

[54] WARNING CIRCUITS FOR INTERMITTENTLY FLASHABLE LAMP

[75] Inventor: **Anthony John Ramshaw**, Hayes,
England

[73] Assignee: **C.A.V. Limited**, Birmingham,
England

[22] Filed: **June 5, 1972**

[21] Appl. No.: **259,822**

[30] Foreign Application Priority Data

June 9, 1971 Great Britain 19577/71

[52] U.S. Cl. **340/251, 340/81 R, 340/331**

[51] Int. Cl. **G08b 21/00**

[58] Field of Search **340/251, 67, 81 R, 80,
340/331; 307/310**

[56] References Cited

UNITED STATES PATENTS

3,271,736 9/1966 Brown et al. 340/251 X

3,050,644 8/1962 Ironside 307/310 X

Primary Examiner—John W. Caldwell

Assistant Examiner—Daniel Myer

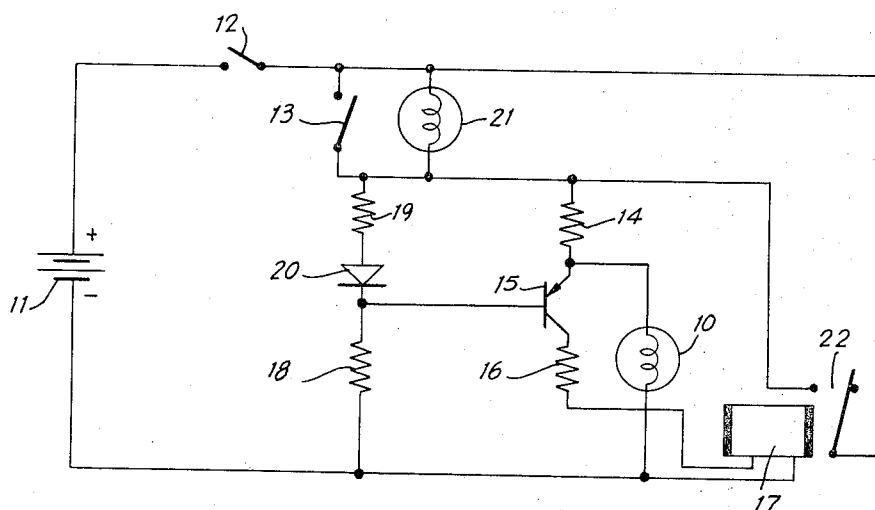
Attorney, Agent, or Firm—Holman & Stern

[57]

ABSTRACT

A warning circuit for use with a lamp which in use is connected to an intermittent source of electric supply, the warning circuit comprising means for sensing the current flow through the lamp during the on period of the supply and further means operable when the current falls below a predetermined value, indicative that the lamp has failed for providing an indication of such failure.

