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Reiss et al.

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[54] **ALARM CIRCUITRY**

[75] Inventors: **Martin H. Reiss,** Newton; **James R. Adams,** Framingham, both of Mass.

[73] Assignee: **Gulf & Western Manufacturing Company Systems,** New York, N.Y.

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[21] Appl. No.: **410,432**

Related U.S. Application Data

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[52] **U.S. Cl.** ..... **340/274,** 340/253 R

[51] **Int. Cl.** **G08b 13/08**

[58] **Field of Search** ..... 340/274, 280, 52 F, 253 H, 340/253 R, 256, 409; 307/39

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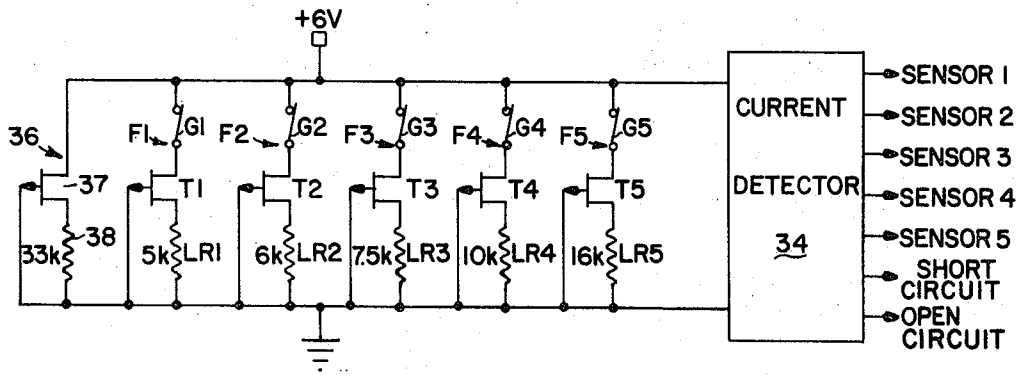
Primary Examiner—Glen R. Swann, III

Attorney, Agent, or Firm—Wolf, Greenfield & Sacks

[57] **ABSTRACT**

The alarm circuitry employs a plurality of pressure responsive sensors interconnected by conductor means to detection circuitry including an alarm relay, display panel, or other alarm indicating means. One sensor may be associated with each door, window or other entrance means of the protected premises and all sensors are preferably closed when the premises are secured. In one embodiment the sensors are coupled in series and the detection circuitry is voltage responsive, while in another embodiment the sensors are coupled in parallel and the detection circuitry is current responsive. In both embodiments the detection circuitry senses an alarm condition when a sensor is activated or when the conductor means becomes open or short circuited. In addition, the detection circuitry includes one or more test switches actuable by an authorized person prior to leaving the premises to determine if all entrance means are in a safe closed position, and to check the operability of the alarm circuitry itself prior to enabling it for possible energization by an unauthorized person.

