

(19)



(11)

EP 2 155 530 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
03.11.2010 Bulletin 2010/44

(21) Application number: **08734535.1**

(22) Date of filing: **13.05.2008**

(51) Int Cl.:
B61L 29/24 ^(2006.01) **B61L 29/30** ^(2006.01)

(86) International application number:
PCT/DK2008/000178

(87) International publication number:
WO 2008/138342 (20.11.2008 Gazette 2008/47)

(54) **A WARNING SYSTEM FOR RAILWAY CROSSINGS**

WARNSYSTEM FÜR EISENBAHNÜBERGÄNGE

SYSTÈME D'AVERTISSEMENT POUR PASSAGES À NIVEAU

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT
RO SE SI SK TR**

(30) Priority: **11.05.2007 DK 200700707**

(43) Date of publication of application:
24.02.2010 Bulletin 2010/08

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Description

[0001] The invention relates to a warning system for crossings, such as railway crossings, said warning system comprising a sound generator and a light generator which, when the crossing is passed by a vehicle, such as a train, emit a sound signal and a light signal, wherein the strength of the sound signal is controlled on the basis of the strength of the ambient noise detected from a microphone.

[0002] Such known warning systems are usually constructed in the manner that when a train approaches a railway crossing a warning is initiated, which may consist in emitting a sound signal which contains the words "do not cross the track, approaching train" from a loudspeaker. Optionally, the sound signal is accompanied by a visually flashing warning signal.

[0003] These known warning systems emit sound and light signals of the same characteristic and intensity, no matter whether it is day or night, or whether the ambient noise is high or low.

[0004] Clearly, there are less ambient noise and less light at night, which means that the sound signal, which is also to operate properly in the daytime, may have such a strength that it can be a nuisance to persons who are present in e.g. dwellings which are located close to the warning system, when the ambient noise is low.

[0005] DE 44 22 308 C2 discloses a warning system which is intended to be arranged on a building site in a railway environment, where workers working at the building site receive an acoustic or sound warning in case of an approaching train, where the intensity of the acoustic warning may be controlled in dependence on the ambient noise, as the strength of the acoustic warning may be damped or enhanced in dependence on the strength of the ambient noise.

[0006] Thus, in the known warning system, an acoustic signal is emitted at daytime, and a sound signal when it is dark, which may be inexpedient inter alia for visually impaired and hearing-impaired persons.

[0007] EP 1731397 A and US 5654705 A disclose a warning system for intersections which has both a visual signal and an audio signal. EP 1731397 A further discloses a sound generator and a light generator, and US 5654705 A further discloses that the volume is reduced depending on the ambient noise.

[0008] Accordingly, an object of the invention is to provide a warning system of the type defined in the introductory portion of claim 1, which is useful under all sound and light conditions, and which adapts itself to the sound and light conditions of the surroundings.

[0009] It is also an object of the invention to additionally ensure that all persons present at the crossing are aware that a train is approaching, and expediently that the warning system may be manufactured to be reliable in operation and using as few components as possible.

[0010] The object of the invention is achieved by a warning system of the type defined in the introductory

portion of claim 1, which is **characterized in that** the intensity of the light signal is controlled in dependence on how powerful the ambient light is, wherein the light signal is detected by a photosensor and is enhanced when the intensity of the ambient light signal is enhanced, while the light signal is damped when the intensity of the ambient light signal is damped, and that the strength of the sound signal changes adaptively in dependence on the sound characteristic of the ambient noise, and when being activated, the warning system first emits the light signal and then emits the sound signal with a time delay, and where the warning system is composed of at least one master post (1), which consists of first (13), second (16), third (16A) and fourth (19) units, wherein the first (13) unit contains two loudspeakers, the second (16) and third (16a) units contain a light module, while the fourth unit is formed by a socket in which electronics are arranged, or that the warning system is composed of at least one master post and a plurality of slave posts, wherein the slave posts have rows of electrical terminals which are connected to the electronics of the master post or posts via lines and optical fibres.

[0011] This has the effect that persons will regard it as if two independent warnings are emitted, whereby the persons who perhaps are not aware of the light signal in the first instance, will be aware of the sound signal.

[0012] To ensure that the warning system is activated correctly, it is advantageous, as stated in claim 2, that the master post or posts are coupled electrically to a central safety system, which contains power supplies and coupled sensors, which detect trains that approach the crossing.

[0013] To maintain necessary reliability in operation, which is required and absolutely indispensable in the above-mentioned type of warning system, it is an advantage, as stated in claim 3, that the light modules are composed of a plurality of light-emitting diodes with associated electronics, wherein one half of the light-emitting diodes are standby light-emitting diodes with associated standby electronics, which, when one or more of the light-emitting diodes fail, will put the standby light-emitting diodes with associated standby electronics into operation, and, as stated in claim 4, in case of interruptions of the sound and/or light modules, the master posts apply a warning signal to the safety system, which passes on a signal to an approaching train, if any, said signal containing information on decelerating the speed of the train, or on stopping the train completely.

