(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 720 141 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.11.2006 Bulletin 2006/45

(51) Int Cl.:
G08B 13/183 *(2006.01)*

(21) Application number: **06009165.9**

(22) Date of filing: **03.05.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **03.05.2005 IT MO20050112**

(71) Applicant: **Meta System S.p.A.**
42100 Reggio Emilia (IT)

(72) Inventor: **Simonazzi, Giuseppe**
42100 Reggio Emilia (IT)

(74) Representative: **Brogi, Graziano**
APTA S.r.l.
Via Giardini 645/1
41100 Modena (IT)

(54) Perimetral protection apparatus, particularly for anti-break-in systems

(57) The present invention refers to a perimetral protection apparatus, particularly for anti-break-in security systems, comprising an electronic barrier that can be positioned near an opening located between a first area and a second area. The electronic barrier features at least one sensor for detecting the transit of a person or object through the opening. Furthermore, the perimetral protection apparatus comprises means for determining the direction of transit through said electronic barrier.

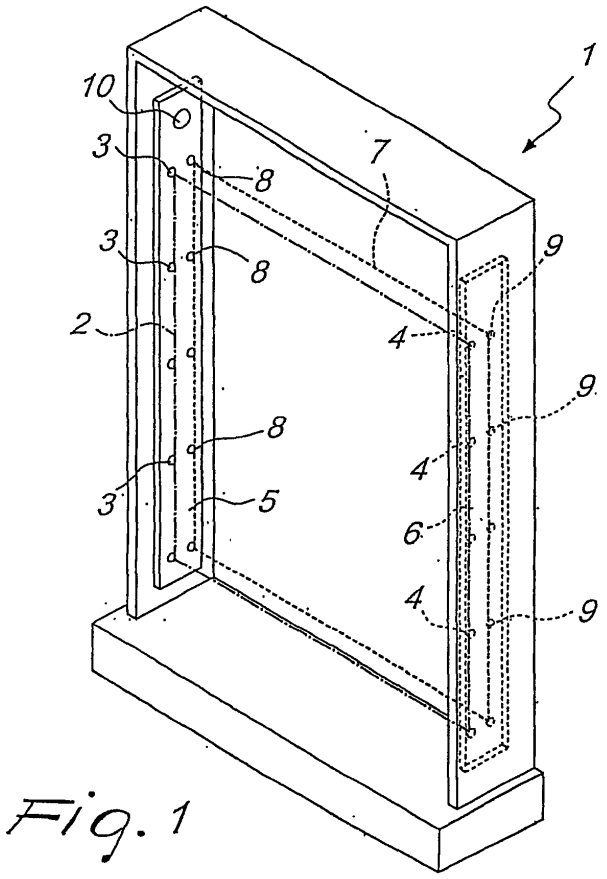

Fig. 1

EP 1 720 141 A2

Description

[0001] The present invention refers to a perimetral protection apparatus, particularly for anti-break-in systems.

[0002] It is well known that perimetral protection apparatuses exist on the market able to signal the crossing of specific protected areas.

[0003] These protection apparatuses feature the use of transmitter and receiver devices, positioned so as to create an electronic barrier by means of light, laser, infra-red or micro-wave beams. In the event of a person or, more generically, an object interrupting such beam, the barrier is able to indicate that it has been crossed.

[0004] In particular, a category of electronic barriers exists that is used in alarm systems and is normally fitted on windows and/or doors, able to send an alarm signal to a break-in alarm unit in the event of the barrier being crossed by an intruder.

[0005] For obvious reasons of visibility, such electronic barriers generally operate within infra-red beam range and are distinguished by transmitter and receiver devices located on door or window jambs so as to create a network of beams for anti-break-in protection.

[0006] A common configuration is that which, on a first column fastened to a window or door jamb, infra-red transmitters are fitted that send a continuous and modulated beam to infra-red receivers located on a second column fastened to the opposite window or door jamb. Crossing the opening causes the interruption of one or more beams, which fail to reach their respective receivers. The receivers are connected to an alarm unit to which they send a break-in signal. The number of transmitters and corresponding receivers substantially depends on the amount of security required according to the height of the opening to be protected.