12 Claims, 6 Drawing Figures



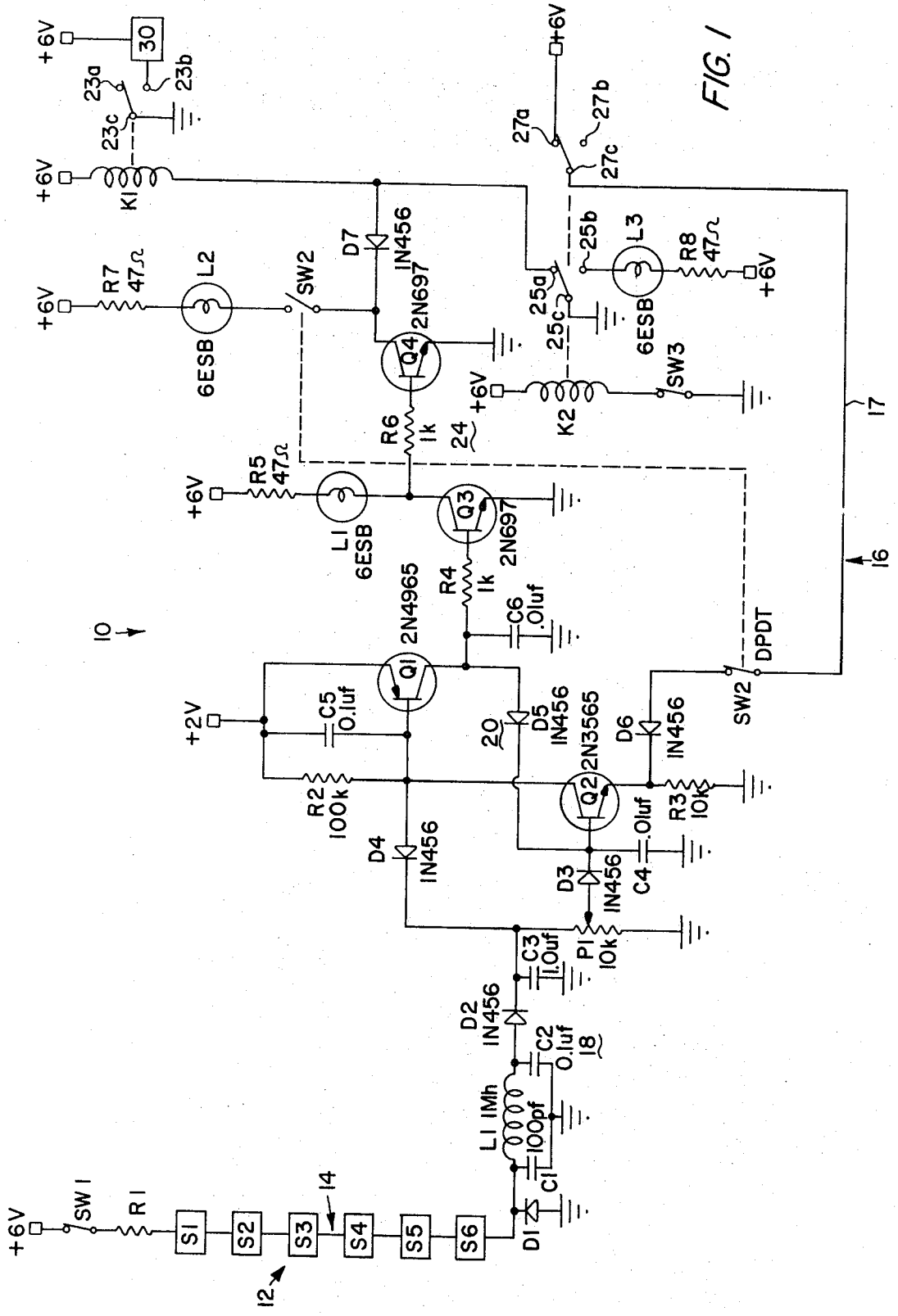

+6V
30
23a
23b
23c
K1
+6V
R7 47Ω
L2
6ESB
SW2
D7 IN456
2N697
Q4
R6 1k
24
+6V
R5 47Ω
L1 6ESB
Q3 2N697
R4 1k
C6 .01uf
2N4965
Q1
10
+2V
C5 0.1uf
20
D5 IN456
D6 IN456
2N3565
Q2
R2 100k
R3 10k
.01uf
D4 IN456
D3 IN456
C4
C3 1.0uf
P1 10k
D2 IN456
C2 0.1uf
18
L1 1Mh
100pf
C1
D1
+6V
SW1
R1
S1
S2
S3
S4
S5
S6
14
12
+6V
27a
27b
27c
25b
25a
25c
L3 6ESB
R8 47Ω
+6V
+6V
K2
SW3
17
16
SW2
DPDT

