United States Patent [19]

Andersson

[11] **3,754,227**

[45] **Aug. 21, 1973**

[54] **HOTEL SIGNALLING SYSTEM**

[76] Inventor: **Sven Gote Andersson,** Syrsastigen 14, 61100 Nykoping, Sweden

[22] Filed: **Dec. 27, 1971**

[21] Appl. No.: **211,881**

[30] **Foreign Application Priority Data**

Jan. 11, 1971 Switzerland 344/71

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

[51] **Int. Cl.** **G08b 5/00**

[58] **Field of Search** ..... 340/286 R

[56] **References Cited**

UNITED STATES PATENTS

3,147,385	9/1964	Burgis	340/286 UX
3,215,998	11/1965	Cloyd	340/286 R
3,228,020	1/1966	Gassenheimer	340/286 R
3,588,868	6/1971	Head	340/286 R
3,594,774	7/1971	Dawson	340/286 R
3,631,536	12/1971	Mosman	340/286 X
3,675,204	7/1972	Miehle	340/286 X

Primary Examiner—Harold I. Pitts

Attorney—Werner W. Kleeman

[57] **ABSTRACT**

A system of multiple apparatuses for a signalling- and indicating function of a hotel, each apparatus embodying a transmitter possessing an indicator key, a receiver possessing a signal lamp and connection terminals for the infeed of power. According to important aspects of this invention, the transmitter possesses a coding mechanism controllable by the indicator key for simultaneously producing a control signal and at least two address signals, and wherein the receiver possesses a decoding mechanism for actuating a storage. At the output of the receiver there is connected the signal lamp.

