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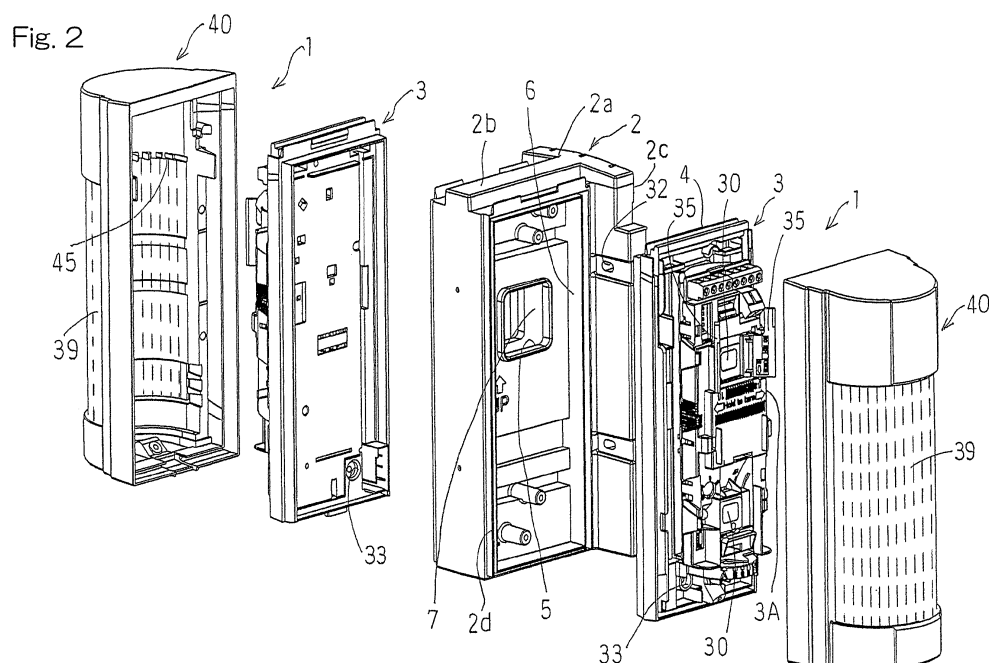
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(54) **Intrusion detection device**

(57) An intrusion detection device includes a plurality of intrusion detection sensors (1) each configured to detect intrusion of an object into a security area W and output a warning signal; and a bracket (2) having a single device-mounting surface (2c) and a plurality of sensor-mounting surfaces (2d) on which the respective intrusion detection sensors (1) are mounted such that predetermined angles thereof different from each other are main-

tained. The bracket (2) includes a hollow portion (S) in which a wire between each intrusion detection sensor (1) is installed. In addition, each intrusion detection sensor (1) includes an optical section (3) including: a main unit (3A) which includes a detection element (30); and a unit holder (4) which rotatably supports the main unit (3A), and the security area (W) is adjusted such that a direction thereof is changed, by rotation of the main unit (3A).



Description

BACKGROUND OF THE INVENTION

(Field of the Invention)

[0001] The present invention relates to an intrusion detection device including a plurality of intrusion detection sensors which detect an object, such as a human body, which intrudes into a security area or an alert area.

(Description of Related Art)

[0002] As such a type of general intrusion detection sensor, one employing an active infrared detection system (AIR) or a passive infrared detection system (PIR) composed of an optical section including a detection element which detects an object within a security area and a light-collecting section such as a lens, is known.

[0003] In general, in order to expand a security area, a plurality of intrusion detection sensors are installed in accordance with the size and the shape of a site (area) where it is desired to keep a lookout. In this case, the plurality of intrusion detection sensors are installed in an irregular manner or aligned horizontally or vertically (e.g., Japanese Laid-Open Patent Publication No. 2010-146289). In addition, a method is also conceivable in which a general-purpose L-shaped angle plate is used, one portion of the L-shaped plate is fixed to a wall or the like, and two intrusion detection sensors are mounted on both surfaces of the other portion thereof, which projects outward, back to back.

[0004] However, when a plurality of intrusion detection sensors are installed so as to be aligned horizontally or vertically, the number of wires to a control panel which controls the entire device is increased, and thus the installation requires much time and effort. In addition, when intrusion detection sensors are mounted back to back using an L-shaped angle, it is complicated to install wires between each sensor, and the wires are exposed to the outside. Thus, waterproof equipment for the wires is also required.

[0005] Moreover, in the case where a plate surface of an L-shaped angle is used as a sensor-mounting surface, since the plate surface is not necessarily accurate as a reference surface like a vertical surface, it is necessary to adjust each intrusion detection sensor into a mounted state corresponding to the reference surface in mounting intrusion detection sensors on the L-shaped angle, and thus the installation is complicated.

[0006] Meanwhile, in addition to expansion of a security area, there is a case where it is desired to change the direction of the security area. As shown in Fig. 10A, in an intrusion detection sensor 70, for example, a cover 73 provided with a lens (light-collecting section) 72 is mounted on an optical section 71 including detection elements 60, and the detection elements 60 are provided so as to be horizontally rotatable within the optical section

71. The direction of a security area is variable by the horizontal rotation. Figs. 10A and 10C show variable states of different areas. In this case, setting of changing the direction is performed based on a sensor-mounting surface for the intrusion detection sensor 70. Thus, unless the sensor-mounting surface is retained accurately, a set direction that is changed based on the sensor-mounting surface is also displaced from the intended direction. Therefore, the necessity to accurately retain the sensor-mounting surface as a reference is great.

SUMMARY OF THE INVENTION

[0007] An object of the present invention is to provide an intrusion detection device that allows expansion of a security area to be easily and accurately conducted when a plurality of intrusion detection sensors are used, that allows wires for each sensor to be easily installed, and that allows waterproofness to be ensured for the wires.

[0008] In order to achieve the above object, an intrusion detection device according to the present invention includes: a plurality of intrusion detection sensors each configured to detect intrusion of an object into a security area and output a warning signal; and a bracket having a single device-mounting surface and a plurality of sensor-mounting surfaces on which the respective intrusion detection sensors are mounted such that predetermined angles thereof different from each other are maintained. The bracket includes a hollow portion in which a wire between each intrusion detection sensor is installed.

[0009] According to this configuration, since the plurality of intrusion detection sensors are mounted on the bracket in a state where predetermined angles thereof different from each other are maintained, when the plurality of intrusion detection sensors are used, it is possible to easily and accurately conduct expansion of the security area. In addition, since the bracket includes the hollow portion, it is made easy to install the wire between each sensor, and the wire is not exposed to the outside. Thus, it is possible to ensure waterproofness for the wire.

[0010] In the present invention, preferably, each intrusion detection sensor includes an optical section including: a main unit which includes a detection element; and a unit holder which rotatably supports the main unit, and the security area is adjusted such that a direction thereof is changed, by rotation of the main unit. In this case, it is possible to accurately perform setting based on the sensor-mounting surface. Thus, even though the security area is variable in direction, it is possible to easily and accurately conduct expansion of the security area.

[0011] Moreover, in the present invention, preferably, the bracket has a T shape in a planar view and includes a head and a body which projects from the head and extends in a vertical direction, and both side surfaces of the body of the bracket are the sensor-mounting surfaces. Therefore, it is possible to expand the security area with a simple configuration.

[0012] Preferably, an intermediate box is mounted as

a separate member on an end of the body of the bracket, and another intrusion detection sensor is mounted on the intermediate box such that a predetermined angle thereof different from that of each intrusion detection sensor is maintained. In this case, the addition of the other intrusion detection sensor allows the security area to be further expanded.

[0013] Moreover, preferably, when the warning signal is wirelessly transmitted, the intrusion detection sensor is mounted on the body of the bracket via a battery box for wireless communication, and an upper surface of the battery box is covered with a cap. In this case, it is possible to provide an appearance in which the device body is made into an integrated body.

