July 28, 1936. A. A. GUZIEL ET AL 2,048,860

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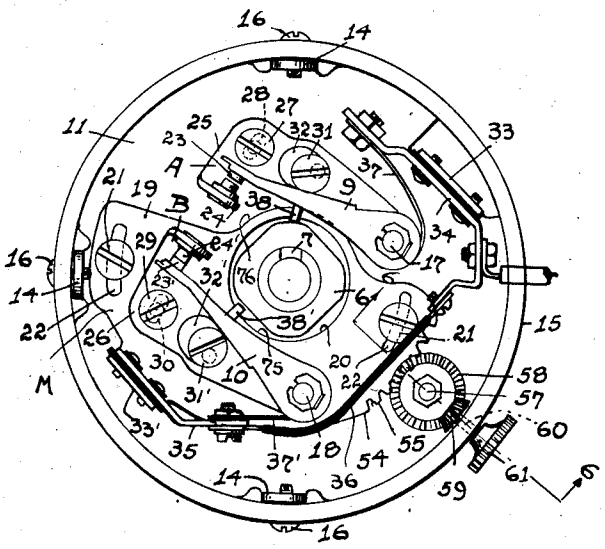


FIG. 1

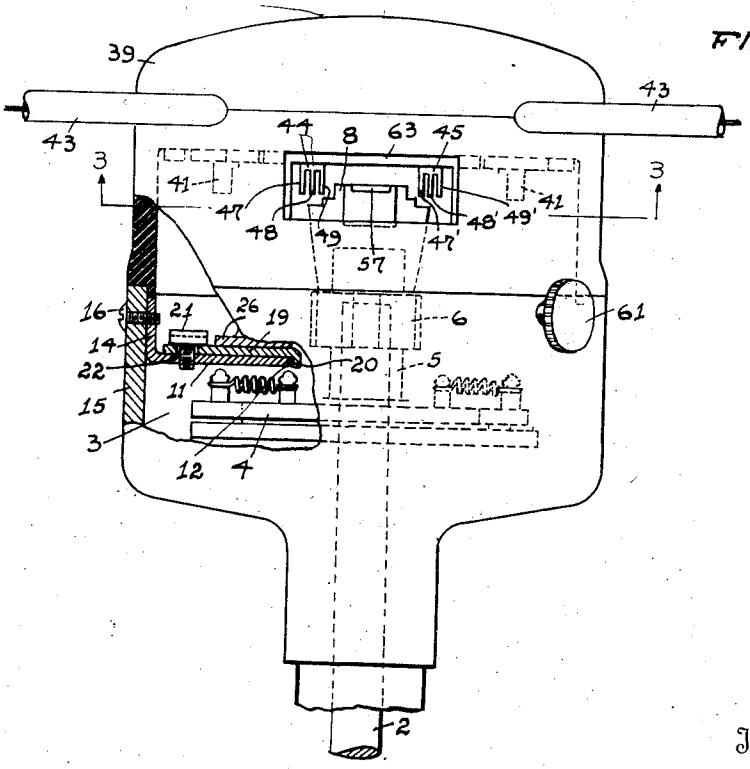


FIG. 2

