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[54] **STATUS-SIGNALLING SYSTEM**
14 Claims, 2 Drawing Figs.

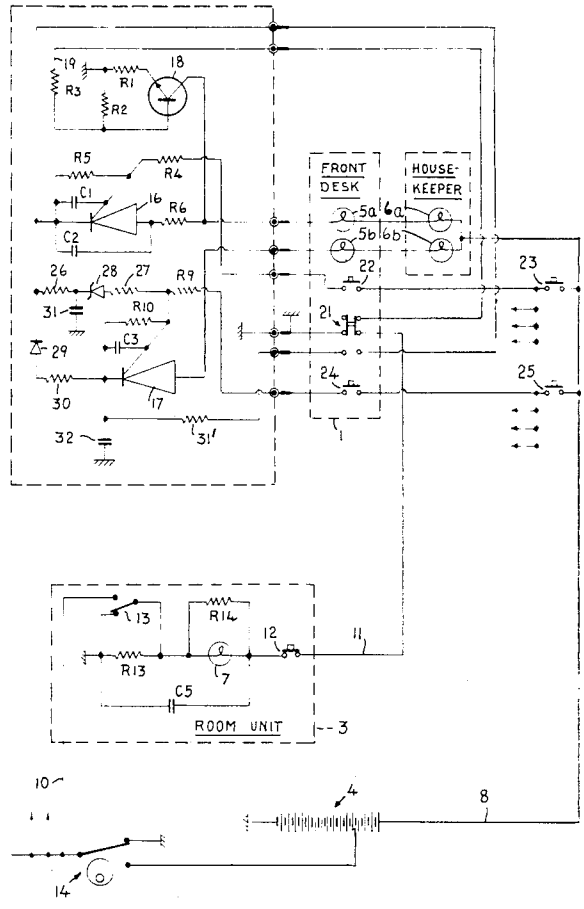
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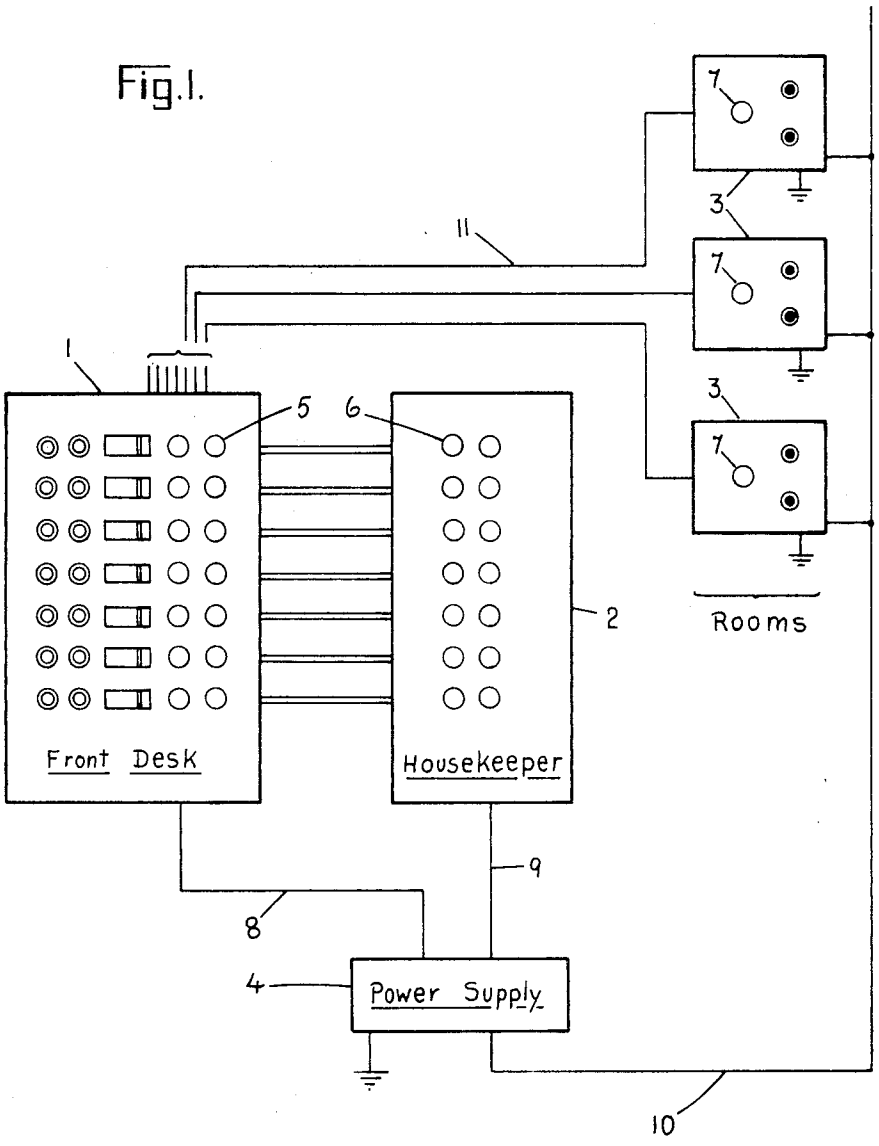
ABSTRACT: A room-status-signalling system comprises a central unit containing a plurality of pairs of indicator lamps and a plurality of room units each containing an indicator lamp corresponding to a respective pair of indicator lamps at the central unit. The remote room units are interconnected with the central unit by call wires to form a plurality of signalling circuits, each signalling circuit containing a single-call wire and including switching means at the remote unit and the central unit for selectively energizing the lamps in accordance with a sequence of room status conditions to be signalled. By selectively energizing one or other of the lamps of any pair, with steady or intermittent current, a number of signals are made available to indicate the different status conditions, and the particular condition is indicated in the room unit by the room lamp.