10 Claims, 8 Drawing Figures

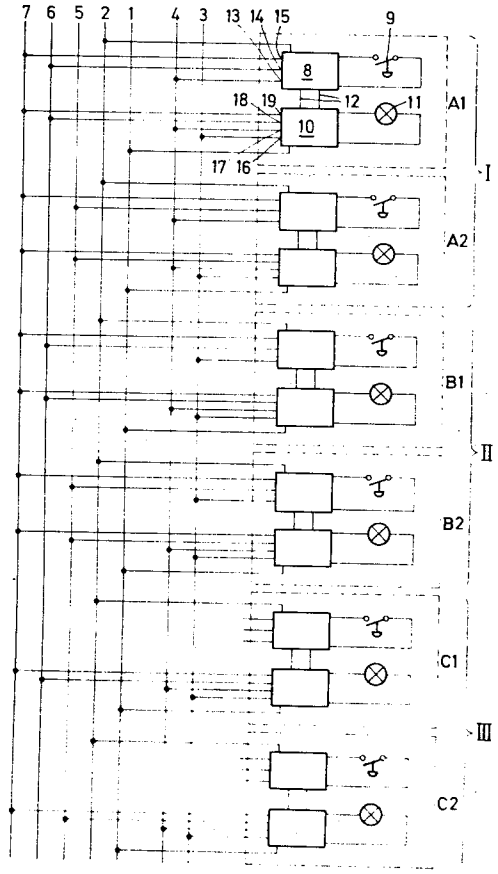


FIG. 1

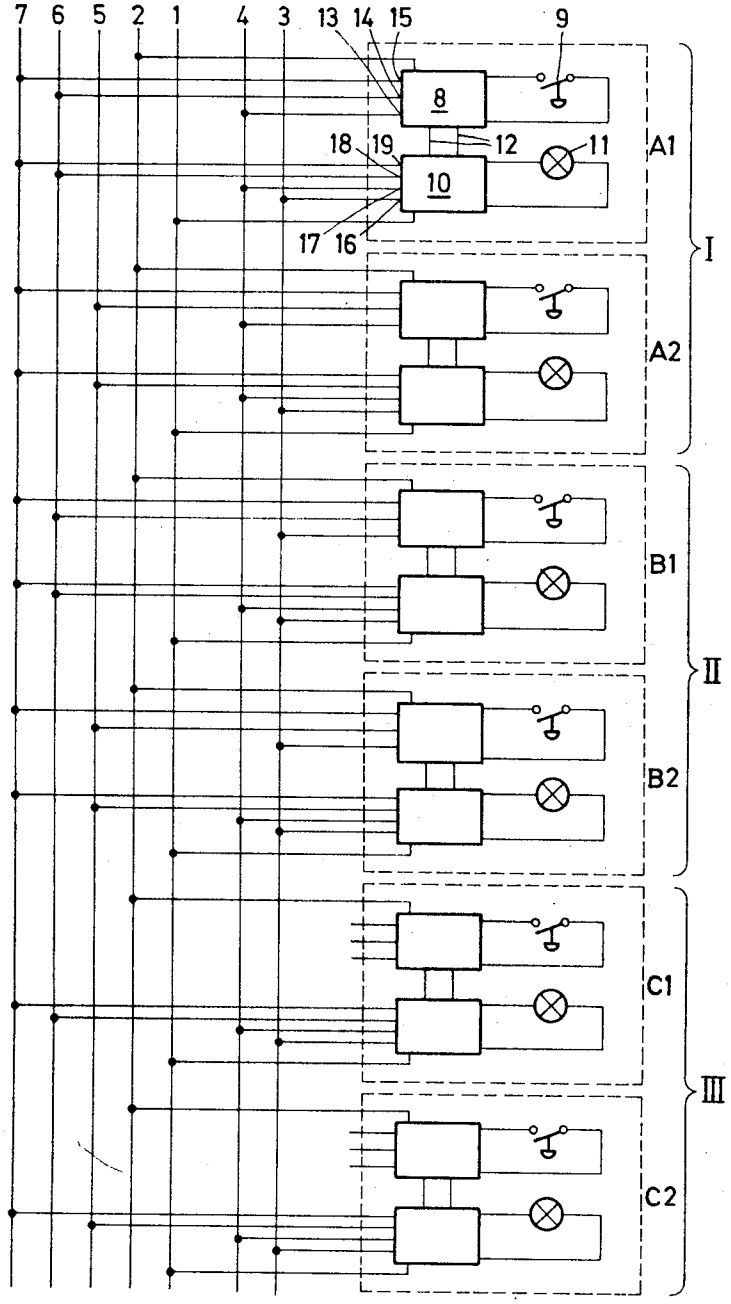


FIG. 2

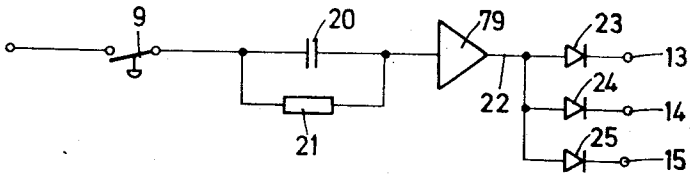


FIG. 3

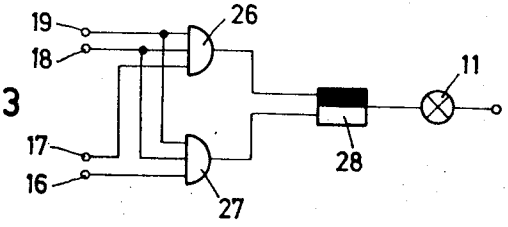


FIG. 7

