

[54] **PANEL ROOM STATUS INDICATOR SYSTEM AND ROOM UNIT THEREFOR**

[72] Inventor: **Lenfred L. Savey**, Cinniminson, N.J. 08077

[73] Assignee: **Philco-Ford Corporation**, Philadelphia, Pa.

[22] Filed: **April 1, 1971**

[21] Appl. No.: **130,222**

[52] U.S. Cl. **340/286 R, 340/287 R**

[51] Int. Cl. **H04n 7/00**

[58] Field of Search **340/286 R, 287 R**

[56] **References Cited**

UNITED STATES PATENTS

3,124,793	3/1964	Foster.....	340/286 X
3,214,747	10/1965	Lurie	340/286 R
3,228,020	1/1966	Gassenheimer.....	340/286 R
3,254,335	5/1966	Staten.....	340/286 R
3,599,200	8/1971	Bunting	340/286 R

Primary Examiner—Harold I. Pitts

Attorney—Robert D. Sanborn

[57] **ABSTRACT**

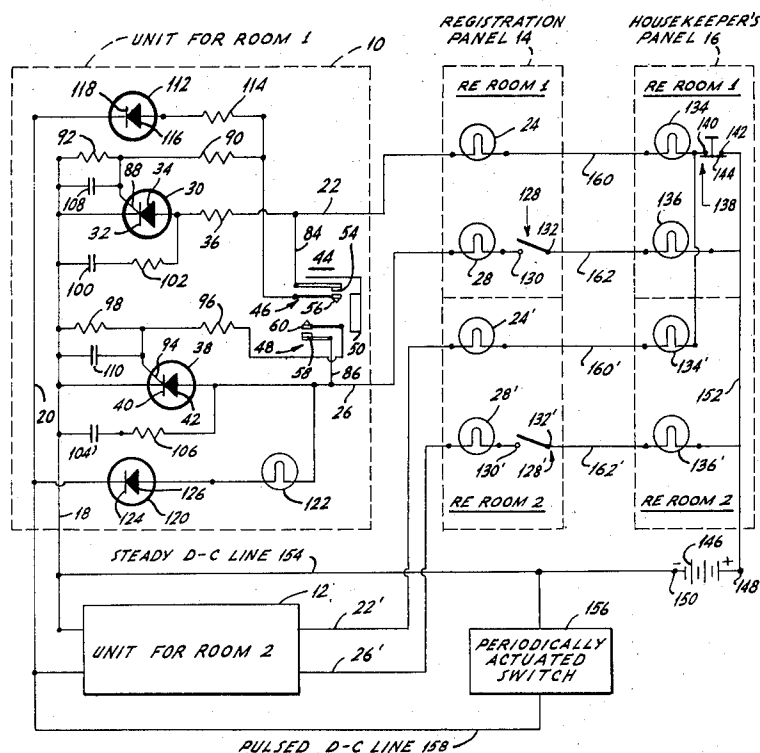
A system for providing visual indication at the registration desk of a hotel or motel and in the housekeeper's office thereof, of the status of occupancy, cleanliness and inspection of each guest room of the hotel or motel, and a room unit for such system. The preferred form of room unit comprises a jack including two open-circuited switches the first of which is arranged to be closed by insertion of a short plug in the jack and both of which are arranged to be closed by insertion of a longer plug in the jack. The anode-cathode path of a first silicon controlled rectifier (SCR) is connected in series relationship with a first resistor between one contact of the first switch and a first supply conductor, to which the cathode of the SCR is connected. That conductor provides a negative return path to a d-c constant voltage source. The anode-cathode path of a second SCR is connected between one contact of the second switch and the first supply conductor. A first diode is connected in series relationship with a second resistor of value smaller than that of the first resistor, between the other contact of the first switch and a second supply conductor to which the cathode of the diode is connected. The second supply conductor provides a negative return

path to a source of pulsating d-c voltage. A second diode is connected in series relationship with an indicator lamp between the second conductor and the anode of the second SCR, the cathode of the second diode being connected to the second conductor. Respective voltage dividers for applying a triggering voltage to the respective control electrodes of the first and second SCRs are connected from the second contacts of the first and second switches respectively to the first conductor. Third and fourth conductors for making connections to respective indicator lamps in an indicator station of the system are connected to the respective first terminals of the first and second switches.

The indicator system preferably comprises two indicator stations — a panel at the registration desk and another panel at the housekeeper's station. Each of those panels includes two indicator lamps for each room. In one embodiment a first lamp in each panel is connected in series with a first lamp in the other panel, the third conductor of the room unit, and one terminal of a normally closed reset switch the other terminal of which is connected to the positive terminal of the d-c constant voltage source. A second lamp in each panel is connected in series with a second lamp in the other panel, with another switch located in the registration panel, and with the d-c constant voltage source. The negative terminal of the source is connected to the first conductor of the room unit. In addition, to provide pulsating voltage a periodically actuated switch is connected between that negative terminal and the second conductor of the room unit. In another embodiment the first lamps of the two panels are connected in parallel and the parallel combination is connected in series with the reset switch, the third conductor and the d-c voltage source. The second lamps also are connected in parallel and that parallel combination is connected in series with the fourth conductor, the other switch and the d-c voltage source.

In either embodiment closure of the other switch causes the second lamps and the room unit light to flash. Insertion of a short plug into the room unit jack causes the first lamps also to flash. Removal of that plug causes the first lamps to emit constant-intensity light. Insertion of the longer plug into the jack causes the room unit lamp to be extinguished and the second lamps to emit constant-intensity light; this condition continues after removal of the longer plug. Opening of the reset switch causes the first lamps to be extinguished, and opening of the other switch causes the second lamps to be extinguished.