[0007] Another embodiment option envisages the use of suitable reflecting devices. In particular, in this case, the infra-red transmitters and receivers are both located on a first column, while the reflecting devices are located on a second column.

[0008] Combinations of the two possible embodiments indicated above are also known on the market.

[0009] Such perimetral protection apparatuses are not without drawbacks; in particular, a first limit relates to the problems which the triggering of a security system created using such devices can cause due to the accidental interruption of the electronic barrier beams by a person inside the area to be protected. In the case, for example, of the perimetral protection apparatuses being fitted on door and windows in a private home, the owner could decide to switch on the security system while remaining inside the house and deciding to keep the windows open. In this case, if the owner leans out of the window, the alarm will accidentally trigger.

[0010] A further limit concerns the limited autonomy of the electronic barriers in the event of these being battery-powered, such units being commonly used because they are easy to install.

[0011] The main aim of the present invention is to eliminate the above drawbacks of the known technique by excogitating a perimetral anti-break-in protection apparatus that ensures the greatest freedom of movement to persons being inside the protected rooms.

[0012] As part of such technical aim, another purpose of the present invention is to achieve low energy consumptions, thus ensuring high autonomy when using the apparatus.

[0013] Another purpose of the present invention is to achieve the previous aims with a simple structure, of relatively practical implementation, safe use and effective operation, as well as of a relatively low cost.

[0014] This aim and these purposes are all achieved by a perimetral protection apparatus, particularly for anti-break-in security systems, comprising an electronic barrier that can be positioned near an opening located between a first area and a second area and provided with at least one sensor for detecting the transit of a person or object, characterised by the fact that it comprises means for determining the direction of transit through said electronic barrier.

[0015] Further characteristics and advantages will appear even more evident from the description of a preferred, but not exclusive, form of embodiment of this invention, illustrated by way of non limiting example in the accompanying drawings, wherein:

the figure 1 is a perspective view of the perimetral protection apparatus according to a first form of embodiment of the invention;
the figure 2 and figure 3 are a perspective view and a front view respectively of the apparatus according to a second form of embodiment of the invention;
the figure 4 is a section according to section axis IV-IV of figure 3;

[0016] With special reference to such figures, the perimetral protection apparatus, particularly for anti-break-in systems, generally designated by reference numeral 1, comprises an electronic barrier 2, which can be positioned near an opening located between a first area and a second area. The electronic barrier 2 comprises a plurality of sensors for detecting the transit of a person or object which can be installed on at least two modules fastened along the perimeter of the opening.

[0017] Each sensor consists of a transmitter device 3, arranged on a transmitter module 5, and of a receiver device 4, arranged on a receiver module 6. The transmitter module 5, in actual fact, comprises a plurality of transmitter devices 3 able to transmit respective beams towards a plurality of receiver devices 4 fastened to the receiver module 6 to create a network of beams able to protect the opening.

[0018] In particular, the two modules consist of two columns that can be fastened to door and window jambs, to one of which is fastened a row of infra-red transmitters that send a continuous and/or modulated infra-red beam

to respective infra-red receivers located on the other column. Crossing the opening necessarily interrupts one or more beams, causing reception failure on the part of the infra-red receivers, which are able to send a signal of the interruption occurred.

[0019] The number of infra-red transmitters and relevant infra-red receivers substantially depends on the amount of security required according to the height of the opening to be protected.

[0020] In an alternative form of embodiment of the electronic barrier 2, not shown in the figures, the transmitter devices 3 and the receiver devices 4 can be fastened to only one transmitter and receiver module while a second reflecting module can be provided for reflecting the beams produced by the transmitter devices 3 to the receiver devices 4 so as to create a network of beams to protect the opening.

[0021] A characterising feature of the invention in question is that it comprises means for determining the direction of transit through the electronic barrier.

[0022] With particular reference to a first form of embodiment, shown in figure 1, the means for determining the direction of transit comprise at least a second barrier 7 arranged sequentially with respect to the electronic barrier 2 along the direction of transit between the first area and the second area, so that the barriers can be crossed sequentially during the transit of a person or object from the first area to the second area, or vice versa.

