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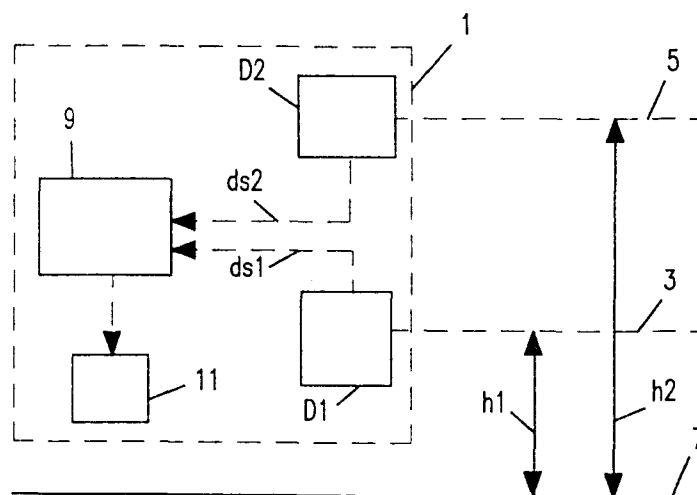
(54) Security device

(57) Security devices are widely used for guarding spaces or areas (for example outdoor areas), with detectors monitoring different planes.

It is a requirement for a good operation of a security device that the risk of false alarms should be reduced

to a minimum.

Each plane is subdivided into several subplanes in that the detector for each plane is provided with several sensors which are positioned so as to enclose an angle with one another. The risk of false alarms is substantially reduced thereby.

**Fig.1****EP 0 834 844 A1**

Description

The invention relates to a security device comprising at least two detectors which cover different horizontal planes, and a processing circuit for processing signals which are generated by the detectors when in operation.

Security devices are generally known. It is required for a good operation of a security device that the risk of false alarms occurring should be reduced to a minimum.

European Patent Application EP-A-0656505 discloses a security device in which several detectors are placed next to one another with the purpose of preventing false alarms occurring. These detectors all cover the same area to be monitored, the processing circuit comparing the detection signals generated by the detectors and giving an alarm signal or registration signal only if all detectors simultaneously give a detection signal.

A security device is known from European Patent Application EP-A-0624857 wherein a distinction is made between the detection of, for example, a person and a dog. To be able to make this distinction, sensors of the detectors scan areas (planes, regions) at different vertical levels. Furthermore, vertical regions corresponding to the height of a person are also scanned in this known security device. This renders it possible to distinguish between a person and a dog, for example, because a dog occupies only part of the vertical region and a person substantially the entire region.

German Patent Application DE-A-3600259 describes a proximity detector in which a detection of electromagnetic radiation, in particular infrared radiation, is carried out simultaneously in two planes which are vertically above one another. The presence or absence of a time difference between the moments at which signals are captured by the sensors of the two separate planes determines whether an alarm or registration signal is given.

A disadvantage of known security devices is that a false alarm can still occur in practice in spite of the measures taken, especially if the spaces or areas (for example outdoor areas) to be monitored are large.

The guarding of outdoor areas is made even more difficult by the presence of birds, which increases the risk of false alarms in the known security devices.

A further disadvantage of the security device according to the European Patent Application EP-A-0624857 is that there will be a difference in detection signal in dependence on the distance from the object (person, animal, etc.) to the detector.

A further disadvantage of the known security devices is that they have been made complicated and expensive so as to minimize the risk of false alarms.

The invention has for its purpose to provide a security device which does not have the above disadvantages. A security device according to the invention is for this purpose characterized in that the detector comprises several sensors for each plane, which sensors are

arranged so as to enclose an angle with one another, subdividing the plane into several subplanes.

It was possible with the known security devices that, especially if a large (outdoor) area was to be monitored, the simultaneous presence in this area of a bird and a dog was interpreted by the security device as being the presence of a human person in the area.

This problem is eliminated in that the planes are subdivided into subplanes. More or fewer subplanes may be used, depending on the desired accuracy, through the placement in the security device of a detector having more or fewer sensors.

US-A-4,849,635 describes a security device comprising an infrared detection unit which is placed at a distance from the floor and which is capable of detecting only the infrared rays from a number of subplanes. These subplanes together form a diverging beam, as seen from the detection unit. However, it is a disadvantage of this device that, in proportion as the distance between the floor and the detection unit increases, the subplanes will increase in size to such an extent that a person will be present in only one of the subplanes once a certain distance between the floor and the detection unit is reached and will not be detected as such by the detection unit.

An embodiment of a security device according to the invention is characterized in that the security device comprises two detectors which cover two planes.

A further embodiment of a security device according to the invention is characterized in that the number of subplanes per detector is at least two.

In an advantageous embodiment, the sensors are each coupled to a glass fibre element which is at least partly enveloped by a tubular member.