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2 Sheets-Sheet 1

Fig. 1.



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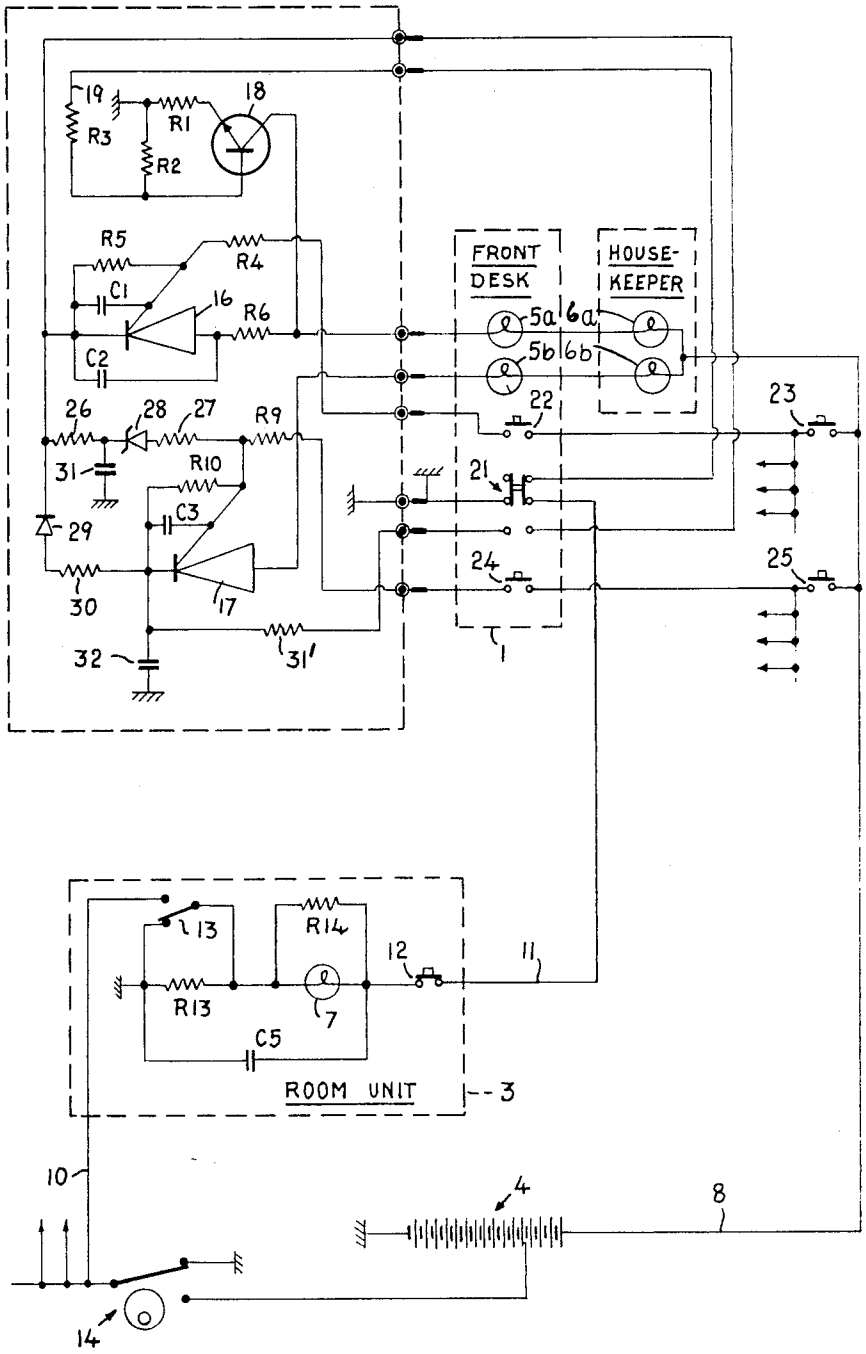