FIG. 1

FIG. 2A

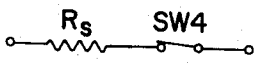


FIG. 2B

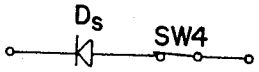


FIG. 3

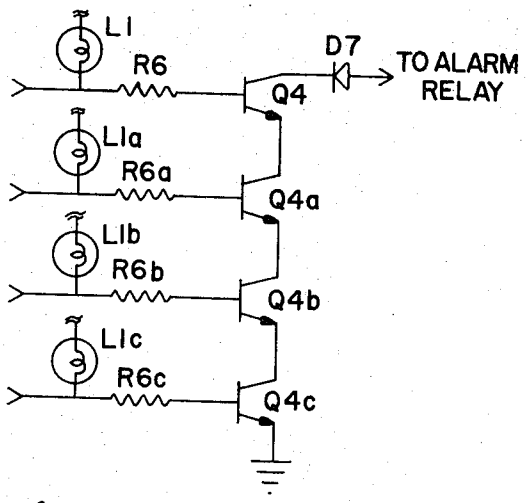


FIG. 4

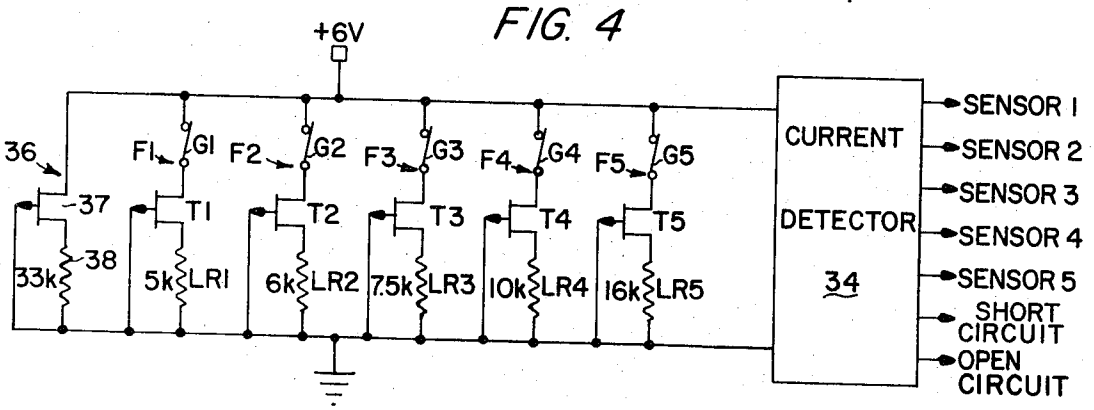
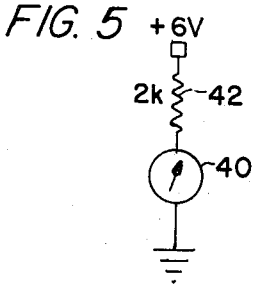


FIG. 5



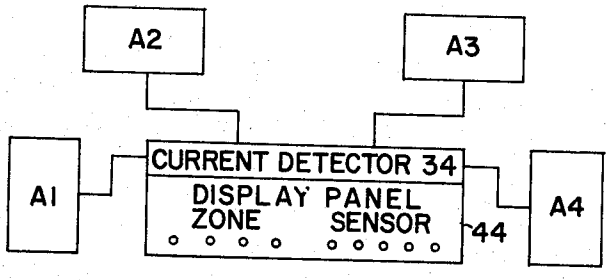


FIG. 6

ALARM CIRCUITRY

CROSS REFERENCE TO RELATED APPLICATIONS

This is a (division) of application Ser. No. 153,297, filed June 15, 1971, now U.S. Pat. No. 821,733.

FIELD OF THE INVENTION

The present invention relates generally to security alarm circuitry for use in buildings such as dwelling houses, museums, commercial buildings and other premises. More particularly, the present invention is concerned with alarm circuitry that includes a plurality of pressure responsive sensors interconnected by conductor means to detection circuitry for detecting activation of the sensors or a shorting or opening of the conductor means.

BACKGROUND OF THE INVENTION

In the prior art alarm circuitry is effective under most operating conditions. However, there are certain drawbacks associated with many of these known alarm circuits. For example, these circuits do not provide good noise immunity and therefore are sometimes falsely actuated into an alarm condition when in fact no alarm conditions exists. Also, in order to monitor many different alarm conditions, these circuits have become quite complex. Usually additional circuitry is needed to indicate the occurrence of an open or short in the conductor means that interconnect the sensors.

Another drawback associated with some of the prior art alarm circuitry is that when an alarm condition is sensed, there is no indication of which sensor created the alarm condition. This is especially important when many sensors are used. For instance, in a museum where a sensor may be used for each painting and where the museum contains many rooms, it is desirable to determine quickly which sensor has been activated.

Another problem that has been found is that the authorized operator, prior to enabling the alarm circuitry for operation, does not check to see that all entrance means are secured (closed). Upon leaving the premises a false alarm condition is then indicated at a remote location such as at a police station, for example, because the authorized operator had no way of previously checking the condition of the premises to determine if one or more of the entrance means are not secured. Also, some alarm circuits do not provide means for testing the operability of the circuit prior to enabling it for use.

OBJECT OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide alarm circuitry including a plurality of sensors interconnected by conductor means and that may be switched to an alarm condition upon activation of one or more sensors or by opening or shorting the conductors.

A further object of the present invention is to provide alarm circuitry that is characterized by improved noise immunity.

A further object of the present invention is to provide alarm circuitry in accordance with the primary object that is not complex in construction and yet provides for the detection of a plurality of different alarm conditions and the determination of which condition has occurred.

Still a further object of the present invention is to provide alarm circuitry which displays an indication of the occurrence of an alarm condition and an indication of which sensor of a plurality of sensors has been activated.

Still another object of the present invention is to provide alarm circuitry that includes one or more test switches that are actuable prior to an authorized person leaving the premises to determine if the alarm system is closed and to determine if the alarm circuitry is correctly operating.