20 Claims, 5 Drawing Figures



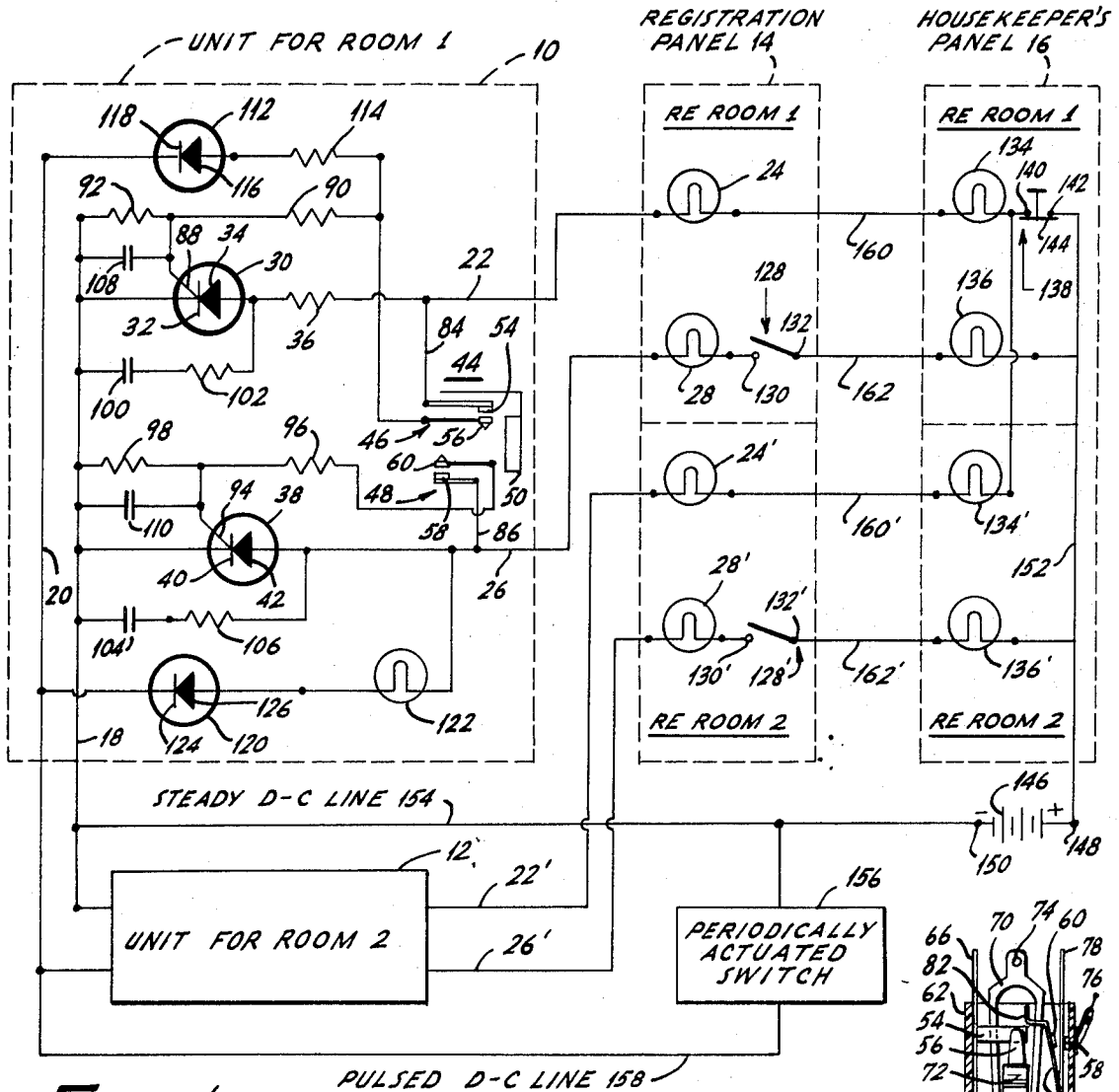


FIG. 1.

FIG. 2B.

FIG. 3A.

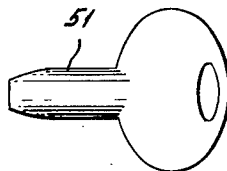


FIG. 3B.

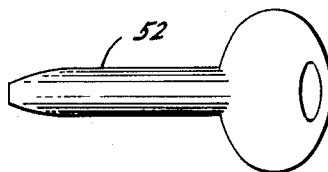
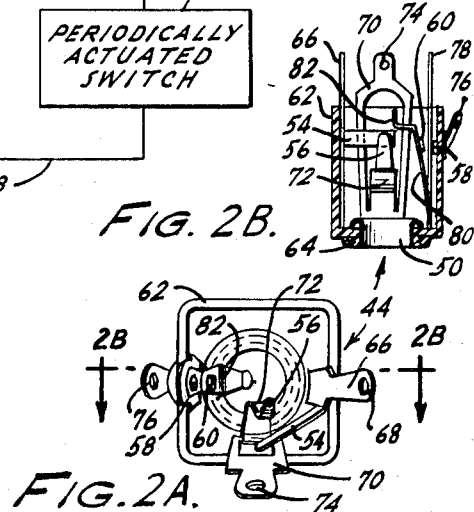


FIG. 2A.

INVENTOR.
LENFRED L. SAYEY

BY

Herbert Epstein

ATTORNEY

PANEL ROOM STATUS INDICATOR SYSTEM AND ROOM UNIT THEREFOR

BACKGROUND OF THE INVENTION

The invention relates to a system for hotels and motels, for indicating with respect to each guest room thereof whether it is occupied, whether it has been cleaned, and whether it has been inspected. Because the system provides constantly updated information regarding the foregoing matters, it facilitates efficient management of the hotel or motel. The system of the invention comprises a room unit, adapted for installation in every room of the hotel or motel, which is small, noiseless, safe and simple to build and service.

SUMMARY OF THE INVENTION

In its simplest form the room unit of the invention comprises a first conductor for receiving a constant operating potential, a second conductor for receiving a pulsating operating potential, and a third conductor for making connection to electrically actuatable indicator means. A thyristor has its anode connected to the third conductor and its cathode to the first conductor. A switch has one contact connected to the third conductor. Means connected to the second contact of the switch is provided for transmitting a triggering current to the control electrode of the thyristor. Rectifier means has its anode connected to one of the contacts of the switch and its cathode connected to the second conductor.

