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(54) **Alerting system and method for hard of hearing or deaf people**

(57) An alerting system (11) for a hard of hearing or deaf person comprising an externally powered electric alerting device (15) comprising an electric vibrating element (43) configured to generate, upon being powered, vibrations of said alerting device (15), and a sound producing means (45) independent of said vibrating element (43) and adapted to produce an alerting sound (35); an electric activating device (13) separate from said alerting

device (15) and connected to said alerting device (15) by an electric power cable (37), wherein said activating device (13) is configured to provide electric power supply to said alerting device (15) through said power cable (37) if triggered by an alarm signal, wherein said sound producing means (45) is adapted to generate said alerting sound (35) fully on its own from a supply voltage provided by said electric activating device (13) through said power supply cable (37), only.

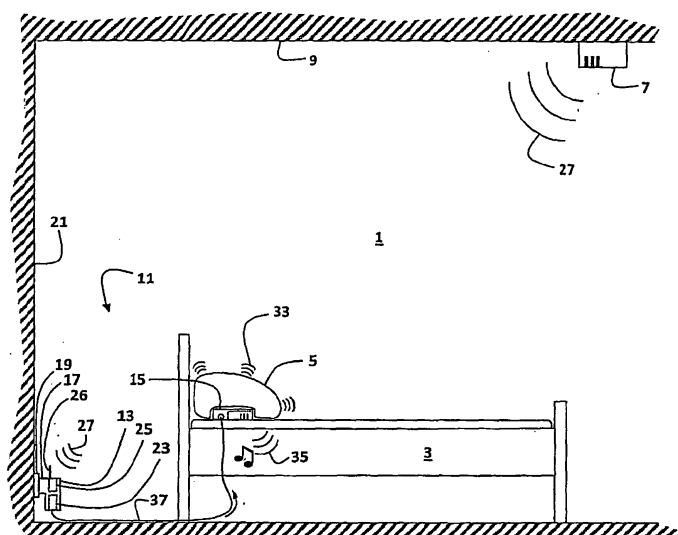


Fig. 1

Description

[0001] The present invention relates to an alerting system and method for hard of hearing or deaf people.

[0002] Among the people at risk of not waking to an auditory smoke alarm are the million people who are hard of hearing. There are known solutions to this problem providing alternative devices which send visual signals, such as a strobe light, or vibrations, such as a vibrating element. For example, bed or pillow shakers have become available for people with hearing impairment and may be used with an alarm clock or for emergency notification during sleep, see for example Canadian patent specification CA 1 123 945. However, the use of bed or pillow shakers are only 80% to 83% effective to wake up hard of hearing and deaf people below the age of 60 years. The effectiveness is even lower for people with an age over 60 years.

[0003] JP 2008 194148 suggests the use a cellular phone in a pillow as an alerting device. However, the cellular phone produces electro-smog close to the head of a sleeping person during the whole night. Furthermore, if the battery of the cell phone runs low in the night and the cell phone automatically switches off, the alarm cannot be activated. Furthermore, mobile phones are complicated devices and it can be difficult for inexperienced users and elderly people to find the correct alarm settings.

[0004] An alarm clock system is known comprising a base station with a clock for a music player, a radio and main loud speakers, and a bed shaker connected to the base station via a cable. The bed shaker is adapted to vibrate and comprises a separate loudspeaker for reproducing sound on the basis of an audio signal from the base station. This versatile alarm clock system provides numerous settings selectable by the user. A wake mode can be chosen among a plurality of pre-defined wake modes some of which involve the bed shaker and some of which do not. If "buzzer" is selected in the wake mode, the buzzing sound can be selected among a plurality of pre-defined buzzing sounds, some of which may be easily overheard by hard of hearing people. Furthermore, a switch is provided for selecting between the base speakers only, the shaker speaker only, or both kinds of speakers. The bed shaker comprises a switch for selecting different volume levels of the shaker speaker. For inexperienced users and elderly people the numerous features may be confusing and wrong settings can easily occur such that the bed shaker is set to a mode where it cannot be heard, or can easily be overheard, by a hard of hearing person, or that the bed-shaker is even deactivated.

[0005] It is the object of the present invention to provide a highly reliable alerting system which is simple to operate in particular for an inexperienced user and elderly people, and provides an alarm with improved perceptibility by a hard of hearing or deaf person.