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FIG. 3

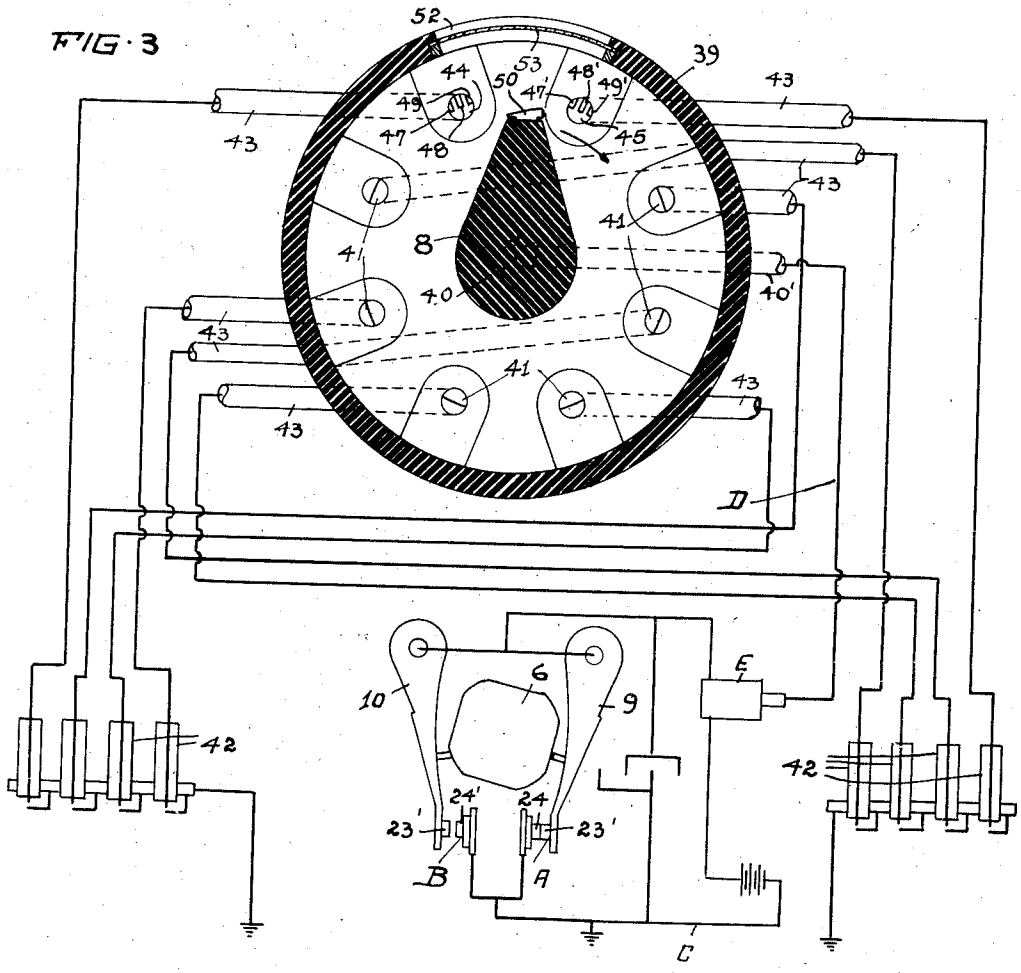


FIG. 4

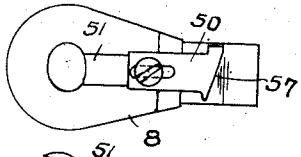


FIG. 5

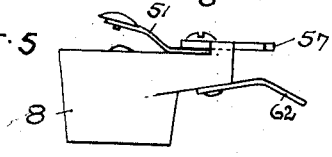
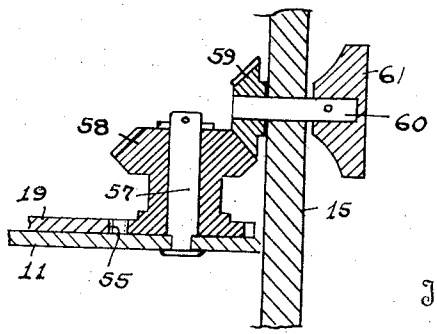