In its simplest form the room status indicator system of the invention comprises the foregoing room unit. It also comprises a signal station including said electrically actuatable indicator means. The third conductor of the room unit is connected to one terminal of the indicator means. Another switch has one terminal connected to another terminal of the indicator means. Means is provided for connecting another terminal of the other switch to the positive terminal of a source of substantially constant unidirectional voltage. Means is provided for connecting the first conductor of the room unit to the negative terminal of the source, and means also is provided for connecting the second conductor of the room unit to the negative terminal of a source of pulsed unidirectional voltage.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic diagram of a preferred embodiment of the room status indicator system according to the invention;

FIGS. 2A and 2B are respectively an end perspective view and a sectional view of a jack comprising two normally open switches, used in the preferred embodiment shown in FIG. 1;

FIG. 3A is a diagram of a plug adapted, when inserted in the jack shown in FIGS. 2A and 2B, to actuate only one switch thereof, and

FIG. 3B is a diagram of another plug adapted, when inserted in the jack shown in FIGS. 2A and 2B, to actuate both switches thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment of my room status indicator system comprises (1) a room unit for each room for which status indication is to be provided, (2) a first signal station comprising for each such room a pair of electrically actuatable indicator means, and (3) a second signal station also comprising two electrically actuatable indicator means. The room units and the two signal stations are interconnected as described hereinafter. For simplicity of description FIG. 1 illustrates a system providing status indication for only two rooms, respectively designated in FIG. 1 as Room 1 and Room 2. However the system can be expanded to provide status indication for as many rooms as desired, or contracted to provide status indication for only one room.

More particularly, the system shown in FIG. 1 comprises a first room unit 10 (also designated in the drawing as "Unit for Room 1") and a second room unit 12 (also designated in the drawing as "Unit for Room 2"), a first signal station 14 and a second signal station 16. Typically station 14 will be located in or near the registration desk of a hotel or motel, and therefore is designated in FIG. 1 as "registration panel 14." Similarly station 16 typically will be located in or near the housekeeper's desk or station and therefore is designated in FIG. 1 as "housekeeper's panel 16." Room unit 12 typically will have a structure identical to that of room unit 10; hence room unit 12 as such is not further described herein.

ROOM UNIT 10

Room unit 10 comprises a first conductor 18 for receiving a constant operating potential, a second conductor 20 for receiving a pulsating operating potential, a third conductor 22 for making connection to first electrically actuatable means, i.e. incandescent lamp 24, in registration panel 14, and a fourth conductor 26 for making connection to second electrically actuatable indicator means, i.e. incandescent lamp 28 in registration panel 14. A first thyristor, preferably a silicon controlled rectifier 30, has its cathode 32 connected to conductor 18 and its anode 34 connected to conductor 22 via first resistive means, e.g. a resistor 36 having a given resistance. A second thyristor, preferably a silicon controlled rectifier 38, has its cathode 40 connected to conductor 18 and its anode 42 connected to conductor 26.

Room unit 10 also comprises switching means, specifically shown in FIG. 1 as a jack 44, comprising a first switch 46, a second switch 48, and a ring 50 for receiving plugs of a given diameter and of differing lengths, i.e. either of the plugs 51 and 52 shown in FIGS. 3A and 3B respectively. Switch 46 has first and second contacts 54 and 56 biased to be open-circuited when no plug is inserted into jack 44. Similarly switch 48 has first and second contacts 58 and 60 also biased to be open-circuited when no plug is inserted into jack 44. Switches 46 and 48 are so physically disposed within jack 44 that, when shorter plug 51 is inserted into jack 44, only switch 46 is closed, while when longer plug 52 is inserted into jack 44, both of switches 46 and 48 are closed.

One suitable structure for jack 44 is illustrated in FIGS. 2A and 2B. As shown therein jack 44 comprises a generally tubular body 62 composed of an insulating material, e.g. an insulating plastic. Ring 50 is secured to one end of body 62 and is threaded to receive a nut 64 adapted to secure jack 44, in conventional manner, to a panel. A strip-like metal member 66 comprising as a solderable terminal 68 is secured to a first interior surface of body 62. A second metal member 70, having formed from a portion thereof the cantilevered switch contact 56, is secured to a second interior surface of body 62 orthogonal to the first interior surface. Switch contact 56 has an elevation 72 spaced from ring 50 by a distance such that either plug 51 or plug 52, when inserted into jack 55 via ring 50, will depress contact 56 into electrical connection with contact 54. Tongue 74 provides a solderable terminal for contact 56.

Contact 58 is secured to a third interior surface of body 62 parallel to the first interior surface, by a rivet member which also secures a solderable terminal 76 for contact 58 to the exterior of body 62. A metal strip member 78, out of which is formed the cantilevered member 80 to which contact 60 is attached, also is secured to said third interior surface. Member 80 has an elevation 82 which is spaced sufficiently far from ring 50 that plug 51, when inserted via ring 50, is too short to depress member 80, and sufficiently close to ring 50 that plug 52, when fully inserted via ring 50, depresses member 80 sufficiently to cause contact 60 to make electrical contact with contact 58. The end of member 78 remote from ring 50 serves as a solderable terminal for contact 60.

Referring again to FIG. 1, a conductor 84 connects contact 54 of first switch 46 to conductor 22, and a conductor 86 connects contact 58 of second switch 48 to conductor 26. To transmit triggering current to control electrode 88 of thyristor 30, a resistor 90 is connected between contact 56 and control electrode 88. In addition, a resistor 92 connects control electrode 88 to conductor 18, resistors 90 and 92 thus forming a voltage divider for controlling the voltage applied to control electrode 88 when switch 46 is closed.

Similarly, to transmit triggering current to control electrode 94 of thyristor 38, a resistor 96 is connected between contact 60 of switch 58 and control electrode 94. In addition a resistor 98 connects control electrode 94 to conductor 18, resistors 96 and 98 thus forming a voltage divider for controlling the voltage applied to control electrode 94 when switch 48 is closed.

To limit the rate of rise of forward-biasing voltage between anode 34 and cathode 32 of thyristor 30, a capacitor 100 and a resistor 102 are connected in series relationship between anode 34 and conductor 18. Similarly, to limit the rate of rise of forward-biasing voltage between anode 42 and cathode 40 of thyristor 38, a capacitor 104 and a resistor 106 are connected in series relationship between anode 42 and conductor 18. To bypass pulses from trigger electrode 88 to conductor 18, a bypass capacitor 108 is connected therebetween. To bypass pulses from trigger electrode 94 to conductor 18, a capacitor 110 is connected therebetween.