[0006] The invention solves this object by the features of the independent claims. According to the invention, the alerting sound is completely produced in the sound

producing means, i.e. in the alerting device. This means in particular that no part of the alerting sound to be output by the alerting device, in particular no alerting audio signal containing the alerting sound information, is generated within the activating device. The activating device provides to the alerting device exclusively AC or DC power supply through the power cable. In simple words, the activating device turns power on for the alerting device in the case of an alarm, and the alerting device when being powered does all the rest by vibrating, and generating and outputs the alarm sound. The inventive configuration allows easy upgrading of existing alerting systems by exchanging the conventional alerting device with an inventive alerting device. A modification of the activating device by generating an audio signal and sending the same to the alerting device is not required. Furthermore, and very important, the alerting sound does not depend on any settings in the activating device, apart from an eventual alarm setting, which reduces the probability of wrong settings to an absolute minimum. Consequently, the risk that the bed shaker is set to a mode where it cannot be heard, or can easily be overheard, by a hard of hearing person, or that the bed-shaker is even deactivated, is reduced to a minimum.

[0007] Supply voltage according to the invention comprises a DC voltage or an AC voltage, where AC voltage in this application means a voltage with a constant periodic waveform. A constant periodic waveform gives a constant curve in an oscillogram. This definition comprises for example a preferred sinusoidal waveform, but also a rectangular, square or triangular waveform. This definition does not, however, comprise permanently varying waveforms which are occurring in transmitting sound information like music or speech, or in communication.

[0008] The generation of an alerting sound according to the invention, in addition to the vibrations, can significantly improve the effectiveness of the alerting system for deaf, profound deaf or hard of hearing people, because even deaf people in some cases hear sound at least to a certain degree. The alerting sound is produced in the alerting device which also produces the vibrations. The volume of the alerting sound is adjusted such that it is perceptible by an average hard of hearing or deaf person when the alerting device is placed in a tactile relationship to the person, for example in, under or on a pillow or mattress.

[0009] Externally powered means that the alerting device is powered by an external power source, in particular a power source arranged in the activating device like a battery, a transformer, a rectifier and the like, and can preferably mean that the alerting device does not comprise an own internal power source, such as a battery.

[0010] The activating device and the alerting device are separate devices which are connected by a power cable. The activating device may therefore be placed remote from the alerting device, for example on a bed table. The activating device may be constantly powered, where electro-smog is unproblematic if the activating device is

placed remote from the alerting device which is placed close to the body of the user. The alarm signal may be internally produced within the activating device by an integrated alarm generator, for example a timer if the activating device is an alarm clock. Alternatively or in addition, the activating device may have access to a wired or wireless communication link to one or more external alarm signal emitter, like smoke detector, baby cry emitter, door bell emitter, telephone call transmitter, message transmitter, alarm clock, contact mat, door switch, and/or any suited item of a personal alarm system for hard of hearing persons. In this case, the activating device expediently comprises a receiver for receiving the alarm signal from the external alarm signal emitter via the communication link.

[0011] In the following, the invention is described in further detail with reference to the accompanying figures, in which

- Fig. 1 shows an alerting system according to an embodiment of the invention;
- Fig. 2 shows a schematic diagram of an alerting system;
- Fig. 3 shows a schematic diagram of an alerting system in another embodiment;
- Fig. 3 shows a schematic diagram of an alerting system in a further embodiment; and
- Figs. 5 to 9 shows different practical embodiments of an alerting system.

[0012] Fig. 1 shows a bed room 1 of a hard of hearing or deaf person with a bed 3 and a pillow 5. An external alarm signal emitter 7, here a smoke detector, is provided, here mounted at the ceiling 9 of the bed room 1. Furthermore, an alerting system 11 comprising an activating device 13 and an alerting device 15, here a bed shaker or pillow shaker, is provided, here installed at the bed 3 in order to alert a sleeping hard of hearing or deaf person, for example in case of fire. The externally powered alerting device 15 is located for example under or in the pillow 5, or alternatively under or in the mattress, of the bed 3. Generally, the alerting device 15 is located in tactile relationship, i.e. close to the body of a user, such that vibrations of the alerting device 15 can be perceived by the user.

[0013] The activating device 13 is adapted to receive an alarm signal 27 from the alarm signal emitter 7. In this case, the alarm signal 27 may be emitted as a radio frequency signal. However, the alarm signal 27 could also be any other wireless signal. It should be understood that the activating device 13 comprises an appropriate receiving means 10 for receiving such a signal. For example, the activating device 13 may be equipped with an R.F. antenna 26 and an R.F. receiver circuit. Alternatively, the

activating device 13 could be wired to the alarm signal emitter 7.

