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Metzler et al.

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[54] **ELEVATOR CALL CIRCUIT**

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[52] **U.S. Cl.** ..... **187/29 R**

[51] **Int. Cl.** **B66b 1/46**

[58] **Field of Search** 317/141, 148.5, 154; 307/267; 187/29

[56] **References Cited**

UNITED STATES PATENTS

3,473,050	10/1969	Groom	307/267
3,602,771	8/1971	Walstad et al.	317/154 X
3,571,626	3/1971	Reif	307/267 X
3,504,236	3/1970	Miyagawa et al.	317/148.5

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[57] **ABSTRACT**

A control system for elevators or the like wherein the elevator call button generates a first signal which is in turn sensed by the control circuit. The control circuit then provides a second signal of greater duration than the first. The second signal is utilized to produce energization of a relay which in turn controls the operation of the elevator motor and related equipment. A threshold device prevents operation of the relay when the first signal is below a threshold level so as to prevent accidental operation of the elevator by low level spurious signals. All of the control circuitry may be positioned remote from the signal generator in a safe environment. Additionally, short circuiting of the leads from the signal generator will not initiate operation of the elevator.

19 Claims, 2 Drawing Figures

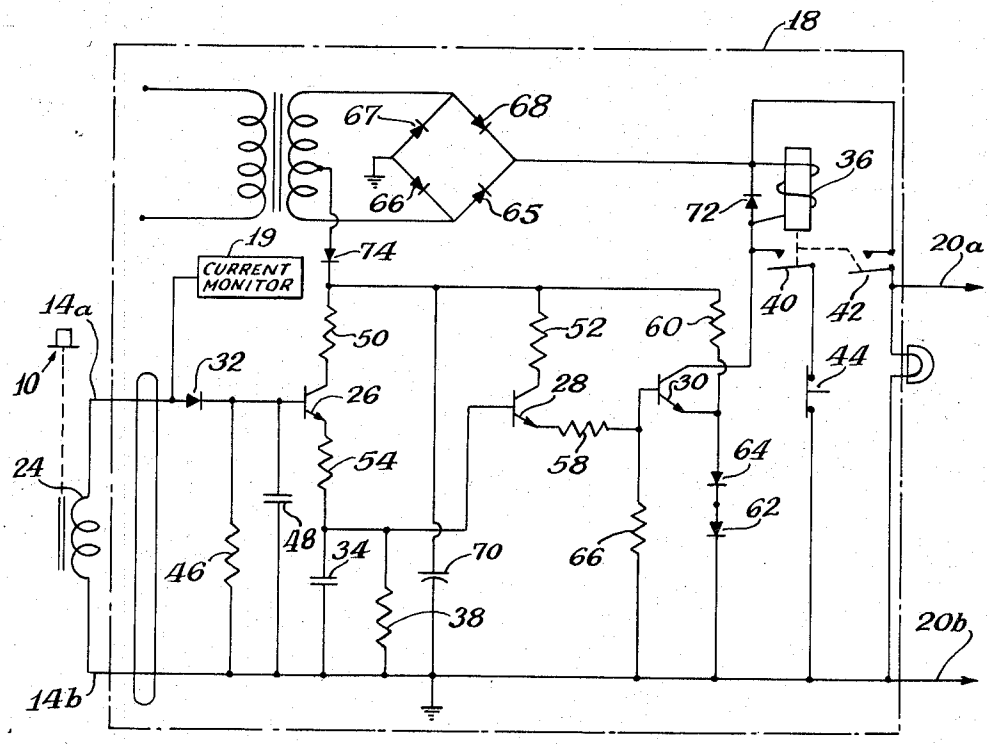


FIG. 1.

