timing adjustment plate in said casing encircling said cam shaft in a plane normal to the axis thereof, a polygonal cam mounted adjacent the upper end of said shaft above said adjustment plate, a metal disc fitted on said cam and in electrical contact therewith, said disc having a plurality of axially extending slots equally spaced about its periphery, said slots being equal in number to the sides of said cam, an electrical insulating member flush mounted in each of said slots, a support plate mounted on the upper surface of said adjustment plate, a stud extending upwardly from said support plate, a yoke in the form of a loop pivotally mounted at one end on said stud and extending generally tangentially of said disc, a metal roller rotably mounted on the outer end of said yoke for peripheral rolling contact with said disc, a spring extending from said support plate to said yoke urging said yoke and roller toward said disc, and means establishing an electric circuit through said spring, yoke, roller, disc, cam and cam shaft, rotation of said disc being effective to periodically interrupt said circuit by contact of said insulating member with said roller, said support plate including slots and being mounted on said adjustment plate by means of screws extending through said slots, said slots permitting positional adjustment of said support plate relative to said cam shaft and disc whereby the spring pressure urging said roller into contact with said disc may be varied.

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