10 Claims, 2 Drawing Figures



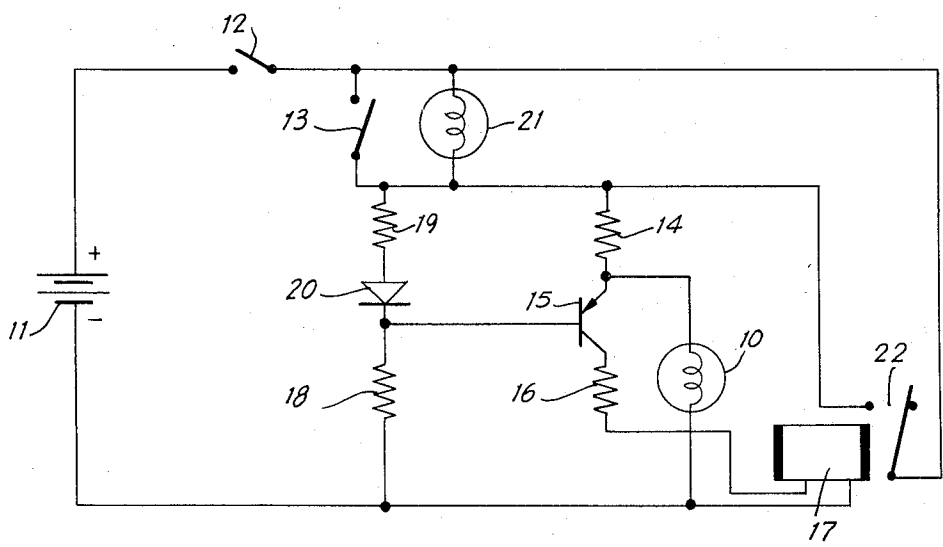


Fig. 1

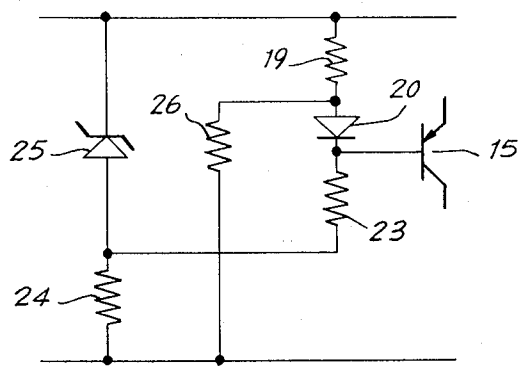


Fig. 2

WARNING CIRCUITS FOR INTERMITTENTLY FLASHABLE LAMP

BACKGROUND OF THE INVENTION

This invention relates to warning circuits for use with lamps which in use, are connected to an intermittent source of electric supply whereby the lamp or lamps will flash.

The object of the invention is to provide a warning circuit for such a lamp or lamps whereby an indication will be given upon failure of the or one or more of the lamps.

DESCRIPTION OF THE PRESENT INVENTION

A warning circuit in accordance with the invention comprises in combination means for sensing the current flow through the lamp or lamps during an on period of said supply and further means operable when the current flow falls below a predetermined value indicative that the lamp or one or more of the lamps has failed, for providing an indication of such failure.

More specifically a warning circuit in accordance with the invention comprises in combination a resistor for connection in series with said lamp or lamps and the intermittent source of electric supply, switch means for sensing the voltage developed across said resistor during the on periods of said supply, said switch means being arranged to switch on and thereby energise a relay, when the voltage developed across the resistor falls below a predetermined value during an on period of said supply, a pair of relay contacts operable when said relay is energised to maintain current flow through said resistor during the off periods of said supply and a warning lamp for providing an indication of the operation of the relay.

In the accompanying drawings forming a part of the specification:

FIG. 1 is a circuit diagram showing one example of a circuit in accordance with the invention, and

FIG. 2 shows a circuit diagram of a modification to the circuit of FIG. 1.

With reference to FIG. 1 there is provided a lamp 10 the failure of which or of one of a plurality of such lamps connected in parallel is required to be indicated. The lamp 10 is connected to the negative terminal of an accumulator 11. The positive terminal of the accumulator is connected by way of a switch 12 and an interrupter switch 13 connected in series. The switches 12, 13 together with the accumulator constitute a source of intermittent supply. One end of a sensing resistor 14 is connected to the switch 13 and the other end of the resistor is connected to the other terminal of the lamp 10.

Also provided is a p-n-p transistor 15 having its emitter terminal connected to a point intermediate the resistor 14 and the lamp or lamps 10 and having its collector terminal connected by way of a resistor 16 and a relay coil 17 to the negative terminal of the accumulator.

The base terminal of the transistor 15 is connected to the negative terminal of the accumulator by way of a resistor 18 and to a point intermediate the switch 13 and resistor 14 by way of a further resistor 19 and a diode rectifier 20 having its cathode connected to the base terminal of the transistor. In addition there is provided an indicator lamp 21 which is connected in paral-

lel with the switch 13 and in parallel with the indicator lamp is a pair of normally open relay contacts 22.