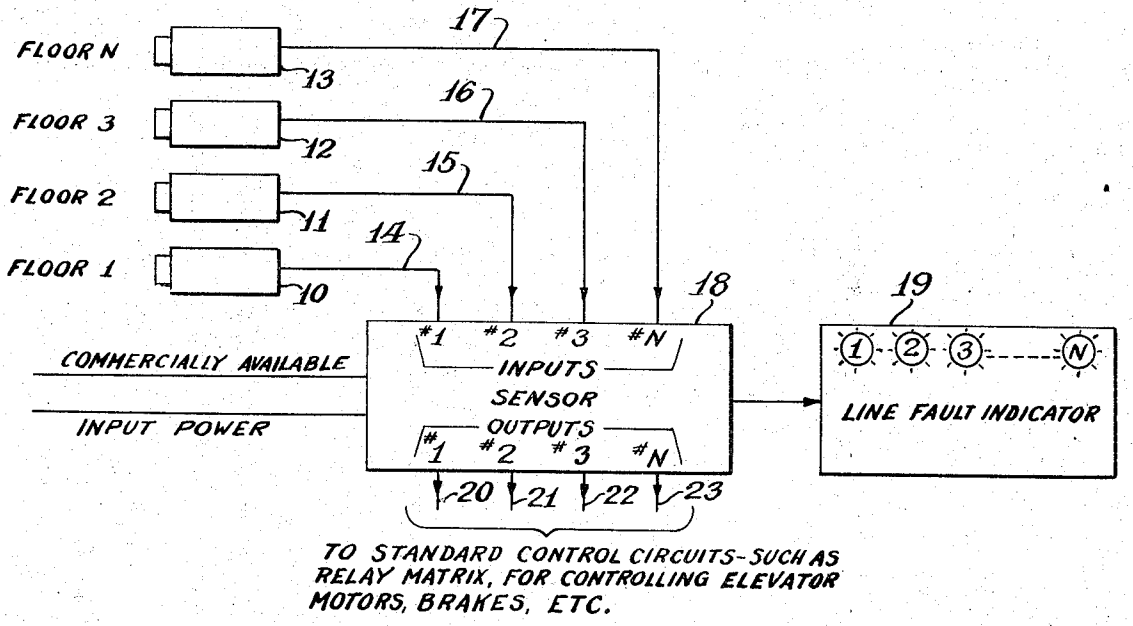
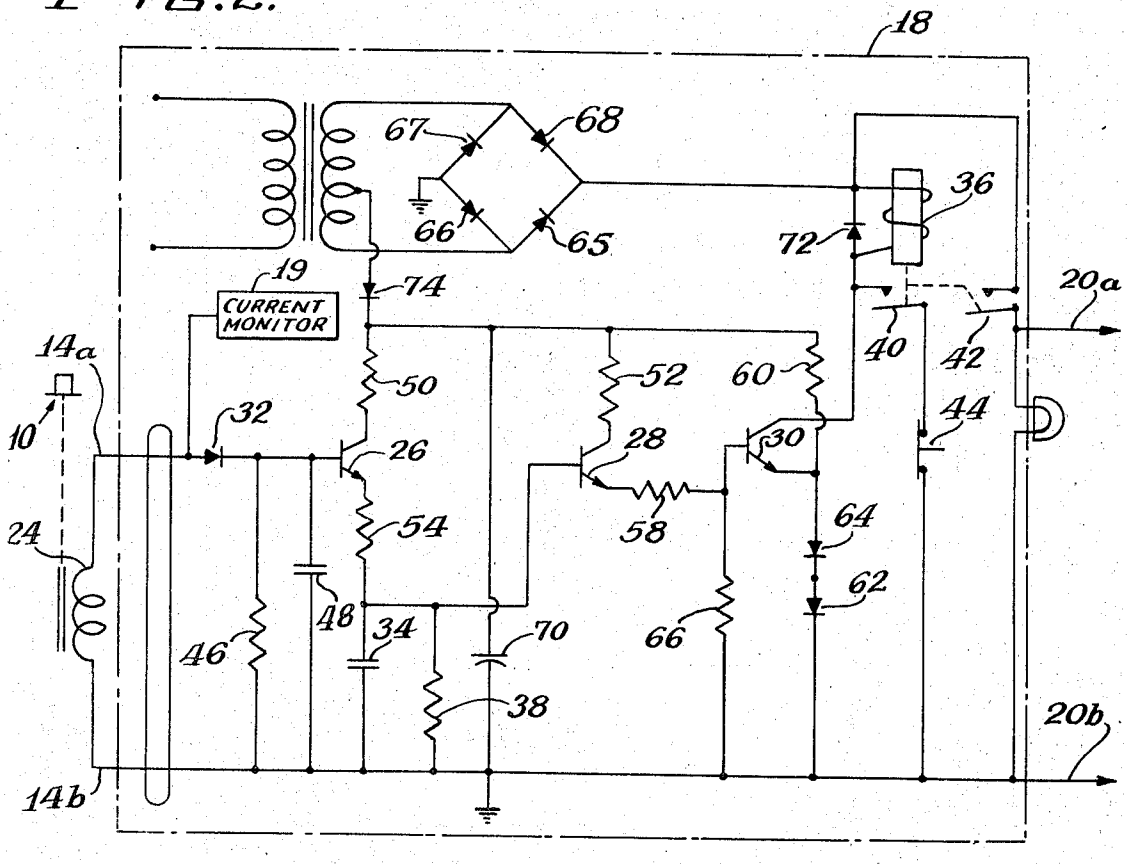