[0014] The activating device 13 preferably comprises an internal DC or AC power source 23 in particular for the alerting device 15. This may for example be a voltage transformer, a rectifier, a battery like a rechargeable battery, or any other suited electric power source. In the present example the activating device 13 is connectable to mains supply and, therefore, expediently includes a plug 17 which is pluggable into a mains power socket 19 in a wall 21 of the bed room 1. The activating device 13 preferably comprises a power cable not shown in Fig. 1 such that the activating device 13 can be placed remotely from the mains socket 19, for example on a bed table. The activating device 13 in the present example includes a voltage transformer 23 for transforming AC mains voltage into any desired AC and/or DC voltage for internal powering and powering of the alerting device 15.

[0015] For the power supply of the alerting device 15 to be provided through the power cable 37, a DC voltage may be preferred in view of upgradeability and simple set-up, since preferably a DC motor is used as a vibrating element 43. The voltage applied to the power cable 37 should be below 20 V in view of user safety.

[0016] The activating device 13 is connected to the alerting device 15 via a power cable 37 through which the activating device 13 is able to power the alerting device 15. This is controlled by a control means 25 provided in the activating device 13. The control means 25 may for example be an electronic processing means, for example a digital signal processor. The control means 25 is adapted, in particular programmed, to control providing of a supply current to the alerting device 15 through the power cable 37 upon reception of the alarm signal 27. In particular, the control means 25 may connect the power source 23 to the power cable 37 by controlling suited switching means. Alternatively, the control means 25 may control connecting an external power source, for example mains supply, to the power cable 37. The power cable 37 may be fixed to the alerting device 15, and may be detachable from the activating device 13, for example by means of a plug/socket connection 40 as indicated in Figs. 5 to 9.

[0017] The alerting device 15 comprises an electric vibrating element 43, for example an electric motor with an unbalanced mass. When the alerting device 15 is powered, the supply voltage is applied to the vibrating element 43 which produces vibrations perceptible by a hard of hearing or deaf person.

[0018] The alerting device 15 comprises a separate sound producing means 45 adapted to produce, upon being supplied with a supply current through the supply cable 37, a pre-defined alerting sound 35 hearable by a hard of hearing or deaf person. Preferably the volume and the sound pattern of the alerting sound 35 cannot be changed nor affected by the user, at least not in normal operation, nor can the sound producing means be switched off. In this manner it is guaranteed that a per-

defined alerting sound with a sufficient volume and optimum sound pattern for a hard of hearing user is emitted if only the alerting device 15 is connected to the activating device 13.

[0019] The alerting sound may be most effective if it comprises an essentially mono-frequent tone with a peak frequency preferably in the range of 400 Hz to 800 Hz, more preferably 400 Hz to 600 Hz, even more preferably 450 Hz to 550 Hz. Preferably the alerting sound has an intermittent time pattern being on and off in succession, in particular a square wave time pattern. Preferably the tone is on and off for a predetermined number of times in succession, preferably three to seven times each, more preferably three to five times each. Preferably each of these ON periods last no more than 2 s, preferably no more than 1 s, for example for about 0.5 s. The same applies to the OFF periods in between the ON periods. After providing the above described alerting sound pattern for a predetermined period of time in a preferred range of 10 to 30 seconds, preferably 10 to 15 seconds, a pause of at least 5 s, for example also in the range of 10 to 30 seconds, preferably 10 to 15 seconds, follows. Afterwards alerting sound patterns and pauses may follow in an alternating manner. The ON and OFF periods of the alerting sound may be produced by intermittently switching the power supply through the power cable 37 on and off. Preferably, however, the power supply through the power cable 37 is constant over an alarm, and the intermittent ON-OFF pattern of the alerting sound is produced in the sound producing means 45.

[0020] For example in case of fire the alarm signal emitter 7 detects smoke and emits an alarm signal 27. The alarm signal 27 is received by the activating device 13. Upon reception of the alarm signal 27, the control means 25 activates for example the voltage transformer 23 by switching on an electric circuit of a primary winding of the voltage transformer 23. The secondary winding of the voltage transformer 23 for example is electrically coupled to the alerting device 15 via the cable 37. In this manner, supply current is provided through the cable 37 for powering the alerting device 15. Upon being powered in this way, the alerting device 15 produces both vibrations and an alerting sound 35 hearable or perceptible by a hard of hearing or deaf person. Such person sleeping in the bed 3 will wake up upon hearing and/or feeling one or both of the vibrations and/or the sound 35.

