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ELECTRICAL INDICATOR OF TROUBLE FOR ENGINES, ETC

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2 Sheets-Sheet 1

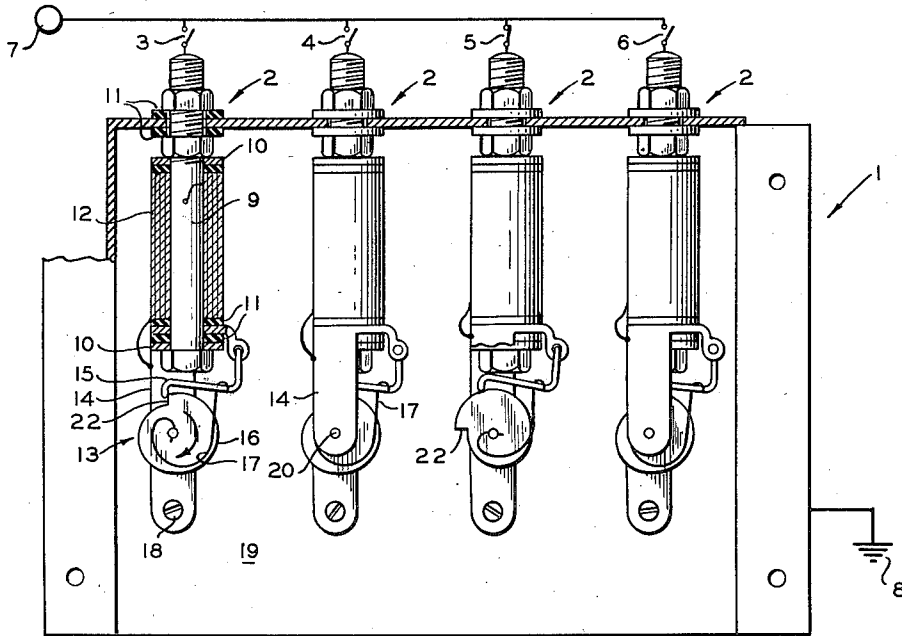


FIG. 1.

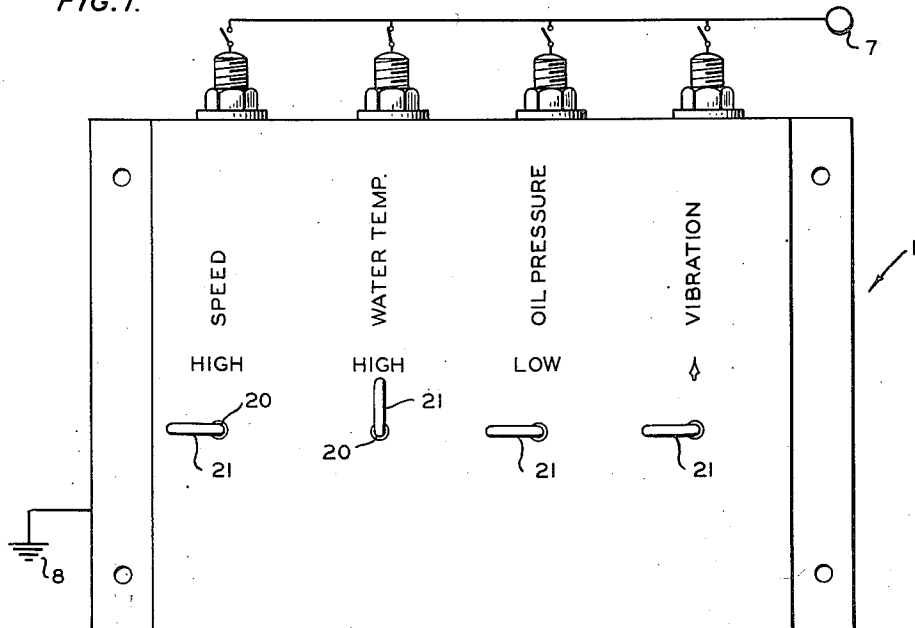


FIG. 1A.