[0014] Any combination of at least two constructions, disclosed in the appended claims and/or the specification and/or the accompanying drawings should be construed as included within the scope of the present invention. In particular, any combination of two or more of the appended claims should be equally construed as included within the scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] In any event, the present invention will become more clearly understood from the following description of preferred embodiments thereof, when taken in conjunction with the accompanying drawings. However, the embodiments and the drawings are given only for the purpose of illustration and explanation, and are not to be taken as limiting the scope of the present invention in any way whatsoever, which scope is to be determined by the appended claims. In the accompanying drawings, like reference numerals are used to denote like parts throughout the several views, and:

Figs. 1A and 1B are perspective views showing an example of an intrusion detection device including a plurality of intrusion detection sensors according to a first embodiment of the present invention;

Fig. 2 is an exploded perspective view of the intrusion detection device;

Figs. 3A to 3D are partial exploded views of the intrusion detection sensor;

Figs. 4A and 4B are front views showing rotated states of an optical section;

Fig. 4C is a cross-sectional view taken along a C-C line in Fig. 4A;

Fig. 4D is a cross-sectional view taken along a D-D line in Fig. 4B;

Figs. 5A and 5B are cross-sectional views taken along a V-V line in Fig. 1;

Figs. 5C and 5D are plan views each showing a security area having a plurality of narrow areas in Fig. 5A or 5B;

Figs. 6A to 6C are plan views showing a security area;

Fig. 7A is a perspective view showing an example

of an intrusion detection device according to a second embodiment of the present invention;

Fig. 7B is a plan view showing a security area of the intrusion detection device;

Fig. 8 is an exploded perspective view of the intrusion detection device;

Figs. 9A and 9B are perspective views showing modifications of the intrusion detection device; and

Figs. 10A to 10C are diagrams illustrating a conventional intrusion detection device.

DESCRIPTION OF EMBODIMENTS

[0016] Hereinafter, preferred embodiments of the present invention will be described with reference to the drawings.

[0017] Fig. 1A is a perspective view showing an example of an intrusion detection device including a plurality of intrusion detection sensors according to a first embodiment of the present invention, as seen from its front side. Fig. 1B is a perspective view of the intrusion detection device as seen from its back side. Fig. 2 is an exploded perspective view of the intrusion detection device, and Figs. 3A to 3D are partial exploded views of the intrusion detection device.

[0018] In this example, a wired system is employed in which power supply, signal transmission, and the like in each intrusion detection sensor 1 are performed through wires. As shown in Fig. 1A, for example, two intrusion detection sensors 1 are mounted on a wall K or a pillar via a bracket 2. The bracket 2 has a T shape in a planar view and includes a head 2a and a body 2b which projects outward (frontward) from the head 2a and extends in a vertical direction Y. A back surface of the head 2a is mounted on the wall K or the like, and the intrusion detection sensors 1 are mounted on both side surfaces of the body 2b.

[0019] Each intrusion detection sensor 1 is configured to employ, for example, a passive infrared detection system (PIR), and a control panel which controls the entire intrusion detection device is provided indoors (not shown). A microcomputer mounted on a control board within the intrusion detection sensor 1 performs control as follows. When detection elements 30 (Fig. 2) receive far-infrared rays emitted from an object, such as a human body, which illegally intrudes into a security area W (Figs. 5C and 5D), and an electrical signal representing the amount of rays received is changed by a certain level or higher, the microcomputer generates a human body detection signal and outputs a warning signal so as to input the warning signal to the indoor control panel.

[0020] The security area W is formed by a light-collecting section such as a lens 39 and an optical section 3 including the detection elements 30 in the intrusion detection sensor 1. As shown in Fig. 3A, the optical section 3 includes: a main unit 3A including the detection elements 30; and a unit holder 4 which rotatably supports the main unit 3A. In this example, a configuration is pro-

vided in which the direction of the security area W is changed by horizontally rotating the main unit 3A of the optical section 3 and fixing the lens 39 provided in a cover 40 mounted on the optical section 3.

[0021] As shown in Fig. 2, for example, two PIR sensors 30 which are detection elements are provided at upper and lower locations at the front side of the main unit 3A (at the near side in the drawing). The lens-equipped cover 40 which is formed so as to be integrated with the lens 39 which is divided into a plurality of segments, such as a Fresnel lens, on its front surface is fitted to the unit holder 4. The unit holder 4 is screwed through a plurality of screw holes 33. The security area W has a plurality of narrow areas formed by the above lens 39, which is divided into a plurality of segments. It should be noted that the lens 39 may be provided as a member separate from the cover 40, or a mirror or the like may be used instead of the lens 39.

[0022] The intrusion detection sensor 1 at the far side of Fig. 2 is configured similarly to that at the near side of Fig. 2, except that the intrusion detection sensor 1 at the far side of Fig. 2 is oriented oppositely from that at the near side of Fig. 2. The intrusion detection device in an assembly-completed state is in a form as shown in Fig. 1A and is supported by a support member such as the wall K or the pillar at an installation location where to keep a lookout for intrusion.

[0023] The T-shaped bracket 2 in Fig. 2 has, at a back side of the head 2a, a single device-mounting surface 2c extending in a horizontal direction X and the vertical direction Y, and is screwed at this surface 2c to the wall K through a plurality of screw holes 32. Both side surfaces 2d of the body 2b, which projects frontward from a center portion of the head 2a at a side opposite to the device-mounting surface 2c and extends in the vertical direction Y, are sensor-mounting surfaces on which the respective intrusion detection sensors 1 are retained. The sensor-mounting surfaces 2d are accurately set as reference surfaces in advance. Thus, when the intrusion detection sensors 1 are merely mounted on the sensor-mounting surfaces 2d, for example, back to back, it is possible to accurately mount the intrusion detection sensors 1 with respect to the wall K (the device-mounting surface 2c).

[0024] The T-shaped bracket 2 includes a hollow portion 5 within the head 2a and the body 2b. The head 2a has the plurality of screw holes 32 for mounting the T-shaped bracket 2 on the wall K. The body 2b has receiving recesses 6 at both sides of the hollow portion 5 at the center, and the intrusion detection sensors 1 are received therein. The hollow portion 5 and the receiving recesses 6 communicate with each other via through holes 7. As shown in Fig. 1B, owing to an internal space S of the hollow portion 5 and the through holes 7 of the T-shaped bracket 2, wires for the sensors 1 are installed within the bracket 2.

[0025] When the T-shaped bracket 2 is used, a position as a reference for each intrusion detection sensor 1 (the sensor-mounting surface) is allowed to be accurately re-

tained, and it is made easy to install wires between each intrusion detection sensor, as compared to the case of using, for example, a conventional general-purpose L-shaped angle. In addition, the wires for each intrusion detection sensor are installed within the bracket 2 and are not exposed to the outside. Thus, waterproof equipment for the wires is not required.

[0026] Next, a rotation structure in the optical section 3 will be described. As shown in Fig. 3A, the main unit 3A has a halved cylinder shape at its back side, and its entirety is supported by the unit holder 4 so as to be horizontally rotatable about a rotation shaft 31. As shown in Fig. 3B, the main unit 3A has, at its back side, a plurality of guide grooves 11 arranged along its circumferential direction, and the unit holder 4 in Fig. 3A has a projection 12 at its center portion. The guide grooves 11 of the main unit 3A and the projection 12 constitute an angle retaining portion 15. The main unit 3A is retained at an optional horizontal rotation angle by manually moving the main unit 3A in the horizontal direction and fitting the projection 12 into a certain guide groove 11.

[0027] As shown in Fig. 3A, rotation bearings 21 and 22 which support the main unit 3A, which rotates about the rotation shaft 31, at upper and lower locations in the unit holder 4 are provided, a display portion 23 is provided at a front side of the lower rotation bearing 22, and the rotation angle of the main unit 3A is displayed thereon.

[0028] Meanwhile, when the above-described T-shaped bracket 2 is used and the security area W is expanded by using the plurality of intrusion detection sensors 1, it is preferred that, as shown in Fig. 6A, the security area W is not in contact with the wall K. If the security area W is in contact with the wall K as shown in Fig. 6B, this becomes a factor in causing a false operation due to the wall surface itself, a change in its temperature, or the like. In the present invention, in order to eliminate the factor for a false operation, a later-described configuration for automatically setting the security area W and an area offset of the security area W are provided.

[0029] First, the configuration for automatically setting the security area W in order to prevent a false operation will be described. Each intrusion detection sensor 1 includes: area adjustment portions 35 which are provided in either one of the optical section 3 or the lens 39, which is the light-collecting section, and optically adjust optical paths between both sections 3 and 39, which form narrow areas of the security area W; and a position setting portion 45 which is provided in the other of the optical section 3 and the lens 39 and engages with the area adjustment portions 35 to set the positions of the area adjustment portions 35. In this example, the area adjustment portions are variable shutters 35 which optically shut (shield) an optical path that forms at least one narrow area, and the position setting portion is a position setting rib 45 which engages with the variable shutters 35 to set the positions of the variable shutters 35.

