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(54) Detector unit and system.

(57) A detector unit, especially for a "child minding" system in hotels, leisure complexes, etc., is a portable unit (12,14) comprising means to sense movement (24a,24b) and noise (22) within a zone being monitored. An alarm signal can also be generated manually from the unit by push-button means (26). The unit will only trigger a positive alert signal if detected movement and/or noise does not conform to preset tolerances or patterns. A plurality of units are linked to a central control which is itself connected to a plurality of remote display units on each of which a characteristic alert signal is displayed.

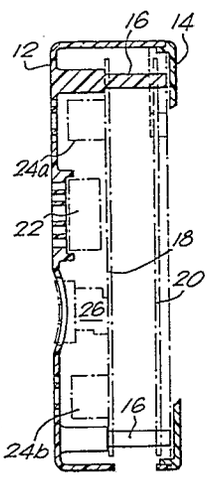

FIG.2.

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Description

DETECTOR UNIT AND SYSTEM

This invention relates generally to detector units adapted to sense movement and noise, and also to a system comprising a plurality of such detector units linked to remote display means.

The present invention is particularly concerned with detector units and detector systems which are suitable for "child minding". There is a need in hotels, time-share complexes, holiday camps, caravan sites, etc. for a monitoring system whereby parents of children can leave a child in a room but be alerted to the fact that the child is awake or needs attention. Various "child minding" systems are known, based upon the use of a microphone mounted within the room and linked to a central control, such as a hotel reception desk. However, such a system has a number of drawbacks. It requires the hotel management then to find and alert the parents with the need arises, which can be difficult or take a considerable length of time. There is also the ever-present uncertainty on the part of the parents as to whether everything is as it should be or whether they might perhaps be needed, often resulting in the parents returning at intervals to the room to check that all is well.

Also, a unit based upon the use of a microphone only will not respond to movement. Movement which should desirably trigger an alert response includes intrusion into a room through door or window for example, and movement of the child itself. In certain instances, illness or distress of a child may not manifest itself in emitted sounds but rather in excessive movements, and existing "child minding" systems do nothing to generate an alert in response to such occurrences.

It is an object of the invention to provide a detector unit appropriate for a child minding situation which is responsive both to sound and to movement.

It is further, preferred object of the invention to provide a detector system which is "intelligent" in that it is able to assess whether a detected sound or movement is such that an alert signal should be generated, i.e. a genuine alarm situation, or is such that the sound or movement should be ignored.

It is an object of the present invention to provide a detector unit and detector system which provide a much greater degree of reassurance to the parents and which enable the parents themselves to maintain a watch over the alarm system of their own room.

In accordance with the present invention there is provided a detector device comprising a portable sensor unit arranged to be positioned in a zone to be monitored, the sensor unit comprising means to sense movement and noise within the zone being monitored, and control means on said sensor unit enabling the sensor unit to be activated and an alarm signal to be generated manually.

Preferably, the portable detector device is arranged to be fitted to a wall-mounted receiving socket, the fitting of the detector device to the socket providing the appropriate power supply to the detector device.

Preferably, the sensor unit includes, in addition to a sound sensing means, a pair of ultrasonic transducers arranged to detect movement within the zone being monitored.

Desirably, the detector device or the system into which it is incorporated has a built-in delay period and an alarm signal is generated only if movement and/or noise persists beyond a preset period or does not conform to a preset pattern which the device or system has been programmed to ignore.

In accordance with another preferred aspect of the present invention there is provided a detector system comprising a plurality of the said individual portable detector devices which can be positioned within respective zones to be monitored, a central control means with which the detector devices are in communication, and a plurality of remote display means to all of which a signal generated by any one of the detector devices is relayed for display.

According to a preferred embodiment of the system the remote display means comprise a number of display screens which can be positioned for example in different parts of a hotel or leisure complex for example, and all linked to the central control means. Then, in the event of an alarm signal being generated manually or automatically by any of the detector devices, an indication of this well appear on all the display screens. For example, the alarm indication can be a representation of the particular room number of the room from which the alarm call has been generated.

