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Schulz

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[54] **ANNUNCIATOR SYSTEM WITH CIRCUITRY PRODUCING AN OUTPUT ALARM SIGNAL FOR A DISCONTINUOUS LAMP**

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[52] **U.S. Cl.** **340/409,** 340/251, 340/256

[51] **Int. Cl.**.....**G08b 29/00**

[58] **Field of Search**.....340/251, 256, 253, 409, 214; 324/53

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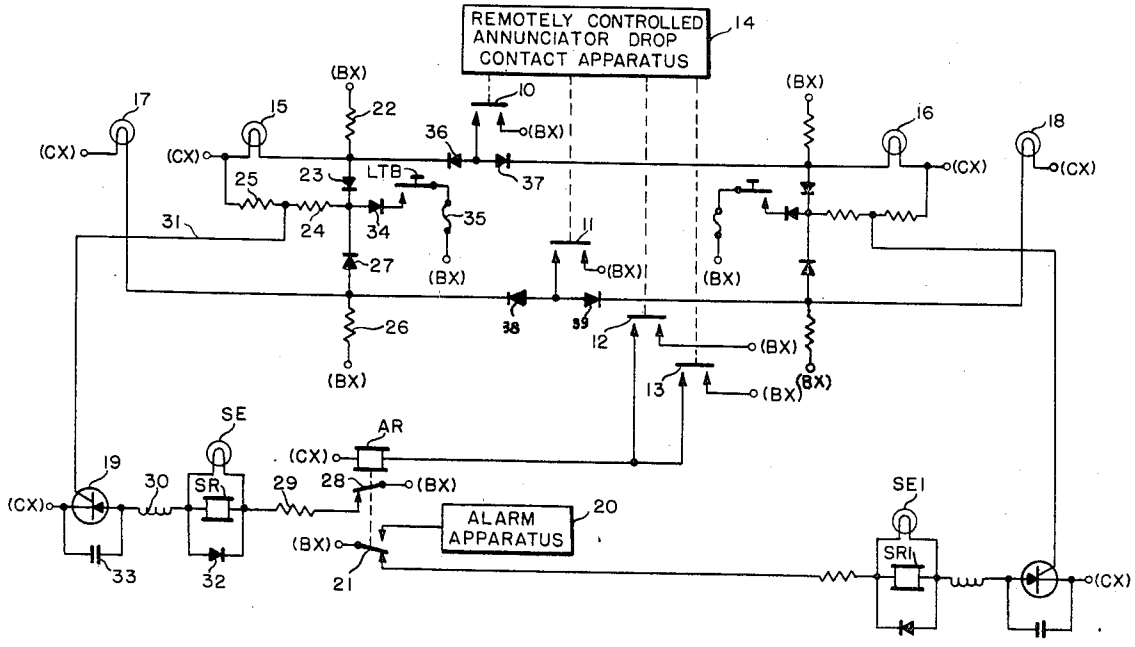
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[57] **ABSTRACT**

An annunciator system with a plurality of normally open drop contacts for controlling illumination of normally dark annunciator lamps. Supervisory circuitry for the indicator lamps includes a normally inactive supervisory detection device associated with a group of the lamps for manifesting when a lamp of the associated group of lamps is inoperable. Sensing means enables operation of the supervisory detection device in accordance with a failure of a lamp to maintain continuity in circuits through filaments of the several normally dark lamps of the group.