[0030] As shown in Fig. 3A, a pair of the left and right variable shutters 35 in the optical section 3 each have a

substantially L shape and includes a shutter piece 35a which shuts a narrow area and an extending piece 35b which extends from a part of the shutter piece 35a. Each extending piece 35b is fitted into a groove of the position setting rib 45 described later, whereby the position of each variable shutter 35 is set. In addition, each variable shutter 35 is provided so as to be slightly oscillatable in the horizontal direction (left-right direction), has a substantially L shape and a color which is less visible through the lens, for example, a transparent color, and is provided at both sides of the detection element 30 so as to be horizontally rotatable. In each variable shutter 35, the extending piece 35b at its upper portion is fitted to the position setting rib 45, and the shutter piece 35a at its lower portion has an intrinsic shutter function. In this example, the variable shutters 35 are provided at only the upper detection element 30 of the upper and lower detection elements 30.

[0031] It should be noted that variable shutters may be provided at both upper and lower detection elements 30 or only the lower detection element 30. In addition, it is also possible to adjust the width of the security area W by changing the horizontal variable ranges of each variable shutter.

[0032] Meanwhile, as shown in Fig. 3D, the position setting rib (cam) 45 is detachably fixed to the cover 40 and has a plurality of recesses (grooves) arranged along the direction in which the main unit 3A is rotated. The position setting rib 45 has recess shapes different from each other depending on the rotation angle of each variable shutter 35. A recess of the position setting rib 45 and the extending piece 35b at the upper portion of each L-shaped variable shutter 35 are fitted to each other. Each extending piece 35b is provided outside a lens effective range of the cover 40, and it is possible to change the security area W without decreasing the lens efficiency.

[0033] The position of each variable shutter 35 is changed with rotation of the main unit 3A of the optical section 3. Fig. 4A is a front view when, for example, the rotation angle of the main unit 3A is 0° and each detection element 30 is directed in the front direction; Fig. 4C is a cross-sectional view taken along a C-C line in Fig. 4A; Fig. 4B is a front view when the main unit 3A is tilted at a rotation angle of about 45°; and Fig. 4D is a cross-sectional view taken along a D-D line in Fig. 4B.

[0034] As shown in Figs. 5C and 5D, the security area W is formed as a whole such that a plurality of narrow areas A to N aligned in the horizontal direction are settable so as to correspond to a plurality of segmented lenses a to n. Fig. 5A is a cross-sectional view taken along a V-V line in Fig. 1A, showing a state where the variable shutters 35 and the position setting rib 45 at the cover 40 in the case of Fig. 4A are fitted to each other. By the variable shutters 35 in Fig. 5A, for example, as shown in Fig. 5C, a security area W composed of the narrow areas D to K is formed with respect to the lenses d to k. As the rotation angle, the above-described display

portion 23 displays position D. In addition, Fig. 5B is a cross-sectional view taken along a V-V line in Fig. 1A, showing a state in Fig. 4B. By the variable shutters 35 in Fig. 5B, for example, as shown in Fig. 5D, a security area W composed of the narrow areas H to N is formed with respect to the lenses h to n. As the rotation angle, the display portion 23 displays position G.

[0035] The respective recesses of the position setting rib 45 have various different shapes, and each has at least one inner surface shape that allows each variable shutter 35 to be positioned within each recess in accordance with the rotation angle of the main unit 3A. Each variable shutter 35 is positioned, for example, by the inner surface shape of the recess of the position setting rib 45 as shown in Figs. 5A and 5B, while being slightly oscillated (loosely fitted) left and right. At the rotated position of the main unit 3A, by closing the cover 40, each variable shutter 35 with which the position setting rib 45 fixed to the cover 40 is in contact is slightly changed in angle left and right and forcibly guided to a specific recess position in the position setting rib 45.

[0036] In the security area W in Fig. 5C, no false operation is caused due to contact with the wall K. Thus, for example, the security area W is formed of the eight narrow areas D to K in a wide range equal to or larger than 90°. Meanwhile, the security area W in Fig. 5D is formed of the seven narrow areas H to N, excluding the narrow area G at its edge, in a narrow range less than 90°, since contact with the wall K occurs at its edge.

[0037] In this case, an area configuration is provided in which an area in the front direction is offset left and right with respect to the sensor front by arrangement of a plurality of lenses such that a desired area range is provided in response to the setting of the rotation angle of the main unit 3A. In this example, the areas G and H are offset left and right by a predetermined angle (e.g., $\pm 5^\circ$ to 10°) with respect to the sensor front by the lenses g and h. In other words, as shown in Fig. 5D, when the main unit 3A is rotated rightward by 45°, the narrow areas G and H are offset such that the narrow area H is not in contact with the wall K. If the narrow areas G and H are not offset, an area is formed at the center between the narrow areas G and H (the sensor front), and thus, when the main unit 3A is rotated, the narrow area at the sensor front is brought into contact with the wall K. If the narrow area is removed for a countermeasure against a false operation, the security area is made quite narrower than 90° by the removed narrow area. Thus, an area near the wall is excluded, and a lookout is not kept in this area.

[0038] In the offset area configuration, for example, in a rotated state where the main unit 3A is rotated rightward by 45°, the narrow area G is removed, and a desired security area W composed of the narrow areas H to N and slightly narrower than 90° is formed. In this case, as shown in Fig. 5B, the variable shutter 35 is fitted to the position setting rib 45 and shuts the optical path of the lens g. It should be noted that in a rotated state where the main unit 3A is rotated leftward by 45° to the contrary,

the narrow area H is removed. In this manner, the security area W is adjustable to a desired one in accordance with the rotated position of the main unit 3A.

[0039] The combination of the area offset of the security area W, the configuration for automatically setting the area, and the T-shaped bracket allows the security area W to be adjusted such that a false operation is not caused, by removing a narrow area (the narrow areas G and H within the wall), which may cause a false operation, by the variable shutter 35 as shown in Fig. 6C. In this manner, it is possible to easily achieve both expansion of the security area W and reduction of a risk of a false operation.

[0040] In a second embodiment, a wireless system is employed in which power supply, signal transmission, and the like in each intrusion detection sensor 1 are wirelessly performed, and as shown in Fig. 7A, three intrusion detection sensors 1 are mounted on a wall or a pillar via a bracket 2 having a T shape in a planar view, similarly to the first embodiment. At both sides of a body 2b of the T-shaped bracket 2, one intrusion detection sensor 1, and one intrusion detection sensor 1, via a battery box 8, are provided. At an end of the body 2b, another intrusion detection sensor 1 is provided via an intermediate box 9 which is a separate member. The addition of the other intrusion detection sensor 1 allows the security area W to be further expanded. In this case, a through hole 17 (a dotted line portion in Fig. 8) is provided in a front surface of the body 2b, and a cap 19 is provided at an upper portion of the body 2b. Therefore, it is possible to provide an appearance in which the device body is made into an integrated body.

[0041] Fig. 7B is a plan view showing a security area formed by the above three intrusion detection sensors. In this example, the bracket 2 is mounted on a wall surface of the wall K near its corner, not on the tip of the corner of the wall K. By so doing, the bracket 2 does not greatly protrude from the corner of the wall K, and it is possible to expand the security area W as a whole, for example, to an area range of 270°. In addition, in this case as well, it is possible to expand the security area W such that a false operation is not caused, by removing an area in contact with the wall K by the variable shutter 35 as described above.

[0042] In Fig. 8 which is an exploded perspective view of the intrusion detection device in Fig. 7A, the intrusion detection sensor 1 is mounted via the battery box 8 in which a battery (not shown) for supplying power is mounted. In this example, a transmitter (not shown) is also provided within the battery box 8. When a human body detection signal is outputted from the intrusion detection sensor 1 to the transmitter, the transmitter wirelessly transmits an alarm signal, and the alarm signal is received, for example, by a receiver (not shown) installed indoors.

[0043] Figs. 9A and 9B show modifications of the intrusion detection device. In Fig. 9A, a wired system is employed similarly to the first embodiment, and three in-

trusion detection sensors 1 are mounted. In Fig. 9B, a wireless system is employed similarly to the second embodiment, and two intrusion detection sensors 1 are mounted.

[0044] As described above, in the present invention, a plurality of intrusion detection sensors are mounted on a bracket in a state where predetermined angles thereof different from each other are maintained. Thus, it is possible to easily and accurately conduct expansion of the security area when the plurality of intrusion detection sensors are used. In addition, since the bracket includes a hollow portion, it is made easy to install wires between each sensor, and the wires are not exposed to the outside. Thus, it is possible to ensure waterproofness for the wires.