According to a preferred feature of the system, messages can also be relayed from the central control means to the remote display screens, e.g. as a paging system.

Although the detector device and detector system of the present invention are particularly concerned with alerting people to children in distress, the detector devices and system will also function to detect intruders in the zones being monitored. They will also respond to smoke and/or fire alarms within the said zones provided that these generate an audible signal when actuated.

In order that the invention may be more fully understood, one presently preferred embodiment in accordance with the invention will now be described by way of example and with reference to the accompanying drawings, in which:

Fig. 1 is a front view of a detector device in accordance with the invention;

Fig. 2 is a sectional view taken along the line II-II in Fig. 1;

Fig. 3 is a front view of a receptacle for the detector device of Fig. 1;

Fig. 4 is a side view, partly in section, of the receptacle of Fig. 3; and;

Fig. 5 is a schematic illustration of a detector system in accordance with the present invention.

Referring first to Figs. 1 and 2, there is shown a detector device comprising a two-part housing 10, for example of injection moulded plastics material. The housing 10 comprises a front portion 12 and a base 14. The housing front portion 12 is provided with there internally projecting bosses 16 which serve to mount two printed circuit boards, a first, sensor board 18 which carries sensors and which is an analogue signal circuit board, and a second, logic board 20 which just carries logic circuitry. Within the front portion of the housing there is mounted a microphone 22 to pick up any sound within the zone in front of the detector device which is to be monitored. A plurality of holes 23 are provided in the housing immediately in front of the microphone. Above and below the microphone are mounted two ultrasonic sensors 24a and 24b. These sensors 24a and 24b consist of a transmitter and a receiver respectively and are arranged to sense movement within the zone being monitored. Preferably, they function at a frequency of 40 kHz. For example, they can have an effective range of about 7 m. A hole of 7 mm diameter is provided through the front portion of the housing immediately in front of each of the sensors 24a and 24b for the passage of the sensing beam. The microphone 22 and the ultrasonic sensors 24a, 24b are each connected to the sensor board 18.

Also connected to the sensor board 18 is a switch unit indicated generally at 26 which comprises three switches, namely a monitor switch 27, an alarm switch 28 and a standby switch 29. These three switches are arranged to be individually illuminated, as appropriate, by the incorporation of light-emitting diodes. Each switch 27, 28 and 29 has a push-button which projects forwardly of the housing through a hole in the front housing portion.

The detector unit 10 is arranged to be fitted into a receptacle which is shown in Figs. 3 and 4 and which is indicated generally at 40. The receptacles 40 is arranged to be wall-mounted. The receptacle housing is provided with three rearwardly projecting bosses 42 to receive screws and bolts for mounting the receptacle on a wall. The receptacle also houses appropriate connections to the sensor board 18 and logic board 20 within the sensor unit. The sensor unit 10 is provided with ribs 46 by means of which the sensor unit is held in place in the receptacle 40.

As shown in Fig. 5, the individual sensor units 10 are connected to remote "slave units" 48, with for example up to 20 room detectors 10 being linked to each slave unit 48. The slave unit 48 are all connected to a central console 50, which may be positioned at a hotel reception desk for example, and also includes microprocessor control means. The console 50 is connected to a plurality of remote display screens 52. The slave units 48 may be located in service ducts, cupboards, etc., and include microprocessors responsive to the detected signals. A low voltage d.c. power supply is taken from the slave units to the individual detector units 10, thus removing any high voltage power supply, transformers, etc. from the room units.

The system operates as follows. On arrival at the hotel or other establishment, a person wishing to use the system will obtain, for example hire, a sensor unit 10 and will fit it into the receptacle 40 in his room. By pressing the standby switch 29 the user can confirm that the system is functioning correctly. When the user wishes to leave the room and monitor the room or a child in the room then it is simply necessary to press the monitor switch 27 in order to activate that unit. There then follows a 20 second delay period before the unit becomes "active", in order to give time to leave the room. If thereafter there should be any movement or noise within the room sufficient in volume and/or duration to trigger the ultrasonic sensors 24a and 24b or the microphone 22, then the particular room number which matches that particular sensor unit will appear on all the remote display screens 52, indicating that there is an alert situation in that room which requires attention. On returning to the room the user simply has to press the standby switch 29 in order temporarily to deactivate the system. On subsequently leaving the room again the system can be reactivated by again pressing the monitor switch 27. If a child or other person within the room wishes to call for attention then pressing of the alarm switch 28 will also cause the room number to appear on the remote display screens 52.

