

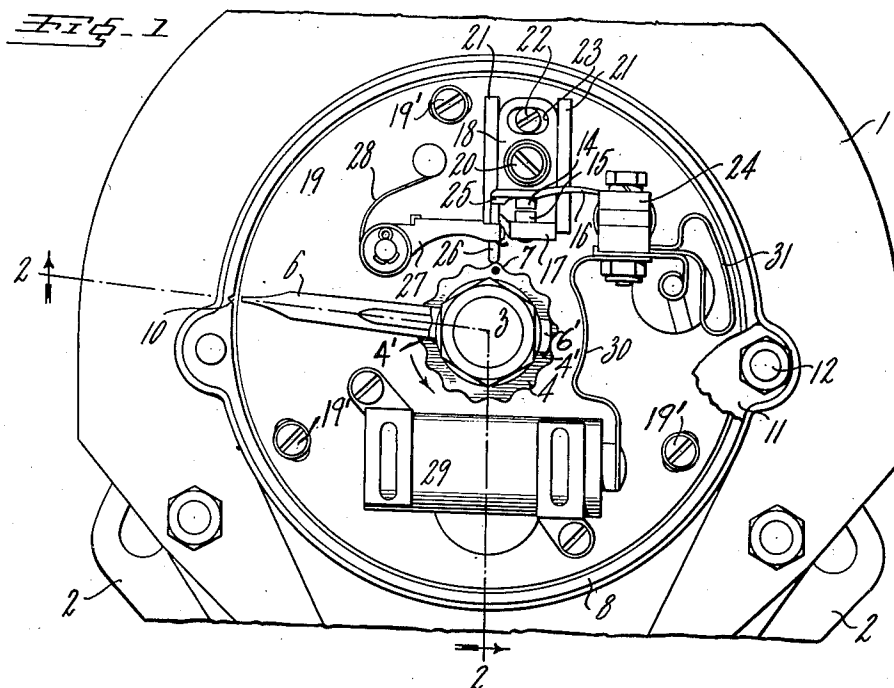
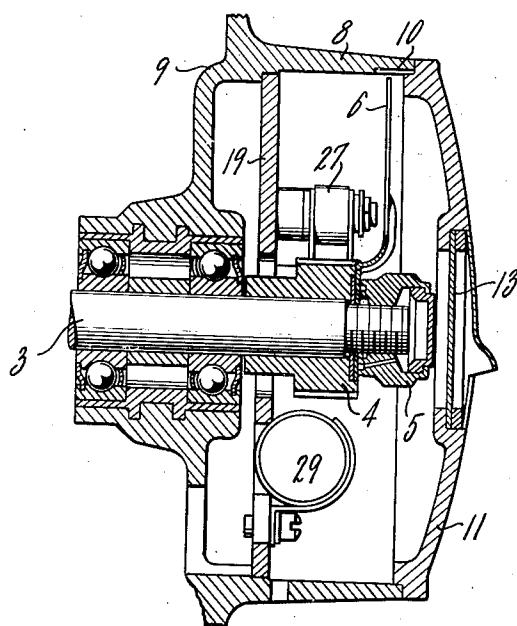
May 6, 1941.

W. E. SCHWARZMANN

2,240,804

INDICATING MECHANISM FOR IGNITION INTERRUPTERS

Filed May 28, 1940



INVENTOR.
WOLFGANG E. SCHWARZMANN
BY *Sam A. Rautsch*
ATTORNEY

UNITED STATES PATENT OFFICE

2,240,804

INDICATING MECHANISM FOR IGNITION INTERRUPTERS

Wolfgang E. Schwarzmann, Longmeadow, Mass.,
 assignor to American Bosch Corporation,
 Springfield, Mass., a corporation of New York

Application May 28, 1940, Serial No. 337,659

5 Claims. (Cl. 200—19)

The present invention relates to indicating mechanism for cam-operated circuit interrupters for ignition generators such as magnetos and such as timer distributors associated with battery ignition coils, and more particularly to such mechanism for indicating, solely and directly whenever the generator is at rest and whether or not it is installed on an engine, the presence and extent of the wear of parts of the interrupter such as cause a variation in the angular relationship between a normally stationary part of the generator and that rotor of the generator which carries the rotatable element of the interrupter.