[0045] In addition, since the configuration for automatically setting the security area is incorporated, it is also possible to reduce a risk of a false operation.

[0046] It should be noted that although the variable shutters are provided at the optical section and the position setting rib is provided at the cover in the above-described embodiments, the position setting rib may be provided at the optical section and the variable shutters may be provided at the cover.

[0047] In addition, in each of the above-described embodiments, a passive infrared detection system is employed in each intrusion detection sensor, but the present invention is not limited thereto. For example, it is possible to employ an active infrared detection system in each intrusion detection sensor.

[0048] Although the present invention has been fully described in connection with the preferred embodiments thereof with reference to the accompanying drawings which are used only for the purpose of illustration, those skilled in the art will readily conceive numerous changes and modifications within the framework of obviousness upon the reading of the specification herein presented of the present invention. Accordingly, such changes and modifications are, unless they depart from the scope of the present invention as delivered from the claims annexed hereto, to be construed as included therein.

[Reference Numerals]

[0049]	
1	intrusion detection sensor
2	bracket
2a	head
2b	body
2c	device-mounting surface
2d	sensor-mounting surface
3	optical section
3A	main unit
4	unit holder
5	hollow portion
6	receiving recess
7	through hole

8	battery box	
9	intermediate box	
15	angle retaining portion	
30	PIR sensor (detection element)	
35	variable shutter	5
39	light-collecting section (lens)	
40	lens-equipped cover	
45	position setting rib	
W	security area	
A to N	narrow area	10
K	wall	

transmitted, the intrusion detection sensor is mounted on the body of the bracket via a battery box for wireless communication, and an upper surface of the battery box is covered with a cap.

Claims

1. An intrusion detection device comprising:

a plurality of intrusion detection sensors each configured to detect intrusion of an object into a security area and output a warning signal; and
 a bracket having a single device-mounting surface and a plurality of sensor-mounting surfaces on which the respective intrusion detection sensors are mounted such that predetermined angles thereof different from each other are maintained, wherein
 the bracket includes a hollow portion in which a wire between each intrusion detection sensor is installed.
2. The intrusion detection device according to claim 1, wherein
 each intrusion detection sensor includes an optical section including: a main unit which includes a detection element; and a unit holder which rotatably supports the main unit, and
 the security area is adjusted such that a direction thereof is changed, by rotation of the main unit.
3. The intrusion detection device according to claim 1 or 2, wherein
 the bracket has a T shape in a planar view and includes a head and a body which projects from the head and extends in a vertical direction, and
 both side surfaces of the body of the bracket are the sensor-mounting surfaces.
4. The intrusion detection device according to claim 3, wherein
 an intermediate box is mounted as a separate member on an end of the body of the bracket, and
 another intrusion detection sensor is mounted on the intermediate box such that a predetermined angle thereof different from that of each intrusion detection sensor is maintained.
5. The intrusion detection device according to claim 1 or 2, wherein when the warning signal is wirelessly

Fig. 1A

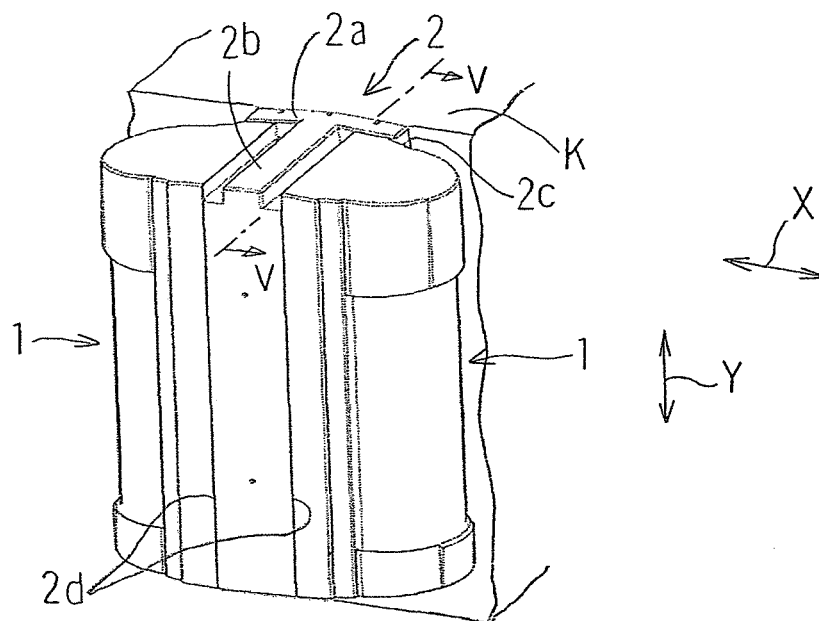
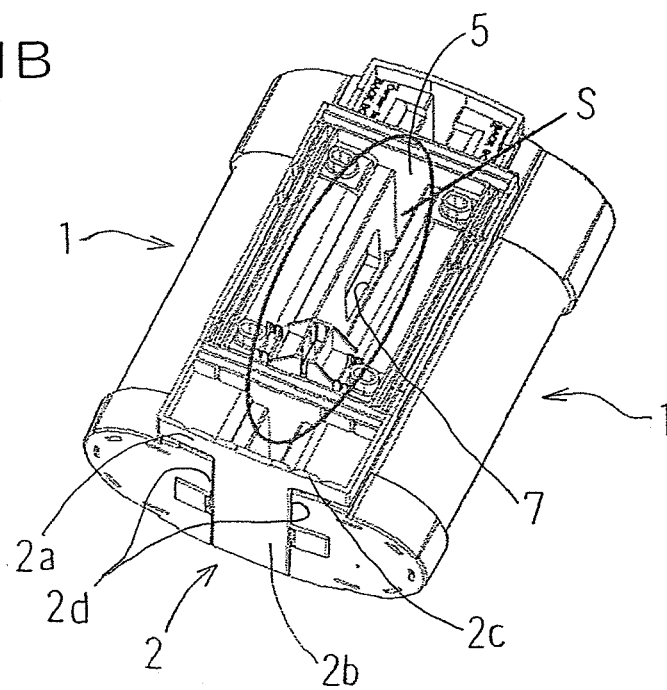