3 Claims, 2 Drawing Figures



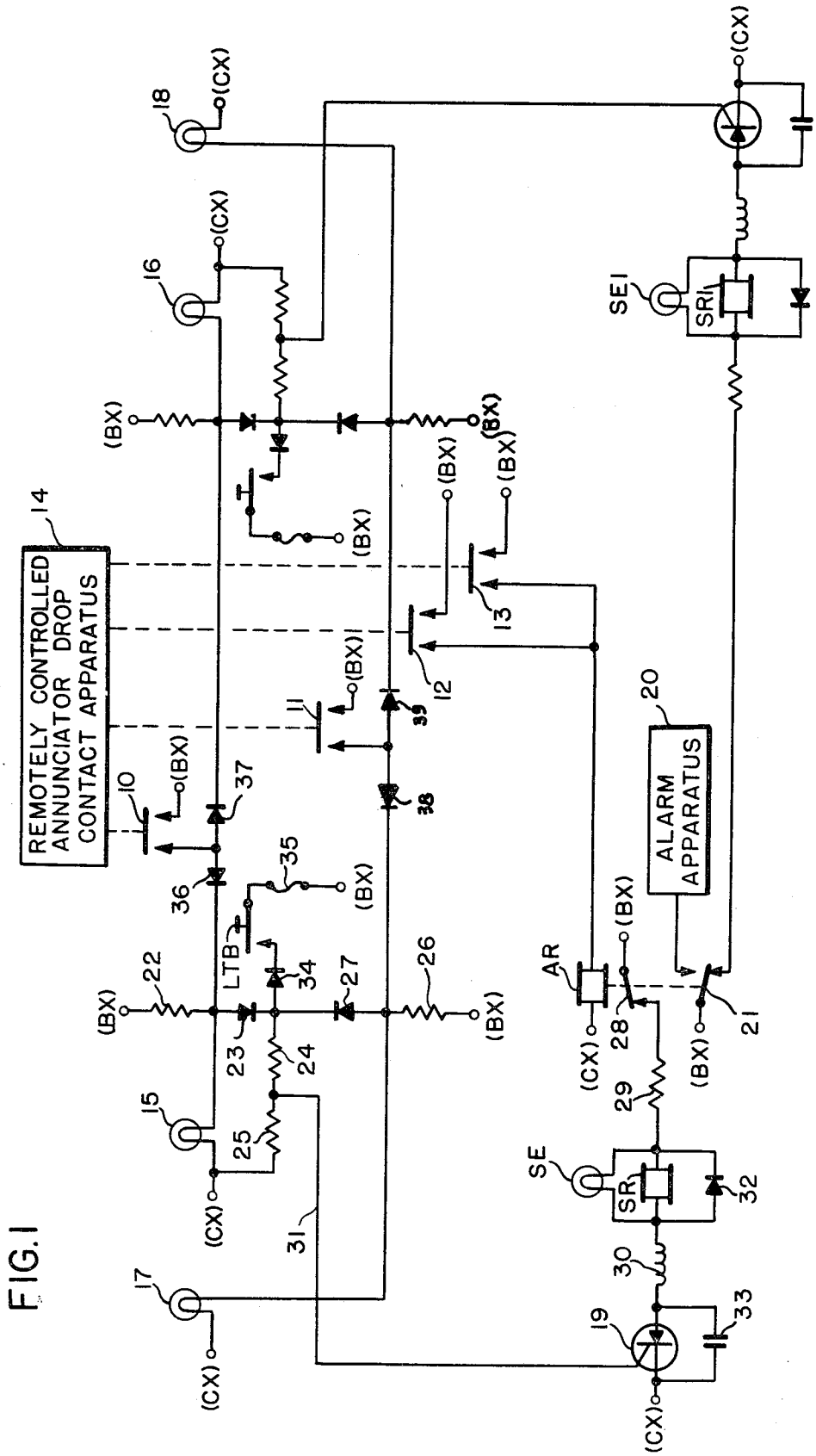

REMOTELY CONTROLLED ANNUNCIATOR DROP CONTACT APPARATUS
ALARM APPARATUS
(BX)
(CX)
LTB
AR
SE
SR
SE1
SR1

FIG. 1

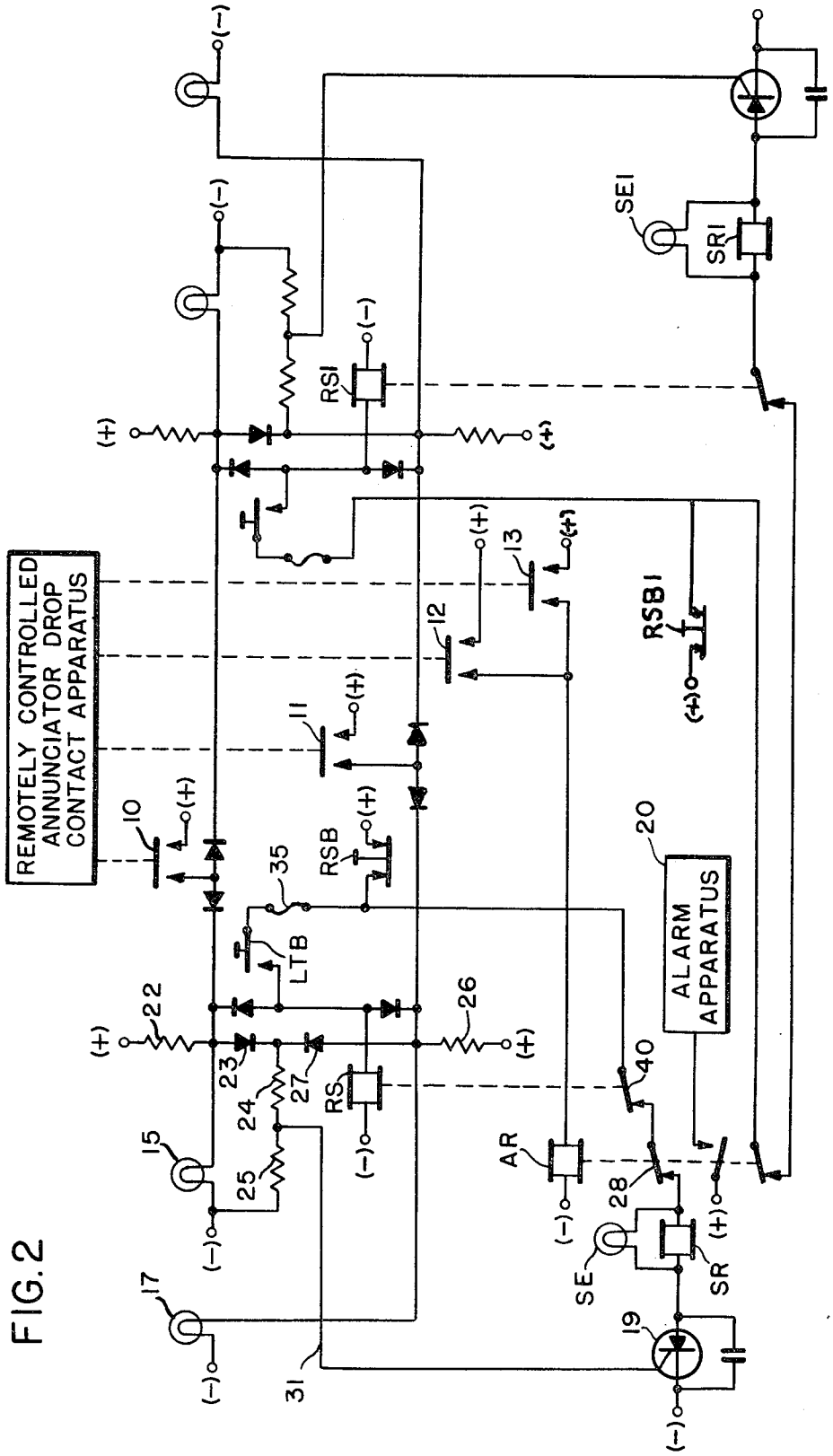

REMOTELY CONTROLLED ANNUNCIATOR DROP CONTACT APPARATUS
ALARM APPARATUS
RSI
SEI
SRI
RSB1
RSB
LTB
RS
AR
SE
SR
(+)
(-)
10
11
12
13
15
17
19
20
22
23
24
25
26
27
28
31
35
40

FIG. 2

ANNUNCIATOR SYSTEM WITH CIRCUITRY PRODUCING AN OUTPUT ALARM SIGNAL FOR A DISCONTINUOUS LAMP

While the invention is subject to a wide range of applications, it is especially suited for supervising normally dark annunciator lamps in an annunciator system, and it will be particularly described in this connection.

Annunciator systems are used for various purposes, such as for the control of alarm indicator lamps in response to the operation of drop contacts which can be controlled by alarm detection devices. It is desired that the annunciator indication lamps be normally dark, and be illuminated only in response to detection of an alarm condition. However, some systems provide for the normal illumination of the lamps at a low level for supervisory purposes.

An object of the present invention is to provide an improved annunciator system wherein means is provided for supervising normally dark annunciator lamps.

