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(54) **Security sensor assembly**

Anordnung für einen Sicherheitssensor

Ensemble détecteur de sécurité

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(56) References cited:
US-B1- 6 262 661 US-B1- 6 377 174

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Description

[0001] The present invention relates to a security sensor assembly including an intruder detecting system for detecting an unauthorized entry of people entering a surveillance area and an obstructor detecting system for detecting the presence of an obstructor such as, for example, an adhesive seal and/or paint that interferes the normal operation of the security sensor assembly.

[0002] The intruder detecting system referred to above is generally so constructed that a passive type infrared beam detecting element, for example, may detect the difference between an object such as a person and the ambient temperature in reference to far infrared rays of light emanating from such object present within a surveillance area, as an indication of the object within such surveillance area. On the other hand, the obstructor detecting system referred to above is utilized to detect the presence or absence of an obstructor such as a piece of tape or paint effective to intercept passage of the far infrared rays of light therethrough, which is applied to a lens or cover of a security sensor. See, for example, the Japanese Patent Applications No. 2000-040701 and No. 2000-052796.

[0003] As is well known to those skilled in the art, the dust tends to deposit on an outer surface of the lens or cover of the security sensor and the amount of the dust deposited increases with passage of time. If the amount of the dust deposited on the outer surface of the lens or cover increases, the amount of light transmitted through the lens or cover correspondingly decreases and, hence, the amount of light reflected from the lens or cover increases. Accordingly, both of the capability of detecting the intruder and the capability of detecting the obstructor are lowered with passage of time and, for this reason, the lens or cover has to be cleaned regularly, for example, every few months. However, depending on the site or place where the security sensor assembly is installed, the amount of the dust deposited varies and, therefore, it is indeed cumbersome to fix the time of cleaning for each of the security sensor assemblies installed at different sites or places.

[0004] Accordingly, the present invention has been devised with a view to substantially eliminating the above discussed problems and inconveniences and is intended to provide an improved security sensor assembly capable of checking change in receiving level of a light receiving element with passage of time so that the change of the receiving level can be compensated for to allow the obstructor detecting sensitivity to be maintained at an initially preset level.

[0005] US-A-6,377,174 discloses an intrusion detector having a sabotage surveillance device. US-A-6,262,661 discloses a pressure infrared detector having an anti-masking device.

[0006] In order to accomplish the foregoing aim of the present invention, the present invention provides a security sensor assembly which comprises an infrared

beam detecting element for detecting infrared rays of light coming from an intruder, a cover for covering a front area forwardly of the infrared beam detecting element, a light transmitting element for transmitting an obstructor detecting beam towards the cover, a light receiving element for receiving a secondary beam of the obstructor detecting beam, which is reflected from or passed through the cover, characterized by a check circuit for checking a receiving level of the light receiving element at intervals of a predetermined period, and a first adjusting circuit operable, when a received level of the secondary beam approaches an obstructor detecting threshold value, to adjust the received level so as to depart from the obstructor detecting threshold value.

[0007] According to the present invention, since the amount of the dust deposited on the cover can be detected by the utilization of the obstructor detecting system and the obstructor detecting level can be corrected so as to approach the initial level at intervals of a predetermined time, the obstructor detecting sensitivity made available at the initial time can be maintained. The term "obstructor detecting sensitivity" hereinabove and hereinafter referred to is intended to mean the difference between the received level of the secondary beam and the obstructor detecting threshold value.

[0008] In a preferred embodiment of the present invention, the first adjusting circuit may adjust a transmitting level of the light transmitting element or a receiving level of the light receiving element. This feature is effective to allow the obstructor detecting sensitivity to be maintained at the initial good sensitivity.

[0009] In another preferred embodiment of the present invention, the first adjusting circuit may adjust the obstructor detecting threshold value. This feature is effective to allow the obstructor detecting sensitivity to be maintained at the initial good sensitivity.

[0010] In a further preferred embodiment of the present invention, the security sensor assembly of the present invention may further comprise a processing circuit for processing a signal received by the infrared beam detecting element, and a second adjusting circuit for adjusting the processing circuit in association with an operation of the first adjusting circuit to bring an intruder detecting sensitivity close to a desired value. According to this feature, the intruder detecting sensitivity can be corrected to represent the level substantially equal to the initial level at intervals of a predetermined time and, therefore, the obstructor detecting sensitivity can be maintained at the initial good sensitivity.

[0011] In a still further preferred embodiment of the present invention, the security sensor assembly of the present invention may further comprise a warning circuit for outputting a warning signal in the event that the rate of change of the received signal of the light receiving element with time exceeds a predetermined value, so that whether or not the level correction exceeds a possible correction range can be informed by the warning signal.

[0012] In a still further preferred embodiment of the present invention, the light transmitting element and the light receiving element may be positioned inwardly of the cover and the light receiving element receives the secondary beam reflected from the cover. With this feature, deposition of the dust on the light transmitting and receiving elements can be effectively avoided to allow the detection of deposition of the dust to be accomplished with high precision.

[0013] Embodiments of the present invention will now be described by way of example only, with reference to the accompanying drawings, in which:-

[0014] 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:

Fig. 1 is a schematic perspective view of a security sensor assembly according to a first preferred embodiment of the present invention;

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

Fig. 3 is a circuit block diagram showing the electric circuitry employed in the security sensor assembly according to the first embodiment of the present invention;

Fig. 4 is a circuit block diagram showing the electric circuitry employed in the security sensor assembly according to a second preferred embodiment of the present invention;

Fig. 5 is a longitudinal sectional view of the security sensor assembly according to a third preferred embodiment of the present invention;

Fig. 6 is a circuit block diagram showing the electric circuitry employed in the security sensor assembly according to a fourth preferred embodiment of the present invention; and

Fig. 7 illustrates charts showing adjustment of threshold values in the security sensor assembly shown in Fig. 6.

[0015] Preferred embodiments of the present invention will now be described with reference to the accompanying drawings.