Fig. 2.

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STATUS-SIGNALLING SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to status-signalling systems in general, and is applicable for example to room-status-signalling systems of the kind used in hotels, clubs and the like to enable signals to be given at different points in accordance with the status or conditions of different rooms.

The invention is generally applicable to business and industrial situations in which personnel have to be notified of the conditions obtaining at different places, or of the status of operations to be performed in sequence. In a large hotel, for example, it is generally necessary to signal to different personnel the status of rooms to be prepared for occupancy or being prepared for occupancy. In a hotel it is usual to provide at a front desk a central panel containing an array of indicator lamps which display information appertaining to the status of different rooms. Each of the lamps is connected in a signalling circuit associated with a respective room unit, and each signalling circuit may include indicator lamps at a housekeeper's panel and in a respective room. When a room is to be made up for occupancy, the desk clerk operates an appropriate switch at the desk panel and this conditions the respective room signalling circuit whereby a characteristic status signal appears at the housekeeper's panel. In response to this signal, a maid is sent to the room where she actuates another switch, thereby transmitting a different characteristic signal to the front desk indicating that the room is being made up. When the room has been made ready for occupancy, the maid actuates the room switch again, thus signalling to the front desk that the room is ready.

In certain cases where only low-grade labor is available, it may be necessary for a room to be inspected by a supervisor after it has been made up, the supervisor being solely responsible for signalling the final status of the room to the front desk. This will in general necessitate additional signalling facilities between each room and the housekeeper's panel at a monitoring station, and between the monitoring station and the front desk.

Numerous arrangements of this general kind have been proposed in the past, but such arrangements have in general been very expensive to install on account of the extensive wiring involved, and frequently on account of the elaborate equipment for providing the different characteristic signals in each of the signalling circuits. Usually several signalling circuits for each room have been required, and each signalling circuit has required a number of call wires.

It is an object of the present invention to provide a status-signalling system in which each signalling circuit involves a minimum amount of wiring and yet is capable of displaying a number of different status signals as required.

