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ADJUSTABLE WARNING LIGHT

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FIG. 1.

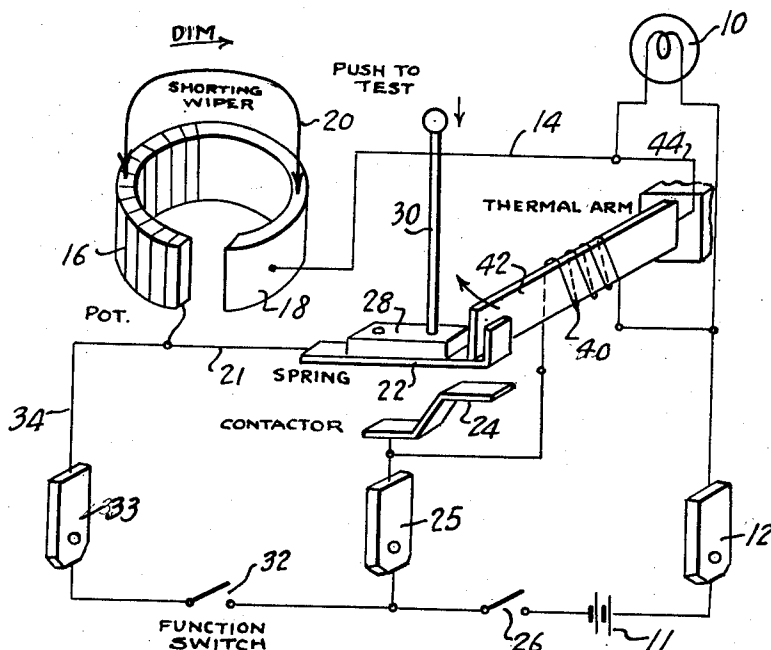
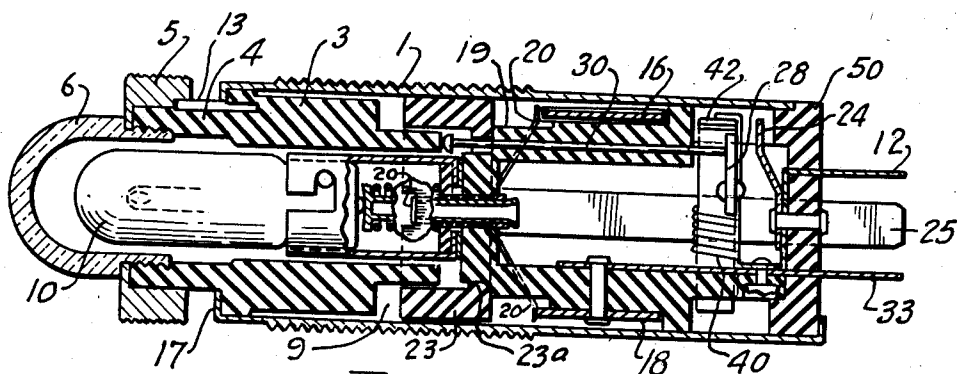


FIG. 2.

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ADJUSTABLE WARNING LIGHT

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6 Claims. (Cl. 340-214)

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This invention relates to indicating or warning lights of the type used to monitor various operating conditions of, for example, an airplane engine. The invention is particularly directed to a device that is readily adjustable as to its light intensity and incorporates an automatic reset feature that cancels previously made adjustments upon the occurrence of a predetermined event.

It is the primary object of the present invention to provide a simple and rugged warning or monitor light assembly that may be quickly and easily installed and connected, that is not likely to get out of order and that operates efficiently and automatically.

Another object of the invention is to provide an adjustable intensity warning or monitor light in which the adjustment is automatically canceled after each use to assure that subsequent operations will be made only after proper preparation.

Other objects and advantages of the invention will become apparent from the following detailed description of a preferred embodiment and from the accompanying drawings in which:

Fig. 1 is a diagrammatic view of the circuit and of the mechanical operating elements involved in the present invention;

Fig. 2 is a central vertical sectional view of a lamp assembly of the present invention.