Transport of infrared radiation takes place here by means of the glass fibre elements, for example glass fibre cables. The angle at which the glass fibre is capable of detecting infrared radiation can be varied in that the glass fibre cables are at least partly, preferably at the ends thereof, enveloped by a tubular member and in that the distance from the end of the glass fibre to the end of the tubular member facing away from the end of the glass fibre is varied.

Preferably, the tubular member has a substantially conical shape.

An even greater variation in the planes to be monitored can thus be achieved. The upper and lower sides of the tubular member are flattened in a favourable embodiment, so that the infrared radiation is measured in particular at a horizontal angle, not at a vertical angle. Measurement at a - too great - vertical angle has the disadvantage that the planes of two detectors placed above one another will overlap.

The use of separate sensors, in particular separate glass fibre sensors, each with its own field of detection, has the advantage that it can be very accurately determined in which of the fields signals are measured. This is in contrast to embodiments of sensors according to

the present state of the art such as described in, for example, US-A-4,849,635, where a reflector element reflects incident radiation originating from different subplanes into an infrared detection unit. Infrared radiation is continuously applied to the detector here, whereas in a separate sensor coupled to a glass fibre the infrared radiation is applied to the sensor once only. It is possible in the latter type of infrared detection to adjust the sensitivity of the device through modification of the length of a pulse which is generated in the case of a change in heat.

Another important advantage of the sensor system according to the present invention is that the sensitivity to pollution and condensation, especially present in the case of reflector elements, is avoided.

Moreover, the detection unit according to the present invention can be given a very compact construction in that, for example, several sensors with glass fibre cables coupled thereto are accommodated in one compact component. Another possibility is, for example, to construct the sensor as a block sensor which is subdivided into a number of planes, and the same number of glass fibres is used for measuring signals from the respective planes.

The invention will now be explained in more detail by way of example with reference to the accompanying Figures, in which:

- Fig. 1 diagrammatically shows an embodiment of a security device according to the invention, and
 Fig. 2 is a diagrammatic plan view of the security device of Fig. 1.

<And what about Fig. 3?>

Fig. 1 diagrammatically shows an embodiment of a security device 1 according to the invention. This embodiment of the security device comprises two heat and/or proximity detectors D1 and D2 which are placed at a height h1 (for example 50 cm) and at a height h2 (for example 150 cm), respectively, above the floor level 7. The detectors cover respective planes 3 and 5 (each subdivided into a number of subplanes, cf. Fig. 2).

When a detector D1 or D2 detects an object, person, or animal, this detector will give a detection signal ds1 or ds2, as applicable, to a processing circuit 9.

The processing circuit will ascertain whether a signal is received from both detectors simultaneously and will only give a signal to, for example, an alarm installation 11 if this is indeed the case.

The detection signals ds1 and ds2 given off by the detectors contain information on the respective subplanes in which the detection has taken place.

The alarm installation 11 may be coupled to, for example, an optical, acoustical, or differently operating alarm, or the like.

A well-known drawback of the infrared detectors is

that hot/cold fluctuations (for example, cloudy vs. sunny periods) can cause false alarms. A known solution is to use a radar detector, which operates independently of hot/cold fluctuations, in addition to the infrared detectors.

Fig. 1 is a plan view of the security device 1 of Fig. 1. The same components have been given the same reference numerals here as much as possible. As was noted above, the detectors D1 and D2 each cover a respective plane 3 and 5. In this embodiment, the planes are each subdivided into five subplanes S1, S2, S3, S4 and S5 (and S1', S2', S3', S4' and S5', respectively).

Each detector in this embodiment comprises as many sensors as there are subplanes for the relevant detector (five for either detector in this embodiment).

The sensors are arranged in the detector in such a manner that they cover the area to be monitored without voids.

In a preferred embodiment, the transport of infrared radiation takes place by means of glass fibre cables which are surrounded at least at the ends thereof by a tubular member which preferably issues into a flared end in the direction of the end of the glass fibre cable. The angle at which the flared end issues and the distance from the end of the glass fibre cable to the end of the tubular member define the subplane in which detection of infrared radiation can take place.

Fig. 3 gives an example of the latter embodiment of the device. The reference numerals S1 to S5 identify the sensors for the respective subplanes. The sensors are each coupled to a glass fibre 20 which near its end is surrounded by a tubular member 22 having a conical shape. The shape of the conical tube 22 and the distance from the end of the glass fibre to the end of the tube 22 facing away from the former end define the angle by which the subplane to be detected deviates. As was noted above, the upper and lower sides of the tube 22 are preferably flattened.

The subdivision into subplanes will have the result that the security device 1 will not detect a bird V in subplane S5' and a dog H in subplane S3 as a person. By contrast, a person P present in the subplanes S4 and S4' will be interpreted as the presence of a person and passed on to the alarm installation 11.

It will be obvious that the security device according to the invention is susceptible of various modifications without departing from the scope of the invention. Thus, for example, the number of subplanes may be adapted to the application in that the detector is fitted with the required/desired number of sensors (and accordingly subplanes). It is obviously also possible to use, for example, three detectors at three levels instead of two detectors at two levels.