[0016] Fig. 1 illustrates, in a perspective representation, a security sensor assembly according to the first preferred embodiment of the present invention. The security sensor assembly shown generally by 1 includes a generally rectangular box-like housing 4 made up of a generally rectangular base 2, adapted to be secured to a ceiling or a wall surface of a building, and a casing 3

fitted removably to the base 2 by means of one or more set screws (not shown) so as to cover a front area forwardly of the base 2. The security sensor assembly 1 also includes a passive type far infrared beam detecting element 5 accommodated within the housing 4.

[0017] Referring now to Fig. 2, showing a cross-sectional view taken along the line II-II in Fig. 1, the casing 3 includes a generally rectangular cover 6 made of a synthetic resin such as, for example, a polyethylene resin of a kind capable of permitting far infrared rays of light F1 therethrough. This cover 6 is fitted to the casing 3 so as to cover a correspondingly shaped window defined in a lower region of the casing 3. The cover 6 concurrently serves as a lens such as, for example, a Fresnel lens for condensing onto the detecting element 5 the incoming far infrared rays of light which come from the outside of the security sensor assembly 1, as will be described in detail later, and entering the housing 4 through the cover 6. A circuit board 10 having the far infrared beam detecting element 5 mounted thereon is positioned within the housing 4 and fixed on the base 2 with the far infrared beam detecting element 5 held at a location aligned with and substantially intermediate of the width of the cover 6.

[0018] A light transmitting element 11 for projecting an optical obstructor detecting beam L1 such as, for example, infrared rays of light towards an inner surface of the cover 6 and a light receiving element 12 for receiving a portion of the optical obstructor detecting beam L1, which has been reflected from the inner surface of the cover 6 as shown by L2 are also fixedly mounted on the circuit board 10 on respective sides of the far infrared beam detecting element 5. The light transmitting element 11 and the light receiving element 12 are covered by respective light sealing members 13 and 14, positioned laterally thereof, so that the amount of strayed beam generated inside the housing 4 and received by the light receiving element 12 can be minimized.

[0019] A circuit block diagram of the electric circuitry employed in the security sensor assembly 1 is best shown in Fig. 2. In a broad sense, the electric circuitry in the security sensor assembly 1 of the present invention includes an intruder detecting system for detecting an unauthorized entry of people entering a surveillance area and issuing a warning signal indicative of such unauthorized entry, and an obstructor detecting system for detecting the presence of an obstructor that interferes the normal operation of the security sensor assembly. The intruder detecting system will first be discussed briefly.

[0020] When the detecting element 5 receives infrared rays of light reflected from an intruder making, for example, an unauthorized entry into a surveillance area, the detecting element 5 issues a pulse signal i1 indicative of the receipt of the reflected infrared rays of light from the intruder. This pulse signal is supplied to a received-ray signal processing circuit 15 and is, after having been subjected to such processes as amplification and wave shaping, supplied to an intruder detecting circuit 16 in the form of an amplified signal i2. The intruder detecting circuit 16

monitors the amplified signal i2 and outputs an intruder detecting signal l indicative of the detection of the intruder in the event that the amplified signal i2 meets with a predetermined threshold value.

[0021] The operation of the obstructor detecting system will now be described. The light transmitting element 11 is driven by a drive circuit 21 to project an optical obstruction detecting beam L1, such as near infrared rays of light, towards an inner surface of the cover 6. A portion of the obstructor detecting beam L1 which has been reflected from inner and outer surfaces of the cover 6, i.e., the reflected obstructor detecting beam L2, is received by the light receiving element 12 which light receiving element 12 in turn provides a received signal s1 indicative of the receipt of the reflected obstructor detecting beam L2 to a received signal processing circuit 22. The signal s2, which has been amplified in the received signal processing circuit 22, is subsequently supplied to an obstructor detecting circuit 23 and a check circuit 24. The obstructor detecting circuit 23 monitors the level of the amplified signal s2 fed from the received signal processing circuit 22 and then provides an obstructor warning S in the event that the level of the amplified signal s2 exceeds a predetermined threshold value. With this obstructor warning S, the supervisor can recognize that an obstructor, which may be an interfering label or paint, has been applied to the cover 6 to disturb the normal operation of the intruder detecting system.

[0022] As is well recognized by those skilled in the art, dust tends to deposit on the surface of the cover 6 of the security sensor assembly 1 that is secured to the wall surface or the ceiling of a building. The dust deposited on the surface of the cover 6 is so objectionable as to reflect the incoming obstructor detecting beam L1 from the light transmitting element 11 with the amount of the reflected obstructor detecting beam L2 increased consequently. This in turn result in increase of the level of the amplified signal s2.

[0023] Since the amount of the dust deposited on the surface of the cover 6 generally increases with passage of time, the level of the amplified signal s2 increases correspondingly to a value approaching the predetermined threshold value preset in the obstructor detecting circuit 23 for detecting the obstructor and accordingly, the difference between the level of the amplified signal s2 corresponding to the level of the received signal s1 and the predetermined threshold value for the detection of the obstructor becomes so small that the obstructor detecting sensitivity may be sensitive enough to result in an erroneous operation.

[0024] A first adjusting circuit 20 shown in Fig. 3 is used for adjusting the obstructor detecting sensitivity to the initially preset detecting sensitivity, i.e., the detecting sensitivity which has initially been preset, and includes a timer 25 operable to output a check signal c to the check circuit 24 at intervals of a predetermined period, for example, every thirty days. The check circuit 24 has stored therein the initial level of the amplified signal s2, which

has been exhibited at the time the amplified signal s2 was supplied thereto for the first time, and, accordingly, when the check signal c is inputted, the check circuit 24 supplies a signal m indicative of the difference between the level of the input amplified signal s2 and the level of the stored amplified signal to a first amplification factor adjusting circuit 26. The first amplification factor adjusting circuit 26 provides a first amplification factor adjusting signal a1 for rectifying the level difference, represented by the signal m, to the received signal processing circuit 22, causing the received signal processing circuit 22 to modify the amplification factor so that the level of the amplified signal s2 can be returned to the initial level.

