

[54] ALARM CIRCUITRY

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[51] Int. Cl. **G08b 13/00**
[58] Field of Search **340/274, 276, 409, 412, 340/213**

[56] **References Cited**
UNITED STATES PATENTS

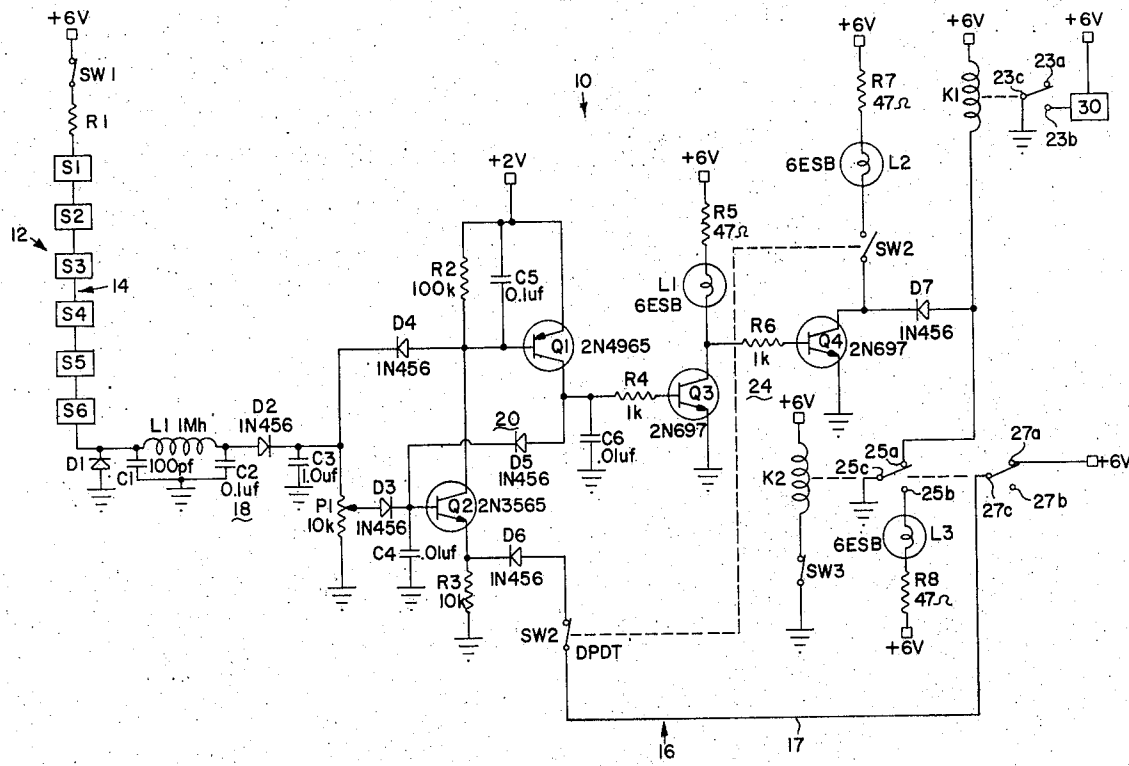
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[57] **ABSTRACT**

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 actuatable 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.