It has been customary to use a separate tool, as a straight edge or the like, to determine this relationship but trouble sometimes occurred from inaccuracies in manually setting the tool each time and sometimes from absence or loss of the tool when needed. Thus even if the reading were obtained, it was often erroneous to such a degree that the resetting of the interrupter contacts in accordance therewith appreciably reduced the power output, and detracted from the dependability and life, of the internal combustion engine with which such ignition generator was associated. This is particularly important in the case of aviation magnetos having fixed ignition and requiring a high degree of effectiveness and reliability for safety and speed under extreme variations of altitude and other influencing factors. Also, spark indicators separate from the generator have been used to determine the angular positions of the sparking periods, but such an indicator requires test equipment having driving mechanism correlated to the speed and angular position of the generator and is not adapted for quick or convenient application to a generator that is or is not installed on an engine.

The primary object of my invention is to provide for such ignition generators, indicating mechanism forming a permanent part of the generator for indicating solely and directly the presence and extent of the wear of the parts of the interrupter resulting in a variation from a predetermined angular relationship between a normally stationary part of the generator and that rotor of the generator which carries the rotatable element of the interrupter, when the generator is at rest and whether or not it is installed on an engine. More specifically, this predetermined angular relationship is usually that between the interrupter cam or the rotor on which it is mounted, on the one hand, and a normally stationary part of the generator, on

the other hand, at the instant the contacts of the interrupter are separated a predetermined extent which is the minimum extent at which the circuit including them is just interrupted but may be any other desired value between the extreme positions of the movable contact with respect to the normally fixed contact. The improvements in ignition generators by which this and other objects are attained will be obvious from the following description in connection with the accompanying drawing which show, as an example, the preferred form of my indicating mechanism for a high tension fixed-ignition aviation magneto having a cam fixed on the distributor rotor shaft in cooperation with a normally stationary interrupter of the deflectable lever type. In this drawing:

Fig. 1 is an end elevation, with the cover partly broken away, of the indicating and interrupting mechanism of my invention; and Fig. 2 is a section on line 2—2 of Fig. 1.

In the drawing, the reference numeral 1 indicates the magneto intended to be fastened by a flange mounting 2 to an internal combustion engine which drives a magneto rotor shaft 3, in this case the combined distributor rotor and interrupter shaft, properly timed to the cam shaft of the engine. The interrupter cam 4 is keyed or otherwise suitably fastened in proper angular position on shaft 3 and is held longitudinally thereon by the self-locking nut 5 with the indicating pointer 6 fastened therebetween in set angular relation to the lobe 7 of the cam by means of diametrically offset slots 4' in the end face of the cam in which fit the pointer 6 and its tail portion 6'. This lobe 7 has a mark thereon as shown for its ready identification in using the indicator as hereinafter described. The peripheral wall 8 of the interrupter housing 9, which is fixed in position for this fixed-ignition magneto, has a V-slot or other suitable index 10 cut along its interior wall surface in position to be directly and accurately observable in proximate registry with the end of the pointer 6 when the cover 11 is removed. As will be understood, this cover is fastened in place over the open end of the interrupter housing in any suitable way as by screws such as 12 and carries the usual ventilator 13, the rotor shaft 3 terminating in the housing.