Fig. 1B



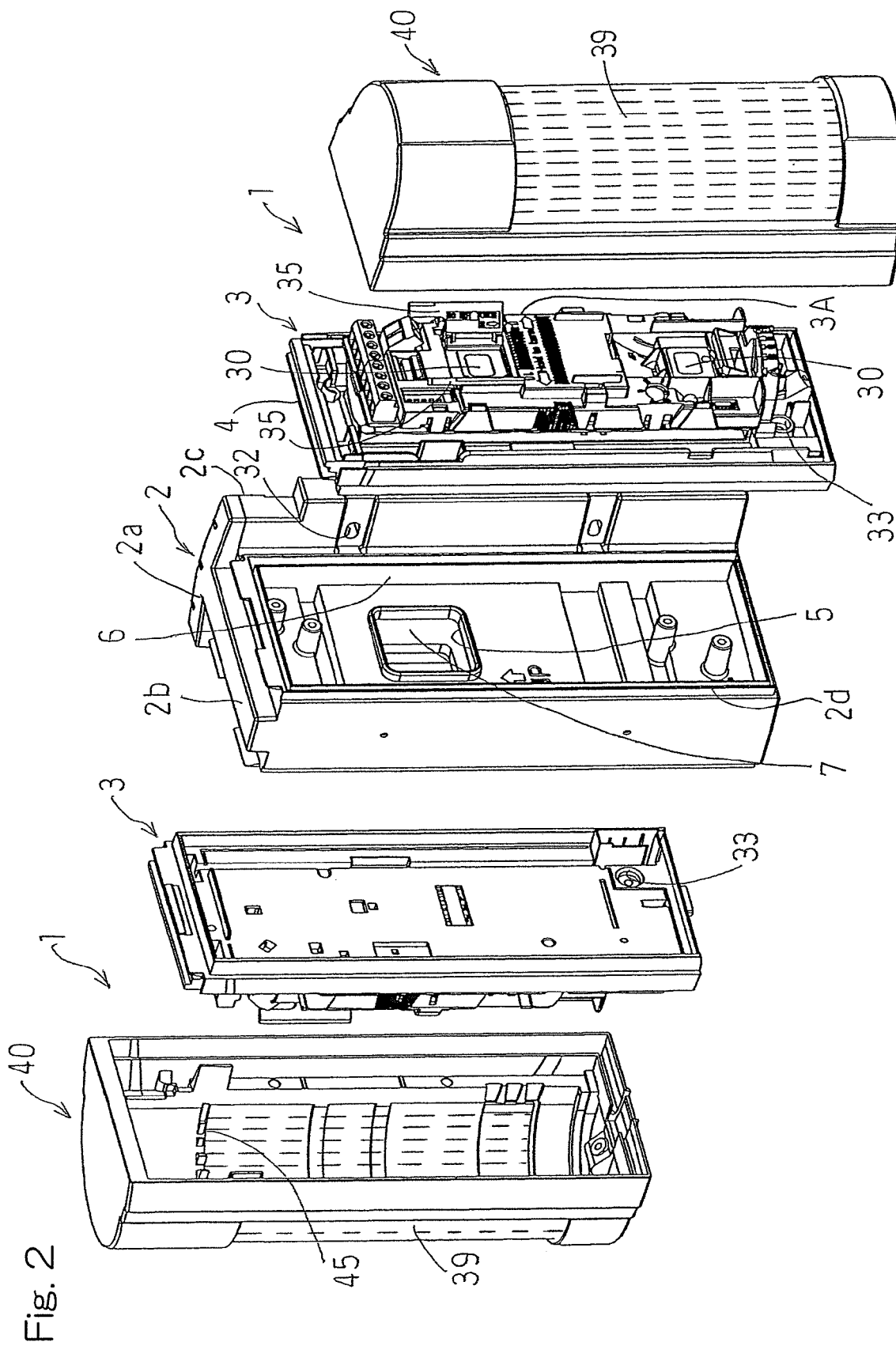


Fig. 3A

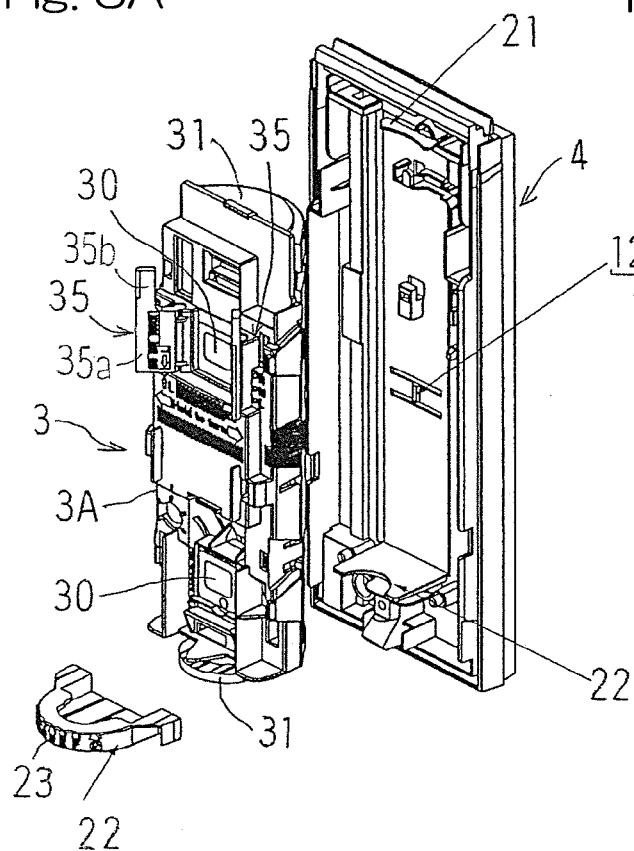


Fig. 3B

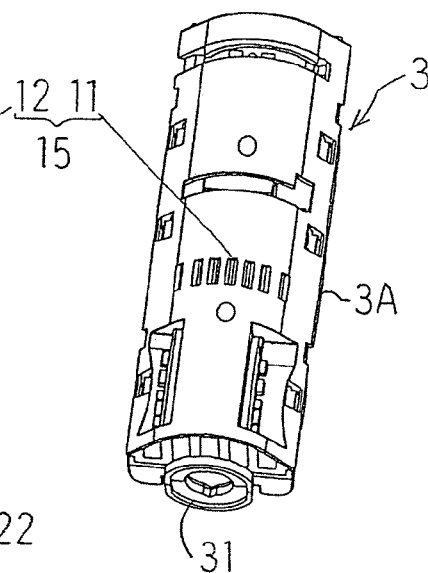


Fig. 3C

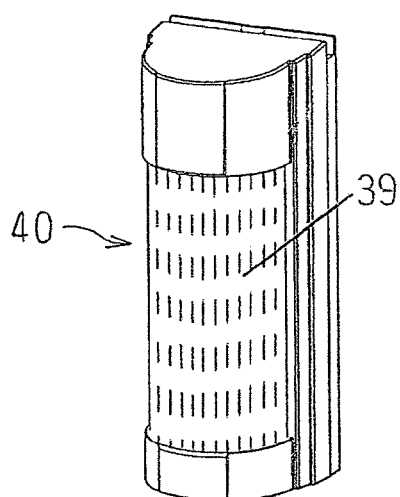


Fig. 3D

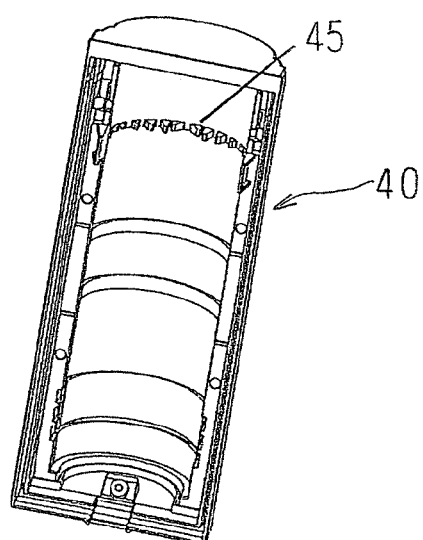


Fig. 4A

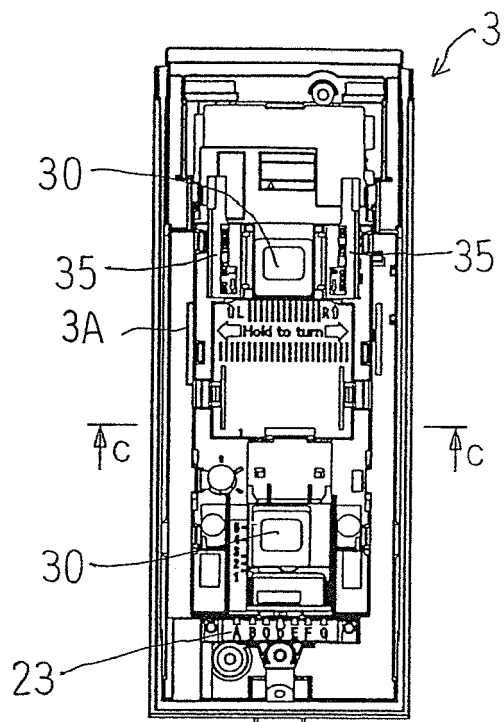


Fig. 4B

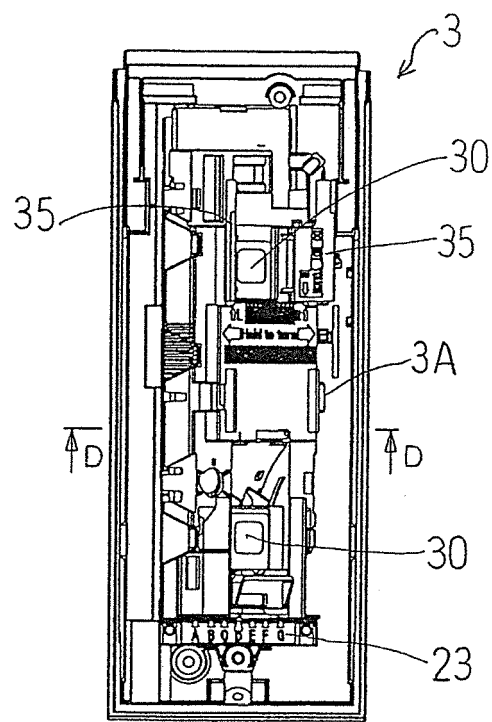
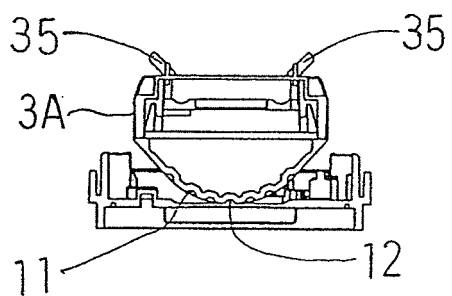
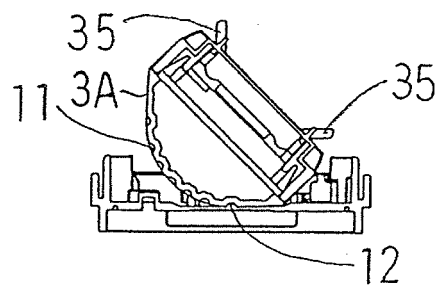