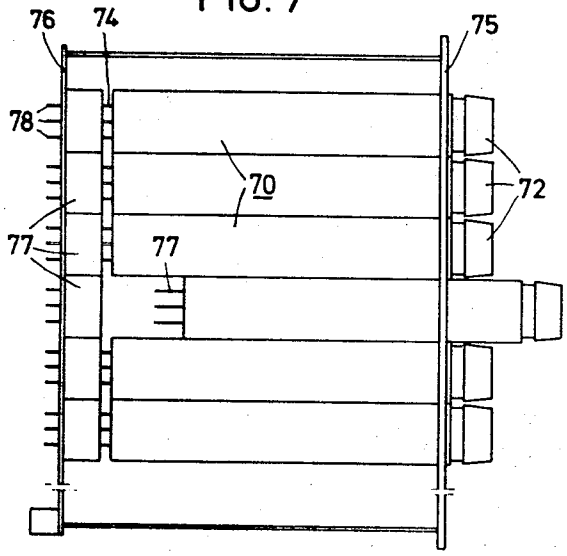


FIG. 8

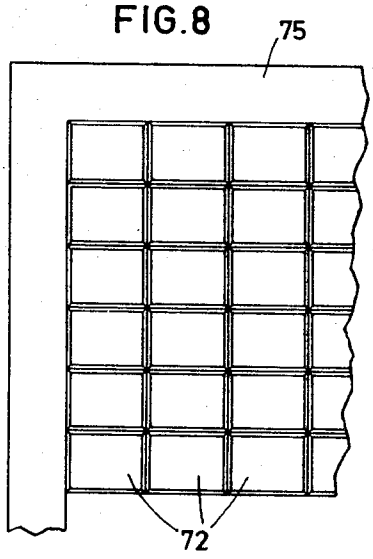


FIG. 6

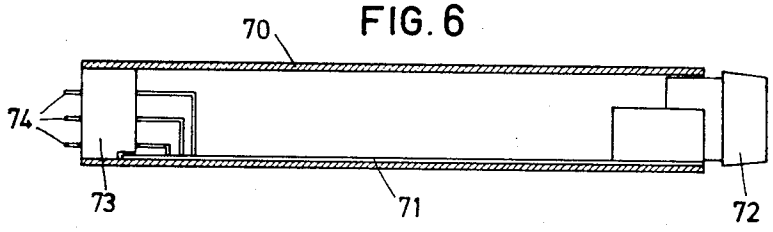


FIG. 4

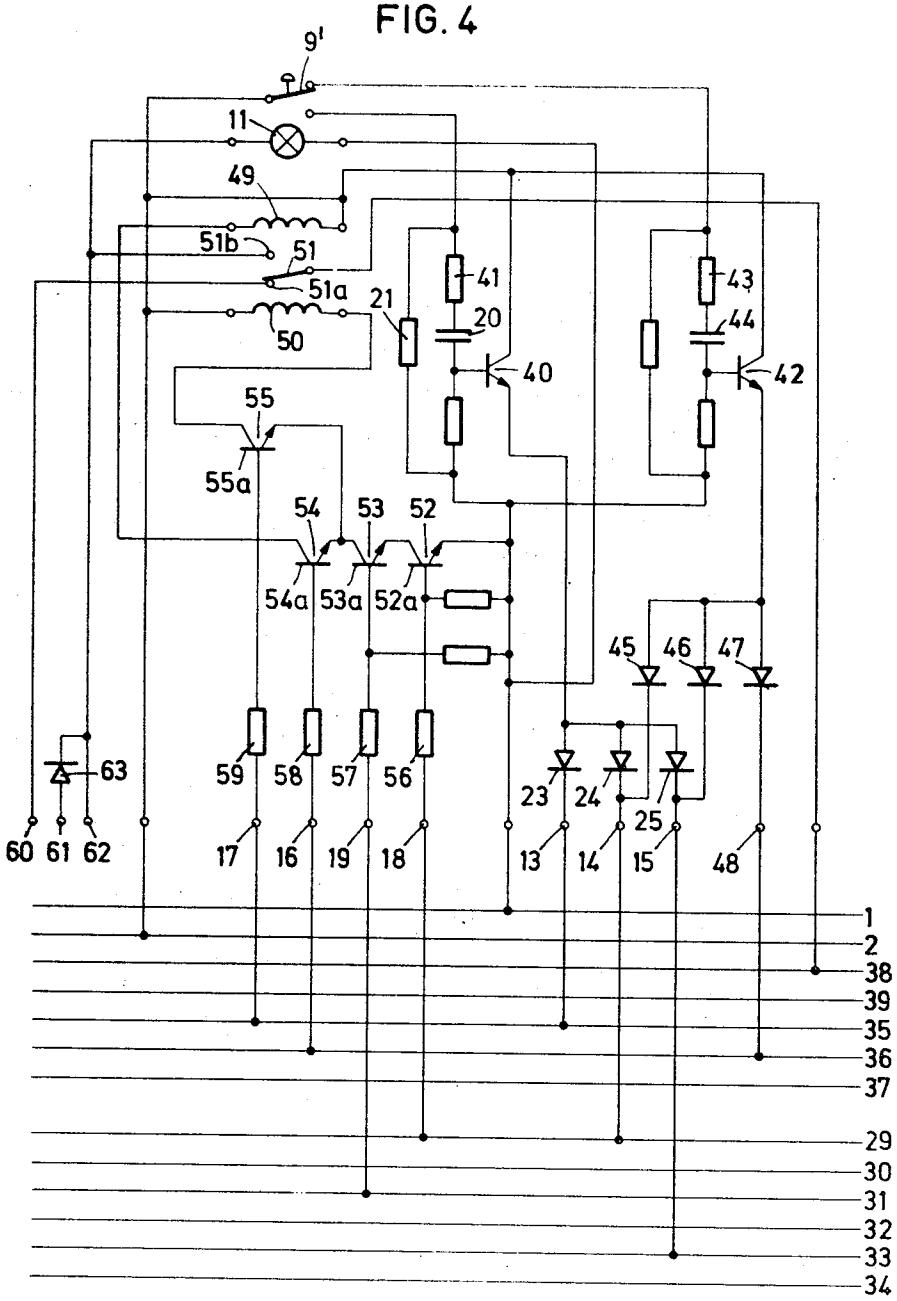
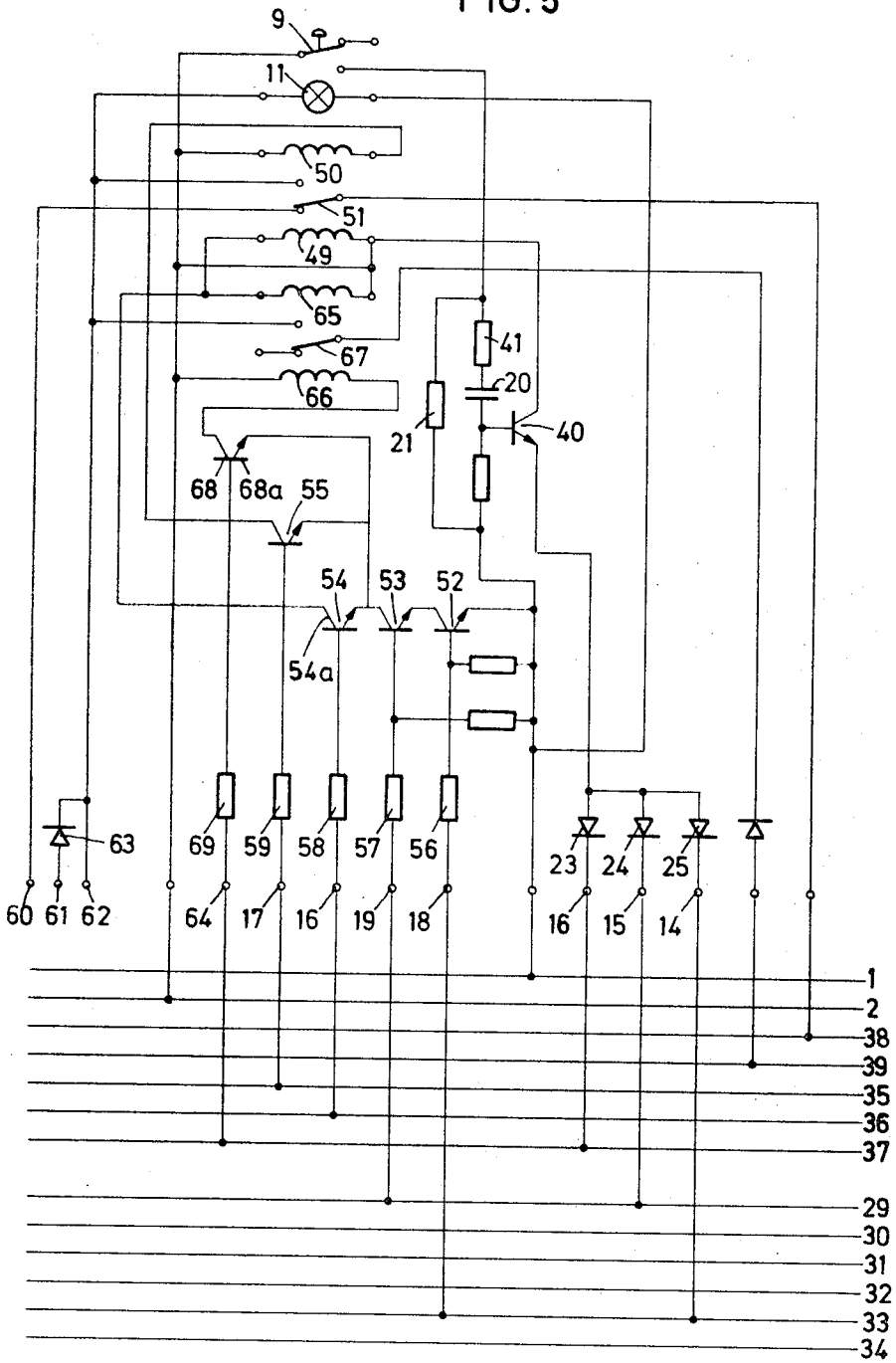

