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Akeley

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[54] ENGINE SHUT-OFF CONTROL SYSTEM WITH TIMER BUZZER TELL-TALE PACKAGE

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[52] **U.S. Cl.**.....**340/53**, 123/198 DC, 180/103

[51] **Int. Cl.**.....**B60b 3/04**

[58] **Field of Search**.....340/53, 52 F, 52 D, 54, 56; 123/198 DC, 198 DB; 180/106, 103; 116/175, 116, 74, DIG. 10, DIG. 23

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[57] **ABSTRACT**

An engine shut-off control system utilizing a timer-buzzer package in which a plurality of detector switches are connected in circuit with a buzzer for signaling the operator whenever one of the switches is closed in response to detection of an abnormal operating condition of the engine. A thermal timer is connected in series with the buzzer and opens an associated switch after a given amount of time has elapsed to interrupt the current to the distributor of the engine.

5 Claims, 2 Drawing Figures

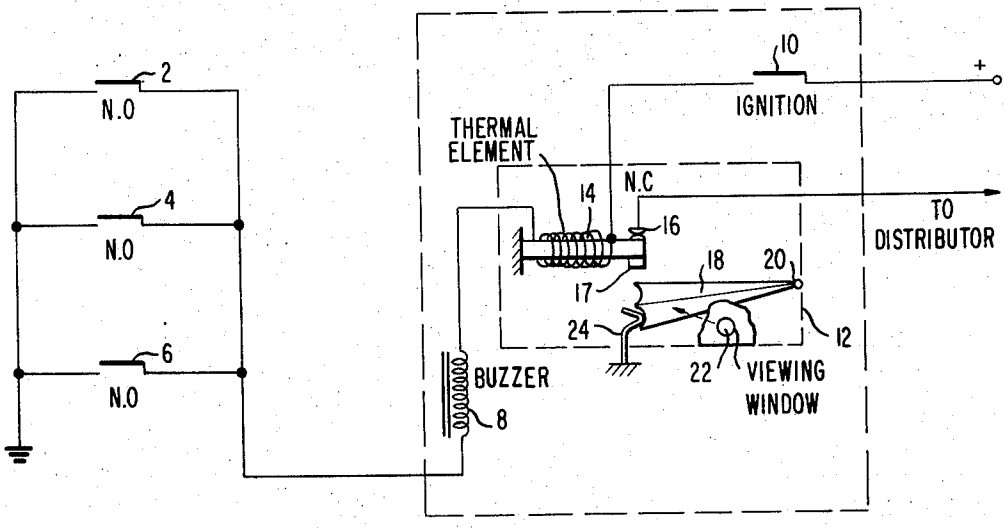


FIG. 1

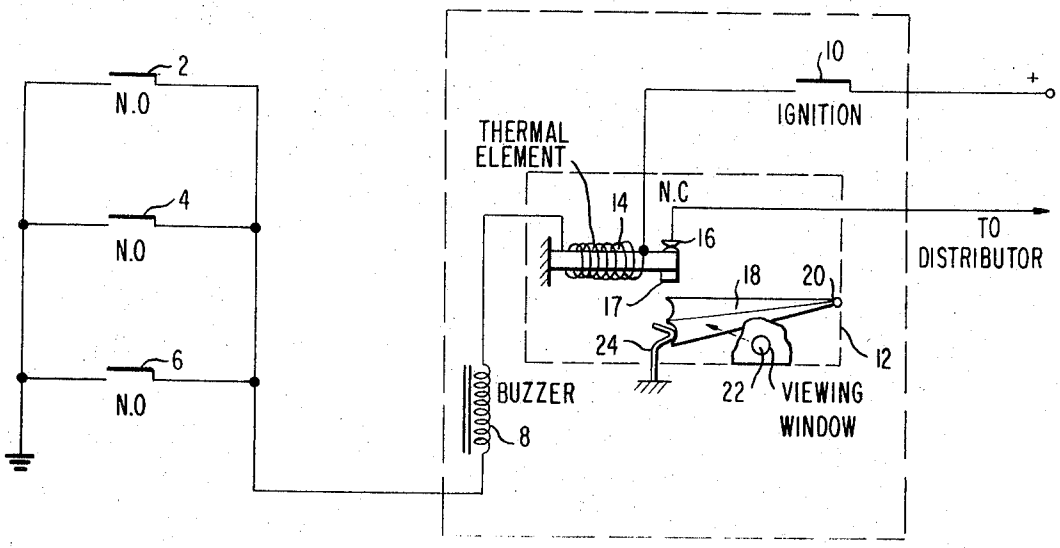
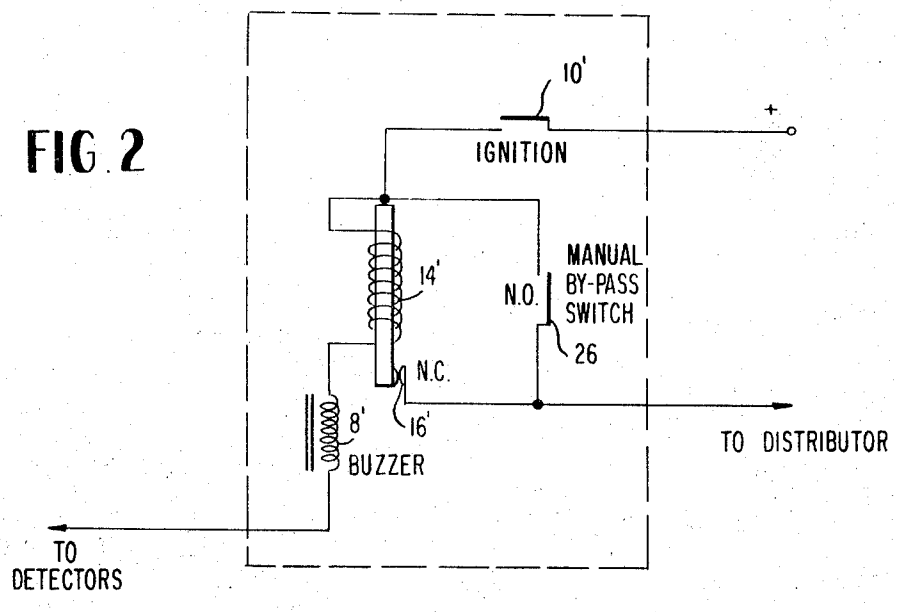


FIG. 2



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ENGINE SHUT-OFF CONTROL SYSTEM WITH TIMER BUZZER TELL-TALE PACKAGE

FIELD OF THE INVENTION

This invention relates to warning and control systems for engines, and more particularly to a time-delay tell-tale unit with a warning signal.

