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INDICATOR FOR IGNITION APPARATUS

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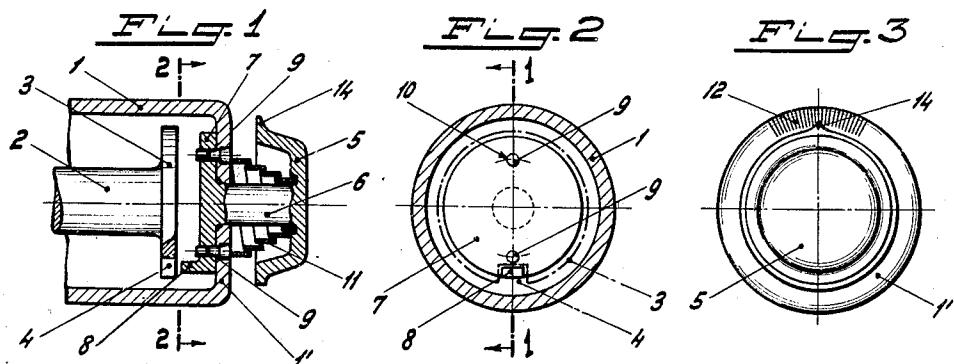
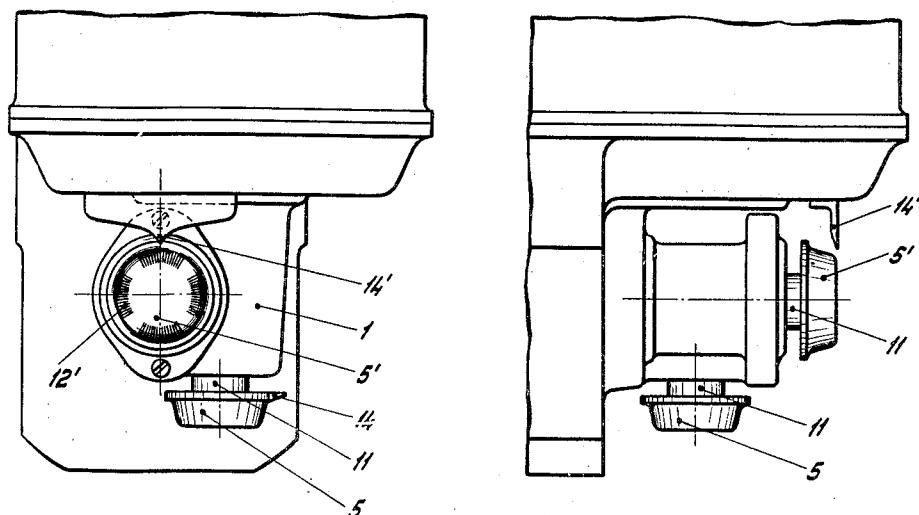


FIG. 4

FIG. 5



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INDICATOR FOR IGNITION APPARATUS

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4 Claims. (Cl. 116—124)

This invention relates to an indicator adapted to be embodied in magnetos and other ignition apparatus and generally in the auxiliary apparatus for internal combustion engines, for the purpose of indicating the angular position of their rotary parts with respect to stationary parts of the apparatus and consequently to the angular position of the crank shaft of the engine as referred to the dead points of the pistons connected with said crank shaft.

As known, in order that an ignition magneto or another ignition apparatus may be coupled at a correct setting with the crank shaft of the engine to secure that ignition sparks are developed at correct and predetermined time and in the required succession, it is necessary to know the exact angular position of the movable parts of the distributor and circuit breaker with respect to cooperating stationary parts at the time the shaft driving said movable parts is being coupled with the engine shaft.

For such a purpose it is necessary to inspect said movable parts of the ignition apparatus and accordingly to dismantle the casing thereof in order to expose said parts for inspection; this operation is materially long particularly in present ignition apparatus whose casing is entirely sealed and shielded.

To make the above stated operation easy, in the common practice reference marks are provided in internal parts of magnetos and other ignition devices or on their driving shafts; however such reference marks are not exposed for inspection at the time the magneto is entirely assembled and mounted on the engine and accordingly it is not feasible to ascertain the setting angle of the magneto moving parts with respect to stationary ones and to the engine shaft at the time said magneto is being mounted on the engine.