A further object of the present invention is to provide alarm circuitry including an observation panel for displaying a plurality of discrete sensor zones with each zone including a plurality of sensors. The observation panel indicates the alarmed zone and the sensor of that zone that has been activated.

SUMMARY OF THE INVENTION

The alarm circuitry of the present invention is adapted for use in a building or the like that has one or more entrance means to be protected against opening by an unauthorized person. The circuitry preferably includes a plurality of pressure responsive sensors, one or more being associated with each entrance means, and being responsive to an opening thereof to switch the sensor from a first preferably closed position to a second preferably open position. One or more conductor means are provided interconnecting the sensors to detection circuitry. The detection circuitry includes means for initially setting a first circuit condition when a sensor is deactivated and means responsive to either activation of a sensor, or shorting or opening of the conductor means, for establishing a second circuit condition. An alarm relay or other means coupled from the detection circuitry is used to indicate an alarm condition in response to the establishing of the second circuit condition.

In accordance with one embodiment of the invention the plurality of sensors are connected in series to the input of the detection circuit and the detection circuit includes a bistable latch means which is normally reset to the first circuit condition when no sensor has been activated and is set to the second circuit condition when one or more of the sensors is activated or the conductor means is shorted or opened. The sensors may include, in addition to a normally closed pressure responsive switch, either a resistor for causing a predetermined voltage drop thereacross or a properly poled diode also having a predetermined drop across it when conducting in the forward direction. The detection circuitry also includes one or more test switches for testing to determine that all sensors are in their closed position and secondly to determine if the circuitry is properly operating.

In accordance with another embodiment of the present invention the plurality of sensors are interconnected in parallel to a current detector and the current through each sensor, when closed, is controlled so that each sensor has a predetermined current level. In one embodiment each sensor includes a switch that is normally closed in the non-alarm condition, a field effect transistor (FET) and a current limiting resistor. The current detector is adapted to sense a predetermined current from all of the sensors when there is no alarm condition. Upon opening of any one sensor the current changes by an amount associated with that sensor and

the current detector can then determine (1) an alarm condition and (2) which sensor of the plurality of sensors has been activated. The current detector may comprise a limiting resistor and meter that is nulled to zero for the non-alarm condition and has its dial sweep either in a positive or negative direction depending upon the particular alarm condition. For example, a short circuit would create a positive (current increasing) deflection of the meter dial.

BRIEF DESCRIPTION OF THE DRAWINGS

Numerous other objects, features and advantages of the invention should now become apparent upon a reading of the following detailed description in conjunction with the accompanying drawings in which:

FIG. 1 is a circuit diagram partially in block form of one embodiment of alarm circuitry constructed in accordance with the principles of the present invention;

FIGS. 2A and 2B show two different embodiments for the sensors depicted in FIG. 1;

FIG. 3 is a circuit diagram of a portion of the alarm circuitry of FIG. 1 showing an arrangement for a multizone system;

FIG. 4 shows another embodiment of an alarm circuit in accordance with the present invention including a current detector;

FIG. 5 shows one embodiment of the current detector of FIG. 4; and

FIG. 6 is a block diagram of a current detector, display panel and plurality of sensor arrays constructed in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1 there is shown an alarm circuit **10** constructed in accordance with this invention. The circuit **10** generaly includes a sensor array **12** interconnected by conductor means **14** which connect the sensor array to detection circuit **16.** Detection circuit **16** includes an input circuit **18,** a bistable latch **20,** output circuitry **24,** and an audible alarm **30.**

The sensor array **12** is shown in FIG. **1** as including six sensors **S1–S6** connected in series with resistor **R1** and switch **SW1** between the +6 volt supply and the cathode of diode **D1.** Each of the sensors **S1–S6** in FIG. **1** may comprise a resistor R_s and pressure response switch **SW4** as depicted in FIG. **2A,** or a diode D_s and pressure responsive switch **SW4** as depicted in FIG. **2B.** The pressure responsive switch **SW4** is normally in a closed position completing the circuit through all of the sensors when all of the system is in a closed condition meaning that all the windows and doors in a particular building are closed, for example. The operation of switch **SW1** is discussed in more detail hereinafter.