SUMMARY OF THE INVENTION

Basically, a status-signalling system according to the present invention includes a steady DC source, an intermittent DC source, a central unit, and a plurality of remote units, the central unit containing a plurality of pairs of indicators (such as lamps, for example) each pair corresponding to a respective remote unit to form a plurality of signalling circuits, and each signalling circuit including a call wire interconnecting the remote unit with the central unit and means for selectively energizing the indicators in accordance with a sequence of status conditions to be signalled. Preferably, each remote unit is interconnected with the central unit by a single call wire, a flasher bus, and a ground return.

In order to energize the lamps selectively in the required manner, each signalling circuit essentially comprises:

a. a first circuit element comprising said call wire, a normally closed switch in series with the call wire, and a first two-position selector switch for selectively connecting the first circuit element in circuit with the steady or the intermittent DC source;

b. a second circuit element comprising first and second electronic switches connected respectively in series with first and second indicators of said pair to form first and second parallel-connected branch elements, each electronic switch having a gate;

c. a third circuit element comprising said first indicator, a control valve in series with the first indicator, the control valve having a control electrode, and circuit means connecting the control valve and first indicator in circuit with the steady DC source;

d. a second two-position selector switch having a first position for connecting said first circuit element in circuit with said control electrode, and a second position for connecting said first circuit element in circuit with said second circuit element and said second branch element in circuit with the steady DC source;

e. switching means in circuit with the steady DC source and the gate of the first electronic switch for applying a triggering current thereto; and

f. impedance means connected to the gate of the second electronic switch for applying a triggering current thereto in response to said first and second selector switches each being in the second switching position.

Initially with the two-position selector switches in their respective first positions, both indicators of the signalling circuit are off. The sequence of operations is as follows:

1. movement of the second two-position switch to its second position and closure of said switching means produces a steady indication at the first indicator;
2. movement of the first two-position switch to its second position now produces a flashing indication at both indicators of the pair;
3. movement of the first two-position switch back to its first position produces a steady indication at both indicators;
4. momentary opening of the normally closed switch extinguishes the first indicator, but a steady indication is still provided by the second indicator; and
5. movement of the second two-position switch back to its first position extinguishes the second indicator.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a wiring diagram of a basic room-status-signalling system according to the invention, and

FIG. 2 is a wiring diagram of a signalling circuit forming part of the system shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the basic room-status-signalling system comprises a central unit including a central panel 1, a housekeeper's panel 2, a plurality of remote room units 3, and a centrally located power supply 4. The central panel 1 contains a plurality of pairs of indicator lamps 5, each pair of indicator lamps 5 being connected in series with a respective pair of indicator lamps 6 on the housekeeper's panel, and being associated with an indicator lamp 7 of a respective room unit 3 to form a plurality of signalling circuits. FIG. 1 also shows switches mounted on the central panel 1, and at the room units 3; these switches are described in detail hereinafter with respect to FIG. 2.

The power supply 4 provides a steady DC source and an intermittent DC source, the assemblies 5 and 6 being connected to the power supply 4 by conductors 8, 9, and the room units 3 being connected to the power supply by a flasher bus 10, the flasher bus constituting the low-voltage terminal of the intermittent DC source. It will be noted that the room units 3 are each interconnected with the central unit by a single call wire 11, the flasher bus 10, and a ground return.

Referring now to FIG. 2, which shows a single signalling circuit of the system, a first circuit element of the signalling circuit comprises essentially the call wire 11, a room lamp 7, a normally closed switch 12 in series with the call wire and room

lamp, and a two-position selector switch 13. The selector switch 13 has a first operative position (as shown) for connecting the first circuit element in series with the steady DC source of the power supply 4, and a second operative position for connecting the first circuit element in circuit with the intermittent DC source of the power supply 4. The means for deriving intermittent current from the power supply 4 is illustrated diagrammatically in the drawing by means of a cam-operated switch 14. It will be seen that the switch 13, in its second operative position, connects the first circuit element in circuit with the flasher bus 10. The switches 12 and 13 are key-operated switches, which are respectively biassed to the closed position and the first position, and which are each adapted to be moved from the normal position by the insertion of a key or jack plug.