[0023] The second barrier 7 preferably comprises a plurality of second sensors installed on the two modules 5 and 6 and arranged, together with the sensors of the electronic barrier 2, along the direction of transit between the first area and the second area. In particular, the second sensors consist of transmitter devices 8 and receiver devices 9, fastened to the transmitter module 5 and receiver module 6 respectively and arranged along parallel rows with respect to the transmitter devices 3 and receiver devices 4 making the electronic barrier 2.

[0024] The means for determining the direction of transit include a control device connected to the sensors of the electronic barrier 2 and to the sensors of the second barrier 7. The control device is a microprocessor electronic circuit, preprogrammed to define and detect a first crossing sequence of the electronic barrier 2 and of the second barrier 7 during crossing by a person or object from the first area to the second area, and to define a second crossing sequence of the electronic barrier 2 and of the second barrier 7 during crossing by a person or object from the second area to the first area.

[0025] The control device is also connected to an alarm unit. More specifically in the event of the control device detecting - during the crossing of the opening by a person or object - a first crossing sequence of the electronic barrier 2 and of the second barrier 7, then it sends an alarm signal to the alarm unit with consequent activation of break-in signalling systems.

[0026] In this case, for example, a break-in is detected from an outer area, indicated above as first area, to an area inside a home, indicated as second area, and an alarm signalling system is activated which preferably features the use of an acoustic signal and/or the sending of signals to police stations or, more generically, to surveillance centres.

[0027] In the event of the control device detecting a second crossing sequence, no signal is sent to the alarm unit and the alarm signal is not triggered and thus remains in standby.

[0028] In actual fact, the perimetral protection apparatus 1, according to the above embodiment, is able to recognize the direction of crossing of the opening by a person or object. This way, the alarm signal only triggers following access from outside towards the inside of a protected area by an intruder, and any accidental activation of the alarm system by a person inside the protected area is avoided.

[0029] Usefully, the perimetral protection apparatus 1 features energy saving means that are particularly useful in case of battery-powered barriers. More specifically, the electronic barrier 2 and the second barrier 7 are normally deactivated, and can be activated by means of a starting sensor 10 sensitive to any nearby movement. In particular, the starting sensor 10 is turned in the direction of the first area so as to force the start of the electronic barrier 2 and of the second barrier 7 only if a movement is detected outside the second area to be protected, thus further reducing consumptions and avoiding starting caused by movements inside the second area to be protected. If, after a pre-set time lapse, the network of beams created to protect the opening is not interrupted, the energy saving means again deactivate the electronic barrier 2 and the second barrier 7.

[0030] Advantageously, the starting sensor 10 comprises serial connection to the infra-red transmitters and/or receivers of the two barriers so as to command their starting after a movement has been detected. Alternatively, it can feature the connection of the starting sensor 10 to the control device, the processor of which is programmed to activate the sensors of the two barriers in response to a detection signal produced by the starting sensor 10.

[0031] In particular, this starting sensor 10 features passive infra-red beams and is distinguished by low energy consumption.

[0032] This way, consumption can be optimised because the barriers will only be operative whenever there is a movement outside an area to be protected, and power absorption is restricted to the relatively low amount required by the starting sensor 10.

[0033] To ensure a greater reliability of the perimetral protection apparatus 1, the use of means for the periodical activation of the electronic barrier 2 and of the second barrier 7 independently from the starting sensor 10 is envisaged. In this case, a further amount of security of the apparatus 1 is ensured by suitably adjusting the starting and switching off time. In particular, the processor of the control device is preferably programmed to carry out

such periodical activation functions.

[0034] The operation of this first form of embodiment, as shown in figure 1, is as follows.

[0035] The direction of transit through the opening of a person or object is determined by means of the use of the sequence consisting of the electronic barrier 2 and of the second barrier 7.

[0036] In a normal situation of use of the apparatus 1, in the absence of movements outside the second area to be protected, the electronic barrier 2 and the second barrier 7 are deactivated. In case of movement inside the first area, the starting sensor 10 detects the movement and commands the starting of the barriers and, therefore, the emission and reception of beams by means of the respective transmitter and receiver devices.

