Jan. 5, 1926. 1,568,112

C. J. VOGE

IGNITION DEVICE

Filed Nov. 1, 1924 2 Sheets-Sheet 1

Fig. 1

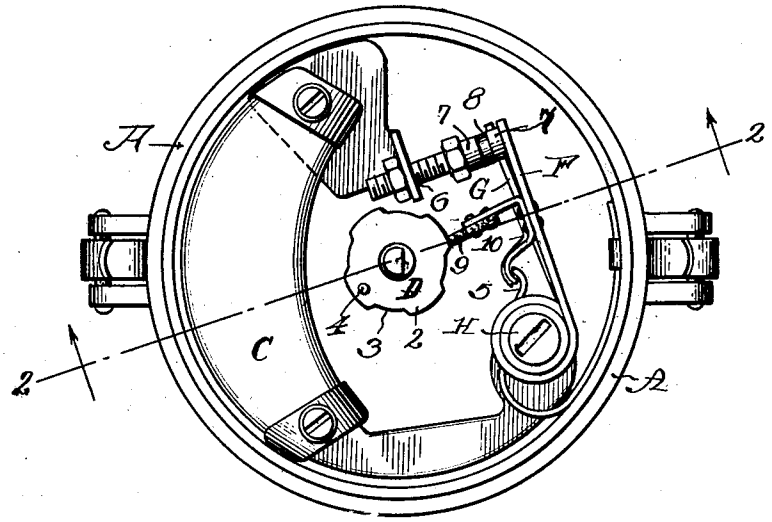
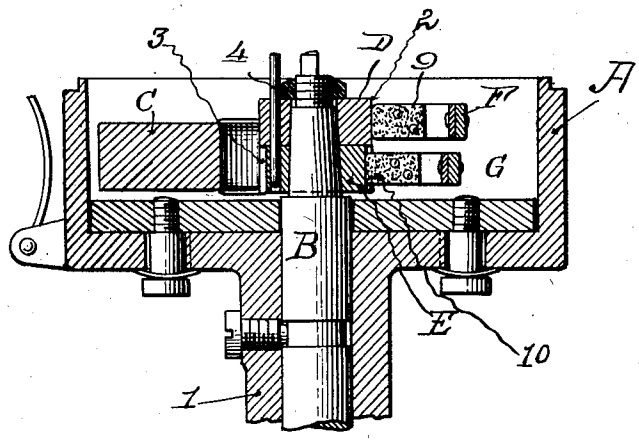


Fig. 2.



Witness:
Chas. L. Howard

Inventor,
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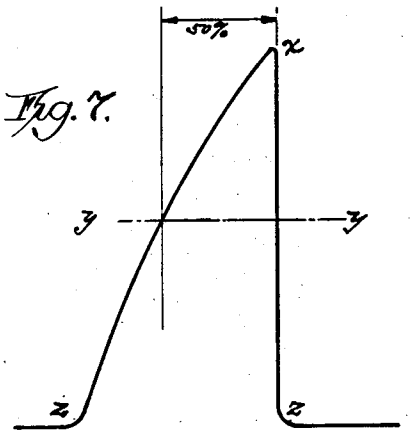


Fig. 7.

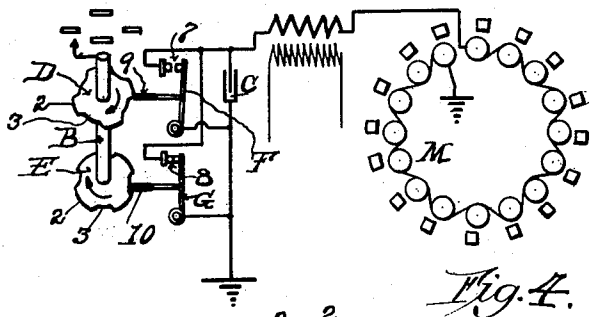


Fig. 4.