A second circuit element of the signalling circuit comprises first and second electronic switches 16, 17, each having a gate, and each being connected in series with a respective indicator lamp 5*a* or 5*b* on the central panel and the corresponding indicator lamp 6*a* or 6*b* on the housekeeper's panel. The lamps 5*a* and 6*a* are red lamps, and the lamps 5*b* and 6*b* are yellow lamps. The two series elements, 16, 5*a*, 6*a* and 17, 5*b*, 6*b*, form parallel-connected branch elements constituting said second circuit element. Each of the electronic switches 16 and 17 is a silicon-controlled rectifier.

A third circuit element of the signalling circuit comprises the series-connected red lamps 5*a*, 6*a*, and a control valve constituted by a transistor 18 in series with the lamps 5*a*, 6*a*, this third circuit element being connected across the terminals of the DC source.

On the central panel 1 is mounted a second two-position switch 21 in the form of a manually operable slide switch having a first position (as shown) for connecting the first circuit element in circuit with the base circuit 19 of the transistor 18, and a second, alternative position at which the first circuit element is connected in circuit with said second circuit element and at which the second branch element formed by rectifier 17 and the yellow lamps 5*b*, 6*b* is connected in circuit with the steady DC voltage source. A pushbutton switch 22, which is normally spring biassed to its open position, is mounted on the central panel 1 for connecting the gate of the silicon-controlled rectifier 16 to the positive terminal of the steady DC source. It is necessary to depress the pushbutton switch 22 in order to apply a triggering voltage to the gate of rectifier 16. Preferably, a normally open switch 23 is connected in series with the switch 22, the switch 23 being inaccessible to unauthorized persons.

A triggering voltage may be applied to the gate of the second silicon-controlled rectifier 17 by operating a second normally open pushbutton switch 24 mounted on the central panel 1. This switch, which is connected in series with a key-operated switch 25, is provided for the purpose of correcting errors and is not used during normal operation of the system. The silicon-controlled rectifier 17 is normally triggered from the intermittent DC source in the following manner.

The gate of the rectifier 17 is connected to the cathode by an impedance circuit comprising resistors 26. 27, a zener diode 28, a blocking rectifier 29, and a surge-limiting resistor 30. A capacitor 31 is connected to ground from the junction of resistor 26 and zener diode 28. The cathode is also connected to ground through a CR circuit comprising a resistor 31′ and a capacitor 32. It will be seen that when the switches 13 and 21 are in their respective first operative positions, the rectifier 17 cannot conduct. Movement of switch 21 to its second position connects the cathode to the negative terminal of the steady DC source through the call wire and room unit, but the gate remains more negative than the cathode and so the rectifier will not conduct. Movement of the switch 13 to the second position, however, enables intermittent direct current to be applied to the gate via the circuit 26, 27, and 28, the CR circuit 31′, 32 ensuring that the cathode is held at ground potential for a time long enough to enable the rectifier to be triggered.

The operation of the circuit, as applied to a hotel signalling system, will now be described.

Initially all the lamps of a signalling circuit are out, indicating that the room is occupied or rented. On checkout, the desk clerk moves switch 21 from its first to its second position thereby disconnecting the base circuit of transistor 18 and completing the circuits of the red and yellow lamps through rectifiers 16,17 and selector switch 13. The desk clerk also depresses pushbutton switch 22, thereby applying a triggering potential to the gate of rectifier 16, and the red lamps are energized. The red lamp 6*a* on the housekeeper's panel indicates that a room must be made up.