FLOOR N
FLOOR 3
FLOOR 2
FLOOR 1
13
12
11
10
17
16
15
14
18
19
#1 #2 #3 #N
INPUTS
SENSOR
OUTPUTS
#1 #2 #3 #N
COMMERCIALLY AVAILABLE
INPUT POWER
1 2 3 N
LINE FAULT INDICATOR
20 21 22 23
TO STANDARD CONTROL CIRCUITS-SUCH AS RELAY MATRIX, FOR CONTROLLING ELEVATOR MOTORS, BRAKES, ETC.

FIG. 2.


18
67
68
66
65
36
72
19
CURRENT MONITOR
74
20a
14a
10
32
50
52
60
40
42
44
26
28
30
54
58
64
62
24
46
48
34
70
66
38
20b
14b

ELEVATOR CALL CIRCUIT

BACKGROUND OF THE INVENTION

This invention relates to a control system which utilizes a generated signal to initiate operation of the control sequence.

The following discussion relating to the present invention is in the context of the application of the invention for use with or as part of an elevator call or control system. This utilization of the particular circuitry involved is to be considered typical even though the following specification is in the context of this elevator type application.

Generally, an elevator control system utilizes push buttons arranged at each floor. Upon depression of the push button, an electric switching circuit is completed and a control signal is fed into a relay matrix. This relay matrix in turn operates to send the elevator to the appropriate floor. This system and similar systems which provide for making a circuit upon operation of a button or the like have been refined and now are highly sophisticated to provide the users of the elevator with prompt and fast service.

However, elevators utilizing this type of control circuitry have an inherent disadvantage. This disadvantage becomes apparent during emergencies such as fires. In such situations, the high temperature due to a fire may cause the leads associated with the push button to short. Consequently, anyone utilizing an elevator as an escape route may have the cab of the elevator called to the floor upon which the fire is raging. This has in fact been the case in numerous circumstances. Thus, it is desirable to provide an elevator call system which will avoid such tragic happenings.

SUMMARY OF THE INVENTION

In a principal aspect, the present invention comprises a control system wherein a signal generator in a circuit is connected to a threshold device and to an energy storing circuit so that upon providing a signal which is indicative of a command, the threshold device will provide an output to a command relay arrangement. This output for the command relay arrangement will in turn close a circuit associated with operation of the controlled device. Because the control system requires the generation of a first signal or pulse before the control operation is initiated, the control circuitry cannot be activated by the open circuiting or short circuiting of the input leads to the control circuitry. Thus, a high temperature fusion of the lead wires to the signal generator will not cause a malfunction of the control system that could possibly lead to disasterous results.

It is thus an object of the present invention to provide an improved control system.

It is a further object of the present invention to provide an improved control system wherein a pulse signal is utilized to initiate operations of the control system.

Still another object of the present invention is to provide a safe and economical control system which cannot accidentally be activated to provide an unwanted control signal.

These and other objects, advantages and features of the present invention will be set forth in greater detail in the description which follows.

BRIEF DESCRIPTION OF THE DRAWING

In the detailed description which follows, reference will be made to the drawing comprised of the following FIGURES:

FIG. 1 is a schematic layout of an entire control system as utilized for an elevator call system; and

FIG. 2 is a circuit diagram of a single call station as contemplated by the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, there is illustrated schematically the arrangement of the present invention as would be utilized for an elevator call circuit. A plurality of push buttons **10–13** would be arranged in serial order on floors 1 through *n* in a desired building. The push button would be a pulse signal generator device. A typical example of such a device is disclosed in the now pending application of Britton et al Ser. No. 170,729 filed Aug. 11, 1971. Such a device includes a coil with two leads extending therefrom. Depression of the push button drives a core through the coil thereby generating a pulse in the coil and through the leads. These leads as at leads **14–17** would all be connected through the control circuitry at some remote station **18.** In this manner, the station **18** could be protected against first and other dangers. Additionally, the station **18** could be maintained at a central location for ease of repair and access for maintenance. Ancillary to the station **18** would be a series of indicator lights at **19.** Typically, such indicator lights would show whether a particular set of leads **14–17** were functioning correctly. Outputs **20–23** from a station **18** would connect with a relay matrix for controlling elevator motors, brakes and the like. That is, all of the leads **20–23** would be connected with a control matrix for one or more elevators.