In commercial vehicles it is often desired to provide maintenance control of the vehicle engine during operating conditions. Such controls involve the detection of coolant level in the radiator, oil pressure within the engine block and temperature of the engine. Should any one of these conditions operate below a given standard, it is desirable to provide a warning of such sub-standard operating condition to the operator of the vehicle so that he may act accordingly, for example, terminate the operation of the engine, or in the case where such engines are unattended, to provide for actuation of an automatic control for discontinuing the operation of the engine. Further, in such cases where a warning is provided to the operator of an engine, whether of the stationary or vehicular type, such warnings may go unheeded.

SUMMARY OF THE INVENTION

It is the purpose of this invention to prevent such negligence on the part of the operator by providing a warning and control system which will be compatible both with the operator of an engine, in particular the vehicular type engine, and the management responsible for the proper maintenance of such engines.

Accordingly, it is an object of this invention to provide a protective warning and control system which operates to shut off an engine in response to abnormal engine operating conditions.

It is another object of this invention to provide a shut-off control system responsive to abnormal engine operating conditions in which a warning signal is registered prior to engine shut-off.

It is yet another object of this invention to provide a protective warning and control system for engine shut-off in response to abnormal operating conditions in which the operator is advised of such abnormal operating conditions by means of a warning signal and as a result he, himself, can shut off the engine before an automatic control shuts off the engine.