Room unit 10 also comprises first rectifier means, shown in FIG. 1 as diode 112, connected in series rela-

tionship with a resistor 114 between second conductor 20 and contact 56 of switch 46. Diode 112 is poled so that its anode 116 is connected to contact 56 and its cathode 118 is connected to conductor 20. Resistor 114 has a value lower than the given value of resistor 36 for reasons discussed hereinafter. Second rectifier means, shown in FIG. 1 as diode 120, is connected in series relationship with third electrically actuated indicator means, shown in FIG. 1 as an incandescent lamp 122, between conductor 20 and conductor 26. Diode 120 is poled so that its cathode 124 is connected to line 20 and its anode 126 is connected to line 26.

PANELS 14 AND 16

As aforementioned, registration panel 14 comprises, for each room, first and second electrically actuated indicator means. For Room 1 these are incandescent lamps 24 and 28 respectively, and for Room 2 these are incandescent lamps 24' and 28' respectively. Typically (but not necessarily) lamps 24 and 28 and their counterparts 24' and 28' are mounted behind jewels (not shown) respectively transmissive of different colors, e.g. amber and red respectively, so that the light emitted by either lamp is readily distinguishable from that emitted by the other. Registration panel 14 also comprises, for Room 1, a switch 128 having one terminal 130 connected to a terminal of lamp 28 and having another terminal 132. (Switch 128' is the corresponding switch for Room 2 and is correspondingly connected.)

Housekeeper's panel 16 comprises, for each room, fourth and fifth electrically actuatable indicator means. More particularly, for Room 1, panel 16 comprises incandescent lamps 134 and 136 respectively, and for Room 2, panel 16 comprises the corresponding lamps 134' and 136' respectively. As in panel 14 the lamps of panel 16 typically are mounted behind jewels (not shown) respectively transmissive of different colors. Thus where lamps 24 and 24' of panel 14 are mounted behind amber-light-transmissive jewels, and lamps 28 and 28' are mounted behind red-light-transmissive jewels, lamps 134 and 134' of panel 16 are mounted behind amber-light-transmissive jewels, and lamps 136 and 136' are mounted behind red-light-transmissive jewels.

To energize the system a source of substantially constant unidirectional voltage, shown schematically in the drawings as a battery 146 having a positive terminal 148 and a negative terminal 150, is provided. Typically source 146 comprises a conventional a-c to d-c power supply, including a transformer for stepping the input alternating voltage to the desired level, a rectifier or rectifiers for converting that voltage to a pulsating unidirectional voltage, and a filter supplied with the unidirectional voltage for extracting therefrom a substantially constant unidirectional voltage. Alternatively source 146 may in fact be a battery, or source 146 may comprise a battery and the output of an a-c d-c supply connected in series relationship.

To prevent more than momentary loss of energization of the system because of a-c power failure, e.g. such as might be caused by lightning striking the line transformer feeding the building or building in which the system is installed, the d-c power supply desirably comprises (1) the aforementioned a-c to d-c system,

(2) a storage battery capable of supplying the requisite current and voltage for the system, and (3) a relay energized by the a-c line current to connect the output of the a-c to d-c power supply into the system as source 146, and adapted in the event of failure of the a-c line current, to switch the storage battery into the system as source 146, while disconnecting the output of a-c to d-c power supply from the the system.

Lamps 24 and 134 are connected in series relationship with source 146. The series path comprises the anode-cathode path of thyristor 30, resistor 36, conductor 22, lamp 24, a conductor 160, lamp 134, a normally closed push-to-open switch 138 having contacts 140 and 142 and a bridging member 144, a conductor 152, source 146, a conductor 154, and conductor 18. The portion of the system pertaining to Room 2 is correspondingly connected.

Lamps 28 and 136 also are connected in series relationship with source 146. The series path in this case comprises source 146, conductor 152, lamp 136, a conductor 162, switch 128, lamp 28, conductor 26, the anode-cathode path of thyristor 38, conductor 18, and conductor 154. The corresponding lamps for Room 2 are series-connected in like fashion.

The system additionally comprises a source of pulsating unidirectional voltage. In the preferred arrangement of FIG. 1, that source comprises source 146 and a periodically actuated switch 156 having one terminal connected to the negative terminal 150 of source 146 and having another terminal connected to a line 158. Line 158, in turn, is connected to second conductor 20 of room unit 10. Typically switch 156 comprises a single-pole single-throw switch which is spring-biased to be normally open and has a member depressable to close the switch. That member is placed in contact with the edge of a cam which is revolved at a relatively slow speed by a motor, e.g. one revolution every two seconds, and which is curved so as to depress the switch member during part of the revolution, e.g. for a half revolution, and to release the member during the remainder of the revolution. Thus switch 156 periodically provides between line 158 and terminal 150 alternatively a low resistance path for one second and a high resistance path for one second.

Exemplary values for the circuit components shown in the embodiment of FIG. 1 are as follows:

Component	Value
Lamps 24, 24', 28, 28', 122, 134, 134', 136, and 136'	each lamp rated at 12volts, 80 milliamperes
diodes 112 and 120	each a silicon diode rated at 1 ampere and 50 volts peak-inverse-voltage
thyristors 30 and 38	each a silicon controlled rectifier rated at 800 milliamperes, 50 volts peak-inverse-voltage, with gate triggerable by application of a potential 5 volts positive with respect to cathode potential
switches 128 and 128'	each a single-pole, single-throw toggle switch
switch 138	a normally-closed, push-to-break switch.
resistors 90, 92, 96 and 98	each a 6 kilohm, half watt resistor
resistor 36	150 ohms, one watt resistor
resistors 102 and 106	each a 1 kilohm, half watt resistor
resistor 114	a 10 ohms, half watt resistor

capacitors 100 and 104	each a 0.01 microfarad,
capacitors 108 and 110	50 volt capacitor
source 146	each a 33 microfarad,
	20 volt capacitor
	24 volts d-c

The foregoing values are only exemplary and the invention is not limited thereto. Other suitable values for the circuit components will readily occur to those skilled in the art.

OPERATION

For ease of understanding, the operation of the system is described with reference to its typical use in a hotel or motel.

GUEST CHECKS OUT OF ROOM 1

When the guest in Room 1 checks out, the check-out clerk closes switch 128 on registration panel 14. Closure of this switch completes the series path including diode 120, lamp 122, line 26, lamp 28, switch 128, line 162, lamp 136, line 152, source 146, periodically actuated switch 156, line 158 and line 20. As a result, pulsating unidirectional current flows through lamp 122 in the room unit, lamp 28 in the registration panel 14 and lamp 136 in the housekeeper's panel 16, causing those three lamps to emit pulsating light. The "blinking" of lamp 136 signals the housekeeper to send a maid to Room 1 to clean it.