In FIG. 2, there is illustrated a circuit diagram associated with the control mechanism or system of the invention as provided at one control station, for example, the first floor in an elevator system. Thus, like parts are correspondingly labeled in FIG. 2. Note that the lead **14** is now identified as leads **14***a* and **14***b* since this is a two wire system. Also, output lead **20** is now identified as leads **20***a* and **20***b*.

The pulse generator **10** provides a first signal input via a coil **24** to the circuit comprised of three stages each stage being associated with a separate transistor **26, 28** and **30.** The stage of transistor **26** provides a high impedance input circuit to keep transmission line losses to a minimum. The stage of transistor **28** acts as a pulse "stretcher." The stage of transistor **30** acts as the driver for an electromechanical load. Details of operation are as follows:

The pulse generator **10** via coil **24** feeds a positive going pulse or first signal through a diode **32** into the relatively high input impedance of transistor **26** which is connected as an emitter follower. Diode **32** blocks any negative going pulse generated by the pulse generator **10.** The positive pulse on the base of transistor **26** causes it to conduct charging capacitor **34.** In the circuit shown, with compound values as set forth below, capacitor **34** is fully charged in approximately 1 millisecond.

The charging of capacitor **34** causes conduction in transistor **28** which, in turn, causes conduction in transistor **30,** thus energizing a relay **36.** Capacitor **34** discharges supplying a second signal of greater duration than the first signal through the high impedance input of transistor **28.** The slow discharge of capacitor **34** in

effect stretches the time of the input pulse from coil **24** to thereby provide ample time for the relay **36** to pull in and latch.

In the circuit shown, the relay driver transistor **30** is in conduction for approximately 50 milliseconds. A resistor **38** is provided in parallel with capacitor **34** to insure the complete discharge of capacitor **34** between operations of the pulse generator **10.** It is readily apparent to those versed in the state of the art that this time can be varied by choosing different values of capacitor **34** and resistor **38.** The relay **36** is first energized on conduction of transistor **30.** After initial energization in this manner, the relay **36** latches itself in through its normally open contacts **40** and the transistor **30** terminates conduction. Normally open contacts **42** of relay **36** perform the switching function to the load via leads **20a** and **20b.** Relay **36** remains latched through contacts **40** until released by switch **44** in series with contacts **40.** In an elevator control circuit, the load would be the elevator motor or motor controller and the release switch **44** would provide a position feedback signal as switch **44** became operated by the elevator car upon arrival near its floor destination.

A resistor **46** is provided to present a lower impedance to the pulse generator **10** than the input impedance of transistor **26,** thereby reducing the amplitude of various transient noise pulses which would be picked up on the transmission line and presented to the base of transistor **26.** Capacitor **48** provides a by-pass for high frequency transients which might otherwise trigger the device. Resistors **50** and **52** are current limiters for transistors **26** and **28** respectively, and prevent any spurious surges from damaging the transistors. Resistor **54** provides the low impedance path to charging capacitor **34** and in conjunction with transistor **26** provides the high impedance input to the system.

Resistor **38** is provided to assure that capacitor **34** discharges completely between operations. Resistor **58,** in conjunction with transistor **28** provides the high impedance discharge path for capacitor **34** and thus provides the effect of pulse "stretching." Resistor **60** and diodes **62** and **64** provide reverse bias on transistor **30** thus providing a threshold device. Since the voltage at base of transistor **30** must be greater than the bias level at the emitter of transistor **30,** there is afforded more protection against accidental activation of the relay by low level spurious signals. Resistor **66** provides a base return for transistor **30.**

Diodes **65–68** form a diode bridge full wave rectifier for **30** volt unfiltered direct current for the operation of the relay **36.** Half of the supply is filtered by a capacitor **70** and is used as the power source for transistors **26** and **28.** Diode **72** is used to shunt the inductive effect of relay **36** thus protecting transistor **30.** Diode **74** is provided to block the unfiltered DC from being coupled back to the unfiltered supply during the energization of relay **36.** For the circuit shown, the following component values were used.