9'
11
49
51b
51
51a
50
21
41
20
40
43
44
42
55
55a
54
53
52
54a
53a
52a
45
46
47
63
59
58
57
56
23
24
25
60
61
62
17
16
19
18
13
14
15
48
1
2
38
39
35
36
37
29
30
31
32
33
34

FIG. 5


9
11
50
51
49
65
67
66
41
20
21
40
68
68a
55
54
53
52
54a
63
69
59
58
57
56
23
24
25
60
61
62
64
17
16
19
18
16
15
14
1
2
38
39
35
36
37
29
30
31
32
33
34

HOTEL SIGNALLING SYSTEM

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved apparatus for a signalling- and indicating system or installation of the type embodying a transmitter possessing an indicator key, a receiver possessing a signal lamp, and connection terminals for the infeed of power.

A signalling- and indicating installation is already known in the art, by means of which it is possible from a first location to switch-in for instance three signal lamps, one of which is provided at the first location and both of the others of which are provided at a second and third location. These three signal lamps can again be extinguished at the second and/or third location. Installations of this type are advantageously employed in the environment of a hotel wherein a guest signifies to a desk clerk or attendant at the reception or hotel area his intention to depart. Thereafter, such desk clerk or attendant activates a key associated with the room which the guest has occupied. Owing to activation of such key is coordinated with the guests's room, the intention of the guest to depart from the hotel is conveyed to the cashier area and to the area where there is located the supervisory control for the chamber maids. This is accomplished in that a respective lamp associated with the aforementioned room of the guest illuminates at the location of the hotel desk clerk or attendant, at the cashier's area and at the control area for the chamber maids. This indication or signalling causes the cashier to prepare the bill for the guests's room and the maid supervisor to disseminate suitable instructions to the chamber maids. Now when the guest has paid his bill at the cashier's desk or area, the cashier actuates a key associated with the relevant illuminated lamp. As a result, the respective lamps at the cashier's area, at the reception or hotel area and at the control area are extinguished. Extinguishment of the lamp at the maid control or supervisory area is an indication that now the guest's room which has become free can be prepared for a new guest.

Prior art illustrations of this type possess a centrally situated apparatus which embodies a number of relays corresponding to the number of rooms. Each relay possesses a respective work contact and a self-holding contact. Three connection lines or wires are provided for each indicator or signalling key associated with each room and the signal lamps located at the attendant's or desk clerk's area. Three connection wires are similarly provided for the indicator keys and the signal lamps at the cashier's area and a connection wire is necessary for the signal lamps at the maid supervisory area. Additionally, a common supply line must be wires at all three locations for the indicator keys and the signal lamps. Hence for each room there is present an installation totalling seven connection wires and additionally one common supply line or wire. Hence, for a hotel having for instance 50 rooms this results in 350 connection wires or lines and the common supply line which must be drawn from the centrally located apparatus to the aforementioned three locations.