On entering the room the maid operates the switch 13 by inserting a key or jack plug, thus moving the switch to its second position. The lamp circuits are now connected across the intermittent DC source through switch 13, a triggering current being applied to the gate of rectifier 17 through the impedance circuit 26, 27, 28. All the lamps are therefore caused to flash. When the room is ready for inspection the maid removes the key or jack plug from switch 13, causing the switch to return to its first position, both lamp circuits now being connected across the steady DC source. After inspection the housekeeper or supervisor inserts her key into the key-operated switch 12, thus interrupting the red lamp circuit; the yellow lamp circuit remains completed through resistor 31′ and selector switch 21, however, and so only the yellow lamps remain on. This indicates to the desk clerk that the room is satisfactory and ready for occupancy. Finally, on renting the room, the desk clerk returns the selector switch to its first position, disconnecting the yellow lamp circuit. The sequence of signals is therefore:

All lamps out—Room rented
Red lamps on—Checkout
All lamps flashing—Maid in room
All lamps steady—Room ready for inspection
Yellow lamps on—Room ready for occupancy

In a case where the room is rented, the selector switch remains in its first position and so insertion of the maid's key in switch 13 causes only the red lamps to flash, intermittent current being applied to the gate of transistor 18. This indicates to the housekeeper that the maid is in a rented room and no inspection is called for.

It will be noted that the room lamp 7 will glow brightly if both the red and yellow lamps are on, but will remain dim if only one set of lamps is on. This provides an indication in the room of the type of signal being displayed at the central and housekeeper's panels.

The key-operated switch 25 in conjunction with pushbutton switch 24 enables a triggering voltage to be applied to the gate of rectifier 17 at any time, thus allowing the desk clerk to switch the yellow lamps back on if a room is rented in error. The switch 23 is accessible to the desk clerk only and is common to all the signalling circuits. This is a normally open key-operated switch for the purpose of defeating errors which might arise from improper or unauthorized actuation of the pushbutton switches 22.

It will be appreciated that a circuit as described above will in practice include a number of current-limiting resistors, biassing resistors, transient suppression capacitors and the like. FIG. 2 illustrates an operative circuit including such resistors and capacitors, the values of which are given by the following table.

TABLE

Resistors		Capacitors	
26, R13	2.2 K	C1, C3, C5	10 mfd.
27, R1, R14	150 ohms	32	10 mfd.
30, R6	120 ohms	c2	0.22 mfd.
31′, R3	2.7 K	31	0.22 mfd.
R4, R9	4.7 K		
R2	22 K		
R5	220 ohms		
R10	470 ohms		

What I claim as my invention is:

1. A status-signalling system comprising a steady DC source, an intermittent DC source, a central unit, and a plu-

rality of remote units, the central unit containing a plurality of pairs of indicators each pair corresponding to a respective remote unit to form a plurality of signalling circuits, each signalling circuit including a call wire interconnecting the remote unit with the central unit and means for selectively energizing the indicators in accordance with a sequence of status conditions to be signalled, each signalling circuit comprising:

a. a first circuit element comprising said call wire, a normally closed switch in series with the call wire, and a first two-position selector switch for selectively connecting the first circuit element in circuit with the steady or the intermittent DC source;

b. a second circuit element comprising first and second electronic switches connected respectively in series with first and second indicators of said pair to form first and second parallel-connected branch elements, each electronic switch having a gate;

c. a third circuit element comprising said first indicator, a control valve in series with the first indicator, the control valve having a control electrode, and circuit means connecting the control valve and first indicator in circuit with the steady DC source;

d. a second two-position selector switch having a first position for connecting said first circuit element in circuit with said control electrode, and a second position for connecting said first circuit element in circuit with said second circuit element and said second branch element in circuit with the steady DC source;

e. switching means in circuit with the steady DC source and the gate of the first electronic switch for applying a triggering current thereto; and

f. impedance means connected to the gate of the second electronic switch for applying a triggering current thereto in response to said first and second selector switches each being the second switching position.

2. A status-signalling system according to claim 1, wherein said first and second electronic switches are semiconductor-controlled rectifiers each having an anode, a cathode, and a gate.