The cooperative circuit contacts 14 and 15 of the circuit interrupting mechanism are stationary in their angular position in the interrupter housing, one being carried by the deflectable spring lever 16 and the other being fixedly mounted on

the upstanding arm 17 of the adjustable bracket of which its base member 18 is normally held firmly on the interrupter plate 19 by the locking screw 20. When desired, however, the contact 15 may be moved between the guides 21 to ad-
 5 justed position toward or away from the cam 4 by first loosening the locking screw 20 and then turning the eccentric headed screw 22 in the en-
 10 gaging slot 23 in the well known manner. The spring lever 16 is fixed at one end to the inter-
 rupter terminal 24, fastened on the plate 19, and has at its other or outer end an abutment 25
 15 which resiliently rests on the outer end of the cam follower or rubbing block 26. This block is fastened near the outer end of a pivoted lever 27
 and the spring 28 assists in holding its inner end continually in engagement with the peripheral
 20 surface of the cam 4. The interrupter plate 19 is fastened to the interrupter housing 9 by screws 19' passing through adjusting elongated holes as shown, and also carries the condenser 29 ground-
 ed to it and electrically connected by conductor 30 to the interrupter terminal 24 and the mag-
 neto short circuiting spring 31.

It will be observed that the pointer 6 is bent outwardly so as to be freely and permanently ro-
 25 tatable in the interrupter housing 9, with its outer end in proximity to the wall 8 thereof, whether or not the cover 11 is in place, and also is pointed so as to assure accurately its position of registra-
 30 tion with the index 10, so as to provide a registerable relation between the pointer and index, that is such a relation as does not require the use of a separate tool in determining the wear of the in-
 35 terrupter parts. The cam 4 and the cooperative circuit contacts are so assembled and fixed in position with relation to the rotor shaft 3, that the cam separates the contacts about 0.009 inch
 40 when the poles of the magnetic rotor and stator have an edge distance of about 2 to 2.5 mm., that is when the trailing edge of one magnetic rotor
 pole has moved away from the trailing edge of a cooperative stator pole by that chord distance, at
 45 which instant, as is well known, the magneto generates substantially its most effective ignition voltage. This is accomplished when assembling
 the magneto, either initially or after overhauling, by first setting the contact 15 for the normal ex-
 50 tent of opening, and then fastening the inter-
 rupter plate 19 in that position in interrupter housing 9 at which pointer 6 exactly registers
 with index 10 when lobe 7 holds contact 14 off
 55 contact 15 by a separation of 0.009 inch or any other predetermined opening. If thereafter the cam, or the cam follower 26 or the contacts 14, 15
 become worn so that this relationship is altered, the predetermined position of maximum effec-
 60 tiveness of ignition may be reestablished by turning the rotor shaft 3 until the pointer 6 registers
 with the index 10, and then adjusting the nor-
 mally fixed contact 15 in the manner before ex-
 65 plained until the proper separation of the coop-
 erative contacts exists. This amount of separa-
 tion of 0.009 inch, or whatever else is predeter-
 mined, may be ascertained by a feeler gauge be-
 70 tween the contacts, or by a bell or lamp circuit
 connected between them, or by earphones or a
 meter or electronic tube associated with an im-
 pedance balanced circuit, or in any other suitable
 way.

It will now be understood that, in accordance
 with my invention, the position of maximum
 effectiveness of ignition may be accurately estab-
 lished and reestablished at any time, with the
 magneto at rest whether or not installed on the

engine, by means of this indicating mechanism
 which is permanently installed on and continu-
 ally operative with the magneto. Obviously, if
 desired, a plurality of index marks may be pro-
 5 vided for the plurality of cam lobes, instead of
 one such mark for a selected lobe, and also the
 indicating mechanism may be used with mag-
 netos having a timing range, instead of fixed tim-
 10 ing, by providing index marks for any or all of
 the retarded and advanced positions desired.
 Thus while I have shown but a single embodi-
 ment of the invention, it will be apparent that
 various other embodiments are within the scope
 of my invention in application to ignition gener-
 15 tors in general such as timer distributors as well
 as magnetos of any suitable type, having various
 kinds of cams, whether rotary or stationary, and
 various kinds of interrupters actuated thereby.
 All such indicating mechanism of these kinds
 20 associated with interrupter mechanism of any
 suitable kind in all suitable rotary, oscillating or
 other form of single or multicylinder ignition
 generators are intended to be covered within the
 broad terms of the appended claims.