The purpose of the input circuit **18** is to provide an alarm circuit having good noise immunity. The circuit **18** includes a tank circuit comprised of inductor **L1** and capacitors **C1** and **C2** which filter out both high frequency and low frequency noise components. The input to the tank circuit couples to the cathode of diode **D1,** the anode of which is grounded. Diode **D1** clamps any input noise from the sensor array **12** at a negative level of, for example, 0.6 volts. The diode **D2** connected at the output of the tank circuit couples to capacitor **C3** and potentiometer **P1** and is adapted to clamp any positive noise. Capacitor **C3** prevents false triggering of bistable latch **20** by noise generated from array **12.**

The bistable latch **20** may be considered as comprising transistors **Q1** and **Q2** and potentiometer **P1.** One of the terminals of potentiometer **P1** is grounded and the other terminal couples to the cathode of diode **D4.** The anode of diode **D4** then couples to the base of transistor **Q1** and by way of resistor **R2** and capacitor **C5** to the +2 volt supply. The moveable arm of potentiometer **P1** connects to the anode of diode **D3** while the cathode of diode **D3** couples to the base of transistor **Q2** and by way of capacitor **C4** to ground. The emitter of transistor **Q1** couples to the +2 volt supply and the collector of transistor **Q1** couples to output circuit **24** and, by way of forward poled diode **D5,** to the base of transistor **Q2.** Transistor **Q2** has its collector coupled to the base of transistor **Q1** and its emitter coupled by way of resistor **R3** to ground and also to the cathode of diode **D6.** Diode **D6** is included in the feedback reset line **17** from the contact **27C** of relay **K2.** The operation of the circuit including line **17** is discussed hereinafter.

Capacitors **C4** and **C6** are coupling capacitors that tend to block any noise that may still be present in bistable latch **20.** The feedback path including diode **D5** from the collector of transistor **Q1** to the base of transistor **Q2** provides the latching feature for the bistable latch **20.** If either transistor **Q1** or **Q2** conducts, the other conducts and both transistors are held on via diode **D5** until a reset signal is received via diode **D6.**

The operation of the circuitry discussed to this point is as follows. Assuming that all of the sensors **S1–S6** are in their closed or deactivated positions, the potentiometer **P1** is adjusted so that the voltage coupled by way of diode **D3** to the base of transistor **Q2** is just not sufficient to allow transistor **Q2** to conduct. The voltage at the cathode of diode **D4** is not sufficiently negative under these conditions to cause conduction of transistor **Q1** either. The +2 volt supply for the emitter of transistor **Q1** is provided instead of the +6 volt supply in order to keep transistor **Q1** out of conduction when the array **12** is not activated. With transistor **Q1** off there is not sufficient positive voltage at the base of transistor **Q3** to turn it on.

The output circuitry **24** shown in FIG. **1** includes transistors **Q3** and **Q4,** indicator **L1–L3,** relays **K1** and **K2,** test switches **SW2** and **SW3,** and audible alarm **30.** In the position shown in FIG. **1** switches **SW1** and **SW2** are in a "non-test" position and switch **SW3** in an "alarm not enabled" position wherein activation of a sensor would not cause activation of audible alarm **30.** Alarm **30** can not be sounded because relay **K1** is kept energized, as indicated in FIG. **1** by the ground applied via contacts **25***a* and **25***c*.

The output of bistable latch **20** taken at the collector of transistor **Q1** couples by way of capacitor **C6** to ground and by way of resistor **R4** to the base of transistor **Q3.** The emitter of transistor **Q3** is grounded. An indicator light **L1** couples from the collector of transistor **Q3** by way of resistor **R5** to the +6 volt supply. The collector of transistor **Q3** also couples by way of resistor **R6** to the base of transistor **Q4.** The emitter of transistor **Q4** is grounded and the collector couples by way of switch **SW2,** indicator lamp **L2,** and resistor **R7,** all in series to the +6 volt supply, and also to the cathode of diode **D7.** The anode of diode **D7** couples to contact **25***a* of relay **K2** and also by way of relay coil **K1** to the

+6 volt supply. The common contact 23*c* of relay K1 couples to ground and one of the other contacts 23*b* couples to audible alarm **30.** Contact 23*a* is not used in the circuit of FIG. **1.**

FIG. **1** also shows a circuit enabling relay K2 which is shown in its actuated position by means of switch SW3. The common contact 25*c* of relay K2 is grounded while the contact 25*b* couples by way of indicator lamp L3 and resistor R8 to the +6 volt supply. The common contact 27*c* of relay K2 coupled by way of switch SW2 to the anode of diode D6. The contact 27*a* of relay K2 couples to the +6 volt supply and the contact 27*b* remains open.