The detector system of the present invention is 35 "intelligent" in that it is programmed to ignore noise and movement which is not representative of a true alert situation. Although there are various ways in which this can be done, according to the preferred system, the desired result is achieved by the units 10 operating in an on-off sensing mode, based upon unit time periods of 5 seconds for example. The unit is "on" for 5 seconds, then "off" for 5 seconds, etc. A complete sensing period covers 5 "on" periods and 4 "off" periods, i.e. a total of 45 seconds. Other lengths of time period and combinations of periods may of course be used. If sound or movement is detected in four out of the five "on" periods, then this is taken as a positive indication and the alarm is signalled. At the end of the 45 second period the sensor resets. This assessment of the detected signals is effected by the microprocessors in the slave units. They are programmed to accept and ignore certain signals or combinations of signals and only to trigger an alert if what is detected does not conform to the software programme.

The actual form of the display on the remote screens 50 can be chosen as desired. For example, when an alarm signal is initially received from a room, the room number may appear full-screen size initially for a predetermined period in order to attract maximum attention. The time of the alarm call is also displayed. After that predetermined period of time the full-screen size number and time can then revert to a smaller size and be displayed along one edge of the screen together with the numbers of any other rooms which have been "called" but not yet answered. It is thus possible for any person to look at any of the remote screens 52 at any time and to determine whether the unit in their own particular room has been activated. There is also provision for central recording of the time that any sensor unit is reset after an alarm signal has been given.

The remote display screens 52 can also be used for the display of messages from the central control 50, in the manner of a paging system.

Although in the system described above the connection of the detector units 10, the slave units 48, the control console 50 and the display screens 52 is by way of electrical wiring, it is possible, and is within the scope of this invention, to use radio links between some or all of the hardware units for the transmission of signals.

Claims

1. A detector device comprising a portable sensor unit arranged to be positioned in a zone to be monitored, the sensor unit comprising means to sense movement and noise within the zone being monitored, and control means on said sensor unit enabling the sensor unit to be activated and an alarm signal to be generated manually.

2. A device according to claim 1, in which the means to sense movement comprises an ultrasonic transmitter and receiver.

3. A device according to claim 1 or 2, in which said control means includes first manually operable means to test the operational integrity of the device, second manually operable means to enable the device to be put on standby, and third manually operable means actuation of which triggers an alarm signal.

4. A device according to claim 2 or 3, which includes a receptacle unit adapted to be mounted permanently within the said zone and adapted to receive the portable sensor unit.

5. A device according to any preceding claim, in which the means to sense movement and noise comprises a pair of spaced ultrasonic transducers for detecting movement, and a microphone for detecting sound positioned between said transducers.

6. A detector system comprising a plurality of detector devices as claimed in any preceding claim, microprocessor control means remote from said detector devices and with which the detector devices are in communication, and a plurality of display means remote from the microprocessor control means and to all of which any alarm signal generated by the microprocessor control means is relayed for display.

7. A detector system according to claim 6, in which the detector devices operate in an "on-off" sensing mode, and in which the microprocessor control means is programmed to decide whether a signal from a detector device requires an alarm signal to be generated in dependence on the pattern of signals from the detector device over a plurality of sequential periods for which the detector device is "on".

8. A detector system according to claim 7, in which an alarm signal is generated by the microprocessor control means if a signal representative of noise and/or movement is detected in four out of five successive periods for which a detector device is "on".

9. A detector system according to claim 6,7 or 8, in which the display means comprises display screens, and in which, upon generation of an alarm signal, a visual signal characteristic of the particular zone from which the alert has come is initially displayed full-screen, and after a predetermined period, if the detector device has not been deactivated, the visual signal is then displayed at the screen margin.