[0037] In the event of transit being detected from the first area to the second area to be protected caused by the interruption in sequence of the networks created by the electronic barrier 2 and the second barrier 7, the control device detects a first crossing sequence and sends an alarm signal to the alarm unit, with consequent activation of the break-in signalling systems. In this case, a break-in is therefore detected, for example, from an outside area, indicated above as first area, to an area inside a home, indicated as second area, and an anti-break-in system alarm signal is triggered.

[0038] In case of transit through the opening from the second area to be protected to a first area the control device detects a second crossing sequence and, consequently, no alarm signal is sent to the alarm unit. The break-in signalling system is not in this case triggered and thus remains in standby. This way accidental activation is prevented of the signalling system due to an interruption in the infra-red beam network by a person who is already inside the area to be protected.

[0039] If, on the other hand, after a pre-set time lapse, the beam network created to protect the opening is not interrupted, the energy saving means again deactivate the electronic barrier 2 and the second barrier 7.

[0040] In a second form of embodiment of the perimetral protection apparatus 1, shown in the figures 2, 3 and 4, the means for determining the direction of transit comprise at least one inside movement sensor 11 turned towards the second area to be protected and able to send a signal to a control device for deactivating the electronic barrier 2, thus preventing accidental activation by a person who is inside the area to be protected.

[0041] The means for determining the direction of transit also comprise at least one outside movement sensor 12 turned towards the first area and able to send a signal to the control device for activating the electronic barrier 2. This way, the detection of a movement by the outside movement sensor 12 starts the electronic barrier 2 for the protection of the opening and, consequently, for the protection of the second area to be protected against undesired break-in.

[0042] In particular, the outside movement sensor 12 and the inside movement sensor 11 feature low energy consumption passive infra-red beams.

[0043] Furthermore the electronic barrier 2 is connected to an alarm unit for the activation of an alarm signal. More specifically, in case the electronic barrier 2 detects crossing of the opening by a person or object, it sends a signal to the central and an alarm signal is triggered.

[0044] Even this second form of embodiment of the perimetral protection apparatus 1 features energy saving means. In particular, the electronic barrier 2 is normally deactivated and can be activated through the outside movement sensor 12 for detecting movements in the first area. In actual facts, the outside movement sensor 12 is turned in the direction of the first area so as to force the start of the electronic barrier 2 if a movement is detected outside the second area to be protected.

[0045] To ensure a greater reliability of the perimetral protection apparatus 1, the use of means for the periodical activation of the electronic barrier 2 independently from the outside movement sensor 12 is envisaged. In this case, a further amount of security is ensured by suitably adjusting the starting and switching off time.

[0046] The operation of this second form of embodiment of the invention is as follows.

[0047] In a normal situation of use of the apparatus 1, in the absence of movements outside the second area to be protected, the electronic barrier 2 is deactivated. In case of movement inside the first area, the outside movement sensor 12 detects the movement and sends a signal to the control device which commands the starting of the electronic barrier 2. Under this condition of the apparatus 1 the opening is protected by a network of infra-red beams and crossing the opening from the first area to the second area to be protected causes the signalling to the alarm unit and triggering of the break-in signalling system.

[0048] If a person moves near the apparatus 1 from the inside of the second area to be protected, the movement is detected by the inside movement sensor 11, which sends a signal to the control device commanding the switching off of the electronic barrier 2, thus preventing any accidental triggering of the alarm signal.

[0049] In practice it has been found that the perimetral protection apparatus, particularly for anti-break-in systems achieves the intended purposes, since it grants a wide freedom of movement to persons being inside the protected rooms, thus ensuring a very high break-in protection.

[0050] The invention thus conceived is susceptible of numerous modifications and variations, all of which falling within the scope of the inventive concept; furthermore all the details can be replaced with others that are technically equivalent.

[0051] In practice, the materials used, as well as the shapes and dimensions, may be any according to requirements without because of this moving outside the protection scope of the following claims.

Claims

1. Perimetral protection apparatus, particularly for anti-break-in security systems, comprising an electronic barrier that can be positioned near an opening located between a first area and a second area and provided with at least one sensor for detecting the transit of a person or object, **characterised by** the fact that it comprises means for determining the direction of transit through said electronic barrier.