[0025] The difference signal m is also supplied to a contamination warning circuit 30. The contamination warning circuit 30 issues a contamination warning T in the event that the level of the difference signal m exceeds a predetermined value which is, for example, equal to one half the difference between the level of the initial amplified signal s2, stored in the check circuit 24, and the obstructor detecting threshold value preset in the obstructor detecting circuit 23, or in the event that the rate of change of the difference signal m exceeds one half the initial level of such signal m. The contamination warning T is issued in the form of an electric signal and is informed in any suitable mode, for example, in the form of lighting, voice and/or graphical display. The supervisor when so informed by the contamination warning T can clean the dust off from the cover 6 so that the security sensor assembly 1 can resume a normal operation to detect the presence or absence of an obstructor on the cover 6.

[0026] On the other hand, it equally occurs that the far infrared rays of light Fi incident upon the far infrared beam detecting element 5 transmit through the cover 6 in a quantity which may decrease with increase of the amount of the dust deposited on the cover 6, and the sensitivity of detecting the intruder decreases accordingly. In view of this, a second adjusting circuit 40 shown in Fig. 3 is used to avoid reduction of the detecting sensitivity and includes a second amplification factor adjusting circuit 41. Specifically, the second amplification factor adjusting circuit 41 is operable in response to the difference signal m, fed from the check circuit 24, to feed a second amplification factor adjusting signal a2, necessary to increase the amplification factor of the received-ray signal processing circuit 15, to the received-ray signal processing circuit 15. The signal a2 increases the amplification factor of the received-ray signal processing circuit 15 in dependence on the rate of change of the differential signal m from the initial value to compensate for reduction of the amount of light transmitted through the cover 6, whereby reduction in sensitivity of detecting the intruder resulting from the deposition of the dust on the cover 6, which sensitivity is the difference between the amplified signal i2 and the intruder detecting threshold value preset in the intruder detecting circuit 16, can be compensated for. By way of example, if the difference signal m lowers

down to a value equal to 50% of the initial value, the amplification factor of the received light signal processing circuit 15 may be increased by 50%.

[0027] As hereinabove described, according to the first embodiment of the present invention, reduction of both of the obstructor detecting sensitivity and the intruder detecting sensitivity, which results from the deposition of the dust on the cover 6, can be so corrected as to approach the initially preset value at intervals of a predetermined period, for example, every thirty days and, at the same time, the contamination warning T can be generated in the event that the amount of the dust deposited on the cover 6 exceeds a predetermined value. Accordingly, any inconveniences brought about by the deposition of the dust on the cover 6 can be substantially eliminated. Also, since the light transmitting element 11 and the light receiving element 12 are positioned inwardly of the cover 6 and, hence, within the housing 4, no dust will deposit on the light transmitting and receiving elements 11 and 12 and, therefore, the precision of detecting the dust deposited on the cover 6 can advantageously be maintained at a high level.

[0028] Fig. 4 illustrates a circuit block diagram of the security sensor assembly according to a second preferred embodiment of the present invention. In this second embodiment, the circuitry is so designed that compensation for the reduction of the obstructor detecting sensitivity brought about by the deposition of the dust on the cover 6 can be accomplished by reducing the amount of the obstructor detecting beam L1, emitted from the light transmitting element 11, by a quantity equal to the amount of a portion of the obstructor detecting beam L1 reflected from the dust particles. More specifically, a first adjusting circuit 20A shown by a single-dotted chain line in Fig. 4 is so designed that the difference signal m can be supplied to a transmitting beam adjusting circuit 28 for adjusting the amount of the obstructor detecting beam L1 emitted from the light transmitting element 11, so that the transmitting beam adjusting circuit 28 can decrease the level of the drive signal, outputted from the drive circuit 21 for driving the light transmitting element 11, by a quantity corresponding to the amount of the level of the amplified signal s2, increased by the light reflected from the dust particles deposited on the cover 6, to thereby approach the difference signal m to the initial value.

[0029] Referring now to Fig. 5, there is shown the security sensor assembly according to a third preferred embodiment of the present invention. The security sensor 1 shown therein is so designed and so structured that the obstructor detecting beam L1 projected from the light transmitting element 11, mounted on the circuit board 10, so as to travel towards the inner surface of the cover 6 concurrently serving as a condensing lens can be received by the light receiving element 12 through a light guide member 9 facing towards the outside of the casing 3. The cover 6 employed in the security sensor assembly 1 according to the third embodiment has its outer surface formed with a plurality of projections 61 for preventing an

obstructor 7, which may be an interfering adhesive tape from being applied and, hence, sticking to the cover 6 and, on the other hand, for allowing the light L3 reflected from the obstructor 7 to travel towards the light receiving element 12 through the light guide member 9. The light transmitting element 11 and the light receiving element 12 are separated from each other by a shielding wall 18 and, therefore, the amount of strayed light to be received by the light receiving element 12 can advantageously be minimized to thereby increase the obstructor detecting accuracy.

[0030] The security sensor assembly 1 according to the third embodiment of the present invention may employ an electric circuit similar to either one of the circuit arrangements shown and described with reference to Figs. 3 and 4, respectively, so that modification of the obstructor detecting sensitivity necessitated by the deposition of the dust on the outer surface of the cover 6, generation of the contamination warning and modification of the intruder detecting sensitivity can be accomplished in a manner similar to that described in connection with the corresponding embodiment. However, the following functional difference may occur.

[0031] In the absence of the obstructor 7 on the outer surface of the cover 6, the light receiving element 12 receives the beam L1 transmitted through the cover 6 and, therefore, the amount of the light received by the light receiving element 12 decreases with increase of the amount of the dust deposited on the cover 6. Accordingly, the difference signal m outputted from the check circuit 24 shown in Fig. 3 represents a negative (minus) value. As a result thereof, the first amplification factor adjusting signal a1 performs the previously described adjustment in a positive (plus) direction; the second amplification factor adjusting signal a2 performs the previously described adjustment in a positive (plus) direction; the transmitting beam adjusting circuit 28 shown in Fig. 4 performs the previously described adjustment in a positive (plus) direction; and the contamination warning circuit 30 monitors the amount of reduction, in the negative (minus) direction to output the contamination warning T.