Referring first to Fig. 1 of the drawings, the present invention comprises a lamp 10 to one side of which power is supplied from a source such as a battery 11 through a connector lug 12. The lamp 10 is also connected through line 14 to a wound resistor 16 carried in a known manner over a metallic body 18 so that the effective resistance in series with lamp 10 can be changed by positioning a metallic shorting wiper 20. One end of the shorting wiper 20 contacts the carrier body 18 and the opposite end wipes the resistance 16 so that more or less of the resistance can be included in the circuit.

The adjustable resistor 16 is connected to two parallel circuits either of which is operative to complete the circuit through lamp 10 and battery 11. The first is a test circuit which includes a connection 21 and a spring contact bar 22. The spring contact bar 22 is anchored at one end and is movable downwardly into engagement with a stationary contact 24 to complete a circuit to battery 11 through a contact lug 25 and a main switch 26.

The contact bar 22 preferably carries an insulating block 28 against which bears one end of an elongated push pin 30 by which the bar may

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be depressed to close the lamp circuit for test purposes.

The other parallel circuit to which the resistor 16 is connected is the warning circuit including a "function" switch 32 interposed between the battery 11 and a connector lug 33 to which the resistor is connected by connector 34.

The "function" switch 32 may comprise any known device that is capable of closing an electrical circuit upon the occurrence of a predetermined condition. For example, the switch may be closed upon the temperature of an engine part reaching a dangerous condition, or upon the pressure of a hydraulic fluid reaching a dangerously low value. In some instances devices of this character are used to monitor the proper flow of oxygen to the crew members of an airplane.

A reset check circuit is also included in the present invention and comprises a heating coil 40 connected across the battery 11 but in series with the main switch 26. The coil 40 is wound around a thermally deformable arm 42, preferably a bimetallic arm anchored at one end and associated with the spring contact bar 22 at its free end. When the deformable arm is cold and the contact bar 22 is in its normal position, a circuit is established through the bar and arm to lamp 10 by a connection 44. Deformation of the arm 42 by the heat of coil 40 is in a direction such that the arm tends to move into a position in which its free end overlies the insulating block 28 on the contact bar 22 so that no current can flow to the lamp through the contact 22 and deformable arm 42 when the function switch 32 is closed, but the lamp circuit will be completed through the resistance 16.

Prior to describing the preferred form of the various elements so far described, which form is shown in Fig. 2, the operation will be described.

In its preferred use, the present invention is incorporated in the monitoring system of airplanes. In such systems regulations require that each monitoring light be tested prior to takeoff. The present invention so orients the elements that this testing is done by pressing a ring surrounding the lamp being tested and provision is made for turning this ring to establish the desired warning light intensity. This adjustability is required since a warning light that is bright enough to be seen in full daylight may be blinding to the operator under night flying conditions, while a light dimmed to the proper intensity for night flying would be nearly invisible during subsequent daytime operation.

When the main power switch 26 is closed, coil

40 immediately begins to heat up and arm 42 is deformed to move against insulating block 23. The operator then presses down on the aforementioned ring and pin 30 forces the spring contact bar 22 against the stationary contact 24, establishing the test circuit through the lamp 10 from the battery, through lug 25, contact 24, contact 22, connection 21, adjustable resistance 16, shorting wiper 20, body 18, and connection 14. By adjusting the shorting wiper 20, the operator can increase or decrease the resistance 16 and thus the intensity of the lamp 10 which is in series with it.

While the operator is adjusting the resistance 16 to set the brilliance of lamp 10 the contact bar 22 must be depressed. The bar is held in its depressed position long enough for the deformable arm 42 to move to a position in which its free end overlies the insulating block 23 carried by the bar 22 so that the bar, when released by the operator releasing pressure on push pin 30, will not return to its full upper position. In the full upper position the circuit to lamp 10 can be closed between the bar 22 and the deformable metallic arm 42 to shunt out the resistance 16 so that the lamp would burn at full brilliance.

The arm 42 will remain in its deformed position so long as current flows through its associated heating coil 40, and thus so long as the main power switch 26 is closed. The arm may thus be considered as a circuit resetting device that operates to shunt out the resistance 16 whenever the main power switch 26 is opened, cancelling the brilliance adjustment of lamp 10. This may occur, for example, if a flight is completed and the power switch opened by the operator. It is thus incumbent on the next operator to test the circuit again after he has reclosed the power switch to see that lamp 10 is in its operative condition.