SUMMARY OF THE INVENTION

An annunciator system is provided having a plurality of normally open drop contacts for controlling illumination of normally dark annunciator lamps. Supervisory means for the indicator lamps is provided including a normally inactive supervisory detection device associated with a group of the lamps for manifesting when a lamp of the associated group of lamps is inoperable. Sensing means is provided for enabling operation of the supervisory detection device in accordance with failure to maintain continuity in circuits through filaments of the several normally dark lamps of the group.

For a better understanding of the present invention, together with other and further objects thereof, reference is had to the following description, taken in connection with the accompanying drawing, while its scope will be pointed out in the appending claims.

Reference will be made to the accompanying drawing wherein:

FIG. 1 illustrates schematically an annunciator system having supervised normally dark annunciator indication lamps according to a preferred embodiment of the present invention; and

FIG. 2 illustrates how the system according to FIG. 1 can be modified for the use of the system with a direct current power supply.

With reference to FIG. 1, an annunciator system is illustrated having a plurality of normally open drop contacts 10, 11, 12 and 13 which are normally open and are subject to control by annunciator drop contact apparatus 14. Annunciator lamps 15 and 16 are provided for indicating the closure of drop contact 10, and similarly annunciator lamps 17 and 18 are provided for indicating the closure of drop contact 11. The lamps 15 and 17 constitute a group of lamps, having associated therewith a supervisory detection device SR and a supervisory indication lamp SE for manifesting when a lamp of the associated group is inoperable. An SCR 19 is provided for controlling the supervisory device SR, and the SCR 19 has a gating circuit which senses failure to maintain circuit continuity through the filaments of the lamps 15 and 17 when these lamps are normally dark.

The system has an alarm relay AR which is illustrated as being energized upon closure of either drop contact 12 or drop contact 13. The energization of the alarm relay AR causes operation of suitable alarm apparatus 20 in accordance with the closure of front contact 21 of the alarm relay AR.

A lamp test push button LTB is associated with each group of annunciator lamps for the purpose of checking the particular lamp that may be burned out when the supervisory relay SR manifests a lamp failure.

Normal conditions can be considered as those conditions wherein the drop contacts 10, 11, 12 and 13 are all open. Thus the annunciator lamps 15, 16, 17 and 18 are normally dark. For supervision, a high resistance continuity circuit is normally closed through lamp 15 from the terminal (BX) of a suitable source of alternating current, through resistor 22 and lamp 15, to the terminal (CX) of the alternating current power supply. A bypass sensing circuit is normally closed in multiple with the circuit just described for lamp 15 through resistor 22, diode 23, resistor 24 and resistor 25.

Similarly the lamp 17 has its continuity checked in a high resistance circuit extending from (BX), through resistor 26 and lamp 17, to (CX). In multiple with this circuit is a bypass sensing circuit including resistor 26, diode 27, resistor 24 and resistor 25.

The SCR 19 is normally in its blocking state in a circuit extending from (BX), through back contact 28 of relay AR, resistor 29, winding of relay SR, choke coil 30 and anode-cathode circuit of SCR 19, to (CX). The gate of the SCR 19 is connected by wire 31 to a midpoint between resistors 24 and 25 in a common portion of the bypassing sensing circuits that have been described in connection with lamps 15 and 17. Thus the gating current for the SCR 19 is dependent upon the voltage drop across resistor 25.

Under normal conditions there is insufficient current flowing in the gating circuit for the SCR 19 to trigger the SCR. If, however, either the lamp 15 or the lamp 17 is burned out, sufficient current flows through the resistor 25, and thus through the gating circuit for the SCR 19 to cause the SCR 19 to be triggered into conduction. This causes the picking up of the supervisory detection relay SR for manifesting a trouble condition, and the illumination of the supervisory indication lamp SE that is connected in multiple with the relay SR. A diode 32 connected in multiple with the winding of relay SR permits the use of a direct current relay.

The choke 30 in combination with a capacitor 33 connected across the SCR 19 protects the SCR 19 against surges. The picking up of the supervisory relay SR manifests the trouble condition that has been detected by failure to maintain continuity through both of the lamps 15 and 17, and an alarm (not shown) may be rendered active by the relay SR in addition to the illumination of the supervisory indicator lamp SE to indicate the trouble condition.