[0021] Fig. 2 shows a more abstract scheme of an alerting system 11 according to the invention. An alarm signal emitter 7 of any kind, such as a baby cry emitter, a door bell transmitter, a telephone call transmitter, a message transmitter, a fire alarm emitter, or an alarm clock, is connected via a signal link 39 to the alerting system 11. The signal link 39 is preferably wireless, but may also be wired. The activating device 13 may be externally powered like in Figure 1, and may for example be a charging station for a pager, a flash receiver, or any other suitable device of a personal alarm system for deaf or hard of hearing people. Alternatively, the activating

device 13 may be internally powered, in particular by a battery like a rechargeable battery, and may for example be a portable wireless receiver device, or any other suitable internally powered device of a personal alarm system for deaf or hard of hearing people.

[0022] The alerting system 11 shown in Fig. 3 differs from the one shown in Fig. 2 in that the alarm signal is produced within the activating device 13 in an internal alarm signal generator 8, for example a timer 8 in an alarm clock 13. In other words, an alarm clock is integrated in the activating device 13, or an alarm clock is designed as an activating device 13 having for example a power output terminal for the alerting device 15.

[0023] In the embodiment shown in Figure 4, the schemes of Figs. 2 and 3 are advantageously combined. Herein, an activating device 13, in particular an alarm clock, with an alarm signal generator or timer 8 also comprises a receiver 10 for receiving an alarm signal from an external alarm signal emitter 7, thus forming an alarm clock receiver device 13. In this embodiment, the control circuit 25 will power the alerting device 15 both upon receipt of an unscheduled alarm signal from the alarm signal emitter 7 and independently upon receipt of a scheduled internal alarm signal from the timer 8.

[0024] Figures 5 to 9 show different practical embodiments of an alerting system 11. It should be understood that any of the schematic embodiments shown in Figs. 2 to 4 may be combined with any of the practical embodiments shown in Figs 5 to 9 in order to realize the invention. In these embodiments the vibrating element 43 is an electric motor provided with an unbalanced mass. This may be a DC motor or an AC motor, supplied via two electric power lines 38 provided in the power cable 37.

[0025] In Fig. 5 the sound producing means is a buzzer 45A. A buzzer 45A is an electric device which combines all components required to produce an alerting sound 35 from an input supply voltage into a single device preferably having a single casing. In contrast to a dynamic loudspeaker device it does not comprise an oscillating coil.

[0026] The buzzer 45A may in particular be a piezo buzzer or a magnetic buzzer. A piezo buzzer comprises a piezo-electric element. A magnetic buzzer comprises a fixed permanent magnet and a fixed electro magnet which generates a magnetic flux proportional to the desired sound amplitude from an input acoustic signal. The magnetic flux exerts a force to a membrane which moves and thus emits sound.

[0027] In Figure 6 the sound producing means 45B comprises a dynamic loudspeaker 48 with an oscillating coil and a membrane, and an audio signal generator 47 which generates an electric audio signal. The electric audio signal comprises the sound information and is input to the dynamic loudspeaker 48 in order to produce the sound waves, or sound, 35. The audio signal generator 47 may comprise a memory for storing pre-recorded sound.

[0028] In Figure 7 the sound producing means 45C comprises a buzzing element 46 and an audio signal gen-

erator, or driving means, 47 which generates an electric driving signal for driving the buzzing element 46. The electric driving signal comprises the sound information and is input to the buzzing element 46 in order to produce the sound waves, or sound, 35.

[0029] The buzzing element 46 is a simple loudspeaker not having a moving coil, and may in particular be a piezo-electric loudspeaker or a magnetic loudspeaker. A piezo-electric loudspeaker comprises a piezo-electric element. A magnetic loudspeaker comprises a fixed permanent magnet and a fixed electro magnet which generates a magnetic flux proportional to the sound amplitude from an input acoustic signal. The magnetic flux exerts a force to a membrane which moves and thus emits sound.

[0030] The buzzer 45A shown in Fig. 5 may be regarded as an integrated element combining a buzzing element 46 and the driving means, or audio signal generator, 47 of Fig. 7 into a single device advantageously having a single casing.