SUMMARY OF THE INVENTION

Accordingly, from what has been explained above, it should be apparent that a need still exists in the art for apparatus for a signalling- and indicating installation of the mentioned type which is simpler in construction and design than the heretofore considered prior art construction. It is a primary objective of the present invention to fulfill this need existent in the art.

Another more specific object of the present invention relates to the provision of a new and improved apparatus by means of which it is possible to produce a signalling- and indicating system, the installation of which is simpler and less expensive because considerably fewer connection lines or wires are necessary.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the invention contemplates that the transmitter possesses a coding mechanism controllable by means of the indicator key for simultaneously producing a control signal and at least two address signals, and wherein the receiver possesses a decoding mechanism for actuating a storage, at the output of which storage there is connected the signal lamp of the receiver.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. 1 is a block circuit diagram of a signalling- and indicating installation equipped with six inventive apparatuses which, for instance, are sub-divided into three groups, each containing two such respective apparatuses;

FIG. 2 is a circuit diagram of the transmitter of the inventive apparatus depicted in FIG. 1;

FIG. 3 is a circuit diagram of the receiver of the inventive apparatus depicted in FIG. 1;

FIG. 4 is a detailed circuit diagram of an apparatus of the type depicted in FIG. 1;

FIG. 5 is a circuit diagram of a modified construction of inventive apparatus used in the installation of FIG. 1;

FIG. 6 schematically illustrates the principles of the apparatus of FIG. 1, partly in section, wherein only a few individual components have been depicted for purposes of clarity in illustration;

FIG. 7 is a side view of a portion of a frame having a cross-bar arrangement, at which frame there are introduced a number of slide-in units of the type used in the arrangement of FIG. 1; and

FIG. 8 is a front view of a portion of the frame depicted in FIG. 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, it is to be understood that the inventive apparatus which is suitable for the construction of a signalling- and indicating installation or system will be described, by way of illustration and not limitation, hereinafter in conjunction with an installation destined to be used in the environment of a hotel. Turning therefore now to FIG. 1, it will be seen that there are illustrated by way of example six such inventive apparatuses or modules, which even though all identical to one another, have been designated by reference characters A1, A2, B1, B2, C1, and C2. These six apparatuses are divided into three groups I, II, and III, with two such apparatuses being associated with

each such group. Hence, group I containing the apparatuses A1, A2 may be assumed to be located at the area of the room attendant or desk clerk, group II, containing the apparatuses B1 and B2, at the cashier's area, and group III, containing the apparatuses C1 and C2, at the maid supervisory area of the hotel. Of course, in reality, there would be provided for each such group the same number of apparatuses as there are monitored guest rooms in the hotel. Apart from the supply lines 1 and 2 for the delivery of the supply voltage or power to the individual apparatuses, there are also provided two signal lines 3 and 4 and three address lines 5, 6 and 7, all of these lines commonly being associated with the apparatuses. The illustrated number of three address lines permits two apparatuses to be associated with each group. If, for instance, there are provided eleven address lines, then, it would be possible to use 55 apparatuses for each group.

From the number n of address lines it is possible to calculate the maximum possible number of apparatuses per group from the following equation:

$$[n\ (n-1)]/2 = \text{No. of apparatuses/group}$$

The number of control lines always remains the same. The number of groups likewise can be enlarged to more than 10 without thereby requiring a greater number of lines or wires. In particular, it should be observed that with the set-up arrangement or configuration of the groups I, II and III illustrated by way of example in FIG. 1, there are only required the supply lines or wires 1 and 2, the signal lines or wires 3 and 4 and the three address lines or wires 5, 6 and 7. If there were employed the prior art installation discussed at the outset, then there would be aleady required for only two rooms an installation having fourteen connection wires or lines.

Each of the identical apparatuses A1, A2, B1, B2, C1, C2, is equipped with a transmitter 8 possessing an indicator or signalling key 9 and a receiver 10 equipped with a signalling lamp 11. Each apparatus is electrically coupled with the supply lines 1 and 2. The connection lines 12 between the transmitter 8 and the associated receiver 10 only serve for the connection of the transmitter 8 with the supply line 1 which is coupled with the receiver 10 and for the connection of the receiver 10 with the supply line 2 which is coupled with the transmitter 8.

If the indicator or signalling key 9 of the apparatus A1 is depressed, then, the transmitter 8 of such apparatus simultaneously delivers a respective pulse via all three of its outputs 13, 14 and 15 which are delivered to the address lines 6 and 7 and the signal line 4. All receivers 10 of the apparatuses A1, B1 and C1 receive both of the pulses which have been delivered to the address lines 6 and 7. Only those receivers 8 which simultaneously receive two pulses via the address lines respond to the pulse appearing at the signal line 4. By means of this pulse received via the signal line 4, a storage at the receiver 10 is set, this storage to be described more fully hereinafter, and the signal lamps 11 of the receivers A1, B1 and C1 light-up.