Having thus described my invention, what I
 claim is:

1. In combination with an ignition generator
 having a rotor, a normally stationary structure
 associated with said rotor, and circuit interrupt-
 30 ing mechanism comprising cooperative contacts
 constituting one element thereof and a cam for
 intermittently separating them constituting the
 other element thereof, one of said elements being
 35 carried by said rotor and the other being nor-
 mally stationary, of indicating mechanism per-
 manently associated with said rotor for indicat-
 ing at rest at a predetermined extent of separa-
 tion of said contacts by said cam the presence
 40 and extent of the wear of parts of said interrupt-
 ing mechanism, solely and directly, such as would
 cause a variation in the angular relationship be-
 tween said rotor and said structure, said indicat-
 ing mechanism comprising a pointer member and
 45 an index member of which one member is fas-
 tened to the rotor carrying the rotatable element
 of the interrupting mechanism and of which the
 other member is permanently associated with
 said structure in proximate registrable relation
 with the first member.

2. In combination with an ignition generator
 having a rotor, an interrupter housing in which
 said rotor terminates, and circuit interrupting
 mechanism in said housing comprising coopera-
 50 tive contacts constituting one element thereof
 and a cam for intermittently separating them
 constituting the other element thereof, one of
 said elements being carried by said rotor and the
 other being normally stationary and arranged in
 55 said housing, of indicating mechanism in said
 housing and permanently associated with said
 rotor for indicating at rest at a predetermined
 extent of separation of said contacts by said cam
 the presence and extent of the wear of parts
 60 of said interrupting mechanism, solely and di-
 rectly, such as would cause a variation in the
 angular relationship between said rotor and said
 housing, said indicating mechanism comprising a
 pointer member and an index member of which
 65 one member is fastened to the rotor carrying the
 rotatable element of the interrupting mechanism
 and of which the other member is permanently
 associated with said housing in proximate regis-
 trable relation with the first member.

3. In combination with an ignition generator
 75 having a rotor, a normally stationary structure

associated with said rotor, and circuit interrupting mechanism comprising cooperative contacts carried by said stationary structure and a cam carried on said rotor for intermittently separating said contacts, of indicating mechanism for indicating at rest at a predetermined extent of separation of said contacts by said cam the presence and extent of the wear of parts of said interrupting mechanism, solely and directly, such as would cause a variation in the angular relationship between said rotor and said structure, said indicating mechanism comprising a pointer fastened to said rotor for rotation therewith and an index carried by said structure in proximate registrable relation with said pointer.

4. In combination with an ignition generator having a rotor shaft, an interrupter housing, and circuit interrupting mechanism in said housing comprising normally stationary cooperative contacts and a cam mounted on said shaft for intermittently separating them, of indicating mechanism in said housing for indicating at rest at a predetermined extent of separation of said contacts by said cam the presence and extent of the wear of parts of said interrupting mechanism, solely and directly, such as would cause a variation in the angular relationship between said rotor and said housing, said indicating mechanism comprising a pointer fastened to said cam and an index associated with said housing in proximate registrable relation with said pointer.

5. In combination with an ignition generator having a rotor and also having a normally stationary structure with circuit interrupting mechanism comprising an adjustably fixed contact, a deflectable contact cooperative therewith, and a cam for intermittently separating said deflectable contact from said fixed contact, said contacts constituting one element and said cam constituting another element one of which is mounted on said rotor, of indicating mechanism permanently associated with said rotor for indicating at rest at a predetermined extent of separation of said contacts by said cam the presence and extent of the wear of parts of said interrupting mechanism, solely and directly, such as would cause a variation in the angular relationship between said rotor and said structure, said indicating mechanism comprising a pointer member and an index member of which one member is fastened to the rotor carrying the rotatable element of the interrupting mechanism and of which the other member is permanently associated with said structure in proximate registrable relation with the first member, said adjustable fixed contact having means for adjusting it relatively to said cam to adjust the extent of separation of said contacts when the indicating members are in registry.

WOLFGANG E. SCHWARZMANN.