[0014] The invention will now be explained more fully with reference to the sole figure of the drawing, which schematically shows an embodiment of the structure of a warning system according to the invention, seen from the front.

[0015] The numeral 1 designates a master post which is electrically connected to two slave posts 2, 3 via conductors 4, 5, 6 and 7, which are passed out through a lowermost unit 21, in the master post. Further, the master post 1 is electrically connected to a safety system 10 via

conductors 8, 9.

[0016] The master post 1 is constructed as a post having several units, where the uppermost unit 13 contains two loudspeakers and a microphone, one loudspeaker of which is designated 14, while the microphone is designated 15. The microphone is intended to detect the characteristic of the ambient noise. The uppermost unit additionally contains a loudspeaker, which, however, cannot be seen in the drawing, as it is arranged on the rear side of the unit 13.

[0017] Two uniform units 16, 16a are arranged below the uppermost unit, each of which contains a light generator in the form of a diode display 17. The two units 16, 16a are disposed with their fronts in their respective directions, and, as will be seen in the figure, a gate 18, which gives access to the light generator and its associated electronics, is provided behind the unit 16a which is oriented opposite the unit 16.

[0018] The diode display is equipped with two sets of diodes and associated electronics, where the one set serves as standby diodes with associated standby electronics, which become operative if the second set of diodes fails.

[0019] In addition, a photosensor (not shown) is connected in association with the light generator, said photosensor being intended to detect the intensity and optionally the colour composition of the ambient light.

[0020] Below the three above-mentioned units, a unit 19 is provided in the master unit 18, said unit 19 having a gate behind which various electronics are arranged, such as amplifiers, optical and acoustic signal processing circuits, control circuits and the like.

[0021] At the bottom, this unit 19 is terminated by a bottom unit 21, which is also intended to secure the master station to a substrate or a foundation in the substrate.

[0022] In the slave units 2, 3, which resemble the master unit 1 from the outside, rows of terminals are disposed in the unit 20, which corresponds to the unit 19, and thus no electronics proper, said terminals being intended to be electrically connected to the master unit 1 via the conductors 4, 5, 6 and 7, which thus controls the slave units via the electronics in it, which slave units do not have a microphone in the uppermost unit either.

[0023] Finally, the safety unit has outwardly extending conductors 11, 12, which may be connected inter alia to detectors which are disposed at a distance from a crossing (not shown). These detectors may be arranged on railway tracks and be intended to detect approaching trains, so that the warning system may be activated.

Claims

1. A warning system for crossings, such as railway crossings, said warning system comprising a sound generator (14) and a light generator (17) which, when the crossing is passed by a vehicle, such as a train, emit a sound signal and a light signal, wherein the

strength of the sound signal is controlled on the basis of the strength of the ambient noise detected from a microphone (15), **characterized in that** the intensity of the light signal is controlled in dependence on how powerful the ambient light is, wherein the light signal is detected by a photosensor and is enhanced when the intensity of the ambient light signal is enhanced, while the light signal is damped when the intensity of the ambient light signal is damped, and that the strength of the sound signal changes adaptively in dependence on the sound characteristic of the ambient noise, and when being activated, the warning system first emits the light signal and then emits the sound signal with a time delay, and where the warning system is composed of at least one master post (1), which consists of first (13), second (16), third (16A) and fourth (19) units, wherein the first (13) unit contains two loudspeakers, the second (16) and third (16a) units contain a light module, while the fourth unit is formed by a socket in which electronics are arranged, or that the warning system is composed of at least one master post and a plurality of slave posts, wherein the slave posts have rows of electrical terminals which are connected to the electronics of the master post or posts via lines and optical fibres.

2. A warning system according to claim 1, **characterized in that** the master post (1) or posts are coupled electrically to a central safety system (10), which contains power supplies and connected sensors, which detect trains that approach the crossing.
3. A warning system according to claim 2, **characterized in that** the light modules are composed of a plurality of light-emitting diodes with associated electronics, wherein one half of the light-emitting diodes are standby light-emitting diodes with associated standby electronics which, when one or more of the light-emitting diodes fail, will put the standby light-emitting diodes with associated standby electronics into operation.
4. A warning system according to claims 2 - 3, **characterized in that** in case of interruptions of the sound and/or light modules, the master posts apply a warning signal to the safety system (10), which passes on a signal to an approaching train, if any, said signal containing information on decelerating the speed of the train, or on stopping the train completely.