[0032] Fig. 6 illustrates the circuit block diagram of the security sensor assembly according to a fourth preferred embodiment of the present invention. This electric circuitry can be employed in the security sensor assembly shown in and described with reference to Fig. 2 in connection with the first embodiment. The first and second amplification factor adjusting circuits 26 and 41 both shown in Fig. 2 are replaced with first and second threshold value adjusting circuits 51 and 62 in Fig. 6, respectively. Specifically, the circuitry shown in Fig. 6 according to the fourth embodiment is so designed that reduction of the obstructor detecting sensitivity and reduction of the intruder detecting sensitivity can be compensated for by modifying an obstructor detecting threshold value for the obstructor detecting circuit 23 and an intruder detecting threshold value for the intruder detecting circuit 16.

[0033] The first adjusting circuit identified by 50 in Fig.

6 is so designed that the difference signal m outputted from the check circuit 24 can be supplied to the first threshold adjusting circuit 51, which in turn outputs a threshold adjusting signal h1 required to increase the threshold value of the obstructor detecting circuit 23 by a level corresponding to the amount of the level of the amplified signal s2 fed from the received signal processing circuit 22 to the obstructor detecting circuit 23, which is increased by the deposition of the dust on the cover 6. Fig. 7(A) is an explanatory diagram showing the operation described above and it will readily be seen that each time the difference signal m is outputted from the check circuit 24, the obstructor detecting threshold value increases to keep a predetermined margin (corresponding to the detecting sensitivity), that when the level of the difference signal m exceeds the limit of adjustment, the contamination warning T is outputted and that the contamination of the cover 6 is removed by means of cleaning, the threshold value returns to the initial value.

[0034] The second adjusting circuit identified by 60 in this third embodiment includes the second threshold adjusting circuit 62 operable in response to the difference signal m from the check circuit 24 to output a threshold adjusting signal h2 necessary to decrease the intruder detecting threshold value of the intruder detecting circuit 16 by a level corresponding to the quantity of the level of the amplified signal i2 fed from the received light signal processing circuit 15, which is reduced by the deposition of the dust on the cover 6. Fig. 7(B) is an explanatory diagram showing the operation described above and it will readily be seen that each time the difference signal m is outputted from the check circuit 24, the intruder detecting threshold value decreases to keep a predetermined margin.

[0035] Although the present invention has been described as applied to the passive type infrared beam detecting (PIR) system utilizing the far infrared beam detecting element 5 such as in any one of the foregoing embodiments of the present invention, the present invention can be equally applied to an active type detecting system utilizing microwaves, ultrasonic waves, near infrared rays of light or the like.

Claims

1. A security sensor assembly which comprises:

an infrared beam detecting element (5) for detecting infrared rays of light coming from an intruder;
a cover (6) for covering a front area forwardly of the infrared beam detecting element (5);
a light transmitting element (11) for transmitting an obstructor detecting beam towards the cover (6);
a light receiving element (12) for receiving a secondary beam of the obstructor detecting beam,

which is reflected from or passed through the cover (6);

characterized by

a check circuit (24) for checking a receiving level of the light receiving element at intervals of a predetermined period; and
a first adjusting circuit (20;20A;50) operable, when a received level of the secondary beam approaches an obstructor detecting threshold value, to adjust the received level so as to depart from the obstructor detecting threshold value.

2. The security sensor assembly as claimed in Claim 1, wherein the first adjusting circuit (20;20A;50) adjusts a transmitting level of the light transmitting element or a receiving level of the light receiving element (12).
3. The security sensor assembly as claimed in Claim 1, wherein the first adjusting circuit (20;20A;50) adjusts the obstructor detecting threshold value.
4. The security sensor assembly as claimed in Claim 1, further comprising a processing circuit (15) for processing a signal received by the infrared beam detecting element (5), and a second adjusting circuit (40;60) for adjusting the processing circuit (15) in association with an operation of the first adjusting circuit (20) to bring an intruder detecting sensitivity close to a desired value.
5. The security sensor assembly as claimed in Claim 1, further comprising a warning circuit (30) for outputting a warning signal in the event that the rate of change of the received signal of the light receiving element (12) with time exceeds a predetermined value.
6. The security sensor assembly as claimed in Claim 1, wherein the light transmitting element (11) and the light receiving element (12) are positioned inwardly of the cover (6) and the light receiving element (12) receives the secondary beam reflected from the cover (6).

Patentansprüche

1. Anordnung für einen Sicherheitssensor, die aufweist:

ein Element zur Detektion von Infrarotstrahlen (5) zur Detektion infraroter Lichtstrahlen die von einem Eindringling herrühren;
eine Abdeckung (6) zur Abdeckung eines Frontbereichs vor dem Element zur Detektion von Infrarotstrahlen (5);
ein Licht aussendendes Element (11) zum Aus-

senden eines einen Blockierer detektierenden Strahls in Richtung der Abdeckung (6);
ein Licht empfangendes Element (12) zum Empfangen eines Sekundärstrahls des den Blockierer detektierenden Strahls, der von der Abdeckung (6) reflektiert wird oder durch diese hindurch tritt;

gekennzeichnet durch

eine Überprüfungsschaltung (24) zum Überprüfen eines Empfangspegels des Licht empfangenden Elements in Intervallen einer vorgegebenen Periode; und

eine erste Regelschaltung (20; 20A; 50), die betriebsfähig ist, wenn sich ein empfangener Pegel des Sekundärstrahls einem Schwellwert zur Detektion des Blockierers annähert den empfangenen Pegel so einzuregeln, dass dieser vom Schwellwert zur Detektion des Blockierers abweicht.