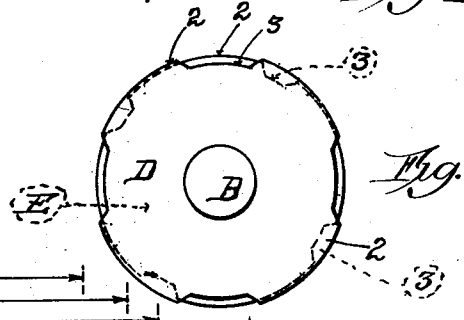


Fig. 3.

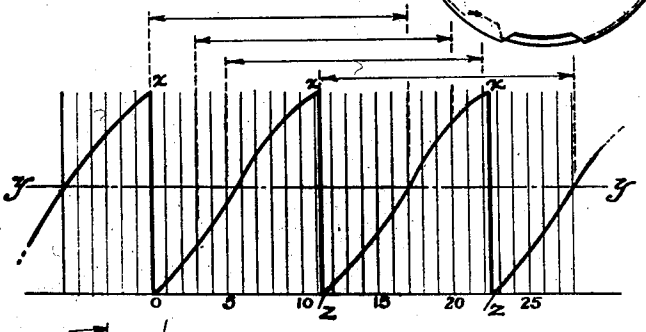


Fig. 8.

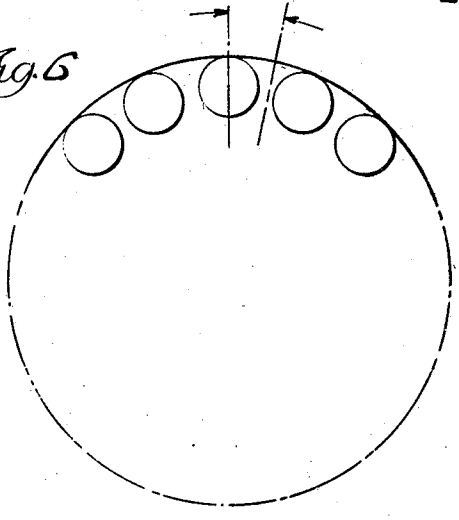


Fig. 6

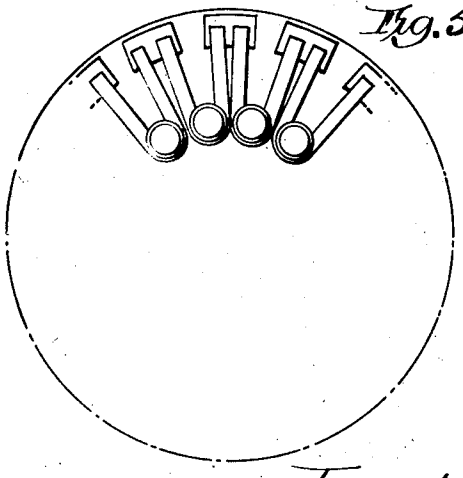


Fig. 5

Witness:
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Patented Jan. 5, 1926. 1,568,112

UNITED STATES PATENT OFFICE.

CHARLES J. VOGE, OF CHICAGO, ILLINOIS.

IGNITION DEVICE.

Application filed November 1, 1924. Serial No. 747,310.

To all whom it may concern:

Be it known that I, CHARLES J. VOGE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Ignition Devices, of which the following is a specification, reference being had to the accompanying drawings, and to the reference characters marked thereon, which form a part of this specification.

This invention relates to ignition devices for internal combustion engines and more particularly to such devices where the source of electrical energy is derived either from a storage battery or from an alternating current generator such as a magneto, and where the interrupter mechanism is not a part of nor mounted directly upon the magneto.