Patentansprüche

1. Warnsystem für Kreuzungen, wie beispielsweise Eisenbahnübergänge, wobei das Warnsystem eine Tonerzeugungseinrichtung (14) und eine Lichterzeugungseinrichtung (17) umfasst, die, wenn die

Kreuzung von einem Fahrzeug, wie beispielsweise einem Zug, passiert wird, ein Tonsignal und ein Lichtsignal emittieren, wobei die Stärke des Tonsignals auf Basis der Stärke des über ein Mikrofon (15) erfassten Umgebungsgeräusches gesteuert wird, **dadurch gekennzeichnet, dass** die Intensität des Lichtsignals in Abhängigkeit davon gesteuert wird, wie stark das Umgebungslicht ist, das Lichtsignal von einem Fotosensor erfasst wird und verstärkt wird, wenn die Intensität des Umgebungslichtsignals stärker ist, während das Lichtsignal abgeschwächt wird, wenn die Intensität des Umgebungslichtsignals schwächer ist, und dass sich die Stärke des Tonsignals adaptiv in Abhängigkeit von der Schallcharakteristik des Umgebungsgeräusches ändert, und das Warnsystem, wenn es aktiviert ist, zuerst das Lichtsignal emittiert und dann das Tonsignal mit einer Zeitverzögerung emittiert, und das Warnsystem aus wenigstens einem Hauptpfosten (1) besteht, der sich aus einer ersten (13), zweiten (16), dritten (16a) und vierten (19) Einheit zusammensetzt, wobei die erste Einheit (13) zwei Lautsprecher enthält, die zweite (16) und die dritte (16a) Einheit ein Lichtmodul enthalten, während die vierte Einheit durch einen Sockel gebildet wird, in dem elektronische Einrichtungen angeordnet sind, oder dass das Warnsystem aus wenigstens einem Hauptpfosten und einer Vielzahl von Nebepfosten besteht, wobei die Nebepfosten Reihen elektrischer Anschlüsse aufweisen, die mit den elektronischen Einrichtungen des Hauptpfostens bzw. der Hauptpfosten über Leitungen und Lichtleitfasern verbunden sind.

2. Warnsystem nach Anspruch 1, **dadurch gekennzeichnet, dass** der bzw. die Hauptpfosten (1) elektrisch mit einem zentralen Sicherheitssystem (10) gekoppelt ist/sind, das Stromversorgungseinrichtungen und angeschlossene Sensoren beinhaltet, die Züge erfassen, die sich der Kreuzung nähern.
3. Warnsystem nach Anspruch 2, **dadurch gekennzeichnet, dass** die Lichtmodule aus einer Vielzahl von Leuchtdioden mit dazugehörigen elektronischen Einrichtungen bestehen, wobei eine Hälfte der Leuchtdioden Bereitschafts-Leuchtdioden mit dazugehörigen elektronischen Bereitschaftseinrichtungen sind, die, wenn eine oder mehr der Leuchtdiode/n ausfällt/ausfallen, die Bereitschafts-Leuchtdioden mit dazugehörigen elektronischen Bereitschaftseinrichtungen in Betrieb versetzen.
4. Warnsystem nach den Ansprüchen 2-3, **dadurch gekennzeichnet, dass** bei Unterbrechungen der Ton- und/oder Lichtmodule der Hauptpfosten ein Warnsignal zu dem Sicherheitssystem (10) sendet, das ein Signal zu einem sich nähernden Zug weiterleitet, wenn ein solcher vorhanden ist, wobei das Signal Informationen über Verringerung der Ge-

schwindigkeit des Zuges oder über vollständiges Anhalten des Zuges enthält.

5 Revendications

1. Système d'avertissement pour des croisements, comme des passages à niveau, ledit système d'avertissement comprenant un générateur de son (14) et un générateur de lumière (17) qui, lorsqu'un véhicule, comme un train, passe le croisement, émet un signal de son et un signal de lumière, dans lequel la force du signal de son est contrôlée sur la base de la force du bruit ambiant détecté à partir d'un microphone (15), **caractérisé en ce que** l'intensité du signal de lumière est contrôlée en fonction de la puissance de la lumière ambiante, dans lequel le signal de lumière est détecté par un photo-détecteur et est amélioré lorsque l'intensité du signal de lumière ambiante est améliorée, alors que le signal de lumière est atténué lorsque l'intensité du signal de lumière ambiante est atténuée, et **en ce que** la force du signal de son change de manière adaptative en fonction de la caractéristique de son du bruit ambiant, et lorsqu'il est activé, le système d'avertissement émet d'abord le signal de lumière puis émet le signal de son après une temporisation, et où le système d'avertissement se compose d'au moins un montant maître (1), qui comporte une première unité (13), une deuxième unité (16), une troisième unité (16A) et une quatrième unité (19), dans lequel la première unité (13) contient deux haut-parleurs, la deuxième unité (16) et la troisième unité (16a) contiennent un module de lumière, et la quatrième unité est formée par une douille dans laquelle des éléments électroniques sont agencés, ou **en ce que** le système d'avertissement se compose d'au moins un montant maître et d'une pluralité de montants esclaves, dans lequel les montants esclaves ont des rangées de bornes électriques qui sont connectées aux éléments électroniques du ou des montants maître par le biais de lignes et de fibres optiques.
2. Système d'avertissement selon la revendication 1, **caractérisé en ce que** le ou les montants maître (1) sont couplés électriquement à un système central de sécurité (10), qui contient des alimentations électriques et des capteurs connectés, qui détectent des trains s'approchant du passage à niveau.
3. Système d'avertissement selon la revendication 2, **caractérisé en ce que** les modules de lumière sont composés d'une pluralité de diodes électroluminescentes avec des éléments électroniques associés, dans lequel une moitié des diodes électroluminescentes sont des diodes électroluminescentes de secours avec des éléments électroniques de secours associés qui, lors de la défaillance d'une ou plusieurs