2. Anordnung für einen Sicherheitssensor nach Anspruch 1, wobei die erste Regelschaltung (20; 20A; 50) einen Sendepiegel des Licht aussendenden Elements oder einen Empfangspegel des Licht empfangenden Elements (12) einregelt.
3. Anordnung für einen Sicherheitssensor nach Anspruch 1, wobei die erste Regelschaltung (20; 20A; 50) den Schwellwert zur Detektion des Blockierers einregelt.
4. Anordnung für einen Sicherheitssensor nach Anspruch 1, weiterhin aufweisend eine Verarbeitungsschaltung (15) zur Verarbeitung eines durch das Element zur Detektion von Infrarotstrahlen (5) empfangenen Signals, und eine zweite Regelschaltung (40; 60) zum Einregeln der Verarbeitungsschaltung (15) in Verbindung mit einem Betrieb der ersten Regelschaltung (20), um eine einen Eindringling detektierende Empfindlichkeit nahe zu einem erwünschten Wert zu bringen.
5. Anordnung für einen Sicherheitssensor nach Anspruch 1, weiterhin aufweisend eine Warnschaltung (30) zur Ausgabe eines Warnsignals für den Fall, dass die Veränderungsrate des empfangenen Signals des Licht empfangenden Elements (12) über der Zeit einen vorgegebenen Wert übersteigt.
6. Anordnung für einen Sicherheitssensor nach Anspruch 1, wobei das Licht aussendende Element (11) und das Licht empfangende Element (12) von der Abdeckung (6) nach innen gerichtet angeordnet sind und das Licht empfangende Element (12) den von der Abdeckung (6) reflektierten Sekundärstrahl empfängt.

Revendications

1. Ensemble à capteur de sécurité, qui comporte :

un élément (5) de détection de faisceau infrarouge destiné à des rayons infrarouges d'une lumière provenant d'un intrus ;
un capot (6) destiné à recouvrir une zone avant en avant de l'élément (5) de détection de faisceau infrarouge ;
un élément (11) d'émission de lumière destiné à émettre un faisceau de détection d'intrus vers le capot (6) ;
un élément (12) de réception de lumière destiné à recevoir un faisceau secondaire du faisceau de détection d'intrus, qui est réfléchi depuis, ou est passé à travers le capot (6) ;

caractérisé par

un circuit de vérification (24) destiné à vérifier un niveau de réception de l'élément de réception de lumière à des intervalles d'une période prédéterminée ; et
un premier circuit de réglage (20 ; 20A ; -50) pouvant être mis en oeuvre, lorsqu'un niveau reçu du faisceau secondaire approche d'une valeur de seuil de détection d'intrus, pour régler le niveau reçu afin qu'il s'écarte de la valeur de seuil de détection d'intrus.

2. Ensemble à capteur de sécurité selon la revendication 1, dans lequel le premier circuit de réglage (20 ; 20A ; 50) règle un niveau d'émission de l'élément d'émission de lumière ou un niveau de réception de l'élément (12) de réception de lumière.
3. Ensemble à capteur de sécurité selon la revendication 1, dans lequel le premier circuit de réglage (20 ; 20A ; 50) règle la valeur de seuil de détection d'intrus.
4. Ensemble à capteur de sécurité selon la revendication 1, comportant en outre un circuit de traitement (15) destiné à traiter un signal reçu par l'élément (5) de détection de faisceau infrarouge, et un second circuit de réglage (40 ; 60) destiné à régler le circuit de traitement (15) en association avec une opération effectuée par le premier circuit de réglage (20) pour rapprocher une sensibilité de détection d'intrus d'une valeur souhaitée.
5. Ensemble à capteur de sécurité selon la revendication 1, comportant en outre un circuit d'avertissement (30) destiné à délivrer en sortie un signal d'avertissement dans le cas où le rythme de variation du signal reçu de l'élément (12) de réception de lumière, avec le temps, dépasse une valeur prédéterminée.
6. Ensemble à capteur de sécurité selon la revendica-

tion 1, dans lequel l'élément (11) d'émission de lumière et l'élément (12) de réception de lumière sont positionnés à l'intérieur du capot (6) et l'élément (12) de lumière reçoit le faisceau secondaire réfléchi depuis le capot (6).