Fig. 4C



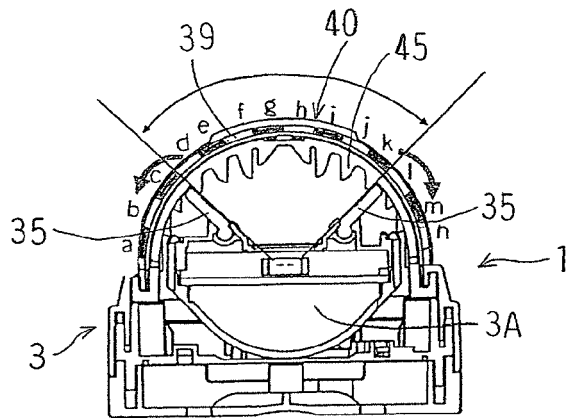
CROSS-SECTIONAL VIEW
C-C

Fig. 4D



CROSS-SECTIONAL VIEW
D-D

Fig. 5A



CROSS-SECTIONAL VIEW
V-V

Fig. 5C

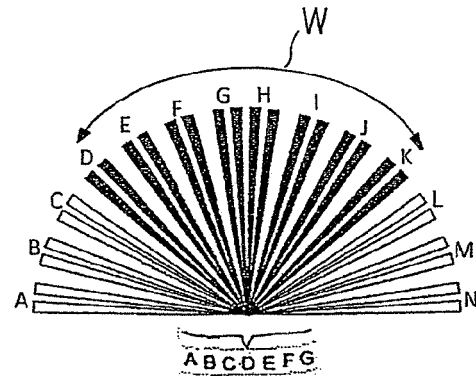
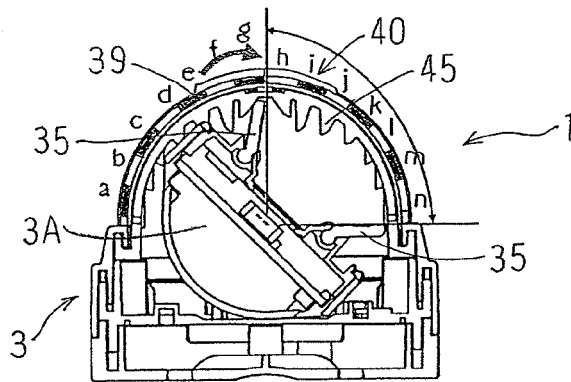