It is another object of this invention to provide an engine shut-off control system with a warning signal device responsive to abnormal engine operating conditions and in which there is provided a time-delay switch for automatically effecting shut-down of the engine should the operator of the engine be unresponsive to the warning signal.

It is still another object of this invention to provide a protective warning and control system which operates to shut off an engine in response to an abnormal operating condition and in which a "tell-tale" indicator prevents the operator from ignoring such warning.

According to one aspect embodying the principles of this invention, there is provided a plurality of detectors responsive to coolant level, oil pressure and engine temperature or any such other parameters which affect the operating condition of an engine. These detectors are connected in parallel and feed a time-buzzer circuit in which a buzzer is series-connected with a thermal time-delay element which operates a switch connecting the ignition with the distributor of the engine. Mechanically connected adjacent the time-delay switch is a tell-tale flag having "yes" and "no" areas, for example, a red and green area, wherein the flag is caused to move in response to mechanical movement of the thermal element and thereby indicate such movement through a viewing window. The flag may be returned to its initial position only by unlocking the compartment within which it is contained along with the thermal element, and this operation is kept from the operator's control. Should the operator shut down the engine immediately after the warning signal is heard, then the thermal delay switch and tell-tale flag remain inoperative, thus indicating no evidence of negligence on the part of the operator.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages will become apparent from the following study of the specification and drawing, in which:

FIG. 1 is a circuit diagram illustrating the concepts of this invention; and

FIG. 2 is a circuit diagram illustrating in simplified version the invention shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1 there is shown a plurality of normally-open switches 2, 4 and 6 which may be condition-responsive switches used with an engine and particularly of a vehicular type of engine. These switches may be of conventional design and responsive to such parameters as radiator coolant level, oil pressure and engine temperature, and the like. As shown, these switches are connected in parallel and feed a circuit which includes a warning signal device 8, such as a buzzer or the like. This circuit is supplied by a conventional vehicular battery by means of an ignition switch 10. A housing 12 is provided for containing the remaining circuit elements and such housing may be located on the dash of the vehicle or some such other location having easy access. Connected in series with the buzzer 8 and located within the housing 12 is a thermal timer control comprising a thermal element or heater coil and bimetallic element 14 which is connected to a normally-closed switch 16 formed by a contact mounted on the movable bimetallic element and an adjacent fixed contact. The switch 16, when closed, connects the current supply through the ignition 10 to the distributor of the engine. Positioned on the bottom side of the free end of the bimetallic element 14 is a bumper element 17 of insulated material and located directly beneath this element is a "tell-tale" flag member 18 pivoted at 20 within the housing 12 and having indented surfaces for engaging a detent member 24. The upper portion of the flag may be colored red and the lower portion of the flag may be colored green, or any two colors may be utilized such as to distinguish the upper and lower portions of the flag. A viewing window 22 is provided on the housing 12 through which can be seen the lower or green portion of the flag 18 such as shown in the condition indicated in FIG. 1

The operation of the device is as follows. The buzzer will be activated or energized as soon as any one of the three detector switches is closed, thus indicating abnormal coolant level, oil pressure, or engine temperature. The thermal element is in series with the buzzer 8 and will open the switch 16 associated with the bimetallic element 14 after a predetermined time period, for example, from 15 to 45 seconds, thus interrupting the current to the distributor and shutting down the engine. At the same time the timer bimetallic element 14 is activated, the tell-tale flag 18 is moved about its pivot 20 from the green position to the red position with respect to the viewing window 22. The detent latch 24 holds the flag in place, and to re-set the flag to its green position, one must gain access into the housing 12 and for this purpose a supervisor's key may be required. Thus, the embodiment shown in FIG. 1 shows a timer-operated tell-tale unit which will provide evidence that the warning buzzer and engine were operated beyond the 15 to 45 second period required to move the tell-tale flag from the green position to the red position. Thus, when the warning buzzer or flashing light, as the case may be, comes on as a result of any one of the detector switches being closed and the operator follows instructions and shuts the engine off within 15 to 20 seconds the tell-tale unit will continue to show green. If he exceeds the tell-tale time period, the color of the flag will change from green to red as above-described and remain so, thus recording the fact that the operator ignored the buzzer warning to shut down the engine immediately or at least within a reasonable time after the warning has been signaled. The au-

tomatic shut-off switch **16** may be dispensed with for those operations in which it is inconvenient to have shut-off, for example, under heavy traffic conditions. The tell-tale unit will still record the operator's lack of action.