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Fig. 1

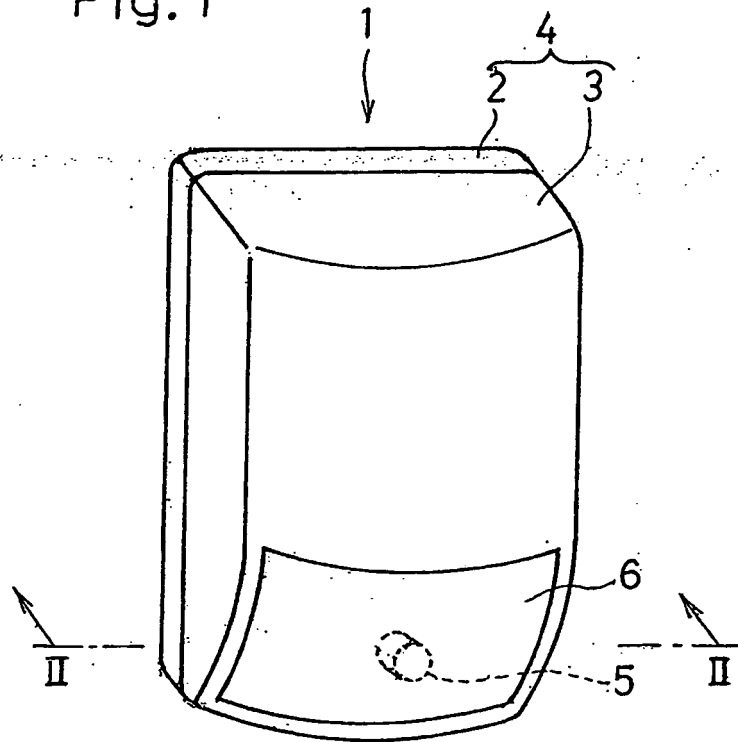


Fig. 2

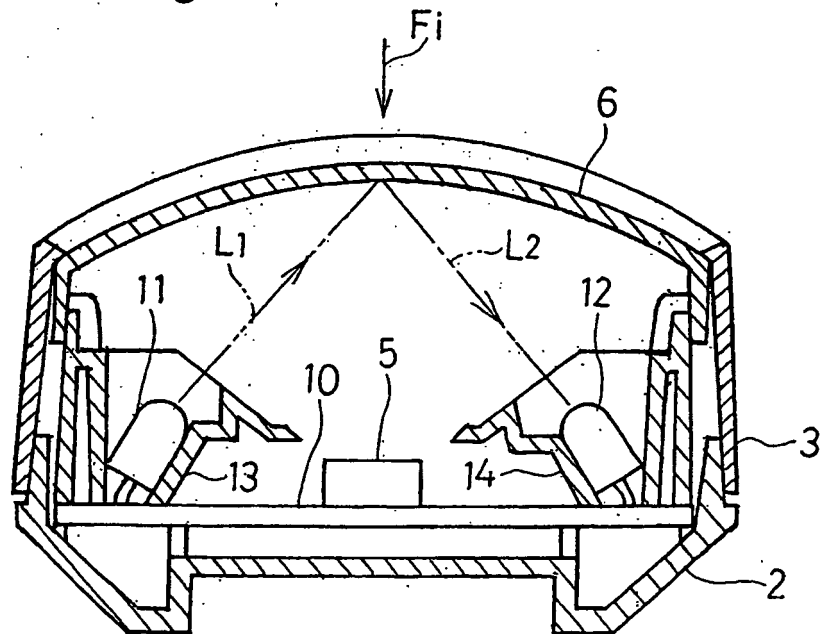


Fig. 3

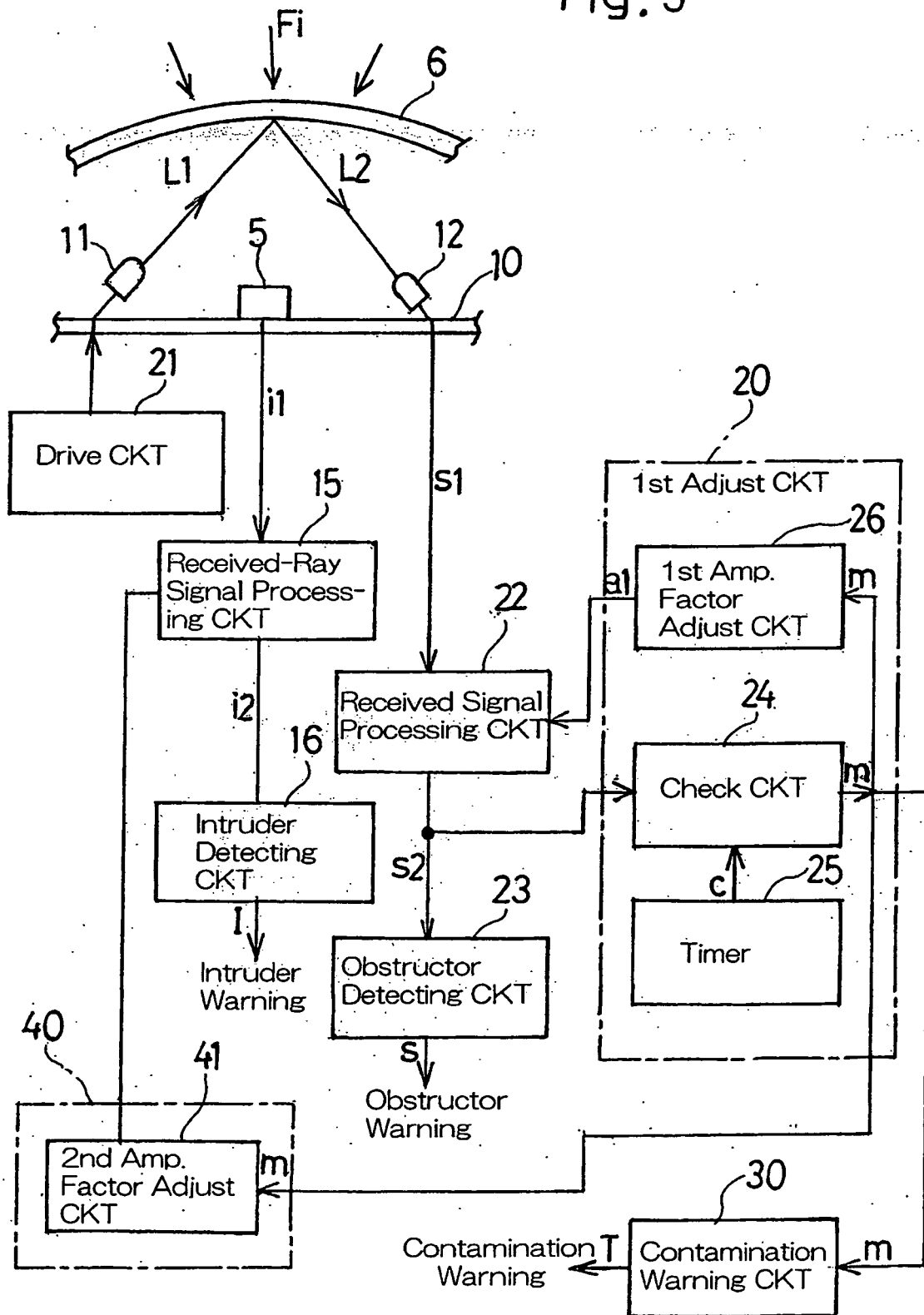