2. Apparatus according to claim 1, **characterised by** the fact that said means for determining the direction of transit comprise at least a second barrier, said electronic barrier and said second barrier being arranged sequentially along a direction of transit between said first area and said second area, so that they can be crossed sequentially during the transit of a person or object from said first area to said second area, or vice versa.

3. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said second barrier comprises at least one second sensor, said sensor of the electronic barrier and said second sensor being arranged along said direction of transit.

4. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said means for determining the direction of transit comprise a control device connected to said sensor of the electronic barrier and to said second sensor, being able to define and detect a first crossing sequence of said electronic barrier and of said second barrier during the transit of a person or object from said first area to said second area, and to define and detect a second crossing sequence of said electronic barrier and of said second barrier during the transit of a person or object from said second area to said first area.

5. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said control device is connected to an alarm unit and sends an alarm signal to said alarm unit in the event of defining and detecting said first crossing sequence.

6. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said electronic barrier and said second barrier are normally deactivated, and can be activated by means of a starting sensor sensitive to movement.

7. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said starting sensor is turned in the direction of said first area.

8. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said starting sensor features low energy consumption passive infra-red beams.

9. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said means for determining the direction of transit comprise at least one inside movement sensor turned towards said second area to be protected and able to send a signal to a control device for deactivating said electronic barrier.

10. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said means for determining the direction of transit comprise at least one outside movement sensor turned towards said first area and able to send a signal to said control device for activating said electronic barrier.

11. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said outside movement sensor and said inside movement sensor feature low energy consumption passive infra-red beams.

12. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said electronic barrier is normally deactivated for energy saving reasons.

13. Apparatus according to one or more of the preceding claims, **characterised by** the fact that at least one between said electronic barrier and said second barrier can be installed on at least two modules associable along the perimeter of said opening.

14. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said modules comprise a transmitter module and a receiver module, said transmitter module comprising transmitter devices of at least one between said electronic barrier and said second barrier able to transmit a respective beam towards respective receiver devices of at least one between said electronic barrier and said second barrier installed on said receiver module.

15. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said modules comprise a transmitter and receiver module, on which transmitter and receiver devices of at least one between said electronic barrier and said second barrier are connected, and a reflecting module comprising a reflecting element for reflecting the beams produced by said transmitter devices to said receiver devices.

16. Apparatus according to one or more of the preceding claims, **characterised by** the fact that said modules

consist of two columns that can be fastened to door and window jambs.