[0031] In the embodiments of Figs. 5 to 7 the sound producing means 45A-45C requires only two voltage supply lines 38 providing a usual DC, or sinusoidal AC, supply voltage. This allows updating of conventional alerting systems 11 by replacing a conventional bed-shaker having a vibrating element 43, only, with an inventive bed-shaker 15 having a vibrating element 43 and a sound generating element 45, without having to modify the activating device 13. Furthermore, the sound producing means 45 and the vibrating element 43 are strictly coupled, such that in case of an alarm it is guaranteed that both vibrations and the alerting sound 35 are always produced simultaneously.

[0032] The embodiments of Figs. 8 and 9 correspond to the embodiments of Figs. 6 and 7, respectively. However, the embodiments of Figs. 8 and 9 provide an additional supply line 42 in the power cable 37 which allows to drive sound generating element 45 independent of the vibrating element 43, which can be advantageous in some applications.

[0033] If an audio amplifier is required in the alerting system 11 for amplifying an electric audio signal, the amplifier is preferably arranged in the alerting device 15, for example as a part of the sound producing means 45.

[0034] The alerting device 15 preferably is a completely analogue device in view of a simple and cost-effective set-up.

[0035] The alerting device 15 preferably does not contain any other active electric or electronic components in addition to the vibrating element 43 and the sound producing means 45, in view of a simple, cost-effective and safety oriented set-up as explained in the foregoing.

Claims

1. An alerting system (11) for a hard of hearing or deaf person comprising

an externally powered electric alerting device (15) comprising an electric vibrating element (43) configured to generate, upon being powered, vibrations of said alerting device (15), and a sound producing means (45) independent of said vibrating element (43) and adapted to produce an alerting sound (35); an electric activating device (13) separate from said alerting device (15) and connected to said alerting device (15) by an electric power cable (37), wherein said activating device (13) is configured to provide electric power supply to said alerting device (15) through said power cable (37) if triggered by an alarm signal,

characterized in that said sound producing means (45) is adapted to generate said alerting sound (35) fully on its own from a power supply voltage provided by said electric activating device (13) through said power cable (37) , only.

2. The alerting system as claimed in claim 1, wherein said sound producing means (45) comprises an audio signal generator or driving means (47, 49) adapted to generate an electric audio signal from a supply voltage, and an electro-acoustical element (46, 48) for producing said alerting sound (35) from said alerting audio signal.
3. The alerting system as claimed in any one of the preceding claims, wherein said alarm signal is received from an external alarm signal emitter (7) or generated in said electric activating device (13).
4. The alerting system as claimed in any one of the preceding claims, wherein said sound producing means (45) comprises a buzzer (45A) .
5. The alerting system as claimed in any one of the preceding claims, wherein said sound producing means (45) comprises a piezo-electric element.
6. The alerting system as claimed in any one of the preceding claims, wherein said sound producing means (45) comprises a loudspeaker.
7. The alerting system as claimed in any one of the preceding claims, wherein said vibrating element (43) and said sound producing means (45) are supplied by the same power supply line (38).
8. The alerting system as claimed in any one of the preceding claims, wherein said vibrating element (43) and said sound producing means (45) are supplied by different power supply lines (38, 42).
9. The alerting system as claimed in any one of the preceding claims, wherein said sound producing means (45) is adapted to generate an alerting sound (35) having a peak frequency in the range of 400 Hz

to 800 Hz.

10. The alerting system according to any of the preceding claims, wherein said alerting sound (35) has an intermittent time pattern being on and off in succession. 5
11. The alerting system according to any of the preceding claims, wherein said alerting sound (35) has a square wave time pattern. 10
12. The alerting system according to any of the preceding claims, wherein said alerting system (11) is free of user operable means effective to change the volume of said sound producing means (45). 15
13. The alerting system according to any of the preceding claims, wherein said alerting system (11) is free of user operable means effective to select the sound pattern of said sound producing means (45). 20
14. The alerting system according to any of the preceding claims, wherein said alerting system (11) is free of user operable means effective to switch off said sound producing means (45). 25
15. A method for alerting a hard of hearing or deaf person comprising
supplying electric power from an activating device (13) to an externally powered alerting device (15) 30
through a power cable (37) connecting said activating device (13) and said alerting device (15), when said activating device (13) is triggered by an alarm signal, said alerting device (15) generating, upon being powered, vibrations of said alerting device (15) 35
and an alerting sound (35);
characterized by generating said alerting sound (35) fully in said alerting device (15) from a supply voltage provided by said electric activating device (13) through said power supply cable (37). 40