MAID IN ROOM 1

The maid sent to Room 1 has in her possession a short key plug like plug 51 shown in FIG. 3A. When she enters Room 1 she inserts her key plug 51 into jack 44 via ring 50, and leaves plug 51 inserted in jack 44 during her stay in the room. Insertion of plug 51 into jack 44 closes contact 56 of switch 46 to its contact 54. Closure of switch 46 closes two series paths in the system:

1. the path including diode 112, resistor 114, switch 46, line 22, lamp 24, line 160, lamp 134, switch 138, line 152, source 146, switch 156, line 158, and conductor 20, and
2. the path including resistor 92, resistor 90, switch 46, conductor 22, lamp 24, line 160, lamp 134, switch 138, line 152, source 146, line 154, and line 18. Because of the closure of path (1) a pulsating unidirectional current component is passed through lamps 24 and 134. Because of the closure of path (2) triggering current is supplied to control electrode 88 of thyristor 30, triggering thyristor 30 into conduction. This conduction causes a substantially constant component of unidirectional current to flow through lamps 24 and 134. Because the resistance of resistor 36 is larger than that of resistor 114, the intensity of the constant component of current flowing through lamps 24 and 134 is less than the intensity of the pulsating current flowing therethrough. As a result, lamps 24 and 134 appear to "wink." That is, they emit a relatively low level of steady light upon which are superimposed higher intensity periodic pulses of light. The "winking" of lamps 24 and 134 informs the registration clerk and housekeeper that the maid is in Room 1.

ROOM 1 CLEANING COMPLETED

When the maid has completed her cleaning of Room 1, she removes her plug 51 from jack 44. As a result,

contact 56 of switch 46 opens from contact 54, thereby breaking the aforescribed series paths (1) and (2). Because thyristor 30 has been triggered into conduction and operates as a latching switch, it continues to conduct even though no further triggering current is supplied thereto. Hence a substantially constant current continues to flow through lamps 24 and 134. However, opening of switch 46 interrupts the supply of pulsating unidirectional current to lamps 24 and 134. Hence lamps 24 and 134 now emit light of substantially constant intensity. This steady emission of light by those lamps signals to the registration clerk and the housekeeper that the cleaning of Room 1 has been completed.

ROOM 1 INSPECTED

To ascertain whether Room 1 has been properly cleaned and is otherwise ready for occupancy, an inspectress visits Room 1. The blinking in Room 1 of lamp 122 (which has continued ever since switch 128 was closed) informs the inspectress that the guest who formerly occupied the room is supposed to have checked out. If the appearance of the room belies this, for example clothing and luggage are still present therein, the inspectress becomes aware that the clerk at the check-out desk has made a mistake in closing switch 128 and informs him of that fact. In contrast if lamp 122 is not blinking and yet the room gives the appearance of having been vacated, the inspectress notifies the registration desk of this fact so that it can be ascertained immediately whether (1) the guest formerly occupying the room has in fact checked out and switch 128 has been closed but the system is out of order (owing for example to the burning out of any of lamps 122, 28 or 136), or (2) the clerk neglected to close switch 128 when the guest did check out, or (3) the guest left the hotel or motel without checking out. Because lamps 122, 28 and 136 are all connected in series relationship, in the event any one of them burns out, the clerk is apprised of the defect in the system, because lamp 28 fails to light when the clerk closes switch 128 or extinguishes even though switch 128, formerly closed, remains closed.

Assuming that lamp 122 is blinking when the inspectress enters the room, and the room appears to be in order for occupancy by another guest, the inspectress inserts momentarily her copy of the longer plug 52 into jack 44 and then removes the plug. When plug 52 is fully inserted into jack 44, it closes both switches 46 and 48. Closure of switch 46 causes lamps 24 and 134 to emit a "winking" light as explained hereinbefore. Closure of switch 48 closes the series path including resistor 98, resistor 96, switch 48, line 26, lamp 28, switch 128, line 162, lamp 136, line 152, source 146, line 154, and conductor 18. As a result triggering current is supplied via resistor 96 to control electrode 94 of thyristor 38, thereby triggering thyristor 38 into conduction. Conduction of thyristor 38 produces two effects in the system — extinguishment of lamp 122 and a shift in the character of the light emitted by lamps 28 and 136 from pulsating to steady. More particularly, because thyristor 38 has a low resistance when conducting, the potential of line 26 becomes nearly that of line 18. Since cathode 124 of diode 120 is connected to line 20, whose potential is never more negative than

that of line 18, diode 120 blocks conduction of pulsating current through lamp 122, causing it to be extinguished. It therefore also blocks conduction of pulsating current through lamps 28 and 136 in series with diode 120 and lamp 122. However conducting thyristor 38 causes a substantially constant current to flow through lamps 28 and 136. Hence those lamps now glow with a steady light. Accordingly, emission of such steady light from lamps 28 and 136 informs the registration clerk and the housekeeper that Room 1 has been inspected and approved. In addition steady light from lamps 28 and 136 coupled with the "winking" of lamps 24 and 134 inform the registration clerk and the housekeeper that the inspectress is just completing her inspection of Room 1. Because thyristor 38 is a latching switch, it continues to conduct until its anode-cathode circuit is interrupted. Hence lights 28 and 136 continue to glow steadily until that circuit is interrupted.

GUEST CHECKS INTO ROOM 1

The steady glow of lamps 24 and 28 informs the registration clerk that Room 1 is ready for occupancy by a new guest. When Room 1 is assigned to a new guest, the registration clerk opens switch 128, thereby breaking the series circuit comprising thyristor 38, lamp 28 and lamp 136. As a result thyristor 38 ceases to conduct and lamps 28 and 136 are extinguished. However lamps 24 and 134 continue to glow steadily. The latter states of lamps 24 and 28 of the registration panel 14 and lamps 134 and 136 of the housekeeper's panel 16 inform the registration clerk and the housekeeper that Room 1, which had been cleaned, has been assigned to a new guest.