With magnetos of this type it is customary to use a timer or contact maker and a vibrating induction coil to obtain the ignition spark at the proper time in relation to the speed of the engine. The points of the vibrator unit used to interrupt the current are operated magnetically and not mechanically and therefore the vibrator unit has a substantially fixed speed. The electromagneto is connected with and is operated from the crank shaft of the engine, and the magnetic flow varies, and also actually increases with the increase of speed of the engine. Due to the practically fixed speed of operation of the vibrator unit, a sufficient advance of the spark timer cannot be obtained for a proper operation of the engine at high speeds.

One of the objects of my invention is to obviate the difficulties just mentioned with respect to magneto operation, and to produce an ignition device wherein the interrupter is mechanically operated by the engine and wherein the operation of the ignition may be retarded or advanced to conform to the varying speed of the engine without diminishing the richness and efficiency of the spark, whether operating upon battery or magneto.

Another object of the invention is to produce an ignition device with two sets of interrupter points, each set being mechanically operated by a cam, which cams shall be so adjusted that the cam first to operate shall close and open its interrupter points before the second cam shall actuate its set of interrupter points.

Another object of the invention is to produce an ignition device with two sets of interrupter points, each set being mechanically operated by a cam, said cams being so constructed and arranged as to give a longer time of contact to the interrupter points of the first cam to operate, than the time of contact of the interrupter points of the second cam.

Another object of the invention is to construct an ignition device whereby two sparks will be delivered for each power impulse of the engine and at least one of said sparks will be taken off at the peak or maximum magneto output or within fifty per cent of maximum magneto output, thereby insuring an effective spark no matter what the speed of the engine, or the adjustment of the control lever, may be.

The invention will be more fully understood by an inspection of the accompanying drawings in which I have chosen to illustrate the same as applied to a magneto having sixteen magnetic coils, such as used on the well known Ford automobile; though it will, of course, be understood that it may be applied to other forms of magneto.

The invention consists in the features, combinations and details of construction herein illustrated and described, and more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a plan view of a device embodying my invention, with the igniter cap removed.

Fig. 2 is a vertical sectional view of the same, taken in the plane indicated by the dotted line 2—2 on Fig. 1.

Fig. 3 is a plan view, enlarged, of the two cam discs on the igniter shaft, superposed one upon the other.

Fig. 4 is a diagrammatic view of the circuit.

Fig. 5 is a diagrammatic face view of the magnet side of the magneto.

Fig. 6 is a similar view of the coil side of the magneto.

Fig. 7 is a graph or chart of the curve of one magneto output peak.

Fig. 8 is a graph or chart showing several of such peaks and the time at which two breaks occur.

In the form chosen to illustrate my invention and with reference to Figs. 1 and 2, it will be seen that A designates the cup

shaped lower casing of an ignition device, provided with a bearing 1 for the rotatable ignition shaft B. It also contains the usual condenser C. Mounted upon the shaft B to rotate therewith are two cams D and E each provided upon its circumferential margin with a plurality of projections 2 and recesses 3. The relation or adjustment of the two cams is important, as will be hereinafter explained, and such adjustment, when made, is maintained by locking the two cams together with a vertically disposed pin 4.

F and G are two interrupter arms, pivotally mounted at H in the casing A, said arms being under tension of springs 5 as usual. Each interrupter arm carries one of a pair of breaker points, the coacting breaker points being adjustably mounted on the bracket 6. The breaker points for the upper arm F are indicated at 7, 7, and shown open, while the pair of breaker points for the lower arm G are closed and indicated at 8, 8. Upon the interrupter arms F and G are contact makers 9 and 10, respectively, adapted to engage and be actuated by the cams D and E, respectively. The shaft B is operatively connected with the engine shaft and its speed of rotation will correspond with the varying speeds of the engine.

It will therefore be understood that the cams D and E will mechanically actuate the interrupter arms F and G and thus close and open the two sets of interrupter points 7 and 8, which, in a familiar manner, will cause the production of the desired spark, the parts being in circuit with the magneto M, as diagrammatically set forth in Fig. 4.