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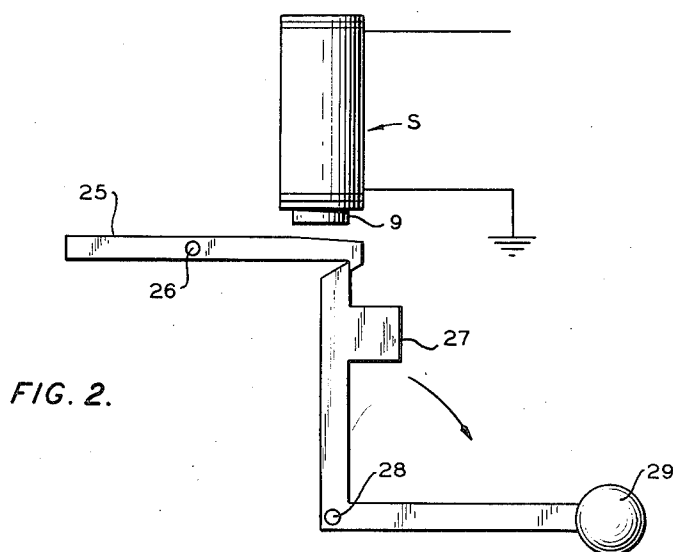
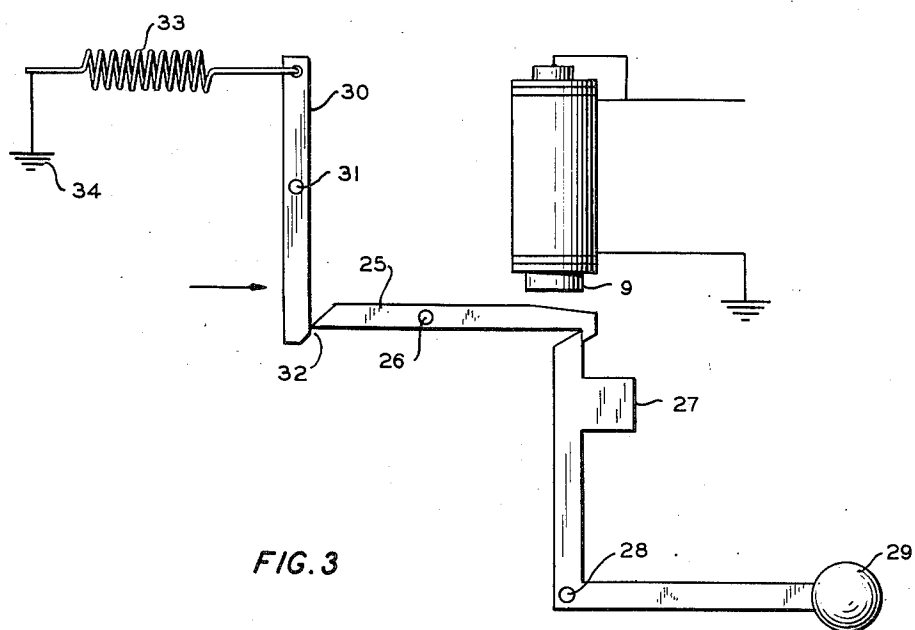
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ELECTRICAL INDICATOR OF TROUBLE FOR ENGINES, ETC.

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5 Claims. (Cl. 340—52)