While the foregoing description of the operation of the circuit has been given in terms of Room 1, the same description would apply to Room 2 or any other room which is included in the system. Lamps 24 and 134, as well as their counterparts 24' and 134', provide for the housekeeper as well as for the registration clerk and up-to-the moment indication of the status of every room in the system with respect to cleanliness. This indication prevents uneconomic duplication of cleaning of the same room and also prevents failure to clean a room which has been vacated. At the end of each day, the housekeeper is enabled to look at panel 16 to observe which rooms have been cleaned that day, which have not been cleaned that day, and which require cleaning because of check-out. After making a permanent record of this information, the housekeeper may cancel all indications as to cleanliness on both panels 14 and 16 merely by opening switch 138 by depressing its push button. When switch 138 is opened, thyristor 30 becomes non-conductive and lamps 24 and 134 are extinguished. Those lamps remain extinguished when the housekeeper closes switch 138 by releasing its push button.

In the preceding discussion of the preferred embodiment, switching means 44 of the room unit has been described as a jack. However switching means 44 may take other forms which, like jack 44, allow the maid to actuate only one switch, corresponding to switch 46, and allow the inspectress to actuate a different switch, corresponding to switch 48. For example, switch 46 and switch 48 can be two separate switches not forming part of one jack. Each such switch can be actuatable by

insertion of a key into a lock and rotation of the key, and the keys required to actuate the respective locks can be different, so as to prevent improper operation of the switches by those not authorized to do so. Alternatively switch 46 can be a push button switch, while switch 48 can be a lock-controlled switch. Other possibilities will be obvious to those skilled in the art.

In addition, while the several electrically actuable indicator means have been illustrated in the preferred embodiment as incandescent lamps, other forms of indicator means can alternatively be used. Examples of such other indicator means are light-emissive diodes, flags actuable by electromagnets, gas discharge lamps such as neon lamps, and electroluminescent indicators. Where lamps are employed, it is preferred that they have similar electrical characteristics, so that they emit similar amounts of light in response to a given current passing therethrough.

Although in the preferred embodiment, a system has been provided for indicating both the state of occupancy of a given room and its state of cleanliness, it will be apparent that a simpler system can be provided for indicating only one of those states. Thus the invention also embraces a system comprising only those components associated with thyristor 30, diode 112, and switch 46, or alternatively a system comprising only those components associated with thyristor 38, diode 120 and switch 48. In addition while the preferred system includes two signal stations, i.e. registration panel 14 and housekeeper's panel 16, the invention also embraces a simpler system in which only one panel is employed. Such a system is particularly desirable for use in small motels or hotels, in which the housekeeper's function is attended to by the clerk at the registration desk. In such a system, comprising for example only housekeeper's panel 16, switch 128 would be mounted on that panel and would be connected in series relationship with lamp 136 and conductor 26, and conductor 22 would be connected directly to lamp 134. Similar changes would be made in respect of the portion of panel 16 pertaining to Room 2. To provide proper operating voltage for the lamps in such a system, the output voltage of source 146 would be adjusted appropriately, e.g. reduced to 12 volts in the specific example set forth above.

Because of its simple structure, room unit 10 is particularly well adapted for compact modular construction. For example one embodiment of the unit has been constructed upon a metal plate having the dimensions of a conventional cover plate for a home lighting switch, i.e. $2\frac{3}{4}$ by $4\frac{1}{2}$ inches. Jack 44 and the jewel (not shown) of "inspector light" 122 (as well as a "message" light of conventional kind, not shown in FIG. 1) are mounted on the metal plate. The remaining components of unit 10 are mounted on a rectangular printed circuit board measuring only $1\frac{3}{4}$ by 2 $\frac{3}{4}$ inches, secured to the aforementioned plate at right angles thereto by a mounting bracket and two screws.

Panels 14 and 16, because of their simplicity, are readily wired by using telephone-type wiring boards.

Although periodically actuated switch 156 has been described hereinbefore as a normally open-circuited switch closed periodically by a motor-driven cam, switch 156 can have other structures. For example, in a system for indicating the status of many rooms, e.g.

hundreds of rooms, where large currents have to be interrupted by the periodic opening of switch 156, that switch can additionally comprise a single-pole single-throw relay having contacts sufficiently massive to interrupt safely such large currents. The electromagnet coil for actuating that relay can be connected in series relationship with the cammed switch and a source of energizing current. The contacts of the relay can be connected to terminal 150 and line 158 respectively.

Switch 156 need not comprise a mechanically operated switch or switches, whose operating noises may be annoying in some hotels or motels, but alternatively can comprise a silent periodically actuated switch, e.g. a power transistor driven periodically into and out of conduction by an astable transistor multivibrator. The emitter-collector path of the power transistor can be connected in series relationship with source 146 and line 158, and the output of the multivibrator can be connected between the base and emitter of the power transistor. Other suitable silent periodically actuated switches doubtless will occur to those skilled in the art.

In addition the source of pulsed unidirectional voltage need not comprise source 146. Instead the source of pulsed voltage may be a supply, independent of source 146, connected directly between terminal 148 and line 158, and may comprise, for example, a second source (not shown) of constant unidirectional voltage, and periodically actuated switch 156 connected in series relationship with the second source between terminal 148 and line 158. In such an arrangement the positive terminal of the second source would be connected to terminal 148 and the negative terminal to line 158.

In the preferred embodiment shown in FIG. 1, lamps 24 and 134 are connected in series relationship, and lamps 28 and 136 also are connected in series relationship. Corresponding series connections are made for lamps 24' and 134' and lamps 28' and 136'. As discussed hereinbefore these series connections of the lamps are preferred because failure of any lamp in the series string immediately is signalled by its disabling of the entire series circuit which includes that lamp. However to have each of the various lamps in a series string produce approximately the same intensity of light as that produced by each of the other lamps in the string, it is necessary that the various lamps have approximately the same electrical characteristics.

To obtain a relatively uniform light output from each of the lamps in the system without having to match electrical characteristics of the lamps, the lamps in panels 14 and 16, connected in series relationship in the embodiment of FIG. 1, can alternatively be connected in parallel relationship. More particularly, referring to the portion of the system of FIG. 1 pertaining to Room 1, these alternative parallel connections can be made as follows:

1. Disconnect conductor 160 from the left terminal of lamp 134, and connect conductor 160 to the right terminal of lamp 134. Connect another conductor (not shown) between the left terminal of lamp 24 and the left terminal of lamp 134.