Should the function switch 32 close after the monitor unit has been properly tested, the warning lamp 10 will glow with the intensity initially established, the lamp circuit being from battery 11 through switch 26, switch 32, lug 33, connection 34, resistance 16, shorting wiper 20, body 18, connection 14 to the lamp.

Should the function switch 32 close at a time when monitor unit has not been properly tested, the warning lamp 10 will glow with full brilliance, the lamp circuit then being by way of a second shunt circuit, from battery 11, through switch 26, function switch 32, lug 33, connection 34, connection 21, spring contact bar 22, the metallic arm 42, connection 44 and to the lamp.

Having described the schematic and diagrammatic disclosure of the invention, reference will now be made to Fig. 2 which shows a central vertical sectional view, somewhat enlarged, of an actual embodiment. As there shown, the device is housed in a casing 1 which may be conveniently threaded intermediate its ends for attachment to a bulkhead between suitable clamping nuts (not shown). Within the casing 1 there is disposed a driver body 3 mounted for free rotation and having a front cylindrical extension 4 extending from the casing to receive an operating ring 5 on its periphery. The driver body is made tubular to receive the indicating lamp 10 and to threadedly receive a lens 6 which may be unscrewed in the event that the lamp is to be replaced. A base connection 7 is provided for the lamp 10 and comprises a spring pressed tubular metallic body that is adapted to make a contact with the base of the lamp at its end and with a stationary con-

tact at its periphery. The driver body 3 is urged outwardly of the casing 1 by a spring washer 9, but may be pressed inwardly and rotated by the operator, the rotational movement being limited by a pin 13 which cooperates with a partially circumferential recess 15 in an inwardly turned flange 17 on the casing 1. The flange 17 limits the outward movement of the driver body 3 under the influence of the spring 9. The spring 9 is preferably formed to rotate with the driver body and also has connection with a rotatable insulating holder hereinafter described.

Also within the casing 1 is a stationary tubular base element 19 made of insulating material and carrying the metallic body 18 on which is wound the resistance element 16. The resistance wire is, of course, insulated from the body 18 in the usual manner as by a layer of insulating paper or fabric placed between the wire and the immediately adjacent metal of the body. The base element 19 is made of reduced diameter near its outer end so that the resistance wire can extend into a space between the casing 1 and the exterior of the insulating base element 19 where the resistance is exposed to be engaged by the shorting wiper 20.

The shorting wiper 20 comprises brush-like arms extending from a bight portion that is fixed to a rotatable insulating holder 23. The holder 23 is fixed to and rotates with the spring washer 9, but is held against axial movement by an intumed flange 23a which engages a shoulder on the base element 19.

Near its inner end the base element 19 is again reduced in diameter, and is further provided with an axial slot through which the spring contact bar 22 extends, the bar being fixed at one end of the base element, as by a rivet, and being extended diametrically across the interior into normal contact with the thermally deformable bar member 42.

The thermally deformable bar member is disposed on the reduced diameter portion of the base member and while it is represented as a bar in Fig. 1 it is preferably wrapped around the base member so that an increased deflecting length can be obtained.

The insulating block 28 on the movable contact bar is designated by the same reference numeral in Fig. 2 as in Fig. 1. It will be seen that the head of the push pin 30 bears against the inner surface of the driver body 3 so that, when the latter is pushed in, the push pin acts against the insulating block 28 on the spring contact bar 22 depressing the contact bar into electrical engagement with the stationary contact 24.

The end of the casing 1 is closed by a cover 50 on which the stationary contact 24 is mounted and through which the lugs 12, 25 and 33 extend. The cover may be held in place in any suitable manner as by turning in a portion of the end of the casing over the end surface of the cover.