This invention relates to engine indicators. In one aspect it relates to an indicator which is actuated by the electrical current which flows from the magneto of a spark ignition engine when said magneto is grounded to stop said engine. In another of its aspects, it relates to an indicator of improved design and simplicity of construction comprising an electrically energized magnet or solenoid, current to which is passed through a conductor, in one modification a rod or bolt, concentrically disposed within said solenoid, and current from which solenoid is passed through an indicator means assembly which is operated by said solenoid and which simultaneously, as it is operated, grounds the current in said rod to shunt it around said solenoid, thus relieving said solenoid from full duty regardless of how long the condition indicated by said current flow continues said current flow. In still another of its aspects, this invention relates to indicator means assembly, having an indicator fixed to a spring biased rotary cam held in a fixed position by a latch adapted to release said cam upon movement of said latch to said solenoid when said solenoid is energized, said cam and latch being so constructed and arranged that upon energizing of the solenoid and release of the cam by said latch, the cam presses the said latch against a conductor conducting current to said solenoid to by-pass said solenoid and to conduct the current to the ground. In a further aspect, the invention relates to a simplified indicator flag releasing mechanism having a pivoted latch and a pivoted flag which is spring, weight or otherwise urged to move to an indicating position, the latch preventing said flag from moving to an indicating position and said latch being adapted to release said flag upon energizing of a solenoid. In a still further aspect of this invention, there is provided a spring or otherwise actuated retaining member adapted to retain said last-mentioned latch in contact with a member conducting current to said solenoid and with the ground to by-pass current around said solenoid after it has acted to operate said latch to release said flag.

There are many reasons for providing operating mechanisms and the like with indicator means. One reason for providing mechanisms such as engines with indicator means is to enable an inspector to readily determine following upon an automatic shutdown on the said engine why the automatic shutdown means, usually electrical in character, has shutdown the engine. Another reason for indicator means upon engines or other mechanisms is to signal to an inspector or operator that something in the mechanism, which continues to operate, is not as it should be, for example, that a bearing is too hot or that cooling water is too hot or that an oil level is too low, etc.

One object of this invention is to provide an indicator mechanism which is electrically operated, employing a solenoid, which solenoid is released from full duty immediately after it has operated to cause an indicator means to indicate. This object of the invention is accomplished by providing an indicator means assembly

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having a means for shunting a substantial amount of the current around an electrically energized solenoid which serves to operate the indicator means.

Another object of this invention is to provide an indicator means which is electrically operated and which has few moving parts and possesses a simplified construction as shown in the drawings. A further object of this invention is to provide indicator means actuated by the electrical current which flows from the magneto of a spark ignition engine when said magneto is grounded to stop said engine.

Other objects and advantages are apparent from a careful consideration of this disclosure, the drawings and the appended claims.

According to this invention, there is provided an electrical energizing means (solenoid), an indicator means operated by said energizing means and means to shunt electrical current around said electrical energizing means when it has operated said indicator means. Also, according to this invention, there is provided an improved indicator retaining and releasing mechanism, comprising a pivoted latch which is caused to operate by action of an electrical solenoid or its equivalent and an indicator or flag which is by a spring or weight or otherwise urged to move to an indicating position and which is retained by said pivoted latch when in non-operating position.

Still according to this invention, there is provided a combination of the last-described flag mechanism and a solenoid operated latch which is grounded and which grounds current being conducted to said solenoid to shunt it around said solenoid when said solenoid has operated. In a preferred embodiment, the combination includes also a spring or otherwise biased keeper which acts to keep said latch in contact with said conductor conducting current to said solenoid until said latch is manually released from said keeper. Also, according to the invention, there is provided a method, and means in combination, to operate an indicator means when current flows to the ground from a device, in which an electrical current ordinarily flows, say, a magneto, which device is grounded for some particular reason.

In the attached drawing, Figure I shows an elevational view partly in cross-section of a group of indicators in a common housing. The left-hand indicator mechanism is shown in elevational cross-section across the solenoid only. The second and fourth indicator mechanisms are shown in full view. The third indicator mechanism is illustrated with a portion broken away to allow the mechanism to be seen.

Figure IA shows the face view of the outside of the housing through which extends a series of four indicators attached to the indicator means within the housing as later more fully described.

Figure II illustrates diagrammatically a simplified solenoid latch and weighted indicator means combination.

Figure III illustrates a modification which can be substituted for the latch and spring biased cam arrangement of Figure I.