2. Disconnect conductor 162 from terminal 132 of switch 128, and connect conductor 162 to the left terminal of lamp 28. Disconnect terminal 130 of switch

128 from the right terminal of lamp 28. Disconnect conductor 26 from lamp 28. Connect terminal 132 of switch 128 to conductor 26, and connect terminal 130 of switch 128 to the left terminal of lamp 28. Connect another conductor (not shown) from the right terminal of lamp 28 to the right terminal of lamp 136.

Corresponding modifications may be made in the portion of the system pertaining to Room 2.

If desired, switch 138 may be located physically on panel 14 instead of on panel 16, both in the embodiment shown in FIG. 1 and in the modification described above.

The circuit configuration of room unit 10 need not be altered in any way when such modifications are made in panels 14 and 16. However where the lamps in panels 14 and 16 are connected in parallel as just described, it is desirable that the above-listed exemplary values of circuit components be modified as follows in view of the circuit modifications:

Components	Value for Series-connected Lamps	Value for Parallel-Connected Lamps
resistor 36 lamps 24, 28, 134 and 136 (and corresponding lamps) lamp 122 (and corresponding lamps)	150 ohms each a lamp rated at 12 volts, 80 milliamperes each a lamp rated at 12 volts, 80 milliamperes	82 ohms each a lamp rated at 12 volts, 40 milliamperes each a lamp rated at 5 volts, 80 milliamperes
source 146	24 volts d-c	12 volts d-c

Again the foregoing component values are only exemplary, the invention is not limited thereto, and other suitable values will occur to those skilled in the art.

I claim:

1. In a room unit for a room status indicator system, a first conductor for receiving a constant operating potential, a second conductor for receiving a pulsating operating potential, and a third conductor for making connection to electrically actuatable indicator means,
- a thyristor having an anode, a cathode and a control electrode, means connecting said cathode to said first conductor, and means connecting said anode to said third conductor,
- a switch having a first contact and a second contact, means connecting said first contact of said switch to said third conductor, and means connected to said second contact of said switch for transmitting a triggering current to said control electrode of said thyristor,
- rectifier means having an anode and a cathode, and bidirectionally conductive means connecting said cathode of said rectifier means to said second conductor and said anode of said rectifier means to one of said first and second contacts of said switch.
2. A room unit according to claim 1, wherein said means connecting said anode of said thyristor to said third conductor comprises first resistive means having a given resistance, and said means connecting said cathode of said rectifier means to said second conductor and said anode of said rectifier means to one of said contacts of said switch comprises second resistive means having a resistance lower than given resistance and con-

nected in series relationship with said rectifier means and said second contact of said switch.

3. A room unit according to claim 1, wherein said means connecting said cathode of said rectifier means to said second conductor and said anode of said rectifier means to one of said contacts of said switch comprises another electrically actuatable indicator means connected in series relationship with said rectifier means and said first contact of said switch.
4. A room status indicator system comprising a room unit according to claim 1 and further comprising:

- a signal station comprising said electrically actuatable indicator means, said indicator means having first and second terminals, said third conductor being connected to said first terminal,
- another switch having one terminal connected to said second terminal of said indicator means and having another terminal,
- means for connecting said other terminal of said other switch to the positive terminal of a source of substantially constant unidirectional voltage, means for connecting said first conductor to the negative terminal of said source, and
- means for connecting said second conductor of said room unit to the negative terminal of a source of pulsed unidirectional voltage.

5. A room unit for a room status indicator system, comprising,
- a first conductor for receiving a constant operating potential, a second conductor for receiving a pulsating operating potential, a third conductor for making connection to first electrically actuatable indicator means, and a fourth conductor for making connection to second electrically actuatable indicator means,
- a first thyristor having a cathode, an anode and a control electrode, means connecting said cathode to said first conductor, and first resistive means having a given resistance and connecting said anode to said third conductor,
- a second thyristor having a cathode, an anode, and a control electrode, means connecting said cathode of said second thyristor to said first conductor, and means connecting said anode of said second thyristor to said fourth conductor,
- switching means comprising first and second switches each having a first contact and a second contact normally open-circuited from said first contact, said switching means being operable by a first actuator to close-circuit said first and second contacts of solely said first switch, and by a second actuator differing from said first actuator to close-circuit said first and second contacts of at least said second switch,
- means connecting said first contact of said first switch to said third conductor, and first means connected to said second contact of said first switch for transmitting a triggering current to said control electrode of said first thyristor,
- means connecting said first contact of said second switch to said fourth conductor, and second means connected to said second contact of said second switch for transmitting a triggering current to said control electrode of said second thyristor,

first rectifier means having an anode and a cathode, and second resistive means having a resistance lower than said given resistance of said first resistive means, said first rectifier means and said second resistive means being connected in series relationship between said second conductor and said second contact of said first switch, and said first rectifier means being poled so that said anode of said first rectifier means is connected to said first switch and said cathode of said first rectifier means is connected to said second conductor, second rectifier means having an anode and a cathode, and third electrically actuatable indicator means, said second rectifier means and said third indicator means being connected in series relationship between said second conductor and said fourth conductor, and said second rectifier means being poled so that said anode of said second rectifier means is connected to said fourth conductor and said cathode of said second rectifier means is connected to said second conductor.

6. A room unit according to claim 5, wherein said first means for transmitting a triggering current comprises third resistive means interconnecting said second contact of said first switch and said control electrode of said first thyristor, and said second means for transmitting a triggering current comprises fourth resistive means interconnecting said second contact of said second switch and said control electrode of said second thyristor, said room unit also comprising fifth resistive means interconnecting said first conductor and said control electrode of said first thyristor, sixth resistive means interconnecting said first conductor and said control electrode of said second thyristor, and first and second capacitive bypass means shunting said fifth resistive means and said sixth resistive means respectively.

7. A room unit according to claim 5, further comprising first means for limiting the rate of rise of forward-biasing voltage between said anode and said cathode of said first thyristor, and second means for limiting the rate of rise of forward-biasing voltage between said anode and said cathode of said second thyristor.

8. A room unit according to claim 5 wherein said third indicator means comprises an electric lamp.

9. A room unit according to claim 5, wherein said switching means comprises a jack including said first and second switches, said first actuator comprises a first plug having a given length, said second actuator comprises a second plug whose length exceeds said given length, said jack comprises means for receiving alternatively said first plug or said second plug, solely said first switch is responsive to insertion of said first plug into said receiving means to close-circuit said first and second contacts of said first switch, and each of said first and second switches is responsive to insertion of said second plug into said receiving means to close-circuit said first and second contacts thereof.