FIG. 6



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FIG. 7

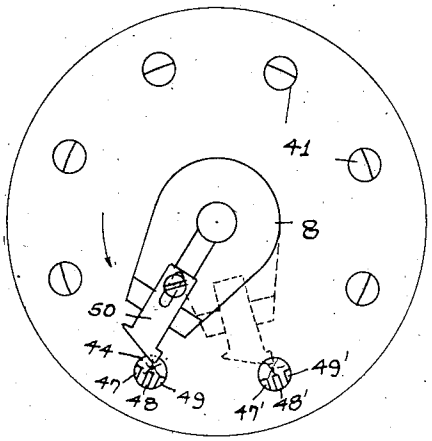


FIG. 8

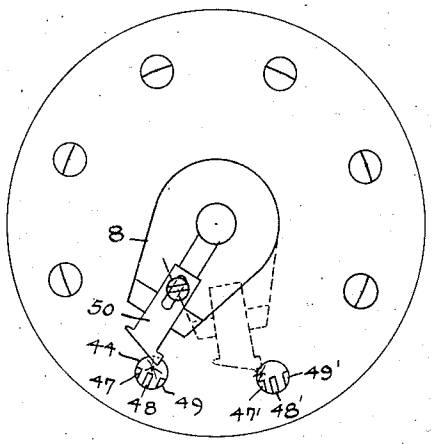


FIG. 9

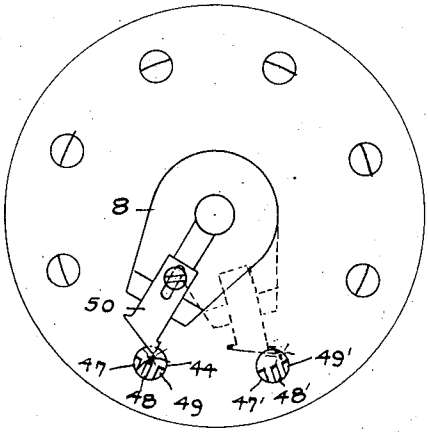
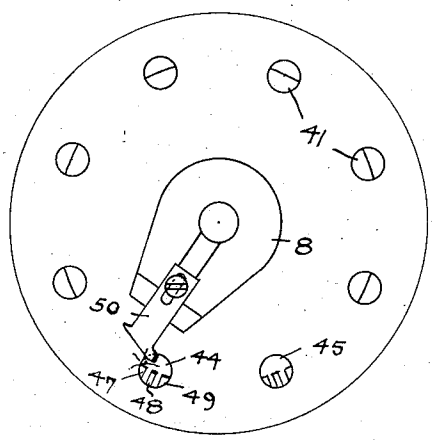


FIG. 10



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UNITED STATES PATENT OFFICE

2,048,860

DISTRIBUTOR

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Application June 6, 1934, Serial No. 729,337

3 Claims. (Cl. 200—21)

This invention relates to distributors such as are employed to supply the spark to the cylinders of multi-cylinder internal combustion engines and particularly to devices of this character which include two or more breaker contacts to permit of proper interruption of the primary circuits of ignition systems for high speed internal combustion engines having six or more cylinders.

As well known the breaker contacts of these distributors must be properly timed with respect to each other to promote cooperation of all the cylinders of the engine. Timing of the breaker contacts of a distributor generally known as synchronization of the points, is however difficult and necessitates demounting of the distributor from its engine to permit timing in so called synchronizing machines adapted to test and synchronize breaker contacts. The timing procedure itself is complicated, highly unsatisfactory and inaccurate and therefore hardly warrants the costs involved. The inaccuracy is partly due to the fact that the distributor is tested and synchronized under different conditions than those present when the distributor is mounted upon its engine.

It is the general object of this invention to provide a distributor of the above described character with manually operable adjusting means adapted to permit of synchronization of the breaker contacts of a distributor while mounted on a running engine.

Another object of the invention is the provision of a distributor, having two or more breaker points with means adapted to visibly indicate the proper setting or timing of the breaker points.

Further objects and advantages will appear from time to time as the description of the invention progresses.

It is believed that the invention will be understood most readily from a detailed description thereof taken in connection with the accompanying drawings in which:

Figure 1 is a plan view of the improved distributor with the insulating cap or cover removed to show the interrupter contacts and mechanism;

Figure 2 is a front view partly broken away of the distributor shown in Figure 1;

Figure 3 is a cross sectional view on line 3—3 of the distributor shown in Figure 2, the distributor contacts being connected to the diagrammatically shown ignition circuits of an internal combustion engine;

Figure 4 is a plan view of the distributor block;

Figure 5 is a side view thereof;

Figure 6 is a fragmentary sectional view on line 6—6 of Figure 1 showing the mechanical means for synchronizing the breaking points;

Figures 7 to 10 inclusive are diagrammatical views of the subdivided terminals and the circuit block contact showing the location of the sparks at different settings of two breaker contacts and their points.

Referring now to the drawings in which like reference characters indicate the same parts in the different views, 2 indicates the distributor shaft which is connected to the motor, not shown, and driven therefrom in such a manner as to rotate the interrupter cam and distributor block at the proper rate of speed to supply spark to the cylinders at proper times. This shaft passes through a cup shaped housing 3, having arranged therein a common centrifugal spark advancing mechanism 4, which is rigidly connected to shaft 2 and coupled with a distributor head shaft 5 sleeved upon shaft 2, for automatically advancing or retarding the spark as the speed of the engine increases or decreases, all as generally practiced in the art.