In the drawing, in Figure I, 1 indicates a complete indicator apparatus which comprises several separate indicators such as the indicators 2. As many indicators 2 are provided as there are separate safety shutdown switches such as indicated diagrammatically at 3, 4, 5 and 6. Each of these shutdown devices completes a circuit from magneto 7 to ground at 8. Each indicator 2 comprises a central core 9 which can be a steel bolt on which are fastened steel washers 10, insulating washers 11, coil 12 and assembly 13 which comprises a metal frame 14 attached between the lower two washers 11 and supporting latch 15, cam 16 and spring 17. One end of the wire of coil 12 is electrically connected to bolt 9 while the

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other end is connected with frame 14 which in turn is connected at 18 with housing 19 and this housing in turn is connected to ground at 8. The ends of shafts 20 extend through the front of housing 19 and are bent at 90° to form setting and indicating levers 21. Suitable lettering may be provided on the front of housing 19 to identify each indicator as shown. In operation, before the engine is started, each lever 21 is turned to the horizontal position as shown by three of these levers in the drawing. This turns cam 16 in the direction shown by the arrow until notch 22 is engaged by latch 15. Spring 17 applies a force to shaft 20 tending to rotate cam 16 in the opposite direction and also provides a slight downward pull on latch 15. When one of the safety shutdown switches closes, a circuit is completed through core 9 and the wire of coil 12 through frame 14 and housing 19 to ground. Flow of current through coil 12 provides a magnetic field which draws latch 15 upward to contact the head of bolt 9. This releases cam 16 and allows spring 17 to turn this cam in the reverse direction. Cam 16 is so formed that when it turns in this direction it forces latch 15 tightly against bolt 9. At the same time lever 21 is turned to the vertical position as indicated on the drawing by the shutdown device labeled "High Water Temperature". When latch 16 contacts bolt 9 a second low resistance path to ground, shunting coil 12, is provided through bolt 9 directly through frame 14 and housing 19 to ground 8 thus insuring that the engine is stopped. Thus, the first circuit is shunted upon completion of the circuit through bolt 9, frame 14 and housing 19 to ground 8. It is inherent in the operation of the device that current, once it begins to flow therethrough, continues, at all times, to flow thus avoiding sparking during the establishment of the shunt.

It is intended that the number of indicators 2 provided in indicator apparatus 1 should correspond with the number of safety shutdown switches. Although it has been found that an apparatus comprising four indicators 2, as illustrated in the drawing, is satisfactory for use in a large number of cases, it is obvious that the apparatus can be provided with a larger or smaller number of indicators as desired.

In Figure II an embodiment of the invention is shown having latch 25 pivoted at 26 which holds or retains flag 27 in a non-indicating position. Flag 27, pivoted at 28, will be urged in the direction of the arrow by weight 29. Weight 29 can be replaced by a spring, not shown. Upon operation of solenoid "S" latch 25 will move in an upwardly direction whereupon flag 27 will rotate in the direction of the arrow to an indicating position.

In Figure III a keeper or second latch 30, pivoted at 31 having shoulder 32 being spring biased by spring 33 and connected to the ground at 34 will move in the direction of the arrow when the solenoid is energized lowering the lefthand end of latch 25 and will act to retain latch 25 in contact with conducting bolt 9 of the solenoid thus by-passing current around the solenoid to the ground. Suitably, flag 27 is made of a non-conductor, whereas, members 25, 30 and 33 are, of course, low resistance conductors. Pivots 26 and 31 can be of conducting or non-conducting materials as desired.

It will be appreciated that the by-pass arrangement provided by the invention, as shown in Figure I or as shown in Figure III, and as it may be modified by one skilled in the art in possession of this disclosure, will operate immediately to relieve the solenoid of duty thus permitting the solenoid to be made of materials which can stand only intermittent duty and then only for short periods of time and which cannot be subjected to prolonged continuous flow of current. A by-pass arrangement also provides a low impedance circuit to ground to assure that the engine is shut down. It is, therefore, evident that the invention provides means whereby savings in the construction, operation and maintenance of indicating means can be effected. When the very large number of indicating

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means which may be installed in a factory or plant having myriads of motors and other operating systems each of which requires several indicators is considered, it is at once clear that the savings provided by the invention are not at all insignificant, but indeed, are of very great value.