des diodes électroluminescentes, mettent les diodes électroluminescentes de secours avec des éléments électroniques de secours associés en fonctionnement.

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4. Système d'avertissement selon les revendications 2 et 3, **caractérisé en ce que**, en cas d'interruptions des modules de son et/ou de lumière, les montants maître appliquent un signal d'avertissement au système de sécurité (10), qui fait passer un signal à un train s'approchant, le cas échéant, ledit signal contenant des informations sur la décélération de la vitesse du train ou sur l'arrêt complet du train.

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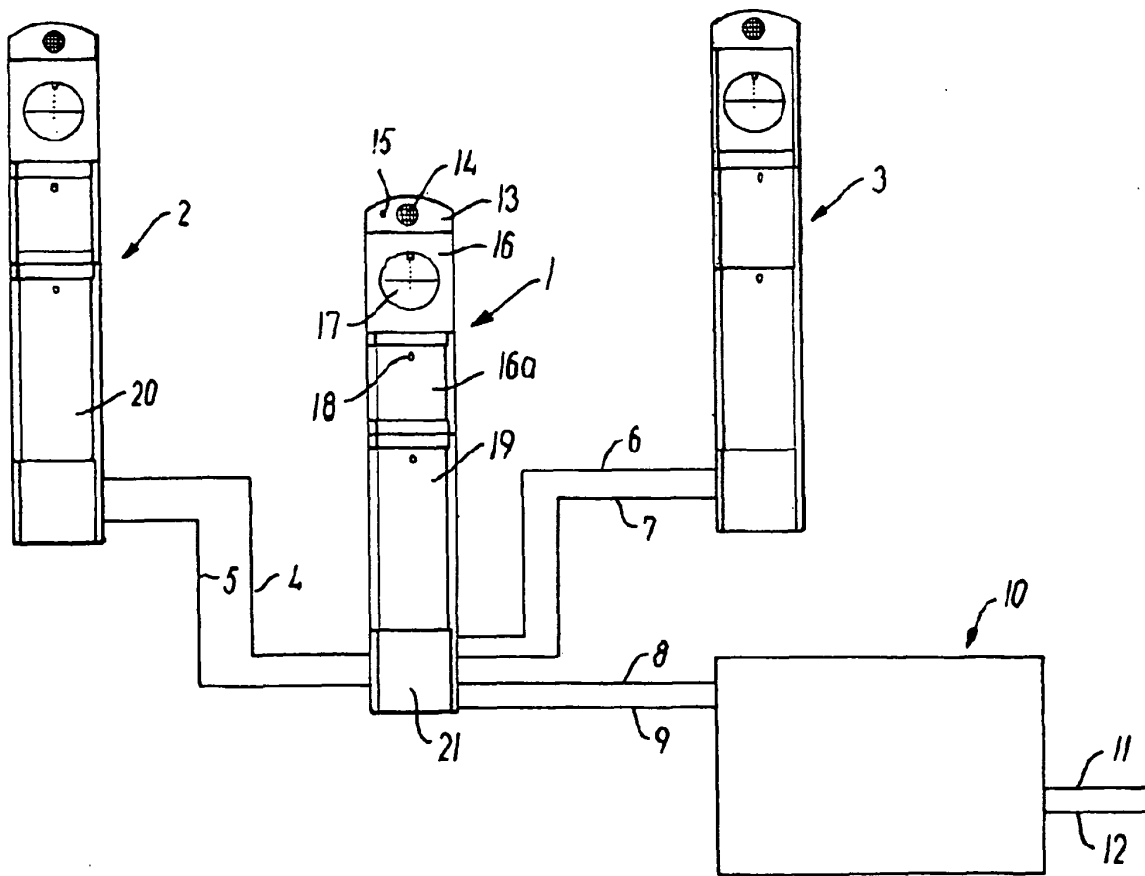
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