As previously discussed, when the alarm circuit is in the condition shown in FIG. **1** and none of the sensors S1–S6 have been activated, transistor Q3 is off and indicator light L1 is not illuminated. Sufficient current does pass by way of resistors R5 and R6 and indicator lamp L1, however, to cause conduction of transistor Q4. Thus, a path is provided by way of relay K1 and diode D7 to the collector of transistor Q4 keeping relay K1 energized. Similarly, with relay K2 energized by virtue of switch SW3 being in its off or closed (alarm not enabled) position a ground is continuously provided via contacts 25*a* and 25*c* for relay K1 to prevent it from falling out and sounding audible alarm **30.** Thus, even if one of these sensors S1–S6 is activated, unless switch SW3 is opened the K1 relay remains energized and the alarm circuit is not enabled for detection.

The previously referred-to adjustment of potentiometer P1 sets a first circuit condition wherein transistor Q1 and Q2 are not conducting. If one of the sensors S1–S6 is activated thereby opening its switch SW4, the voltage across potentiometer P1 decreases, current is drawn in a forward direction through diode D4 and transistor Q1 conducts. This action causes the collector voltage of transistor Q1 to increase positively thereby turning on transistor Q2 by way of latching diode D5. If the activated sensor is subsequently deactivated by a burglar closing the door, for example, diode D4 blocks any positive voltage from causing a resetting (transistors Q1 and Q2 off) of bistable latch **20.** Diode D5 also keeps transistors Q1 and Q2 on. Similarly, if the conductor **14** is broken at any point bistable latch **20** also becomes set.

Alternatively, if an unauthorized person attempts to gain entry by shorting out one or more of the sensors S1–S6 the current through inductor L1 and diode D2 increases and the voltage across potentiometer P1 also increases. This increased voltage is coupled by way of diode D3 to the base of transistor Q2 causing transistor Q2 to conduct. When this action occurs the collector of transistor Q2 and base of transistor Q1 go negative thereby causing transistor Q1 to conduct. Again, the latch is provided by way of diode D5 for transistors Q1 and Q2 and diode D3 blocks any subsequent negative voltage from turning off transistor Q2 if the short is later removed.

When either condition occurs, that is when an open or a short occurs the bistable latch **20** is set, transistor Q1 is conducting and the transistor Q3 also conducts. This causes illumination of an indictor light L1 thereby indicating that an alarm condition exists. However with switch SW3 closed and the alarm circuit not enabled contacts 27*a* and 27*c* of relay K2 cause a positive voltage to be applied by way of line **17** to bistable latch **20** causing it to reset and keeping transistors Q1 and Q2 off. This operation is provided so that transistors Q1 and Q2 are held in a non-set position until the alarm circuit is enabled for operation.

The enabling of the alarm is provided by switch SW3 which is opened in order to enable monitoring by the alarm circuitry. When switch SW3 is opened relay K2 deenergizes and relay contact 25*c* couples to contact 25*b* causing indicator lamp L3 to light thereby indicating that the alarm circuit is in an enabled condition. Similarly, contact 27*c* switches to contact 27*b* and the reset is no longer provided, thus enabling the bistable latch **20** to be operated from sensor array **12.** It is also noted that the breaking of the contact from 25*c* to 25*a* now removes the ground from relay K1 and enables relay K1 to fall out should one of the sensors be activated or should an open or short condition exist in array **12.**

Before the circuit is enabled, however, by opening switch SW3, the test switches SW1 and SW2 are operated to check to see that the array is closed and that the circuitry of FIG. **1** is properly operating. Thus, the circuitry of FIG. **1** is first checked by depressing test switch SW2 just before the operator is to leave the premises. Switch SW2 includes two poles, one of which is open when the other is closed, as shown in the non-test position of FIG. **1.** If all of the sensors are closed the bistable latch **20** should be reset, transistor Q4 should be conducting and when switch SW2 is thrown to the test position, indicator light L2 illuminates via one of the poles of switch SW2 thereby indicating that the entire system is secured (closed). The change in position of switch SW2 from the position shown in FIG. **1,** to the test position opens reset line **17** assuring that transistors Q1 and Q2 do not get reset if one of the sensors is open and relay K2 is still energized. The closing of one of the poles of switch SW2 also connects light L2 to transistor Q4. Thus, when switch SW2 is depressed if latch **20** is reset, transistor Q3 is off and light L1 is also off indicating that the array **12** is closed. Transistor Q4 is on, however, and light L2 is on indicating that transistor Q4 is also properly functioning.

With switch SW2 still depressed switch SW1 may then be moved to an open position thereby causing bistable latch **20** to set. Transistor Q3 conducts and indicator lamp L1 illuminates thereby indicating that the circuitry prior thereto is operating properly and that the transistors of the bistable latch are conducting. Transistor Q4 ceases conduction and thus indicator lamp L2 extinguish if the circuitry is operating properly.