If the indicator key 9 of the apparatus B1 is depressed, then, again a respective pulse arrives at the address lines 6 and 7 and a pulse at the signal line 3. All receivers 10 of the apparatuses A1, B1 and C1 connected with both address lines 6 and 7 therefore receive such pulse appearing at the signal line 3. Consequently, the information contained in the aforementioned storage is erased and the signal lamps of the apparatuses are switched-out.

The transmitters 8 of the apparatuses C1 and C2 are not electrically coupled with the address lines 6 and 7, only the signal lines 3 and 4 are connected, because at the location of group III the information is only indicated, however not altered.

Turning attention now to FIG. 2, there is illustrated therein a circuit diagram of the transmitter 8 of each apparatus. As will now be explained the transmitter 8 embodies a coding mechanism for simultaneously generating a control signal and at least two address signals. Thus, it will be understood that a direct-current amplifier 70 has delivered a pulse thereto by depressing the indicator key 9, the just-mentioned pulse being transmitted through the agency of a differentiation element embodying a capacitor 20 and a discharge resistor 21. This pulse lasts, for instance, for only 3 milliseconds. This pulse duration time is determined by the capacitance valve of the capacitor 20 and the resistance of the resistor 21, across which the capacitor is charged. As a function of the brief input pulse, the duration of which is not dependent upon the duration of actuation of the indicator key 9, there appears at the output 22 of the amplifier 79 a brief pulse. This last-mentioned pulse is delivered via suitable semi-conductor elements i.e. diodes 23, 24 and 25 to the three outputs 13, 14 and 15 of the transmitter 8. These diodes 23, 24 and 25 serve to decouple these outputs in that, when at one of the address lines 6 and 7 there appears a pulse, such diodes prevent that this pulse can arrive via other non-participating transmitters at neighboring address lines. The function of the discharge resistor 21 is to again discharge the capacitor 20 following actuation of the indicator key 9, so that the transmitter is again in a preparatory state for transmitting a new message or signal.

The duration of the generated pulses which are delivered to two of the address lines and one of the signal lines is intentionally maintained so brief so as to practically preclude any transmission errors. Such transmission error could then arise if, for instance, the indicator key 9 of a respective one of the apparatuses of groups I and II were actuated. In such case the corresponding receivers would receive a pulse via both signal lines, resulting in an erroneous indication. The probability that within a time-span of 3 milliseconds, in other words practically simultaneously, an indicator key 9 of the group I and an indicator key 9 of the group II will be actuated, is extremely small. On the other hand, the brief duration of such pulses is sufficient for the faultless operation of the installation constructed from such apparatuses.

Now in FIG. 3 there is illustrated the circuit diagram of a receiver 10. Such will be understood to comprise a decoding mechanism embodying two AND-gates 26 and 27, the outputs of which are electrically coupled with a storage or store 28 capable of storing a binary 0 or a binary 1 signal. Signal lamp 11 is connected with this storage 9, lamp 11 illuminating when, for instance, there is stored at the storage 28 the logic or binary signal 1. Each of the AND-gates 26 and 27 possesses three inputs, two of which are parallely connected and electrically coupled with the inputs 18 and 19 of the receiver 10, as shown. The inputs 18 and 19 are those destined to be connected with two of the address lines. As also illustrated, the remaining inputs of the AND-

gates 26 and 27 are connected with the inputs 16 and 17 respectively, destined to be connected with the control signal or signal lines 3 and 4. Now, if pulses simultaneously appear at the inputs 17, 18 and 19, then, the AND-gate 26 delivers a pulse at its output. As a result, a binary signal "1" is stored at the storage 28 which brings about illumination of the signal lamp 11. If pulses simultaneously appear at the inputs 16, 18 and 19, then the AND-gate 27 produces a pulse which erases the information contained at the storage 28 and switches-out the signal lamp 11.

FIG. 4 illustrates the circuit diagram for an apparatus of the type illustrated in FIG. 1, but in any event here with the difference that it contains two transmitters and that six address lines 29, 30, 31, 32, 33 and 34 as well as three signal lines 35, 36 and 37 are provided. The supply voltage for the transmitters and receivers are delivered via the supply lines 1 and 2, whereas the current required for the signal lamp 11 is delivered via the supply line 1 and a third supply line 38 or via a fourth supply line 39. The supply line 38 is connected with a non-illustrated direct-current or alternating-current source, whereas the supply line 39 is connected with a non-illustrated flickering or flashing current circuit, and thus only carries a pulse-like or pulsating voltage. A signal lamp coupled with this supply line 39 therefore does not continuously light-up, rather it illuminates in rythmn with the pulsating voltage.