It is usual, furthermore, to use a radar detector in addition to the infrared detectors, as was noted above.

It is also possible to choose a different number of subplanes per level in dependence on the application and the relevant requirements or desires.

Claims

1. A security device comprising at least two detectors which cover different horizontal planes, and a processing circuit for processing signals which are generated by the detectors when in operation, characterized in that the detector comprises several sensors for each plane, which sensors are arranged so as to enclose an angle with one another, subdividing the plane into several subplanes.
2. A security device as claimed in Claim 1, characterized in that the security device comprises two detectors which cover two planes.
3. A security device as claimed in Claim 1 or 2, characterized in that the number of subplanes per detector is at least two.
4. A security device as claimed in any one or several of the Claims 1 to 3, characterized in that the sensors are each coupled to a glass fibre element which is at least partly enveloped by a tubular member.
5. A security device as claimed in Claim 4, characterized in that the tubular member has a substantially conical shape.

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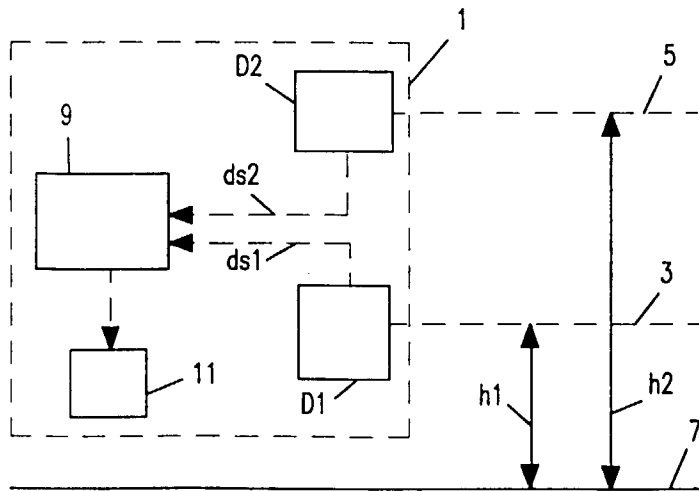


Fig.1

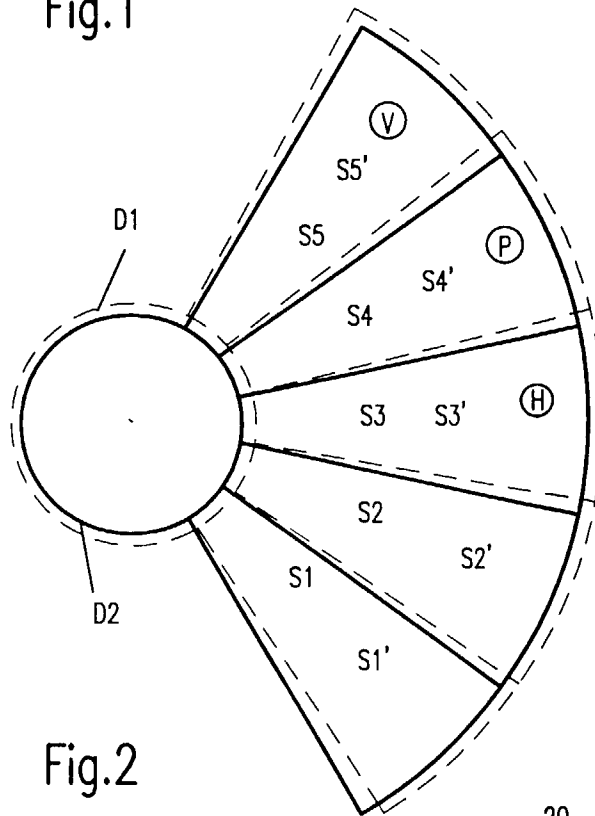


Fig.2

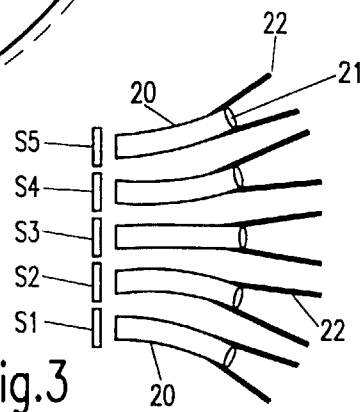


Fig.3



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Application Number
EP 97 20 3017

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y,D	DE 36 00 259 A (HIRSCHMANN RADIOTECHNIK) 9 July 1987 * column 3, line 50 - column 4, line 30; figure 1 *	1-4	G08B13/19
Y,D	US 4 849 635 A (SUGIMOTO TADASHI) 18 July 1989 * the whole document *	1-4	
Y	DE 37 36 616 C (MESSERSCHMITT-BÖLKOW-BLOHM GMBH) * claims 1,3-5; figures 1,4A,4B,4C *	4	
A	DE 88 08 644 U (ASEA BROWN BOVERI AG) * page 5, line 14 - page 6, line 4; figure 1 *	4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G08B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 December 1997	Examiner Wanzeele, R
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