Element	Rating Value
a. Resistors	
46	15 K Ω
54	1 K Ω
50	270 Ω
38	1.0 Meg Ω
52	270 Ω
58	1.5 K Ω
66	10.0 K Ω
60	15 K Ω
b. Capacitors	
48	0.01 microfarads
70	5 microfarads/35 volts
34	0.5 microfarads

The transistors **26, 28** and **30** are NPN type transistors, Model No. **2N3414.**

What is claimed is:

1. An electrical elevator call control system which provides command output signals to a controlled device comprising, in combination,

means for generating a first signal,

signal stretching means connected to said first signal generating means, said stretching means being responsive to said first signal generating means for generating a second signal having a duration greater than said first signal,

a command relay means for providing an output signal to said controlled device,

means connected to said relay and to said stretching means for energizing said relay in response to said second signal, and

interlock means for said command relay means engageable upon energization of said command relay means to retain energization of said command relay and disengageable by feedback control means from said controlled device.

2. The system as set forth in claim **1** including threshold means for preventing operation of said relay energizing means until said second signal exceeds a predetermined level such that spurious line signals below said predetermined level will not accidentally energize said relay.

3. The system of claim **1** wherein said signal stretching means includes an energy storage device having an input charging impedance and an output discharging impedance greater than said input charging impedance, said energy storage device being connected between said first signal generating means and said relay energizing means.

4. The system of claim **1** wherein said feedback control means comprise circuit breaker means in series with said relay, said circuit breaker means being operative in response to said controlled device.

5. The system of claim **1** wherein said components are direct current responsive.

6. The system of claim **1** including a plurality of said systems, each one of said systems being associated with a separate command station.

7. The system of claim **1** wherein said means for generating a first signal comprises a coil and means for inducing a voltage in said coil.

8. The system of claim **7** including a separate low amperage test circuit in parallel with said coil.

9. The system as set forth in claim **1** including means connected between said first and second signal generating means for shorting out high frequency spurious signals from the input to said first signal generator means.

10. An electrical elevator call control system which provides command output signals to a controlled device comprising, in combination,

means for generating a first signal including an input,

signal stretching means connected to said first signal generating means, said stretching means being responsive to said first signal generating means for generating a second signal having a duration greater than said first signal,

means connected between said first and said second signal generating means for shorting out high fre-

quency spurious signals from the input to said means for generating a first signal,

a command relay means for providing an output signal to said controlled device, and

means connected to said relay and to said stretching means for energizing said relay in response to said second signal.

11. The system as set forth in claim **10** including threshold means for preventing operation of said relay energizing means until said second signal exceeds a predetermined level such that spurious line signals below said predetermined level will not accidentally energize said relay.

12. The system of claim **10** wherein said signal stretching means includes an energy storage device having an input charging impedance and an output discharging impedance greater than said input charging impedance, said energy storage device being connected between said first signal generating means and said relay energizing means.

13. The system as set forth in claim **10** including interlock means for said command relay means engageable upon energization of said command relay means to retain energization of said command relay and disengageable by feedback control means from said controlled device.

14. The system of claim **13** wherein said feedback control means comprise circuit breaker means in series with said relay, said circuit breaker means being operative in response to said controlled device.

15. The system of claim **10** wherein said components are direct current responsive.

16. The system of claim **10** including a plurality of said systems, each one of said systems being associated with a separate command station.

17. The system of claim **10** wherein said means for generating a first signal comprises a coil and means for inducing a voltage in said coil.

18. The system of claim **17** including a separate low amperage test circuit in parallel with said coil.

19. An electrical elevator call control system which provides command output signals to a controlled device comprising, in combination,

means for generating a first signal,

a low amperage test circuit in parallel with said means for generating a first signal,

signal stretching means connected to said first signal generating means, said stretching means being responsive to said first signal generating means for generating a second signal having a duration greater than said first signal,

a command relay means for providing an output signal to said controlled device, and

means connected to said relay and to said stretching means for energizing said relay in response to said second signal.

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