The upper portion of the distributor head shaft 5, carries a time cam 6, and is slotted at its end as at 7 for slidable, non-rotatable engagement with a distributor block 8, of insulating material. The time cam 6 oscillates two insulated pivotally mounted arms 9 and 10 of an interrupter mechanism M mounted on a circular metal base plate 11 and having a large central aperture 12 to permit of shaft 5 being extended freely through the plate. Plate 11 is provided with perforated ear portions 14 for securing said plate to the peripheral wall 15 of housing 3 by means of screws 16. The arm 9 oscillates about a pivot pin 17, secured to and carried by the plate 11 and the arm 10 oscillates about a pivot pin 18, which is carried by an irregularly shaped plate member 19, in turn mounted for slight rotary movement on the plate 11. The member 19 is formed with a large aperture 75 for receiving the shaft 5, and a curved outer edge portion 76 is formed with a flange 20. This flange is extended through the aperture 12 to form a bearing support for said rotatable plate member. The plate member 19 is secured to the base plate 11 by means of headed screws 21, which extend through slots 22 in said plate member, and permit of slight rotation of member 19 with respect to the base, all for a purpose later to be described.

The arms 9 and 10 carry at their free ends contacts 23, 23' adapted to engage corresponding contacts 24, 24', which latter contacts are mounted on adjustable bracket members 25, 26 respectively. The bracket member 25 is pivotally mounted on the pin 17 and rigidly secured in desired adjusted position to the base plate 11 by means of a headed screw 27, extended through the slot 28 in said bracket member, and the bracket member 26 is pivotally mounted on the pin 18 and rigidly secured to the member 19 in desired adjusted position by means of a headed screw 29, extended through a slot 30 in bracket member 26. Headed cams 31, 31' which are extended through slots 32 and 32', in said bracket members, permit of proper adjustment of these brackets with respect to base 11 and member 19 for setting the points of the thus formed distributor contacts A and B.

The base 11 and the member 19, each are provided with an upstanding flange 33, 33', respectively supporting electrically connected metal strips 34, 35, interconnected by means of a flexible, insulated metal band 36, and these strips are in turn electrically engaged with the arms 9 and 10 by springs 37, 37', which yieldingly force these arms toward the interrupter cam 6, and cause the fibre members 38, 38' projecting from these arms to yieldingly engage the interrupter cam. Consequently rotation of the shaft 5 and interrupter cam 6 causes oscillation of the interrupter arms and therewith timed operation of the breaker points, which points control the primary circuit C of the ignition system, see Figure 3.

The upper end of the housing 3 is closed by a cap or cover 39 formed of insulating material. This cover has arranged therein a high tension terminal 40 adapted to be connected by a wire 40', to the coil E, and the common distributor terminals 41, 44, and 45 in turn connected to the respective spark plugs 42 of the engine by high tension wires 43. The distributor terminals 41 are alike and of solid tubular formation but the adjacently arranged terminals 44 and 45 are vertically slotted at their exposed ends to subdivide the ends into three vertical symmetrically arranged prongs or fingers 47, 48, 49, and 47', 48' and 49', respectively, spaced from each other approximately one sixteenth of an inch. These prongs, the middle one of which is arranged radially of the axis of the distributor terminals, are aligned with an adjustably mounted contact member 50 on the distributor block 8. The member 50 is electrically connected to the high tension terminal 41 by means of a spring contact 51, according to common practice. The subdivided or forked construction of the terminals 44 and 45 permits of the sparks jumping the gaps between the contact member 50, on the distributor block 8, and the two terminals 44 and 45, being definitely located and the timing and working of the distributor accurately determined, when the sparking is observed through an opening 52 in cover 39, preferably closed by a transparent member 53.

Timing adjustment of the breaker contacts A and B is effected by rotation of the plate member 19, which supports breaker point B, with respect to rigidly mounted plate 11 supporting breaker point A. An outer edge portion or area of the plate member 19 is provided with teeth 55, which mesh with a gear 56 on a shaft 57 secured to the base plate 11. The gear 56 carries a bevel gear 58, which meshes with a small bevel pinion 59, on a shaft 60, in turn rotatably mounted in and extended through the peripheral wall 15 of housing 3. A knob 61 at the exposed end of shaft 60 permits of manual operation of said shaft for timing operations, after headed screws 21 have been slightly unscrewed.