10. A room status indicator system comprising a room unit according to claim 5 and further comprising:

a signal station comprising said first electrically actuatable indicator means and said second electrically actuatable indicator means, each of said first and second indicator means having first and second terminals, said third conductor being con-

nected to said first terminal of said first indicator means, said fourth conductor being connected to said first terminal of said second indicator means, and a third switch having a first terminal connected to said second terminal of said second indicator means and having a second terminal, means for connecting said second terminal of said third switch to the positive terminal of a first source of substantially constant unidirectional voltage, means including normally closed switch means for connecting said second terminal of said first indicator means to said positive terminal of said first source, means for connecting said first conductor of said room unit to the negative terminal of said first source, and means for connecting said second conductor of said room unit to the negative terminal of a second source of pulsed unidirectional voltage.

11. A room status indicator system according to claim 10, comprising said first source and said second source, wherein said second source comprises said first source and also comprises switch means having one terminal connected to said negative terminal of said first source and having another terminal, for periodically providing between said terminals thereof alternately a low-resistance path and a high-resistance path, and wherein said second conductor of said room unit is connected to said other terminal of the last-named switch means.

12. A room status indicator system according to claim 10, wherein each of said first, second and third indicator means comprises an electric lamp.

13. A room status indicator system according to claim 10, wherein said switching means of said room unit comprises a jack including said first and second switches, said first actuator comprises a first plug having a given length, said second actuator comprises a second plug whose length exceeds said given length, said jack comprises means for receiving alternatively said first plug or said second plug, solely said first switch is responsive to insertion of said first plug into said receiving means to close-circuit said first and second contacts of said first switch, and each of said first and second switches is responsive to insertion of said second plug into said receiving means to close-circuit said first and second contacts thereof.

14. A room status indicator system according to claim 13, wherein each of said first, second and third indicator means comprises an electric lamp.

15. A system for indicating the status of a plurality of rooms, said system comprising for each of said rooms a room unit according to claim 5, said system further comprising:

a first signal station comprising for each of said rooms said first electrically actuatable indicator means and said second electrically actuatable indicator means, each of said first and second electrically actuatable indicator means having first and second terminals, means connecting said third conductor of said room unit for each given one of said rooms to said first terminal of said first indicator means for said given room, means connecting said fourth conductor of said room unit for said given room to said first terminal of said second indicator means for said given room, and a third

switch having a first terminal connected to said second terminal of said second indicator means for said given room and having a second terminal,
 a second signal station comprising for each of said rooms fourth electrically actuatable indicator means and fifth electrically actuatable indicator means, each of said fourth and fifth indicator means having first and second terminals,
 means connecting said second terminal of said first indicator means for said given room to said first terminal of said fourth indicator means for said given room, means connecting said second terminal of said third switch to said first terminal of said fifth indicator means for said given room, and normally closed switch means having one terminal connected to said second terminal of each of said fourth indicator means for every one of said rooms and having another terminal,
 a source of a substantially constant unidirectional voltage, said source having a positive terminal and a negative terminal,
 means for connecting said other terminal of said normally closed switch means and said second terminal of every one of said fifth indicator means to said positive terminal of said source, means for connecting said first conductor of every one of said room units to said negative terminal of said source, switching means having one terminal connected to said negative terminal of said source and having another terminal, for periodically providing between said terminals thereof alternately a low-resistance path and a high-resistance path, and means for connecting said second conductor of every one of said room units to said other terminal of the last-named switch means.

16. A room status indicator system according to claim 15, wherein, in each of said room units, said first means for transmitting a triggering current comprises third resistive means interconnecting said second contact of said first switch and said control electrode of said first thyristor, and said second means for transmitting a triggering current comprises fourth resistive means interconnecting said second contact of said second switch and said control electrode of said second thyristor, said room unit also comprising fifth resistive means interconnecting said first conductor and said control electrode of said first thyristor, sixth resistive means interconnecting said first conductor and said control electrode of said second thyristor, and first and second capacitive bypass means respectively shunting said fifth resistive means and said sixth resistive means.

17. A room status indicator system according to claim 16, further comprising, in each of said room units, first means for limiting the rate of rise of forward-biasing voltage between said anode and said cathode of said first thyristor, and second means for limiting the rate of rise of forward-biasing voltage between said anode and said cathode of said second thyristor.

18. A room status indicator system according to claim 17, wherein each of said first, second, third, fourth and fifth indicator means comprises an electric lamp.

19. A room status indicator system according to claim 18, wherein, in each of said room units, said switching means comprises a jack including said first and second switches, said first actuator comprises a first plug having a given length, said second actuator comprises a second plug whose length exceeds said given length, said jack comprises means for receiving alternatively said first plug or said second plug, solely said first switch is responsive to insertion of said first plug into said receiving means to close-circuit said first and second contacts of said first switch, and each of said first and second switches is responsive to insertion of said second plug into said receiving means to close-circuit said first and second contacts thereof.

20. A room status indicator system comprising a room unit according to claim 5 and further comprising:

a first signal station comprising said first electrically actuatable indicator means and said second electrically actuatable indicator means, each of said first and second electrically actuatable indicator means having first and second terminals, means connecting said third conductor of said room unit to said first terminal of said first indicator means, a third switch having first and second terminals, means connecting said fourth conductor of said room unit to said first terminal of said third switch, and means connecting said second terminal of said third switch to said first terminal of said second indicator means,

a second signal station comprising fourth electrically actuatable indicator means and fifth electrically actuatable indicator means, each of said fourth and fifth indicator means having first and second terminals,

means interconnecting said first terminals of said first and fourth indicator means, means interconnecting said second terminals of said first and fourth indicator means, normally closed switch means having one terminal connected to said second terminal of said fourth indicator means and having another terminal, means interconnecting said first terminals of said second and fifth indicator means, and means interconnecting said second terminals of said second and fifth indicator means, means for connecting said other terminal of said normally closed switch means and said second terminal of said fifth indicator means to the positive terminal of a source of substantially constant unidirectional voltage, means for connecting said first conductor of said room unit to the negative terminal of said source, and means for connecting said second conductor of said room unit to the negative terminal of a source of pulsed unidirectional voltage.

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