One of the transmitters of the apparatus depicted in FIG. 4 encompasses the indicator key 9', a transistor 40 to which there is delivered a brief pulse through the agency of the differentiating element consisting of the resistor 41 and the capacitor 20 when the indicator key 9' is brought into the other position from that illustrated in FIG. 4, and finally the diodes 23, 24 and 25. The second transmitter of the apparatus embodies the indicator key 9', a transistor 42 to which there is delivered a brief pulse via the differentiation element consisting of the resistor 43 and the capacitor 44 when such indicator key 9' is brought back into the position illustrated in FIG. 4, and finally the diodes 45, 46 and 47. A connection or lead of the diodes 24 and 25 respectively of the first transmitter and a connection or lead of the diodes 45 and 46 respectively of the second transmitter are each commonly connected with the outputs 14 and 15 respectively of the apparatus. Therefore, the different messages or signals which these transmitters deliver arrive, on the one hand, via the diode 23 and the output 13 of the apparatus at the signal line 35 and, on the other hand, via the diode 47 and the output 48 of the apparatus at the signal line 36 at the same address, which for instance is determined by the simultaneous appearance of a respective pulse at the address lines 29 and 33.

The storage of the receiver of the apparatus according to FIG. 4 comprises a bistable, polarized relay embodying the two windings 49 and 50 and the switching or changeover contact 51. The switching contact 51 remains in a corresponding position depending upon which of both of these windings 49 and 50 was the last to have been placed into a state of brief excitation, until the other winding becomes excited.

Both of the AND-gates mentioned above with regard to the description of FIG. 3 are here formed by the transistors 52, 53, 54 and 55, wherein the respective bases 52*a* and 53*a* of the transistors 52 and 53 define respective parallely connected inputs of such AND-gate. These bases 52*a* and 53*a* are coupled via the protective resistors 56 and 57 with the inputs 18 and 19 respectively of the receiver, which inputs 18 and 19, in turn, are connected with two of the address lines, for instance lines 29 and 31. The bases 54*a* and 55*a* of the transistors 54 and 55 provide the separate inputs of the above-mentioned AND-gate. These bases 54*a* and 55*a* are connected via protective resistors 58 and 59 or 59 with the inputs 16 and 17 respectively of the receiver, which inputs 16 and 17, in turn, are connected with onee of the signal lines, for instance, line 35 or 36. Now, for instance, if pulses simultaneously appear at the address lines 29 and 31 as well as at the signal line 36, then, the transistors 52, 53 and 54 conduct, so that the winding 49 of the polarized relay is energized and the switching contact 51 is thrown into the position which is not illustrated in FIG. 4. Through such changeover of the switching contact 51 the signal lamp 11 is coupled with the supply line 38 and the lamp continuously illuminates or lights up.

In order to be able to indicate the position of the switching contact 51, if desired by still further non-illustrated indicating devices, the alternating contacts or terminals 51*a* and 51*b* associated with the switching contact 51 are coupled with additional output terminals 60, 61 or 62 of the apparatus, whereby the output terminal 61 is decoupled by a diode 63.

If pulses simultaneously appear at the address lines 29 and 31 and at the signal line 35, then, the transistors 52, 53 and 55 conduct. As a result the winding 50 of the polarized relay 49 – 51 becomes energized and the switching contact or blade 51 returns back into the position illustrated in FIG. 4, causing the signal lamp 11 to extinguish.

Now in FIG. 5 there is illustrated a further embodiment of apparatus for a signalling- and indicating installation. It contains one of the indicator keys 9, a differentiation element embodying the resistor 41 and the capacitor 20, the transistor 40 and the transmitter embodying the diodes 23, 24 and 25. The receiver, apart from the already mentioned separate inputs 16 and 17, further possesses an additional input 64 and a second bistable, polarized relay embodying the windings 65 and 66 and the switching contact 67. The winding 66 can be energized by a transistor 68 when the base 68*a* of this transistor has delivered thereto a pulse via the third signal line 37, the input 64 and the protective resistor 69.

The collector 54*a* of the transistor 54 is connected to the winding 49 of the first polarized relay 49 – 51 and the winding 65 of the second polarized relay 65 – 67, so that, when pulses simultaneously appear at the address lines 29 and 33 and at the signal line 36, both windings 49 and 65 are energized, and therefore, both switches 51 and 67 are brought into the other position from that shown in FIG. 5. This then brings about that the signal lamp 11 no longer continuously illuminates, rather begins to flicker because now it is no longer electrically coupled via the switching contact 51 with the supply line 38, rather via the switching contact 67 with the supply line 39 which, in turn, is coupled with the previously discussed not particularly illustrated flickering current circuit.

An apparatus according to FIG. 5 could be employed for instance for group III, that is to say, in the supervisory area for the chamber maids. When the departing guest has paid his bill at the cashier area and the cashier

has actuated the appropriate indicating key, the signal lamps will not be extinguished, rather will begin to flicker. This then would be a sign for the chamber maid that she can begin to prepare the room which has just been freed by the departing guest for a new guest. After the room has been newly made-up, then by depressing the indicator key **9** there can be signalled that the corresponding room is again ready to be occupied. By depressing the indicator key **9** flickering of the signal lamps stops and the signal lamp extinguishes.