Such a system can form part of the direction indicator system of a road vehicle. The switch 13 is a switch which is closed and opened in sequence, when the switch 12 is closed, and during its on period causes current to flow to the lamp 10 by way of the sensing resistor 14. In normal circumstances therefore when the switch 13 is closed the lamp or lamps 10 is illuminated and when the switch 13 is open or off the indicator lamp 21 will be illuminated. The current flowing in the lamps 10 flows through the sensing resistor 14 and as with all tungsten filament lamps the initial flow of current through the lamp or lamps is high but falls to a steady value after a comparatively short time. The voltage developed across the resistor 14 will therefore initially be high but will gradually fall as the current flowing through the lamps decreases. In the event that the lamp 10 or one of such lamps fails, then the current will fall to a much lower value and the transistor 15 which constitutes a switch means, will turn on.

The value of current flow in the lamps at which the transistor 15 turns on is determined by the base potential of the transistor and this in turn depends upon the relative values of the resistors 18 and 19 and the forward volt drop of the diode 20. When the transistor 15 is turned on current will flow through the relay coil 17 and the relay contacts 22 will be closed thereby to effectively short circuit the warning lamp 21 and the interrupter switch 13. When this occurs the warning lamp 21 will cease to flash thereby providing an indication that the lamp 10 has failed or that one or more of such lamps has failed. Once failure has occurred and whilst the switch 12 is closed the remaining lamps 10 will remain illuminated. The diode 20 is provided to compensate for the changes in the characteristics of the transistor with varying temperature.

The circuit of FIG. 1 is able to tolerate variations in the voltage of the source since the base terminal of the transistor is connected to a potentiometer network effectively across the supply terminals. However, where the voltage of the source can vary over fairly high values the biasing circuit of the transistor is modified as shown in FIG. 2. In this circuit the resistor 19 and diode 20 are as before but the cathode of the diode as well as being connected to the base terminal of the transistor 15 is connected to the negative terminal of the supply through a pair of resistors 23, 24 connected in series. Moreover, a point intermediate the resistors 23 and 24 is connected to the anode of a zener diode 25 the cathode of which is connected to the interrupter switch 13. In addition a further resistor 26 is connected between a point intermediate the resistor 19 and the diode 20 and the negative terminal of the source of supply. The voltage which is applied to the base terminal of the transistor therefore does not vary directly in accordance with the supply voltage and therefore takes into account the fluctuations in the current flowing in the lamps 10 resulting from variation in the supply voltage.

I claim:

1. A warning circuit for a lamp which in use, is connected to an intermittent source of electric supply the circuit comprising in combination a resistor connected in series with said lamp and the intermittent source of electric supply, switch means for sensing the voltage developed across said resistor during the on periods of

3

said supply, an electromagnetic relay, said switch means switching on to energise said relay when the voltage drop due to current flow developed across said resistor falls below a predetermined value during an on period of said supply, a pair of relay contacts forming part of said relay, said relay contacts when said relay is energised maintaining current flow through said resistor from a further source of supply during the off periods of said first mentioned supply and a warning lamp for providing an indication of the operation of the relay.

2. A warning circuit as claimed in claim 1 in which said switch means comprises a transistor having the operating coil of said relay connected in its collector emitter path.

3. A warning circuit as claimed in claim 2 in which the operating coil of the relay and the collector emitter path of the transistor are connected in parallel with the lamp.

4. A warning circuit as claimed in claim 3 including means for determining the base potential of the transistor whereby the voltage across the resistor at which the transistor switches on can be determined.

5. A warning circuit as claimed in claim 4 in which

4

the means for determining the base potential of the transistor comprises a potential divider network connected in parallel with said first mentioned supply.

6. A warning circuit as claimed in claim 5 in which said potential divider network includes a diode to provide compensation for changes in the operating characteristics of the transistor with temperature variations.

7. A warning circuit as claimed in claim 6 in which said potential divider network includes a Zener diode whereby compensation for varying lamp current will be obtained as a result in fluctuation of the voltage of said first mentioned supply.

8. A warning circuit as claimed in claim 1 in which said warning lamp is connected in parallel with said pair of relay contacts.

9. A warning circuit as claimed in claim 8 in which said first mentioned source of supply comprises an interrupter switch connected in series with a steady source of supply.

10. A warning circuit as claimed in claim 9 in which said relay contacts are of the normally open type and are connected in parallel with said interrupter switch.

* * * * *

25

30

35

40

45

50

55

60

65