Referring now to FIG. **2** there is shown a simplified version of this invention which might be applied to the control of gasoline engines. Those elements similar to those described with respect to FIG. **1** have been designated by the same reference numerals but primed. In this circuit the buzzer **8'** will become activated when any one of the three detector switches is closed, which as mentioned above signals an abnormal condition in cooling level, oil pressure or engine temperature. The thermal timer **14'** connected in series with the buzzer will open a switch after 15 to 45 seconds interrupting the current to the distributor and thus shutting down the engine. A manual by-pass switch **26** may be closed by the operator, however, before the time-delay period is over. If, however, the operator ignores the warning signal from the buzzer **8'** by closing the manual by-pass switch **26** without attending to the detected abnormal operating condition of the engine, the tell-tale arrangement shown in FIG. **1** should be employed. The circuit shown in FIG. **2**, however, may be advantageously used with unattended engines.

That which is claimed is:

1. In a warning and cut-off control system for an engine having a distributor, a current supply and an ignition circuit, the combination comprising, a plurality of normally open detector switches responsive to the operating condition of said engine, said switches being electrically connected in series circuit with the current supply and the distributor of said engine, means providing an audible warning signal connected in said circuit, a time-delay means connected in said circuit, said time-delay means having a normally closed switch connected thereto, a movable indicator flag positioned adjacent said time-delay means, said time-delay means being arranged for opening said normally closed switch in response to current supplied thereto for a predetermined period when one of said normally open switches is closed and for causing said indicator flag to be moved by said time-delay means from a first to a second position when said normally closed switch is opened.

2. A device according to claim **1**, wherein said time-delay means comprises a bimetallic thermal element which is caused to move in a given direction in response to current supplied thereto and said movable indicator flag is provided with an indent and further including a detent member engaging said indent for retaining said flag in said second position.

3. In a warning and cut-off control system for an engine having a distributor, a current supply and an ignition circuit for connecting the current supply to the distributor the combination comprising a plurality of normally open detector switches, each being responsive to an operating condition of the engine and adapted to be closed upon the occurrence of a predetermined abnormal operating condition in said engine, a buzzer, a thermal timer including a thermal element and a bimetallic element adapted to be actuated from a first to a second position after a predetermined heating time period for said thermal timer, means for electrically connecting said detector switches, said buzzer and said thermal timer in series circuit with the ignition circuit of said engine and normally closed switch means operatively connected to said bimetallic element and arranged for connecting the current supply through said ignition circuit to the distributor of the engine when said bimetallic element is in its first position and for disconnecting said current supply from the distributor when opened upon actuation of said bimetallic element to its second position, said bimetallic element being actuated in response to current through said thermal element when one of said plurality of switches is closed, and further including a manual by-pass switch connected in parallel with said thermal timer and a visual indicator pivotally supported adjacent said bimetallic element, said visual indicator being arranged to be pivoted from a first to a second position in response to actuation of said bimetallic element from its first to its second position and means for retaining said visual indicator in its second position upon return of the bimetallic element to its first position.

4. In a warning and cut-off control system as set forth in claim **3** wherein said means for retaining said visual indicator in its second position comprises an indent on said indicator and a detent member supported adjacent thereto for engaging said indent.

5. In a warning and cut-off control system as set forth in claim **4** further including a housing enclosing said visual indicator, means for providing controlled access to said housing and a viewing window in said housing disposed to permit observation of the position of the visual indicator.

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