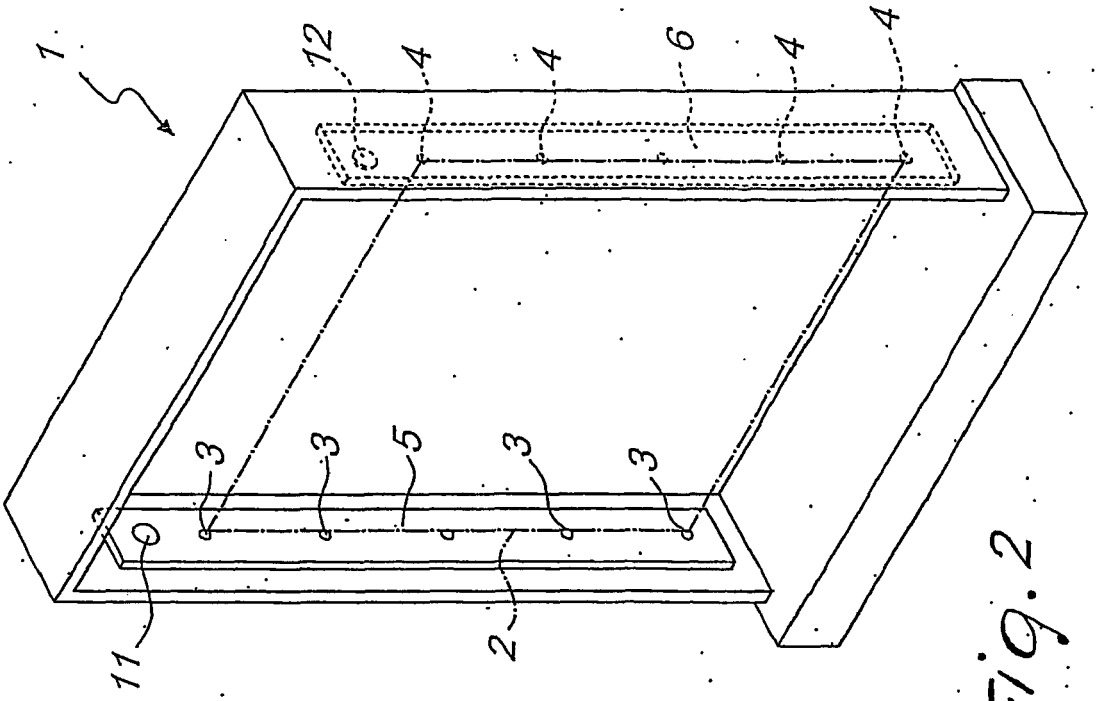

Fig. 2

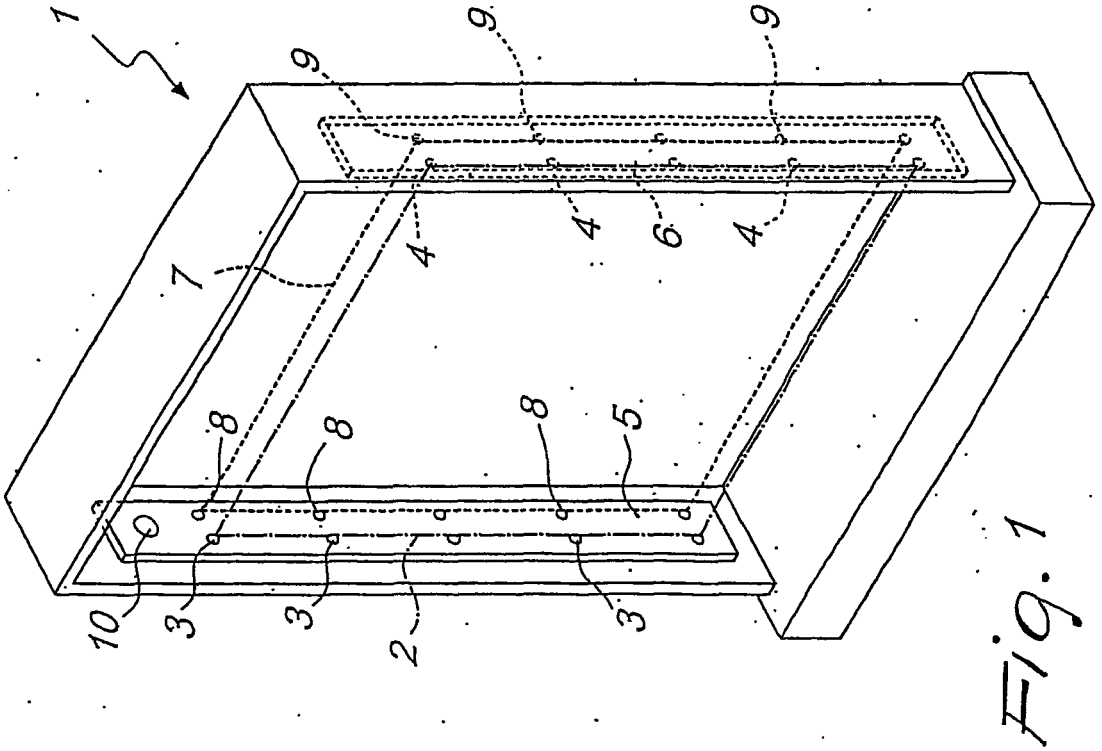

Fig. 1