10 Claims, 7 Drawing Figures



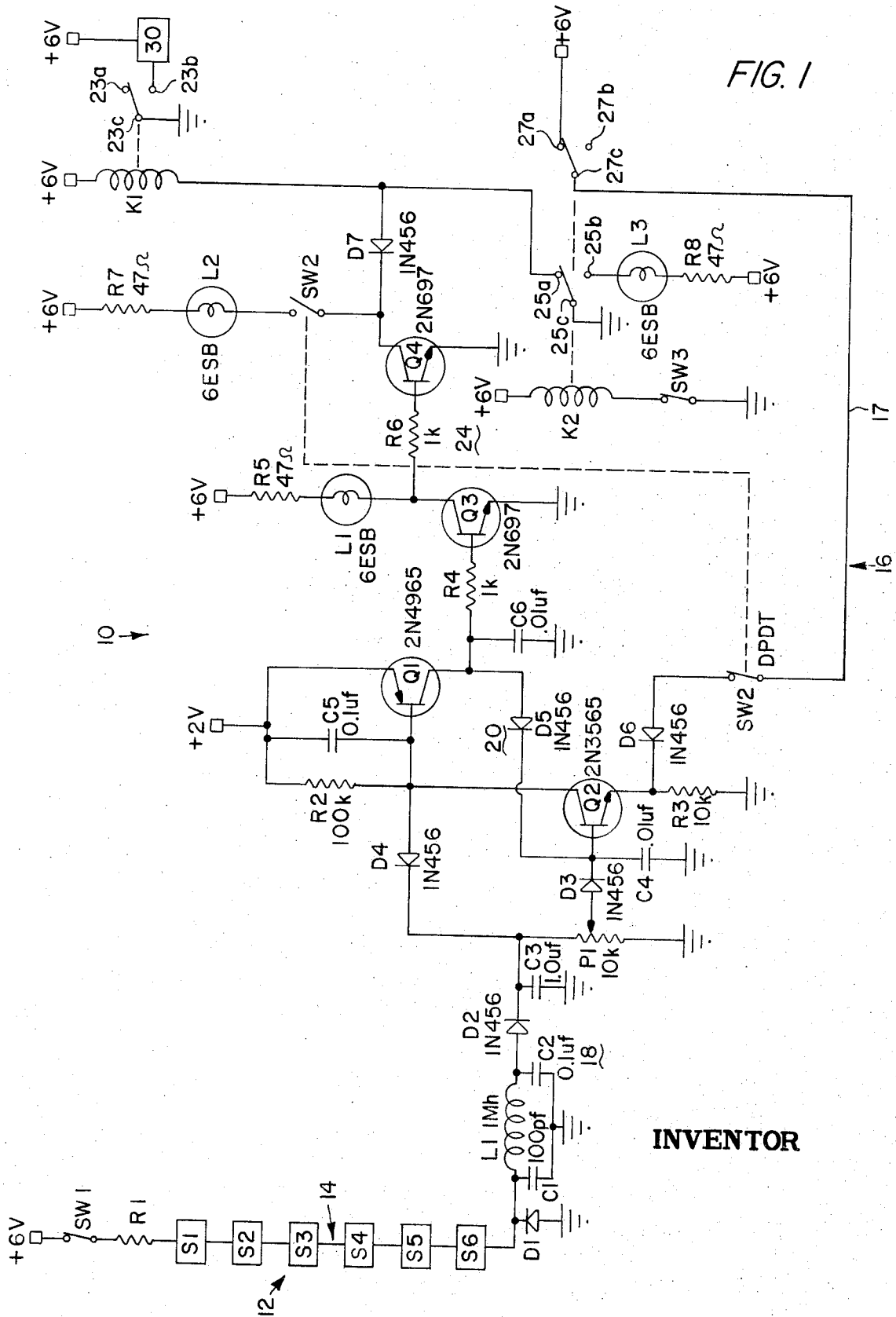


FIG. 1

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FIG. 2A

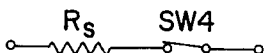


FIG. 2B

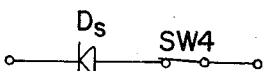


FIG. 3

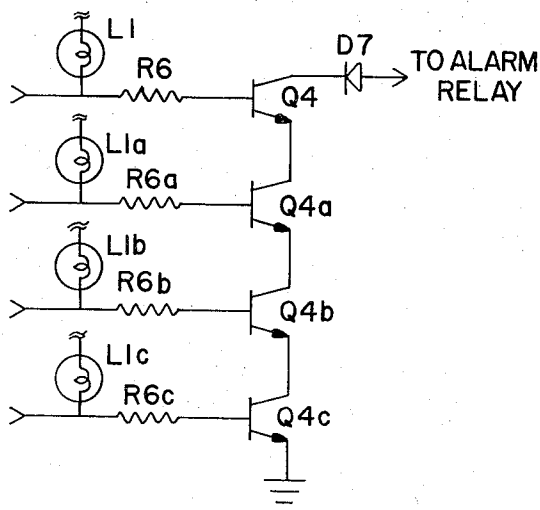


FIG. 4

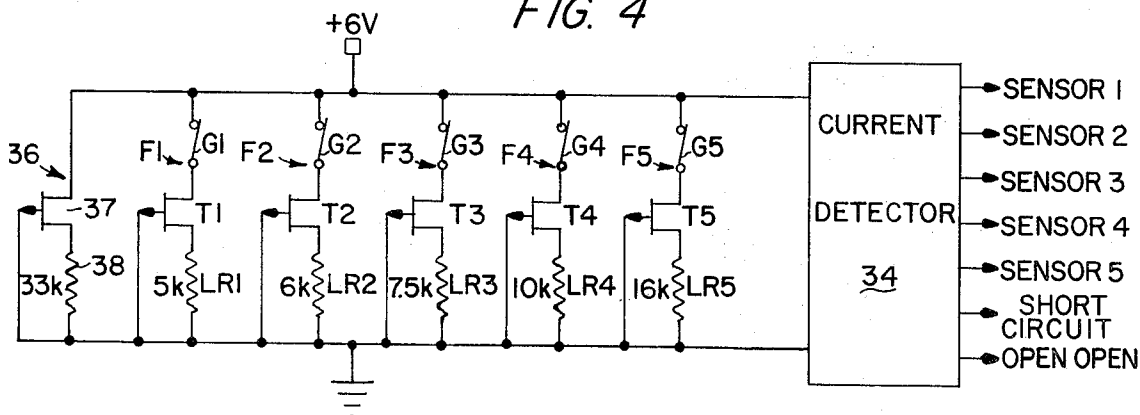


FIG. 5

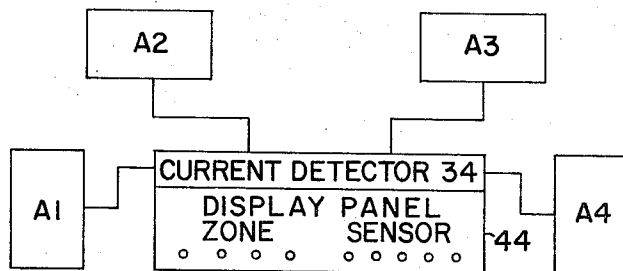
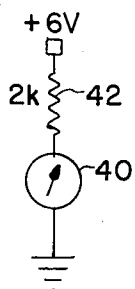


FIG. 6

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ALARM CIRCUITRY**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 condition 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 the building of a 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 com-

prise 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 multi-zone 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 for 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 DRAWINGS

Referring now to FIG. 1 there is shown an alarm circuit 10 constructed in accordance with this invention. The circuit 10 generally 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 C5 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 lights 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 is 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 25a and 25c.

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 25a of relay K2 and also by way of relay coil K1 to the +6 volt supply. The common contact 23c of relay K1 couples to ground and one of the other contacts 23b

couples to audible alarm 30. Contact 23a 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 25c of relay K2 is grounded while the contact 25b couples by way of indicator lamp L3 and resistor R8 to the +6 volt supply. The common contact 27c of relay K2 coupled by way of switch SW2 to the anode of diode D6. The contact 27a of relay K2 couples to the +6 volt supply and the contact 27b 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 25a and 25c 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 transistors 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 authorized 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 indicator light L1 thereby indicating that an alarm condition exists. However, with switch SW3 closed and the alarm circuit not enabled contacts 27a and 27c of relay K2 causes 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 transis-

tors 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 25c couples to contact 25b causing indicator lamp L3 to light thereby indicating that the alarm circuit is in an enabled condition. Similarly, contact 27c switches to contact 27b 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 25c to 25a 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 its 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 by virtue of relay K2 being 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 23c to apply ground to contact 23b 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 tran-

sistor 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 is 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 additional 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 activated one of the lamps illuminates indicating 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 34 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 activated, 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 (milliamps)	ALARM CONDITION
2.1	No alarm
1.5	F1 activated
1.6	F2 activated
1.7	F3 activated
1.8	F4 activated
1.9	F5 activated
1.4 or less	Open circuit condition
3.0	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 ÷ 2K 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 for detecting unauthorized entrance to the structure, comprising:

a sensor operatively associated with the entrance means and responsive to an unauthorized entry to change said sensor from a first state to a second state,

a latch circuit coupled from said sensor for assuming a reset state during said first state and a set state for at least the duration of said second state, said latch circuit having a reset input,

a first lamp means coupled from said latch circuit and that is on when said latch circuit is in the set state

and is off when said latch circuit is in the reset state,
 indicating means responsive to the state of said latch circuit for indicating an alarm condition in response to the set state thereof,
 an enabling circuit including a first switch means, said enabling circuit having one output coupling to said indicating means for enabling operation thereof when the structure is to be protected against unauthorized entrance and for inhibiting operation thereof at other times,
 second lamp means responsive to the state of said latch circuit,
 second switch means including a first contact for permitting said second lamp means to be on when said latch circuit is in the reset state thereby indicating that said sensor is in its first state and said latch circuit is in its reset state in readiness for use,
 and a reset line coupling from another output of said enabling circuit to the reset input of said latch circuit, said reset line for holding said latch circuit reset when said enabling circuit is inhibiting operation of said indicating means,
 said second switch means having a second contact disposed in said reset line for opening said reset line when said second lamp means is permitted to be on.

2. Alarm circuitry as defined in claim 1 comprising a first transistor coupled from said latch circuit to said first lamp means and a second transistor coupled from said first transistor to the first contact of said second switch means.

3. Alarm circuitry as defined in claim 2 wherein said first contact is closed causing illumination of said second lamp means when said latch circuit is in its reset state and said second contact is concurrently opened preventing a resetting of said latch circuit.

4. Alarm circuitry as defined in claim 3 wherein said enabling circuit comprises a third lamp means for indicating the position of said first switch means.

5. Alarm circuitry as defined in claim 4 wherein said first switch means includes a relay and a switch, said relay having one set of contacts coupled to said third lamp means and a second set of contacts coupled to said reset line.

6. Alarm circuitry as defined in claim 5 wherein said alarm indicating means includes a relay coupled from both said second transistor and said first set of contacts for maintaining the relay energized when either said second transistor is conductive or when said third lamp is not illuminated.

7. An alarm circuit for use in a structure having means for detecting unauthorized entrance to the structure, comprising;
 a sensor operatively associated with the entrance

means and responsive to an unauthorized entry to change said sensor from a first state to a second state,
 power supply means,
 a first test switch coupled in series with said sensor and power supply means and being in an open position with testing,
 a latch circuit coupled from said sensor for assuming a reset state during said first state and a set state for at least the duration of said second state, said latch circuit having a reset input,
 a first lamp circuit coupled from said latch circuit and including a lamp that is on when said latch circuit is in the set state and is off when said latch circuit is in the reset state,
 a second lamp circuit coupled from said first lamp circuit and including a lamp that is permitted to be on when the latch circuit is reset,
 indicating means coupled from said second lamp circuit responsive to the state of said latch circuit for indicating an alarm condition in response to the set state thereof,
 an enabling circuit including an on-off switch and bistable means having first and second sets of contacts, said first set of contacts coupling to said indicating means for enabling operation thereof when the on-off switch is on and inhibiting operation thereof when the on-off switch is off,
 a second test switch having first and second poles, said first pole for permitting the lamp of said second lamp circuit to be on when said latch circuit is in the reset state thereby indicating that said sensor is in its first state and said latch circuit is in its reset state in readiness for use,
 and a reset line coupling from the second set of contacts of said bistable means to the reset input of said latch circuit, said reset line for holding said latch circuit reset when said enabling circuit is inhibiting operation of said indicating means,
 said second pole of said second test switch being disposed in said reset line for opening said reset line when the lamp of said second lamp circuit is permitted to be on.

8. The circuit of claim 7 wherein said enabling circuit includes a lamp coupled to the first set of contacts and being illuminated when said indicating means is permitted to operate.

9. The circuit of claim 8 wherein said second test switch is operated to open the reset line, and the first test switch is thereafter opened to test the operation of said latch circuit.

10. The circuit of claim 9 wherein said first and second lamp circuits each include a transistor.

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