Fig. 5B



CROSS-SECTIONAL VIEW
V-V

Fig. 5D

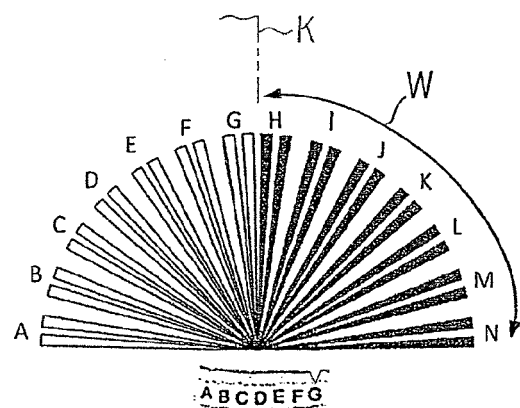


Fig. 6A

SECURITY AREA W

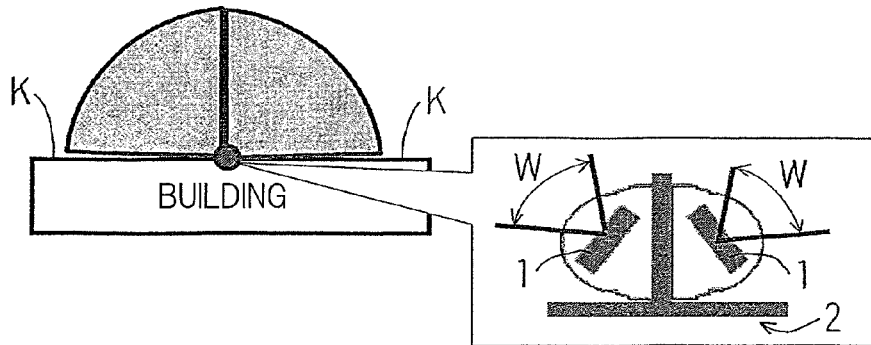


Fig. 6B

SECURITY AREA W

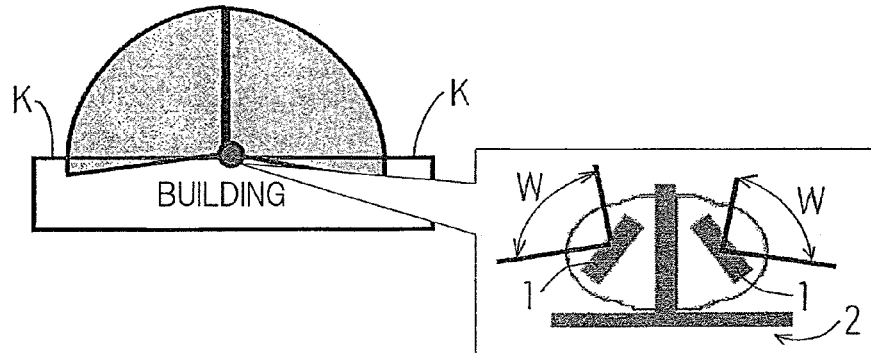


Fig. 6C

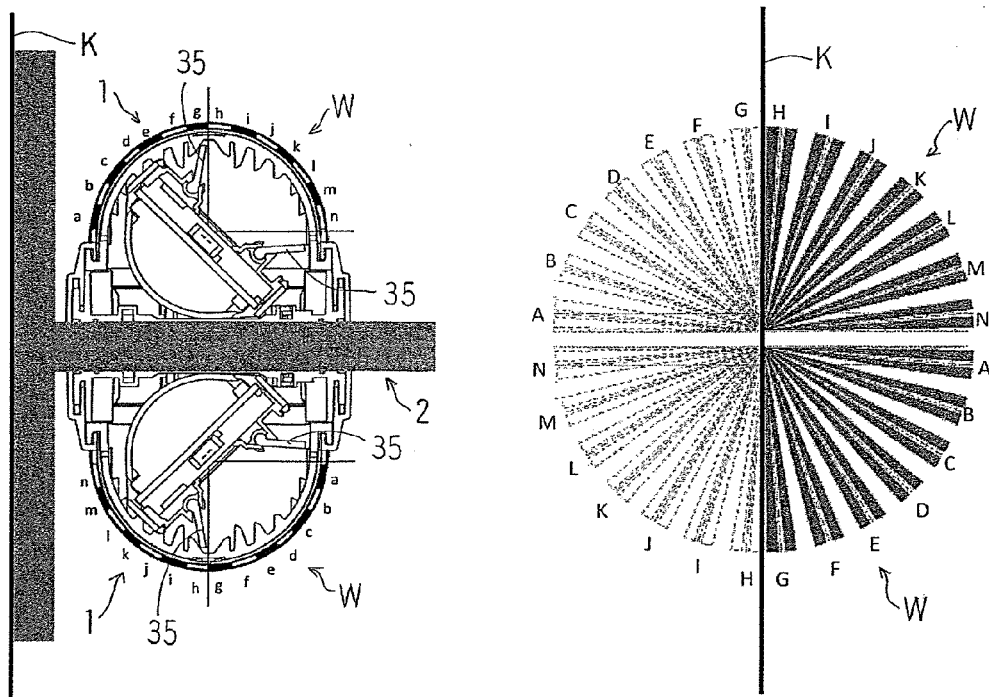


Fig. 7A

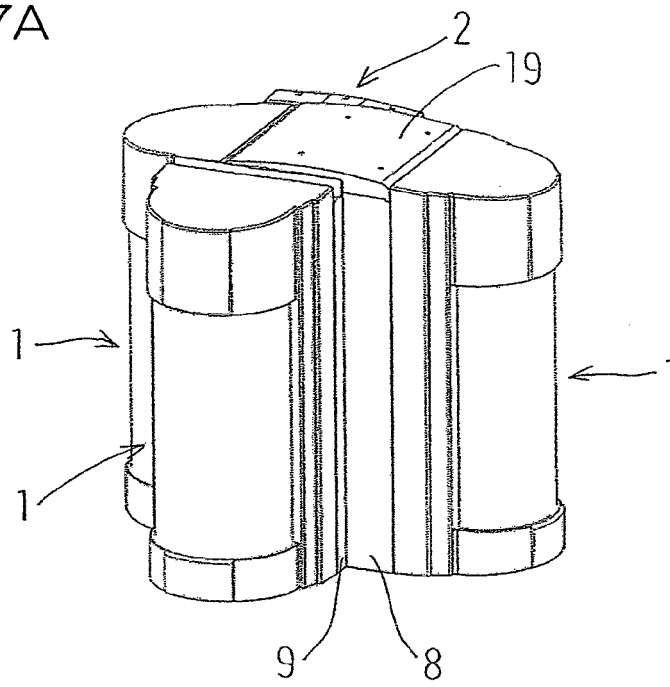
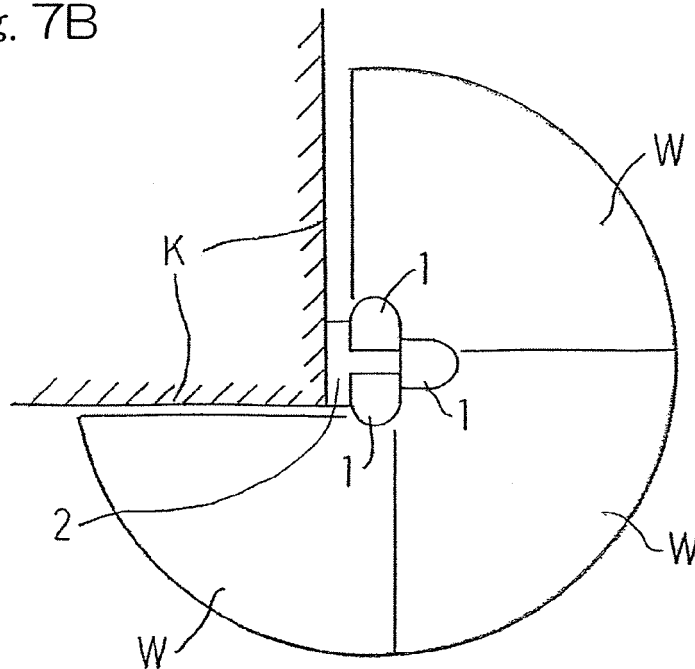