The present invention has for its object a device adapted for use in connection with apparatus of said kind; said device includes a rotary member which is adapted to evidence at any time at the outside the angular position of the distributor and of the breaker cam, but is usually released from the rotary parts of the ignition apparatus to prevent said indicator from being in continuous motion during the engine operation with inherent likelihood of trouble in view of the high speed imparted to the rotary parts in the ignition apparatus; the present invention further includes an arrangement by which the indicator is automatically released from the part of the ignition apparatus driving it as soon as the regular operation of the ignition apparatus is started.

An embodiment of the present invention is shown by way of example on the annexed drawing and

Fig. 1 is a fragmentary section of a portion of an ignition apparatus provided with the device of this invention, on line 1—1 of Figs. 2 and 3;

Fig. 2 is a section on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary front view;

Fig. 4 is a fragmentary plan view of a portion of an ignition magneto of an internal combustion engine equipped with indicators in accordance with this invention in respect with a shaft driving the magneto breaker and a distributor shaft;

Fig. 5 is a view of Fig. 4 from left hand side.

In the embodiment of Figures 1, 2 and 3, 1 denotes a portion of the body of an ignition magneto arranged to provide a casing and 2 denotes a part mounted to rotate in said casing, say a shaft driving a magneto distributor whose angular position around its own rotary axis is required to be known from outside, said part being provided for cooperation with the device of the present invention with coupling means which in the illustrated construction include a disk 3 fast thereon and having a notch 4.

The indicator includes a knob 5, having preferably the shape of a cup, which is mounted to rotate in front and outside of the casing 1 by means of a spindle 6 fast therewith and rotatably seated in the front wall 1' of said casing. Inside the casing 1 said spindle 6 is provided with coupling means adapted to cooperate with those of shaft 2, said means including a disk 7 having a finger 8 adapted to engage the notch 4 of disk 3; the knob 5 and casing 1 are further provided with means adapted to lock the knob 5 on the casing and including two pins 9 fast on the casing 1 and cooperating holes 10 provided in the disk 7. The respective size and arrangement of the several parts 7, 9, 8, 3 are such as the disk 7 is released from pins 9 only after finger 8 has engaged the notch 4 of disk 3 and parts 3 and 8 may be released from each other only after disk 7 is again engaged with pins 9.

A spring 11 is located intermediate the knob 5 and the front wall 1' of casing 1 and it acts to hold the parts 5, 6, 7, 8 released from parts 2, 3, 4 and engaged with pins 9 of said casing; said spring 11 is conveniently located in a recess of the knob 5 which has a cup-shape as illustrated.

Finally the knob 5 has a pointer 14 cooperating with a scale 12 provided on the front wall 1' of the casing.

In the inoperative conditions shown in Figures 1 and 2, the indicator 5, 6, 7, 8 is locked its disk 7 being in position to have its holes 10 entered by locking pins 9, and then the shaft 2 with cooperating parts may rotate freely without driving said indicator.

When it is desired to ascertain the angular position of the shaft 2 with respect to parts fast with casing 1, said shaft being assumed to be sta-

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tionary at such time, the operator moves the knob 5 inwardly to shift it towards the casing 1; if, as it usually happens, the notch 4 of disk 3 fast with shaft 2 is not in front of finger 8 of the indicator 5 said indicator is stopped after a certain inward displacement, because its finger 8 engages the solid portion of the disk 3.

Then, while the knob 5 is being held forced in the above described position against the action 10 of spring 11, the shaft 2 and disk 3 are moved angularly by any suitable means, say by hand on the end of the shaft 2 extending to the outside of casing 1 at the opposite end of the ignition device, or also by moving the crank shaft of the engine (not shown) the shaft 2 is geared with; then at a certain instant the finger 8 and notch 4 come in front of each other and thus said finger 8 may enter notch 4 and the disk 7 and the knob 5 are able to move forward the disk 7 being then 20 released from pins 9 and engaged by finger 8 and notch 4 with shaft 2. After a certain angle of rotation and as soon as the holes 10 of disk 7 are not longer in full register with pins 9, the knob 5 is prevented by the pins 9 engaging the 25 opposite face of disk 7 from moving back under the action of spring 11 and is held engaged with shaft 2; accordingly the shaft 2 and associated parts may be carried into the desired angular position which may be ascertained from outside by 30 means of the knob pointer 14 and scale 12.