FIG. **6** schematically illustrates the construction of a unit according to FIG. **4** or FIG. **5**. Within a housing **70** which is illustrated in section and which possesses the configuration of a pipe or tube having a rectangular cross-section there is arranged a plate member **71** equipped with a non-illustrated printed circuit containing likewise non-illustrated components. A so-called luminous key **72** is arranged at one of the open ends of the housing **70** so as to partially extend into such housing. This luminous key **72** contains the switching or changeover contact associated with the indicator key **9** and the signal lamp **11**. The other open end of the housing **70** is closed by a multiple plug or multi-pin connector **73**, wherein the plug pins **74** of this multiple plug **73** define the outputs **13, 14, 15** and **48** of the transmitter and the inputs **16, 17, 18, 19** and **64** of the receiver, as previously discussed.

FIGS. **7** and **8** illustrate parts of a frame or panel **75** as viewed from the side and front respectively. In a plane which is parallel to the plane of the frame **75** there is provided a so-called multiple arrangement **76** which has only been partially illustrated in principle in FIG. **7**. This multiple arrangement **76** resides in that all required supply-, signal-, and address-lines are multiplied by each plug-in location provided for the apparatuses. Between the multiple arrangement **76** and the apparatuses there is provided a respective intermediate plug **77**. Such intermediate plug **77** possesses insert pins **78** of two different lengths, whereby only the long plug pins **78** make contact with those supply-, control signal-, and address-lines which are necessary for the apparatus inserted at this location.

Although the previously described apparatus has been specifically discussed in conjunction with a signalling-and indicating installation for a hotel, it would of course be possible to also construct by means of such apparatuses installations for other purposes, where it is necessary to collect certain information at certain locations, if desired to vary such, and again to extinguish same.

With the above-described apparatus the address to which the message should be directed is determined by the selection of two address or connection lines. Of course, physical constructions are also conceivable wherein the address can be determined by the selection of three or more address lines. Similarly, it is naturally possible not only to use two or three signal lines rather also a greater number of signal lines. Those skilled in the art will make the most favorable selection for each encountered situation in order that the construction of the individual apparatuses, which of course can be universally employed, is not unnecessarily complicated.

The great advantage which is offered by the above-described apparatuses is the fact that the cost of the installation can be considerably reduced because between the individual localities of the grups only a few lines or wires must be laid. Further, it is possible to completely dispense with the use of a centrally situated apparatus equipped with the relays and self-holding contacts as were required by similar prior art equipment as heretofore discussed.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

Accordingly what is claimed is:

1. A system for hotels for reporting and signalling, to at least one central monitoring location, the condition of each one of a plurality of individual rooms, wherein the system comprises: a plurality of modules, said modules each including means for transmitting coded signals and means for receiving coded signals, said means for transmitting coded signals including an indicator key means, a coding mechanism controllable by said indicator key means for simultaneously generating at least two address signals and at least one control signal, said means for receiving coded signals including a decoding mechanism, a storage mechanism actuated by said decoding mechanism, a signal lamp responsive to said storage means, a plurality of n address lines for interconnecting the rooms into said system where n is at least less than the number of rooms, said transmitter means and said receiving means each being interconnected to at least two of said address lines and one of said control signal lines, an individual one of said plurality of modules being located in each one of said plurality of rooms, connection means for the delivery of power to said modules, and wherein is provided a plurality of said modules at said central monitoring location, the modules being interconnected to ones of said address and control lines identified with the respective room located modules.

2. The system as defined in claim **1**, wherein said coding mechanism embodies an amplifier means with at least three decoupled outputs, said decoding mechanism comprising at least two AND-gates, each of said AND-gates being provided with three respective inputs and a respective output, said storage comprising a binary storage means which is electrically coupled with the outputs of said AND-gates, a respective two inputs of each said AND-gate being parallely connected and serving to receive the address signals, and the remaining respective input of each said AND-gate serves to receive the control signal.

3. The system as defined in claim **1**, further including a differentiation element arranged between said indicator key and said coding mechanism for producing control and address signals of brief duration which are independent of the duration of actuation of said indicator key.

4. The system as defined in claim **3**, wherein said coding mechanism comprises a direct-current, single stage transistor amplifier having an input and an output, said transistor output being connected via diodes with three output terminals, said differentiation element comprising a capacitor for connecting said indicator key with said input of said transistor amplifier and a discharge resistor bridging said capacitor.

5. The system as defined in claim **2**, wherein said binary storage means defines a two-stage flip-flop storage.

6. The system as defined in claim 2, wherein said binary storage means defines a two-stage storage in the form of a bistable polarized relay.

7. The system as defined in claim 1, further including a second coding mechanism, said indicator key comprising switch means having a contact means connected with said second coding mechanism.

8. The system as defined in claim 1, further including a substantially quadratic shaped housing for accommodating said apparatus, said indicator key and signal lamp being combined into a luminous key and at least partially arranged in an open end of said housing, the other end of said housing being provided with a multiple plug, an intermediate socket for selectively connecting connection terminals for the control and the address signals with corresponding control and address lines.

9. The system as defined in claim 7, means defining a multiple arrangement for supply-, control signal- and address lines, said intermediate plug possessing different length plug pins which can be inserted into said multiple arrangement.

10. The system of claim 1 wherein said n address lines are operative to connect at least $n(n-1)/2$ rooms.

* * * * *