The distributor thus described is capable of visibly indicating the synchronization of its breaker contacts A and B, the adjustment of the points thereof, the coil action and the functioning of the spark advancing mechanism. All these conditions can be readily visualized by the car owner when the motor is running and the cylinders are under compression. When the breaker points A and B are properly set and synchronized the sparks of the high tension circuit D of the distributor jump from the contact member 50, on distributor block, to the middle prongs 48, 48' of the distributor terminals 44, 45, respectively. A sparking action indicating the proper setting and timing of the breaker contacts is illustrated in the diagram of Figure 7, showing in full lines the position of the distributor block 8 when a spark jumps at terminal 44, and in dotted lines the position of said block when a spark jumps at terminal 45. Assuming that the breaker points A and B are properly set but out of synchronization, the spark from the contact member 50 to terminal 44 will occur at the middle prong 48 whereas the spark at terminal 45 jumps either to prong 47 or 49, in accordance with the relatively advanced or retarded timing of breaker contact B with respect to breaker contact A. Figures 8 and 9 show the respective diagrams for these conditions in the distributors, which can readily be remedied by turning knob 61 in an appropriate direction until the sparks at terminals 44 and 45 respectively appear on their respective middle prongs 48, 48'.

Assuming the gap of rigidly mounted breaker contact A is greater or less than the standard setting of .020 of an inch, the sparking of terminal 44 will occur at prong 47 or 49 and thus visibly indicate exactly what is wrong with breaker contact A. Pitting of the points will of course be visibly indicated in a similar manner, so that the operator can readily determine this fact without the necessity of opening the distributor. A diagram indicating the sparking action which takes place when the contact points are pitted or too widely spaced, is disclosed in Figure 10. The functioning of the spark advancing mechanism is also visibly indicated by the position of the spark at one of the subdivided terminals. Thus the spark at these terminals shifts from one prong to the next adjacent prong, or from one side of a prong to the other side thereof, when the speed of the engine is increased. The distributor finally permits the testing of the coil, when the spark gap between contact member 50 and the terminals of the distributor is increased. The condition of the coil can readily be determined by shifting slotted contact member 50 axially toward the center of the distributor block, after a headed screw 54, securing member 50 to the arm 55 of the block has been loosened. When the spark jumps a gap of approximately 3/8" the coil is in perfect condition.

The front edge of contact member 50 is preferably inclined or beveled to form a substantially pointed extension 57 thus permitting a better alignment of the sparks with respect to the prongs of terminals 44 and 45. A metal reflector member, such as indicated at 62, reflects the light

of the sparks through the opening **52**, the upper edge **63** of which is inclined to facilitate observation of the two subdivided terminals **44** and **45** without interference from the sparks jumping at the other terminals.

The distributor of the type described also facilitates proper timing of a motor by merely rotating the loosened distributor head on its housing until the pointed contact member is exactly opposite the middle prong of either one of the two distributor terminals **44**, **45**. It is of course understood, that the pistons of the cylinders of the motor controlled by terminals **44** or **45** will be previously brought into their dead center position, which can readily be determined by cranking the motor until the dead center mark for one or the other cylinder appears in the common peep hole of the fly wheel case. Before timing, the distributor contacts should of course be properly set and synchronized.

Distributors having pronged contact members may also be used for four-cylinder engines. Under such circumstances, they embody a single pair of breaker points for which synchronization is of course impossible. However the distributor will indicate the condition of the points, the condenser and the wiring, and may also be used for timing the engine, all as previously described.

Having thus described our invention:

What we claim is:

1. A spark distributor comprising a housing, a cover member for said housing, two breaker contacts mounted in said housing, means for angularly moving one of said contacts for synchronizing said contacts, a rotatable cam member for alternately actuating said breaker contacts in timed relation, a rotatable distributor block coupled with said cam member, distributor terminals in said cover member and engaged by the distributor block in distributing the spark, two adjacent distributor terminals having their ends divided and said cover member having an opening opposite the divided distributor terminal whereby it may be determined whether the breaker contacts are properly synchronized.

2. A spark distributor comprising a housing, a cover member for said housing, two breaker contacts mounted in said housing, means for changing the relative time of operation of said contacts, a rotatable cam member for alternately actuating said breaker contacts in timed relation, a rotatable distributor block coupled with said cam member, distributor terminals in said cover member and engaged by the distributor block in distributing the spark, two adjacent distributor terminals having their ends divided and said cover member having an opening opposite the divided distributor terminal whereby it may be determined whether the breaker contacts are properly synchronized.

3. A spark distributor comprising a housing, a cover member for said housing, two breaker contact members mounted in said housing, one of said breaker contacts movable angularly from without the housing for changing the relative time of operation of said contacts, a rotatable cam member for actuating said breaker contacts, a rotary distributor block coupled with the cam, distributor terminals in said cover member two of which are forked and engaged by the distributor block and said cover member having an opening opposite the two forked distributor terminals whereby it may be determined whether the breaker contacts are synchronized.

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