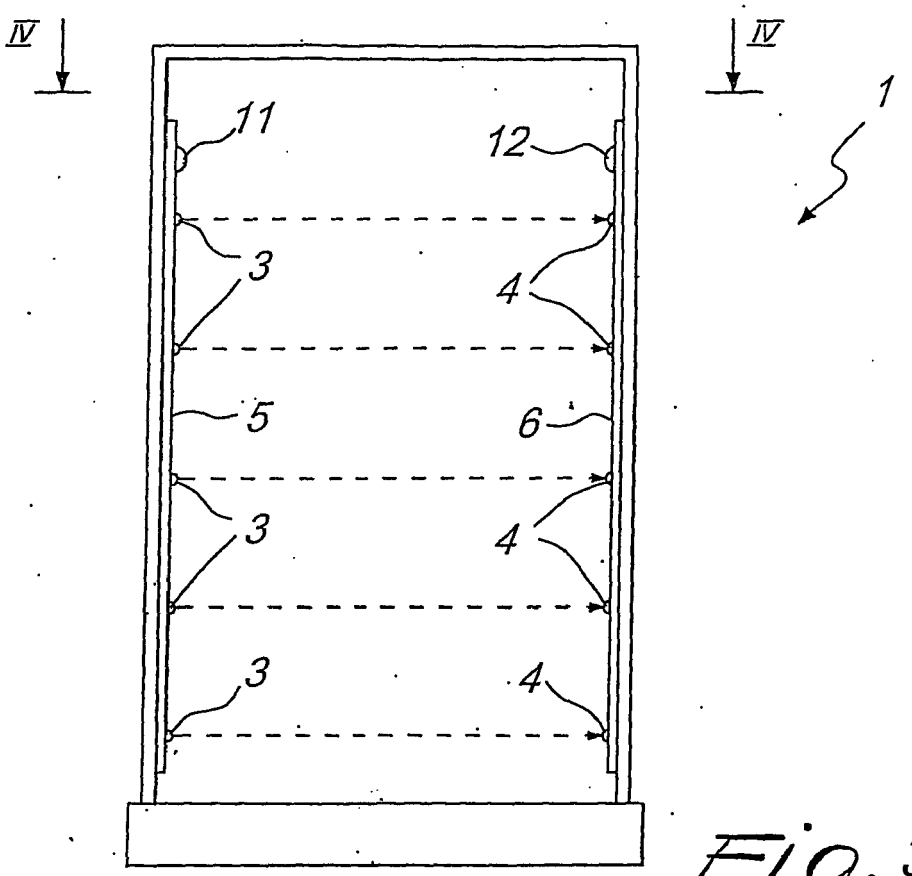

Fig. 3

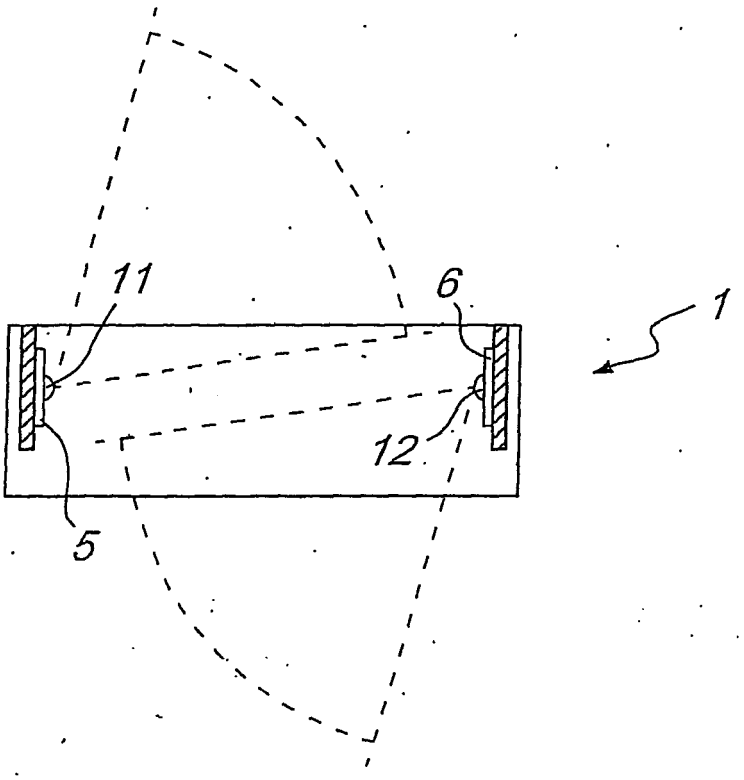

Fig. 4