3. A status-signalling system according to claim 2, wherein said impedance means comprises an impedance path interconnecting the gate and cathode of the second semiconductor-controlled rectifier and means for maintaining the cathode at a low potential prior to triggering of the rectifier, whereby a triggering voltage for the gate is derived from the intermittent DC source when said first and second two-position selector switches are moved to their respective second positions.

4. A status-signalling system according to claim 3, wherein said first two-position switch is normally biassed to its first position, said normally open and normally closed switches being respectively biassed to their normal operative positions, said first two-position switch and normally closed switch being key-operated switches, said normally open switch being push-button switch, and said second two-position switch being a manually operable slide switch.

5. A status-signalling system according to claim 4, including a further normally open pushbutton switch in circuit with the steady DC source and the gate of the second semiconductor-controlled rectifier for applying a triggering current thereto.

6. A status-signalling system according to claim 1, in which each remote unit includes an indicator in series with the respective first circuit element.

7. A status-signalling system according to claim 1, wherein the control valve of the third circuit element is a transistor having emitter and collector electrodes connected in series with the first indicator, and a base electrode constituting the control electrode.

8. A room-status-signalling system comprising a steady DC source, an intermittent DC source, a central unit having a central panel, a housekeeper's panel, and a plurality of remote room units, each of said panels containing a plurality of pairs of indicators and each room unit containing a room indicator corresponding to a respective pair of indicators on each of said panels to form a plurality of signalling circuits, each signalling circuit including a call wire interconnecting the respective room unit with the central unit and means for sequentially energizing the indicators in accordance with a sequence of status conditions to be signalled each signalling circuit comprising:

a. a first circuit element comprising said call wire, said room indicator, a normally closed switch in series with said call wire and room indicator, and a two-position selector switch having a first position for connecting the first circuit element in circuit with the steady DC source and a second position for connecting the first circuit element in circuit with the intermittent DC source;

b. a second circuit element comprising first and second electronic switches connected respectively in series with first and second indicators of a respective pair on each panel, to form first and second parallel-connected branch elements, each electronic switch having a gate;

c. a third circuit element comprising the first indicator of each pair, a control valve in series with said first indicators, the control valve having a control electrode, and circuit means connecting the control valve and first indicators in circuit with the steady DC source;

d. a second two-position selector switch having a first position for connecting said first circuit element in circuit with said control electrode, and a second position for connecting said first circuit element in circuit with said second element and said second branch element in circuit with the steady DC source;

e. switching means in circuit with the steady DC source and the gate of the first electronic switch for applying a triggering current thereto; and

f. impedance means connected to the gate of the second electronic switch for applying a triggering current thereto in response to said first and second selector switches each being in the second switching position.

9. A room-status-signalling system according to claim 8, wherein each room unit is interconnected with the central unit by a single call wire, a flasher bus, and a ground return.

10. A room-status-signalling system according to claim 9, wherein said first and second electronic switches are semiconductor-controlled rectifiers each having an anode, a cathode and a gate.

11. A room-status-signalling system according to claim 10, wherein said impedance means comprises an impedance path interconnecting the gate and cathode of the second semiconductor-controlled rectifier and means for maintaining the cathode at a low potential prior to triggering of the rectifier, whereby a triggering voltage for the gate is derived from the intermittent DC source when said first and second two-position selector switches are moved to their respective second positions.

12. A room-status-signalling system according to claim 11, wherein said first two-position switch is normally biassed to its first position, said normally open and normally closed switches being respectively biassed to their normal operative positions, said first two-position switch and normally closed switch being key-operated switches, said normally open switch being a pushbutton switch, and said second two-position switch being a manually operable slide switch.

13. A room-status-signalling system according to claim 12, including a further normally open pushbutton switch in circuit with the steady DC source and the gate of the second semiconductor-controlled rectifier for applying a triggering current thereto.

14. A room-status-signalling system according to claim 8, wherein the control valve of the third circuit element is a transistor having emitter and collector electrodes connected in series with the said first indicators, and a base electrode constituting the control electrode.

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