In operation, the operator pushes on the operating adjusting ring 5 in a direction axially of the casing 1 and thus depresses the push pin 30 to establish a connection to the lamp 10 through the resistance 16. By turning the ring the operator also turns the driver body 3 and the brush holder 23 thus rotating the shorting wiper 20 in contact with the resistance 16 and with the body 18 to adjust the value of the resistance in circuit with the lamp 10. During the time that the parts are held by the operator in the pushed-in position the thermally deformable bar member moves radially inward to assume a position

over the insulating block 28 thus preventing the return of the movable spring contact bar 22 into electrical engagement with the metallic thermally deformable arm 42 as hereinbefore described.

It should be expressly understood that while the invention has been disclosed in a particular embodiment and form and disposition of the parts that the disclosure is illustrative only and that various modifications and changes may be made without departing from the spirit of the appended claims.

Having described my invention, I claim:

1. A monitor light system comprising an indicating lamp, a source of power for said indicating lamp, a resistor, a plurality of parallel circuits to connect said resistor in series with said lamp and said power source, one of said parallel circuits comprising a test circuit including a manually operable contact, the other of said parallel circuits including a circuit closing means responsive to a condition to be monitored, means to establish a second shunt circuit through said circuit closing means and said lamp shunting said resistor, and means operable upon movement of said manually operable contact toward circuit closing position to open said second shunt circuit.

2. A monitor light system comprising an indicating lamp, a source of power for said indicating lamp, a variable resistor, a plurality of parallel circuits to connect said variable resistor in series with said lamp and said power source, one of said parallel circuits comprising a test circuit including a manually operable contact, the other of said parallel circuits including a circuit closing means responsive to a condition to be monitored, means to establish a second shunt circuit through said circuit closing means and said lamp shunting said variable resistor, and thermally deformable means operable upon movement of said manually operable contact toward circuit closing position to hold said second shunt circuit open.

3. A monitor light system comprising an indicating lamp, a source of power for said indicating lamp, a variable resistor, a plurality of parallel circuits to connect said variable resistor in series with said lamp and said power source, one of said parallel circuits comprising a test circuit including a manually operable contact, the other of said parallel circuits including a circuit closing means responsive to a condition to be monitored, means to establish a second shunt circuit through said circuit closing means and said lamp shunting said variable resistor, and thermally deformable means having a heating coil across said source of power connected whenever said power source is connected, and operable to hold said second shunt circuit open.

4. A monitor light system comprising an indicating lamp, a source of power for said indicating lamp, a variable resistor, a plurality of parallel circuits to connect said variable resistor in series with said lamp and said power source, one of said parallel circuits comprising a test circuit in-

cluding a manually operable contact, the other of said parallel circuits including a circuit closing means responsive to a condition to be monitored, means to establish a second shunt circuit through said circuit closing means and said lamp shunting said variable resistor, and thermally deformable means having a heating coil across said source of power connected whenever said power source is connected, and operable to hold said second shunt circuit open, said thermally deformable means having a portion completing said second shunt circuit when cold.

5. A monitor light system comprising an indicating lamp, a source of power for said indicating lamp, a variable resistor, a plurality of parallel circuits to connect said variable resistor in series with said lamp and said power source, one of said parallel circuits comprising a test circuit including a manually operable contact, the other of said parallel circuits including a circuit closing means responsive to a condition to be monitored, means to establish a second shunt circuit through said circuit closing means and said lamp shunting said variable resistor, means to adjust said variable resistor, means to interlock said last named means and said manually movable contact in said test circuit, whereby said test circuit may be closed and said resistor adjusted together, and means operable upon movement of said test circuit contact toward closed position to open said second shunt circuit.

6. A monitor light system comprising an indicating lamp, a source of power for said indicating lamp, a variable resistor, a plurality of parallel circuits to connect said variable resistor in series with said lamp and said power source, one of said parallel circuits comprising a test circuit including a manually operable contact, the other of said parallel circuits including a circuit closing means responsive to a condition to be monitored, means to establish a second shunt circuit through said circuit closing means and said lamp shunting said variable resistor, means to adjust said variable resistor, means to interlock said last named means and said manually movable contact in said test circuit, whereby said test circuit may be closed and said resistor adjusted together, and thermally deformable means having a heating coil across said source of power connected whenever said power source is connected, and operable to hold said second shunt circuit open, said thermally deformable means having a portion completing said second shunt circuit when cold.

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