When the apparatus starts to operate in normal manner, the shaft 2 drives the disk 7 in rotation through a certain angle until the holes 10 come in register with pins 9 and then the spring 35 11 causes the indicator 5, 6, 7 to move back, the finger 8 thus releasing the notch 4 while the disk 7 again engages the pins 9 by its own holes 10 as soon as these holes come in front of said pins; it is thus obtained that the indicator is made in- 40 operative and is locked in such condition as soon as the normal operation of the device starts.

The pins 9 and holes 10 may be arranged along diameters with respect to the axis of revolution of spindle 6 and at even distances from said axis, 45 and in such a construction the indicator 5, 6, 7 is released from shaft 2 after it has moved through an angle of 180°; when a single pin as 9 and a single hole as 10 are used or the several cooperating pins and holes are arranged at different 50 radial or angular distances around or from the rotary axis of spindle 6 the automatic release of the indicator from the shaft 2 driving it occurs after an angular displacement of 360°.

Figures 4 and 5 illustrate the embodiment of 55 two indicators of the described construction in an ignition magneto for internal combustion engines.

The knob 5 cooperates with the shaft of a magneto distributor (not shown) and indicates its angular position while the knob 5' cooperates 60 with the shaft of the magneto rotor (not shown) which rotates with a speed which is many times higher than that of said distributor and accordingly provides for a quite true indication as to the instant at which the separation of the breaker 65 contacts occurs; in connection with the indicator knob 5' a stationary pointer 14' is provided on casing 1 and cooperates with a scale 12' provided on the knob.

Of course the location of means 4 and 8 and 70 of means 9 and 10 may be reversed with respect to the illustrated one and generally the present invention includes all the equivalents of the described means and arrangements lying within the spirit of the appended claims.

What I claim as my invention and desire to secure by United States Letters Patent is:—

1. In means for indicating the angular position of a rotary part of an auxiliary apparatus of an internal combustion engine, a casing, said rotary part being enclosed in said casing, a member mounted to slide and rotate through the wall of said casing, indicating means on said member at the outside of said casing, means on said member within said casing for releasable coupling with 10 said rotary part, spring means acting on said member for disengagement of said coupling means and cooperating means on said casing and member to hold said coupling means temporarily interengaged after said coupling means have been 15 brought into operative position.

2. In means for indicating the angular position of a rotary part of an auxiliary apparatus of an internal combustion engine, a casing, said rotary part being enclosed in said casing, a member 20 mounted to slide and rotate through the wall of said casing, indicating means on said member at the outside of said casing, an extension on said member within said casing, cooperating releasable intercoupling means on said extension and 25 rotary part, spring means acting on said member for disengagement of said coupling means and cooperating means on said casing and extension to hold said coupling means temporarily interengaged after said coupling means have been 30 brought into operative position.

3. In means for indicating the angular position of a rotary part of an auxiliary apparatus of an internal combustion engine, a casing, said rotary part being enclosed in said casing, a member 35 mounted to slide and rotate through the wall of said casing, indicating means on said member at the outside of said casing, cooperating finger and notch on the portion of said member extending within said casing and on said rotary part said finger and notch being interengaged when said member is in its fully inwardly projected position with respect to said casing, cooperating pins and holes on said casing and on the portion of said member extending within said 40 casing said pins and holes being interengaged when said member is in its fully retracted position with respect to said casing, spring means acting on said member for bringing said member in said fully retracted position, said pins acting to hold said member temporarily in said fully 45 inwardly projected position.

4. In means for indicating the angular position of a rotary part of an auxiliary apparatus of an internal combustion engine, a casing, said rotary part being enclosed in said casing, a member mounted to slide and rotate through the wall of said casing, a cup-shaped knob connected with said member at the outside of said casing, indicating means on said knob, means on said member within said casing for releasable intercoupling with said rotary part, releasable cooperating locking means on said casing and member, a spring located between said knob and said casing and within the recess of said knob, said spring acting 60 on said member for disengagement of said coupling means and interengagement of said cooperating locking means, with said releasable cooperating locking means on said casing and member to hold said coupling means temporarily interengaged after said coupling means have been 65 brought into operative position.