Reasonable variation and modification are possible within the scope of the foregoing disclosure, drawings and appended claims to the invention, the essence of which is that (1) there has been provided an improved indicator means which is electrically operated and which when it has operated, by virtue of its construction, is self by-passing in the sense that electrical current which passes through electrically operated energizing means of the indicator means to cause said means to operate is shunted around said electrically operated energizing means, and (2) an improved indicator or flag mechanism of simplified design comprising in combination a pivoted and weighted or spring biased flag, held in a non-indicating position, and a pivoted latch member adapted to release said flag member to allow it to pivot when said pivoted latch member is caused to pivot by an electrically operated energizing means, for example, a solenoid; also a means and method for indicating the grounding of an electrical device, say a magneto upon an engine, for example, a spark ignition engine, for any particular reason, by causing an indicator to be operated by current flowing from said device when it is grounded, have been provided, as described.

We claim:

1. An improved electrically energized indicator means, adapted to be operated by and to continue uninterrupted flow of electrical current relayed from an operating mechanism in which an element or an operating condition requires attention of the operator, comprising in combination an electrically operated energizing means, an indicator means operated by said electrically operated energizing means and means providing uninterrupted flow of current therethrough to shunt a substantial proportion of the current, which continues to flow at all times around said electrically operated energizing means when said indicator means is in an indicating position.

2. In combination, in an electrical indicator device an electrical conductor; a solenoid adjacent said conductor and insulated therefrom; one end of the winding of said solenoid being electrically connected to said conductor; a latch; a spring biased rotary cam, retained stationary by said latch; said latch being positioned with respect to said solenoid to be caused to move to said solenoid and into contact with said conductor upon energizing of said solenoid; said cam being so shaped and arranged that upon release thereof by said latch it will rotate to a position in which it will urge said latch toward said conductor and will hold said latch against said conductor; said latch and cam being made of conducting material and said cam being grounded; the other end of the winding of said solenoid being grounded; and said conductor being connected to a source of current which when it supplies current causes the combination to operate to move said latch toward said conductor; thereby releasing said cam and by the electrical contact of the said conductor, said latch, and said cam and the ground of said cam, to shunt nearly all of the current around said solenoid thereby relieving it of full duty, thus, at all times, assuring continuous flow of current through the device avoiding sparking anywhere in the device.

3. A combination according to claim 2 wherein there is attached to said cam an indicator member.

4. In combination, in an electrical indicator device, an electrical conductor; a solenoid, adjacent said conductor and insulated therefrom; one end of the winding of said solenoid being electrically connected to said conductor; a latch; a pivotally mounted indicator flag, weighted to exert a couple about its pivot, retained in a non-indicating position against said couple by said latch;

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a spring biased keeper; said latch being positioned with respect to said solenoid and to be caused to move to said solenoid and into contact with said conductor upon energizing of said solenoid; said keeper being so positioned with respect to said latch that, upon movement of said latch to said solenoid, said keeper will engage said latch and keep it against said solenoid; said latch, keeper and spring being made of conducting material and said keeper being grounded; the other end of the winding of said solenoid being grounded; said conductor being connected to a source of current which when it supplies current causes the combination to operate to move said latch toward said conductor thereby releasing said flag, and, by the electrical contact of said conductor, said latch and said grounded keeper, to shunt nearly all of the current around said solenoid thereby relieving it of full duty thus, at all times,

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assuring continuous flow of current through the device avoiding sparking anywhere in the device.

5. In combination, a spark ignition engine including a magneto, a first means connecting said magneto to ground to stop said engine, and an indicator actuated by a second means in circuit with said first means and a third means actuated by said second means for maintaining said magneto grounded.

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