10. A detector system according to any of claim 6 to 9, which includes a number of slave units each linked to a plurality of detector devices and incorporating first microprocessor control means, and a central control unit linked to the slave units and incorporating second microprocessor control units.

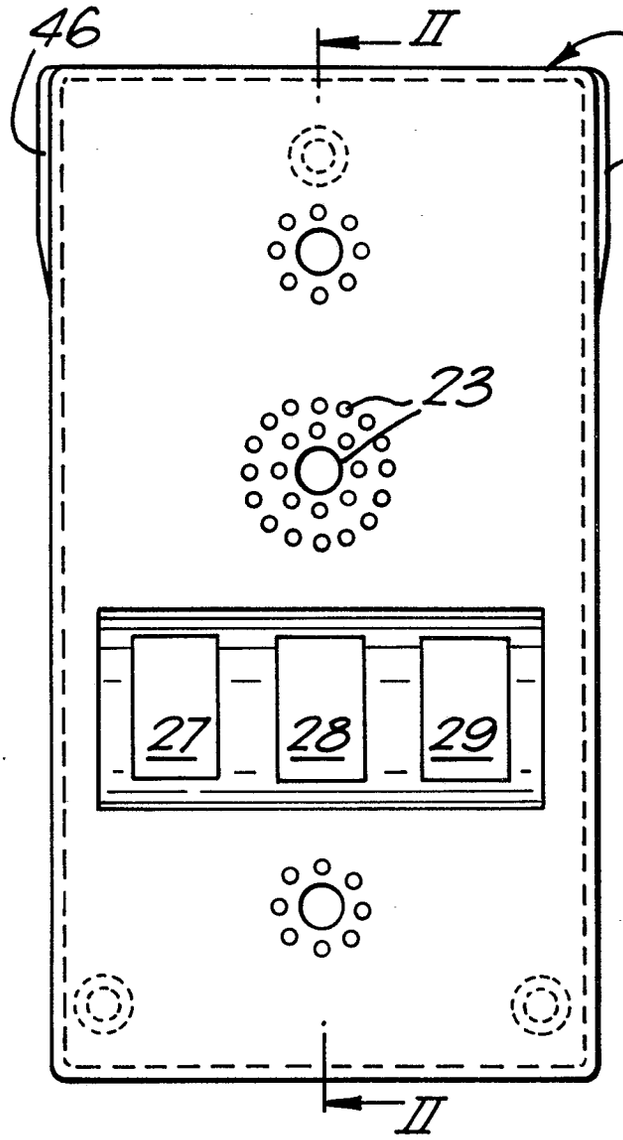

FIG.1.

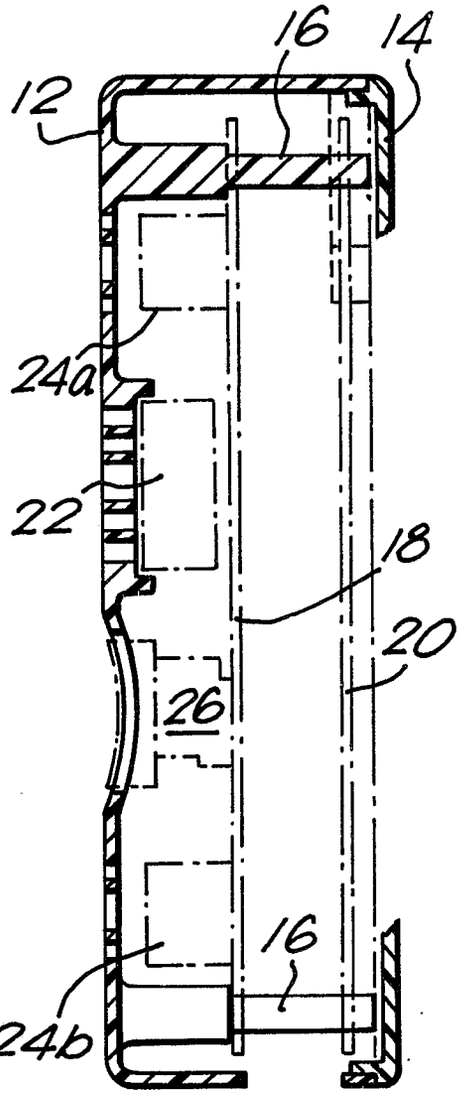

FIG.2.