Thereafter test switches SW1 and SW2 are returned automatically to the position of FIG. **1** and the circuit is enabled by opening switch SW3. If one of the sensors is then activated bistable latch **20** is set, transistor Q3 conducts, transistor Q4 turns off and alarm relay K1 falls out. This causes the contact 23*c* to apply ground to contact 23*b* which in turn causes the audible alarm **30** to sound, thereby indicating an alarm condition. This operation is realized whether a sensor is activated, or the conductor **14** is opened, or one or more of the sensors is shorted out. In the preferred embodiment switches SW1 and SW2 are momentary switches, and switch SW3 may be a conventional single pole/single throw on-off switch.

Referring now to FIG. **3** there is shown a circuit diagram of part of the circuitry of FIG. **1** including diode D7 transistor Q4, resistor R6 and lamp L1. With this

arrangement instead of grounding the emitter of transistor Q4 it couples to the collector of a second transistor $Q4_a$ whose emitter in turn couples to the collector of transistor $Q4_b$ whose emitter in turn connects to the collector of transistor $Q4_c$ whose emitter in then grounded. The bases of transistor $Q4_a$, $Q4_b$, $Q4_c$ couple by way of resistors R6*a*, R6*b*, R6*c* respectively, to lamps L1*a*, L1*b* and L1*c*, respectively, and additonal circuitry that may be identical to the input circuitry and bistable latch circuit of FIG. **1**. Each of the lamps could couple to identical input and latch circuitry. This arrangement is used for a multi-zone building wherein a plurality of circuits identical or similar to those shown in FIG. **1** are used to actuate a single relay such as relay K1 in FIG. **1**. Thus, resistor R6 may couple by way of input and latch circuitry from one sensor array and the other resistors couple to separate sensor arrays. If a sensor of an array is activated, its associated bistable latch **20** is set and one of the transistors shown in FIG. **3** is turned off. Because these transistors are in series, the turning off of any one of the transistors causes a break in the conductive path to relay K1 and thus causes a falling out of the relay K1 and an attendant actuation of audible alarm **30**.

A display panel may be provided with the circuit arrangement of FIG. **3** having a plurality of lamps L1. When a sensor is activted one of the lamps illuminates indicting an alarm condition and the particular illuminated lamp tells which zone of the building has been entered.

Referring now to FIG. **4** there is shown another embodiment of the invention including a plurality of pressure responsive sensors F1–F5 connected in parallel to a current detector **34**. Each of these sensors F1–F5 includes a normally closed pressure responsive switch G1–G5, a field effect transistor T1–T5, and a current limiting resistor LR1–LR5, respectively. By connecting the gate of each of the transistors T1–T5 to ground, each of the sensors is in effect a constant current source when its associated switch is closed, the value of the current for each source being determined by its associated resistor.

One additional current source is also provided and is indicated in FIG. **4** as current source **36** which includes a field effect transistor **37** and resistor **38** connected in series between the +6 volt supply and ground. The gate of transistor **36** couples to ground to provide the constant current operation. The current source **36** may comprise circuitry similar to that depicted in FIG. **1** and is adapted to detect a change in current rather than a change in voltage. For example, with the values of resistance shown in FIG. **4**, sensor F1 draws a current when closed of 0.6 milliamps. Similarly, sensor F2 draws 0.5 milliamps, sensor F3 draws 0.4 milliamps, sensor F4 draws 0.3 milliamps, and sensor F5 draws 0.2 milliamps. The constant current source **36** has a resistor value that causes a 0.1 milliamp current to be drawn to current detector **34**. Thus a total of 2.1 milliamps is detected by current detector **34** when all of the sensors F1–F5 are in a closed position and the current source **36** is connected as shown.

As indicated in FIG. **4** the current detector **34** has seven output lines that detect which of the five sensors has been activted, or whether there has been a short condition or an open condition. The current detector **34**, for example, could comprise a balancing circuit that is nulled at an input current of 2.1 milliamps and is responsive to the different currents either greater or less than 2.1 milliamps to illuminate a predetermined indicator light corresponding to one of the sensors or a short or open condition.

The table below indicates the different conditions that can occur and the currents that are associated therewith.

CURRENT LEVEL	ALARM CONDITION
2.1 milliamps	No alarm
1.5 do.	F1 activated
1.6 do.	F2 activated
1.7 do.	F3 activated
1.8 do.	F4 activated
1.9 do.	F5 activated
1.4 do. or less	Open circuit condition.
3.0 do.	Short circuit condition.