Fig. 4

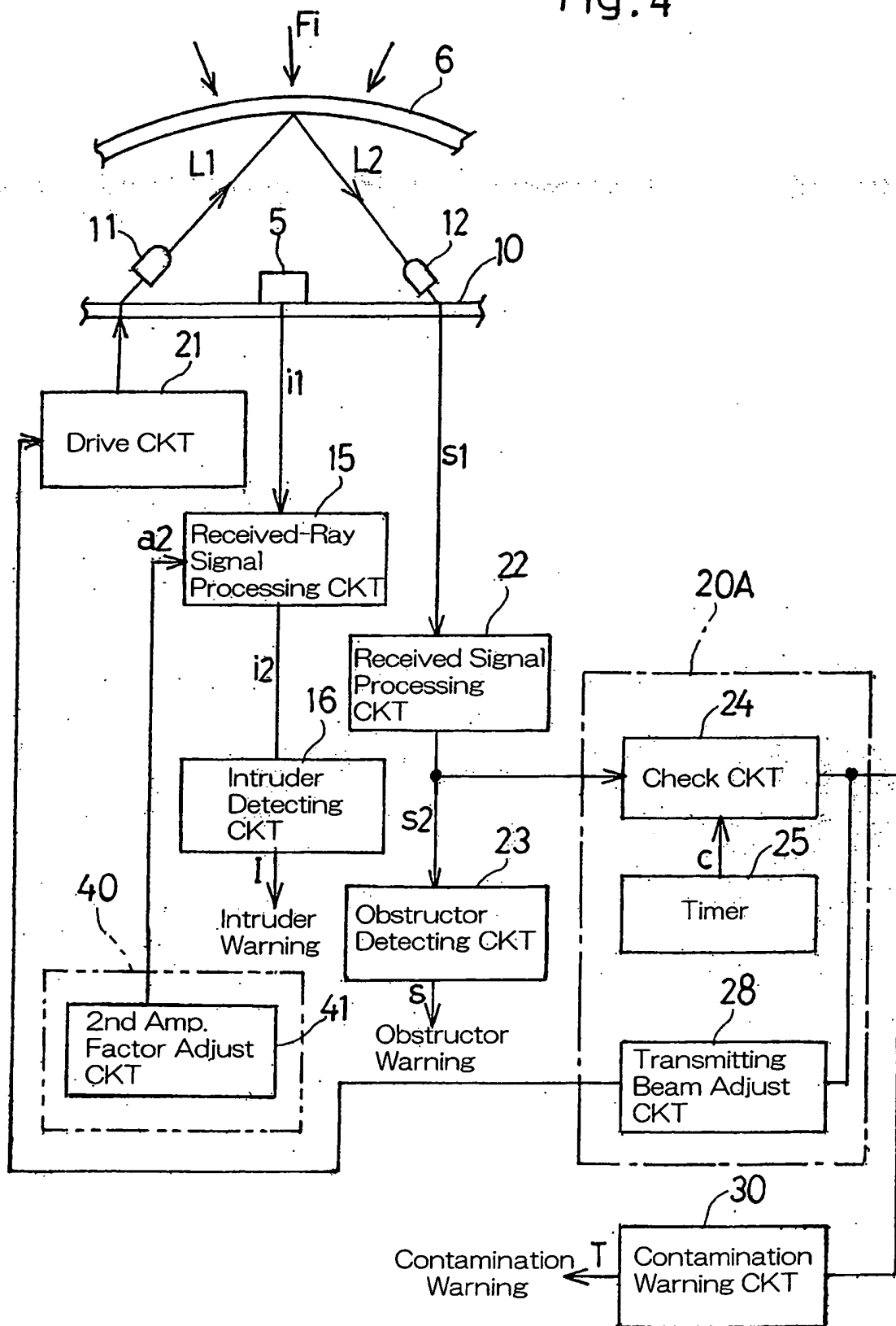


Fig. 5

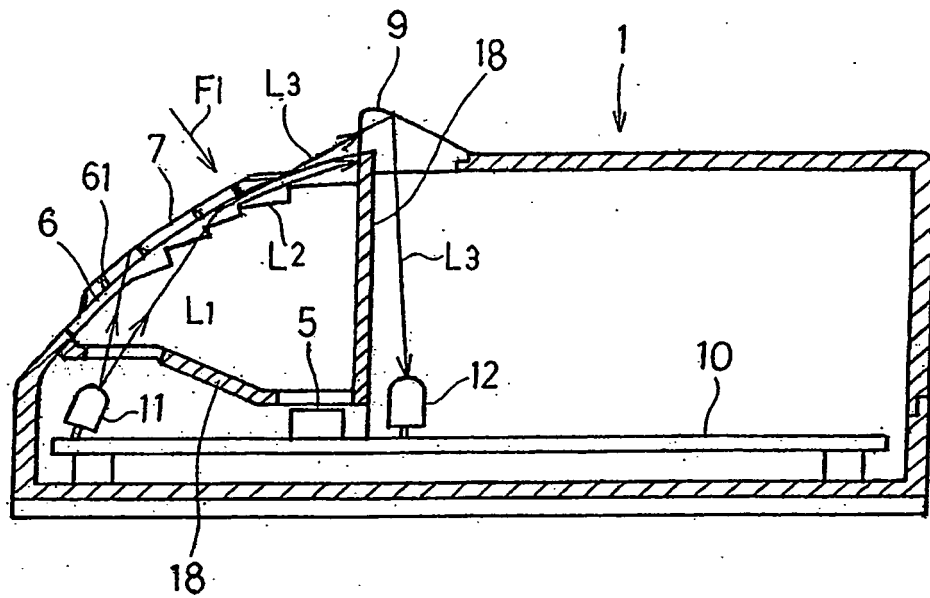


Fig. 6

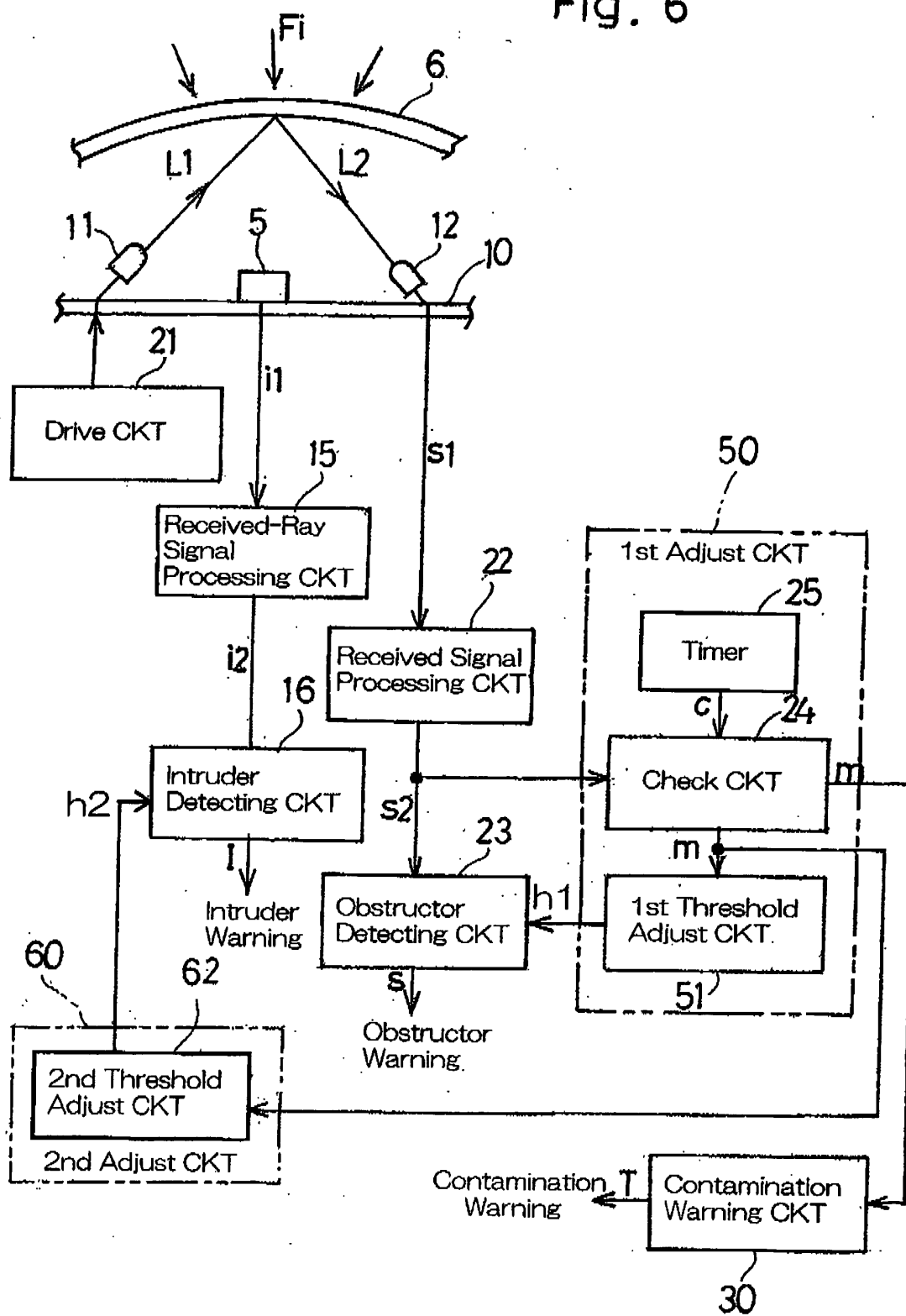


Fig. 7A

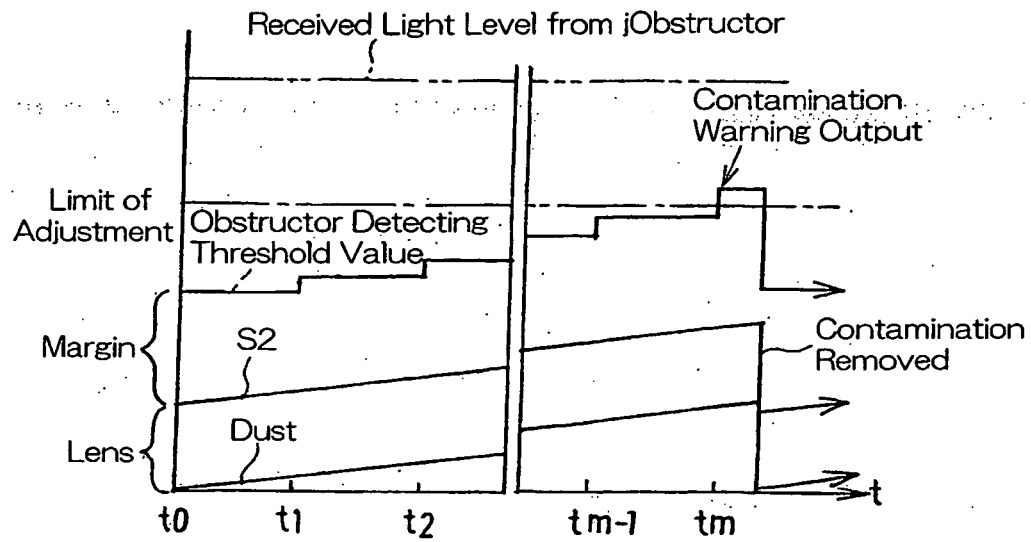