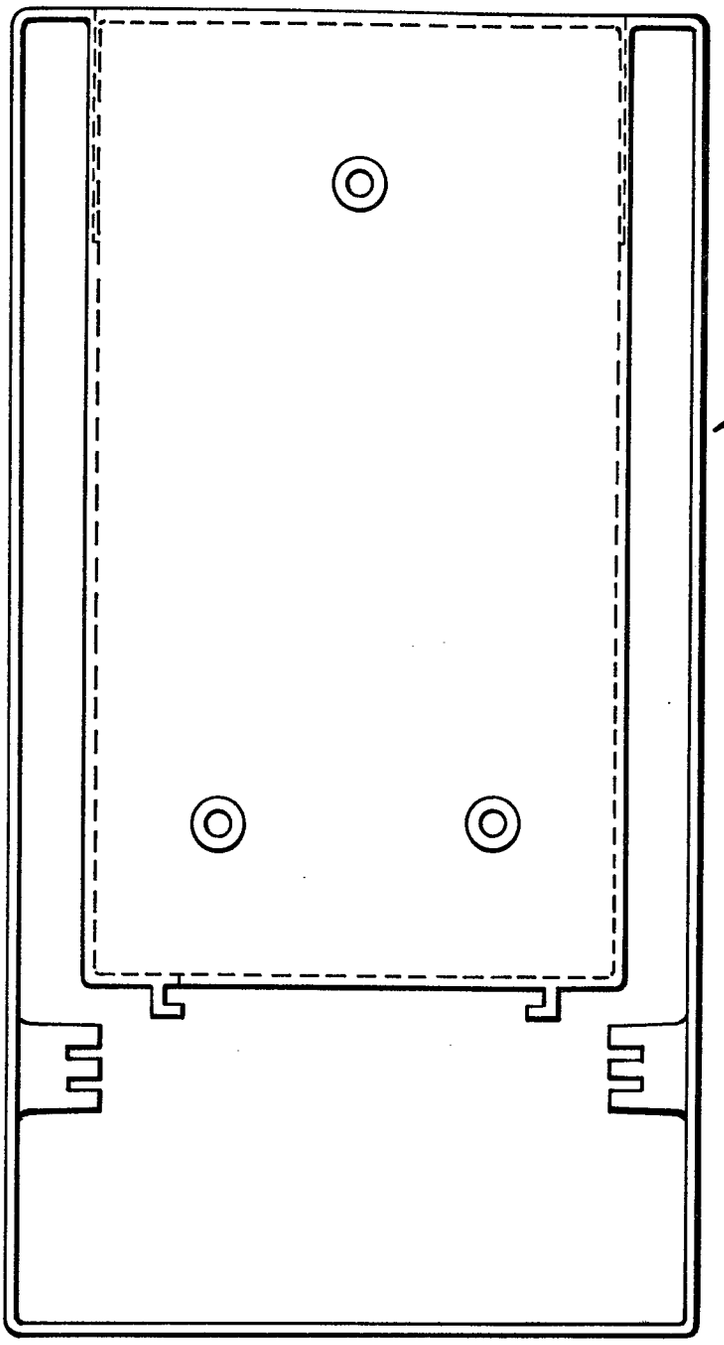

FIG.3.