In the above table it is seen that the constant current source **36** is provided in order to distinguish between an open circuit condition between sensors F1 and F2 and activation of sensor F1. Without the source **36** both of these conditions would be indicated by a 1.5 milliamp reading. With the current source **36** in place one is indicated by a 1.5 milliamp reading and the other is indicated by a 1.4 milliamp reading.

FIG. **5** shows one simplified embodiment for current detector **34**. The current detector comprises a conventional meter **40** and associated limiting resistor **42**. The value of resistor **42** is 2K ohms in FIG. **5** thereby defining the 3.0 milliamp (6 volts ÷ 2 K ohms) reading under short circuit conditions. The meter **40** may be read by a person monitoring the alarm system and the meter **40** may also be labeled so that when the reading is 2:1 milliamps no alarm condition exists. The other alarm conditions as depicted in the above table, are labeled on the meter to identify the different conditions that can occur.

In another embodiment of the invention the meter **40** may be nulled to zero when reading 2.1 milliamps and then be caused to deflect either positively or negatively depending upon whether the sensor has been activated or an open or short circuit condition exists.

FIG. **6** shows one further embodiment of the invention using a plurality of sensor arrays similar to the one shown in FIG. **4**. The block diagram of FIG. **6** shows sensor arrays A1–A4 each of which comprise a plurality of individual sensors such as sensor F1–F5 of FIG. **4**. The current detector **34** would also comprise a display panel **44** including four zone lamps and five sensor lamps. With such an arrangement the current detector is adapted to determine which zone is being entered and which sensor in the zone is activated. Thus, with one of the zone lamps illuminated and one of the sensor lamps illuminated one can pin point which entrance means has been opened.

What is claimed is:

1. Alarm circuitry for use in a structure having entrance means, comprising;

current detection means,

a plurality of sensors each operatively associated with an entrance means and responsive to an activation thereof to change said sensor from a first state to a second state,

conductor means intercoupling said sensors in parallel to an input of said current detection means,

each said sensor including a current source for drawing a predetermined amount of current whereby each current source draws a different amount of current,

said detection means including means for registering a first condition when all said sensors are drawing current and means for registering a plurality of alarm conditions, each such alarm condition corresponding to activation of one of said sensors,

and an additional current source connected in parallel with said sensors.

2. Alarm circuitry as defined in claim **1** wherein each said current source includes a field effect transistor and resistor coupled in series between said conductor means.

3. Alarm circuitry as defined in claim **1** wherein said detection means includes a meter and a limiting resistor and means coupling the meter and limiting resistor in series, the input of said current detection means being defined at one end of the limiting resistor.

4. Alarm circuitry as defined in claim **1** wherein said additional current source draws a different amount of current than any of said sensors.

5. Alarm circuitry as defined in claim **4** wherein said additional current source draws less current than any one of said sensors.

6. Alarm circuitry as defined in claim **1** wherein said current detection means distinguishes a short circuit condition by a maximum current detection.

7. Alarm circuitry as defined in claim **5** wherein said additional current limiting means is added for distinguishing between two fault conditions.

8. Alarm circuitry for use in a structure having a plurality of ways through which access may be gained, comprising;

current detection means,

a plurality of sensor switch means each operatively associated with an access way and responsive to an activation thereof to change from a first state to a second state,

a plurality of constant current elements each arranged to draw a different amount of current,

means coupling each sensor switch means in series with an associated constant current element,

and means intercoupling the series connected constant current elements and sensor switch means in parallel to an input of said current detection means,

said current detection means including means for registering a first condition when all said sensor switch means are drawing current, and for registering a plurality of alarm conditions, each such alarm condition corresponding to activation of one of said sensor switch means to its second state.

9. The alarm circuitry of claim **8** wherein each said constant current element comprises an active semiconductor device and a limiting resistor coupled in series.

10. The alarm circuitry of claim **9** wherein said means intercoupling includes two different voltage lines.

11. The alarm circuitry of claim **10** wherein said semiconductor device comprises a field effect transistor having one electrode coupled to the sensor switch means, a second electrode coupled to the limiting resistor and a third electrode coupled to one of the two different voltage lines.

12. Alarm circuitry for use in a structure having a plurality of ways through which access may be gained comprising;

current detection means,

a plurality of sensors each operatively associated with an access way and each including a current source comprising a field effect transistor coupled in series with a current limiting resistor, each said current source drawing a different predetermined amount of current, and

conductor means intercoupling said sensors in parallel to an input of said current detection means, said current detection means including means for registering a first condition when all said sensors are drawing current and for registering a plurality of different alarm conditions each corresponding to activation of one of said sensors.

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