In order to insure a full and efficient spark for each power impulse of the engine, it is necessary to deliver a spark when the electric current is at peak or within fifty per cent of current peak. To insure this moment of spark delivery, my device provides that two sparks shall be delivered in rapid succession as the result of the mechanical operation of the interrupter points from the cams D and E. This result I accomplish by adjusting the cams D and E so that the cam first to operate shall close and open its set of interrupter points before the second cam shall actuate its set of interrupter points.

In battery operation the potential of current is practically constant, but as engine speed increases, the potential is weakened by lessening of time of contact. Therefore, for battery operation I provide in my device that the cam first to operate shall have a longer period of contact for its interrupter points than the time of contact of the interrupter points of the second cam, thus insuring an effective spark. The arrangement and adjustment of the cams D and E for this purpose (battery operation), I find will not interfere with the hereinabove described action when operating upon magneto. My ignition device may therefore be switched from magneto to battery at will.

The arrangement of the cams D and E upon the shaft B and their shape and adjustment is important. It will be observed (see Fig. 3) that the projections 2 on the periphery of the cam D have a shorter arcuate contact surface than have the projections 2 on the lower cam E; while the recesses 3 on the lower cam E have a shorter arcuate contact surface than have the recesses 3 of the upper cam D.

Where a magneto is used which contains sixteen electro-magnetic coils, such as illustrated, I have discovered that the proper adjustment and relation of the cams D and E to cause the delivery of an efficient spark at the desired time, requires such adjustment of the cams as to cause the two successive breaks of the interrupter points for each power impulse to occur sixteen and seven-eights degrees apart, one break being caused by one cam and the second by the other cam. This will bring one of the two spark deliveries at the maximum of the magneto output, as indicated at the curve peak x in Fig. 7, or the spark will be delivered somewhere within fifty per cent of current peak, as indicated on the curve between the points y and x on Fig. 7.

It will, of course, be understood by those skilled in the art, that where a greater or lesser number than sixteen magnetic coils are used in the magneto, the degree of adjustment should be correspondingly varied from 16⅞ degrees.

In the diagrams shown in Figs. 7 and 8, the maximum magnetic output or current peak is indicated at x, the zero of current output at z and the fifty per cent point on the curve at y. Any spark delivered at any point between y and x will be an efficient spark. It will be noted by the diagram, Fig. 8, that one of the two sparks delivered for each power impulse of the engine will always be efficient, no matter what the degree of ignition advance which may be required to conform to the varying speed of the engine.

I claim as my invention:

1. An ignition device having two sets of interrupter points and a cam for mechanically operating each set, and means for causing one of the two sets of interrupter points to break at the maximum or within fifty per cent of the maximum magneto output.

2. An ignition device having two sets of interrupter points and a cam for mechanically operating each set, the cam first to operate having a longer time of contact of its interrupter points than the time of contact of the interrupter points of the second cam.

3. An ignition device having two sets of

interupter points and a cam for mechanically operating each set, said cams being so adjusted with relation to each other that the cam first to operate will close and open its set of interrupter points before the second cam closes and opens its set of interrupter points.

4. An ignition device having two sets of interrupter points, a cam for mechanically operating each set, means whereby the cam first to operate shall cause a longer period of contact of its interupter points than the time of contact of the interrupter points of the second cam, and means whereby said first operating cam shall close and open its set of interrupter points before the second set of interrupter points are closed and opened.

5. In an ignition device having a rotatable shaft, a pair of cams mounted thereon and two sets of interrupter points, one set for each cam, the corresponding contact surfaces of the two cams being of unequal arcuate length.

6. In an ignition device having a rotatable shaft, a pair of cam discs fixedly mounted thereon and a set of interrupter points mechanically operated by each cam disc, the circumferential surface of each disc having concentric recesses and cam projections of unequal arcuate lengths, and the recesses of one disc being of different lengths than the recesses of the other disc.

In testimony, that I claim the foregoing as my invention I affix my signature this 29th day of October, 1924.

CHARLES J. VOGE.