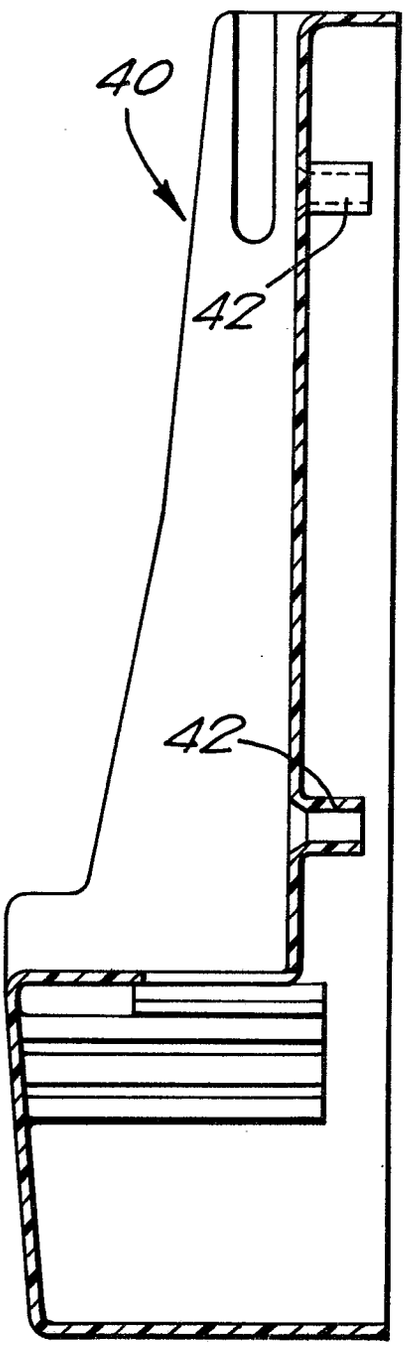

FIG.4.

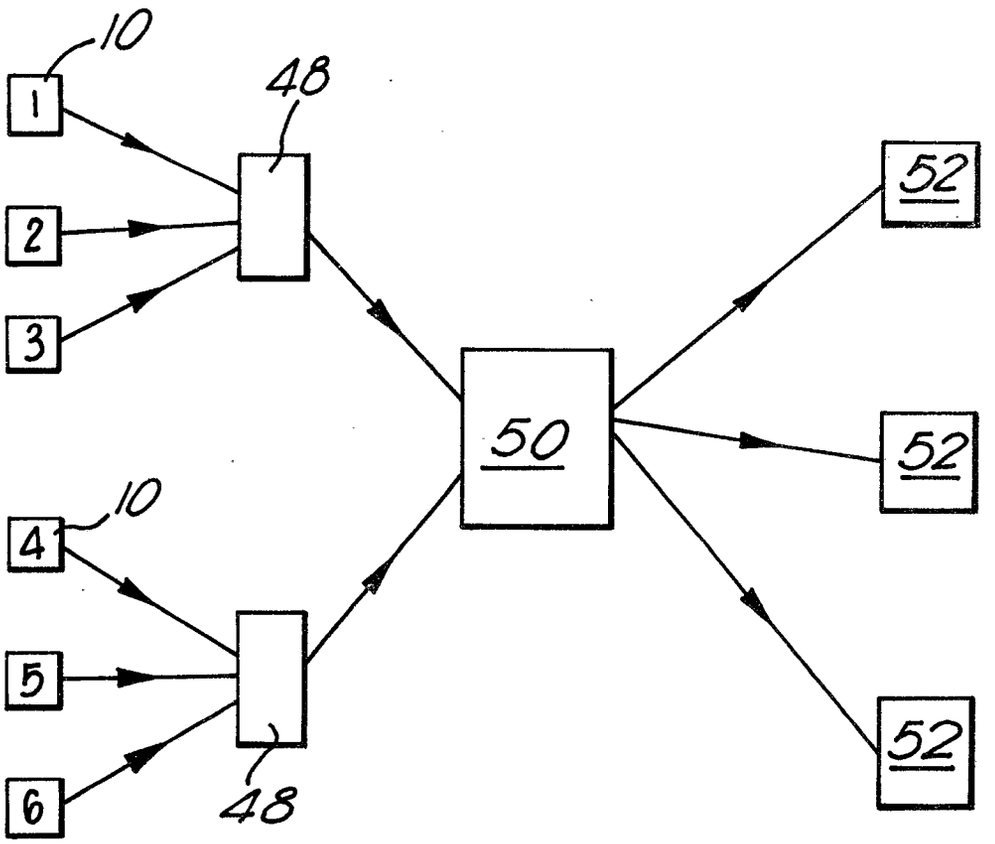

FIG.5.