Upon observing the trouble signal, an operator can determine which of the lamps 15 and 17 is inoperable by actuation of the lamp test push button LTB. This connects the lamps 15 and 17 in multiple to the power supply through diode 34 and fuse 35 for energization of these lamps at full voltage. The lamp that fails to become illuminated in response to actuation of the lamp test button LTB is thus identified as the lamp that

is burned out, and that has caused the supervisory relay SR to be picked up. Replacement of this lamp causes restoration of the normal conditions of the system, the SCR **19** being automatically restored when its gating current is reduced to normal because of energization of its anode-cathode circuit with alternating current.

When a condition to be indicated by the annunciator system, such as an alarm condition, is communicated to the annunciator drop contact apparatus **14**, the contact **10** can be closed due to such control, and in accordance therewith the annunciator lamps **15** and **16** become illuminated by energization through diodes **36** and **37** respectively. Similarly, the closure of drop contact **11** can cause the illumination of annunciator lamps **17** and **18** through diodes **38** and **39** respectively.

In accordance with the closure of drop contact **10** or **11**, a drop contact **12** or **13** respectively is closed to energize the alarm relay AR and thus sound the alarm apparatus **20**. The picking up of the relay AR disables the supervisory detection relays SR and SR1 so that these relays do not become picked up in response to the higher level of energization of the circuits for the lamps **15** and **17**.

Having thus described the mode of operation of the system for the control of annunciator lamps **15** and **17** and the supervisory detection apparatus associated therewith, it is to be understood that a similar mode of operation is effective for the supervision of the group of annunciator lamps comprising lamps **16** and **18**. A supervisory relay SR1 and an associated indicator lamp SE1 is provided in association with the lamps **16** and **18** to detect a burned out lamp condition in the same manner that has been described relative to apparatus provided for supervising the lamps **15** and **17**.

With reference to FIG. **2**, the system as described in FIG. **1** is modified in accordance with the use of a direct current power supply, as compared to the alternating current power supply used for energization of the system according to FIG. **1**. The organization according to FIG. **2** is substantially the same as has been described relative to FIG. **1**, except that a reset relay RS is provided for the purpose of resetting the SCR **19** upon actuation of the lamp test button LTB. Under such conditions the relay RS is picked up by the energization of a circuit including normally closed push button RSB, fuse **35** and lamp test push button LTB. The picking up of relay RS opens its back contact **40** to deenergize the anode-cathode circuit of SCR **19**, and thus cause the dropping away of the supervisory detection relay SR. Also the SCR **19** can be reset by actuation of the push button RSB which is included in series in the circuit for SCR **19**.

Although the system disclosed has been simplified to show only two groups of annunciator indicator lamps of two lamps each, it is to be understood that the system as used in practice will be expanded in accordance with the number of distinctive annunciator indications required in practice.

While there have been described what are at present considered to be the preferred embodiments of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein, without departing from the invention, and it is, therefore, aimed in the appending claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. An annunciator system having a plurality of normally open drop contacts for controlling illumination of normally dark annunciator lamps connecting to a suitable source of power wherein the improvement comprises;

a. a current limiting means connected to the annunciator lamps and to the power source for limiting current through the lamps when the drop contacts are open so that the lamps remain dark;

b. a bypass sensing circuit connecting to the lamps and responsive to the limited current flowing through the lamps so that an output alarm signal is produced when the lamps would become discontinuous;

c. supervising means connected to said bypass sensing circuit and including a normally deenergized supervisory detection indicating device associated with a group of the lamps for manifesting when a lamp of the associated group is inoperable by manifesting an indication when the output alarm signal is produced by a lamp becoming discontinuous;

d. said supervising means further including a memory means for storing a signal indicative of the occurrence of the alarm signal produced a discontinuous lamp; and

e. a reset means for clearing said memory means of any signal stored therein.

2. The invention according to claim **1** wherein a switching means is connected to the lamps and includes a switch for each group of lamps for causing illumination of all lamps of that group irrespective of the condition of the drop contacts for locating a particular lamp of the group that is inoperative.

3. The invention according to claim **1** wherein means is provided for preventing operation of the supervisory detection device upon closure of one of the drop contacts.

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