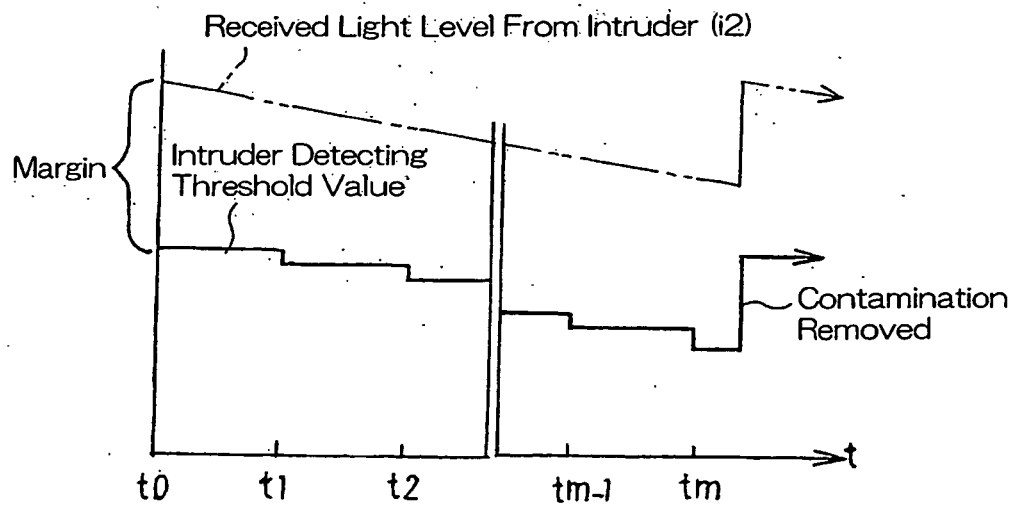


Fig. 7B



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2000040701 A [0002]
- JP 2000052796 A [0002]
- US 6377174 A [0005]
- US 6262661 A [0005]