Fig. 7B



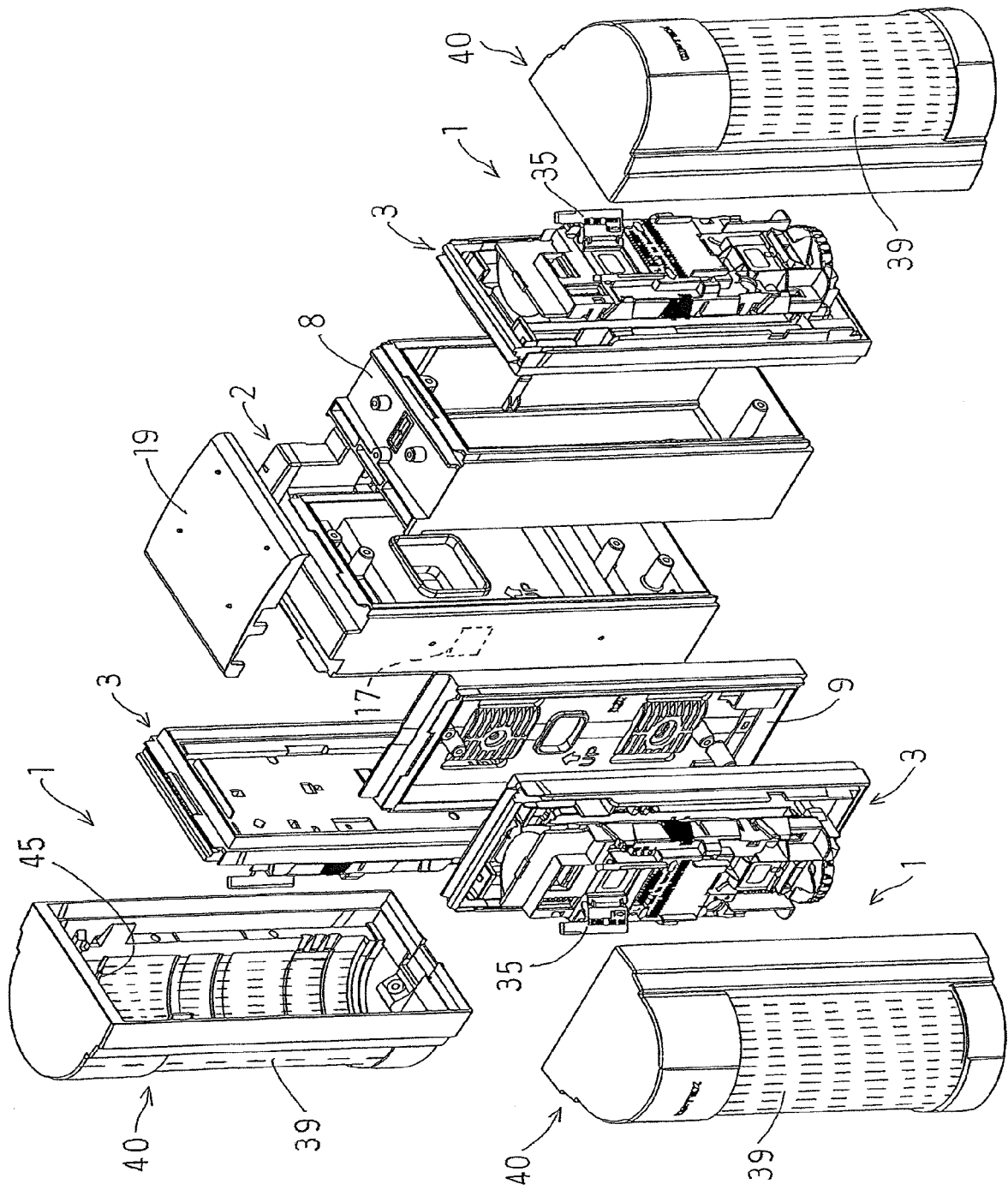


Fig. 8

Fig. 9A

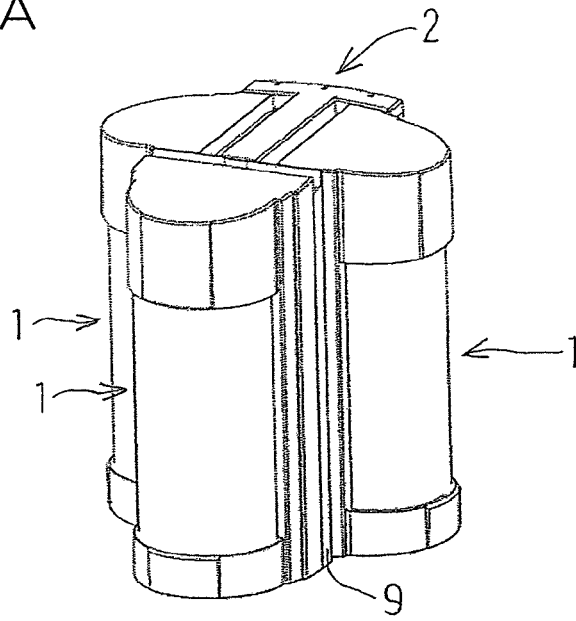


Fig. 9B

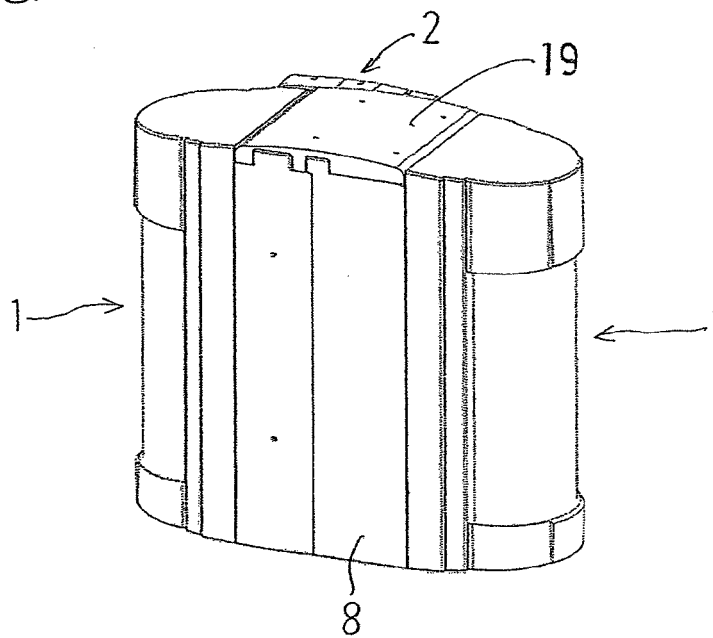


Fig. 10A

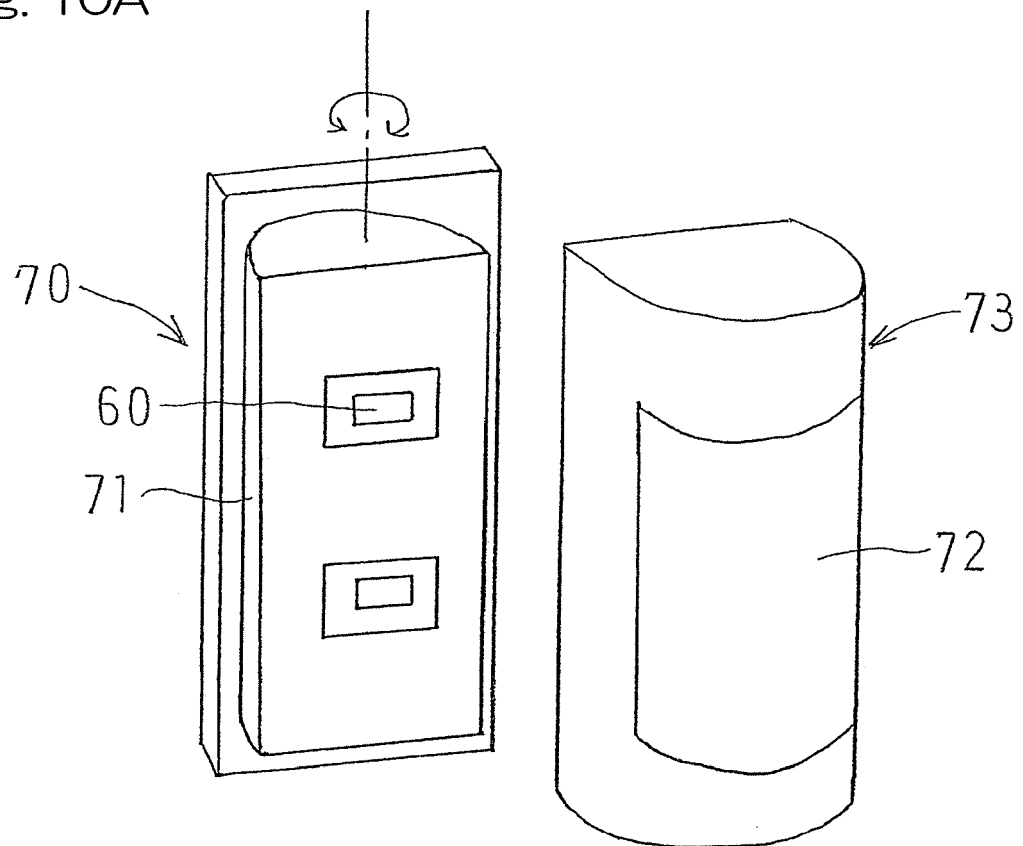
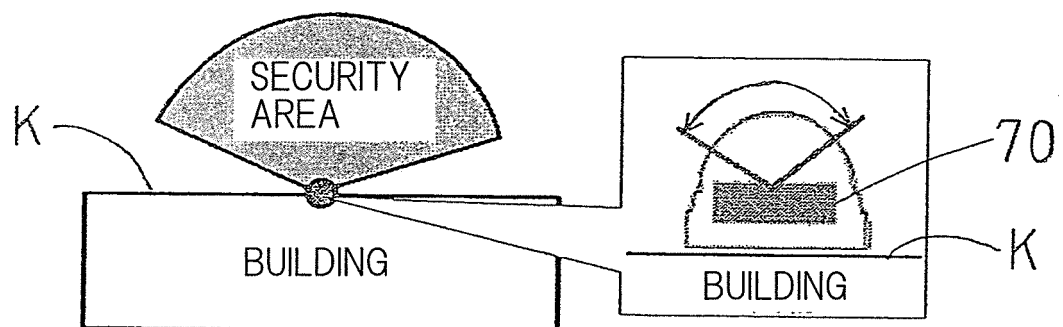
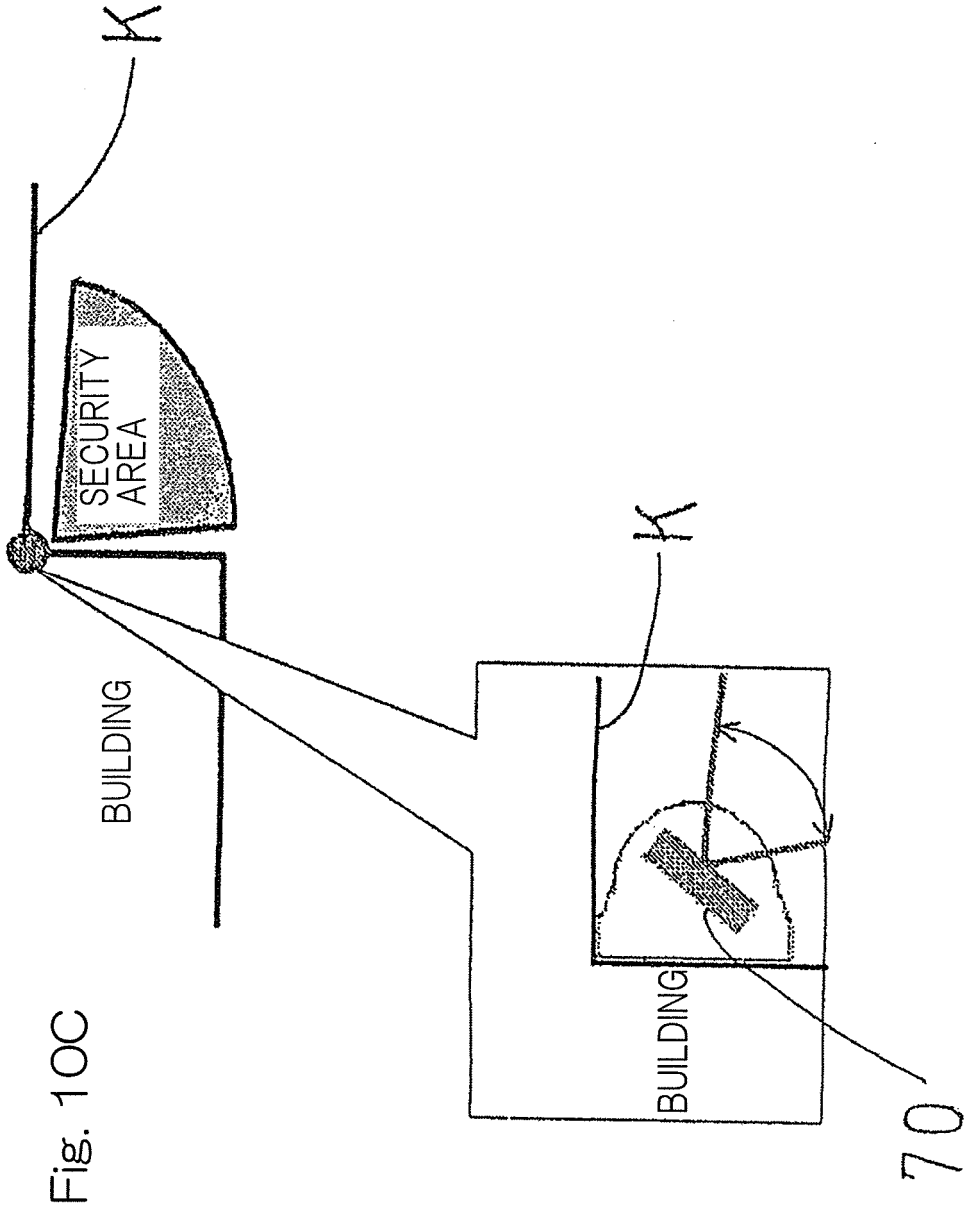


Fig. 10B





REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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