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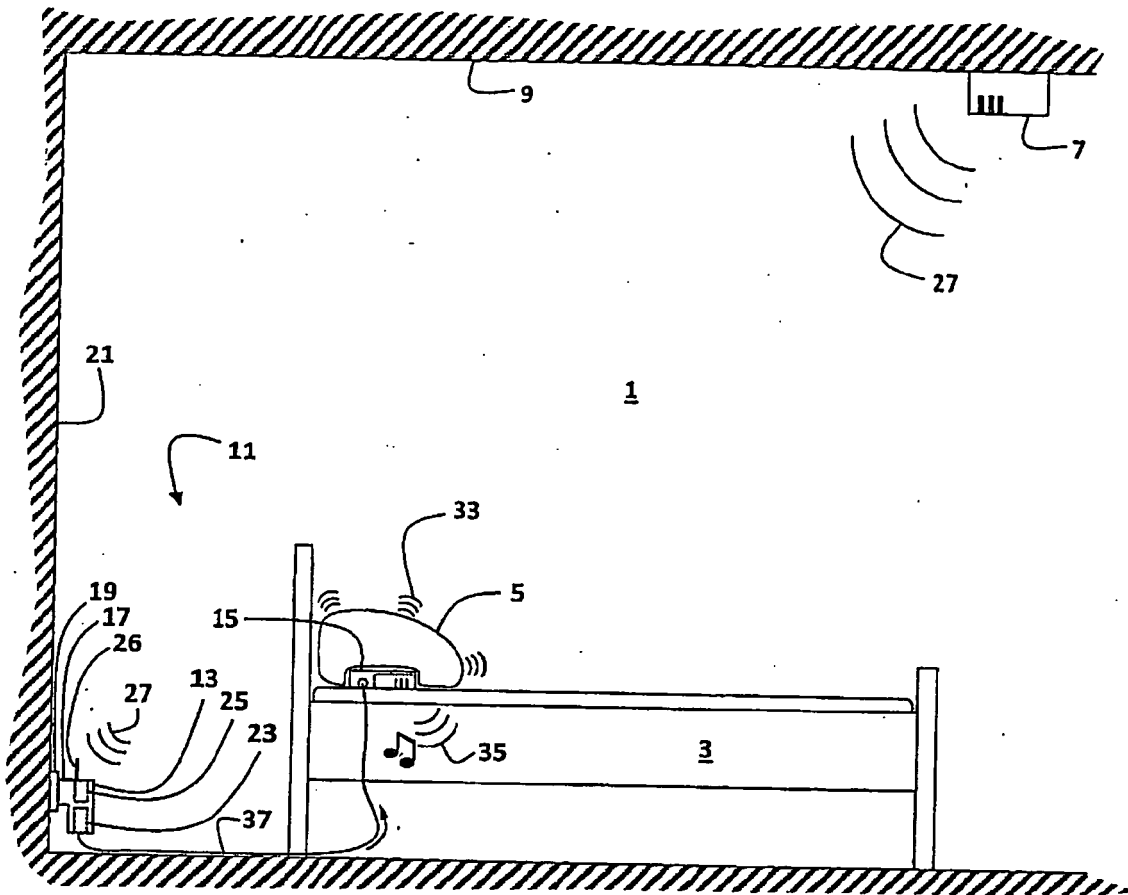
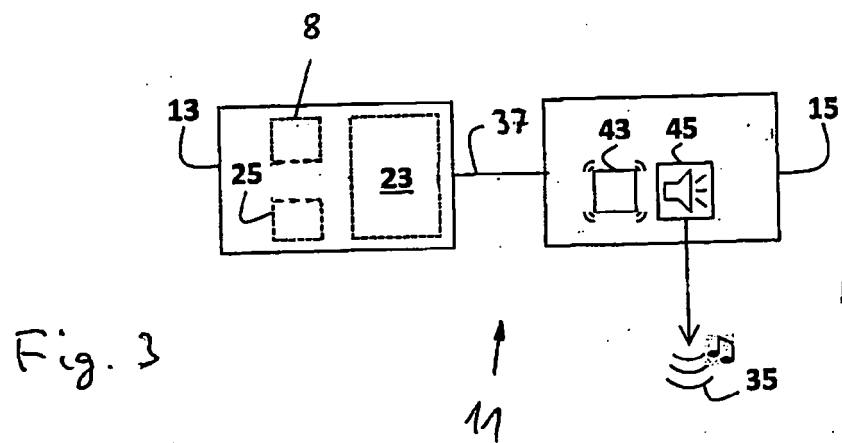
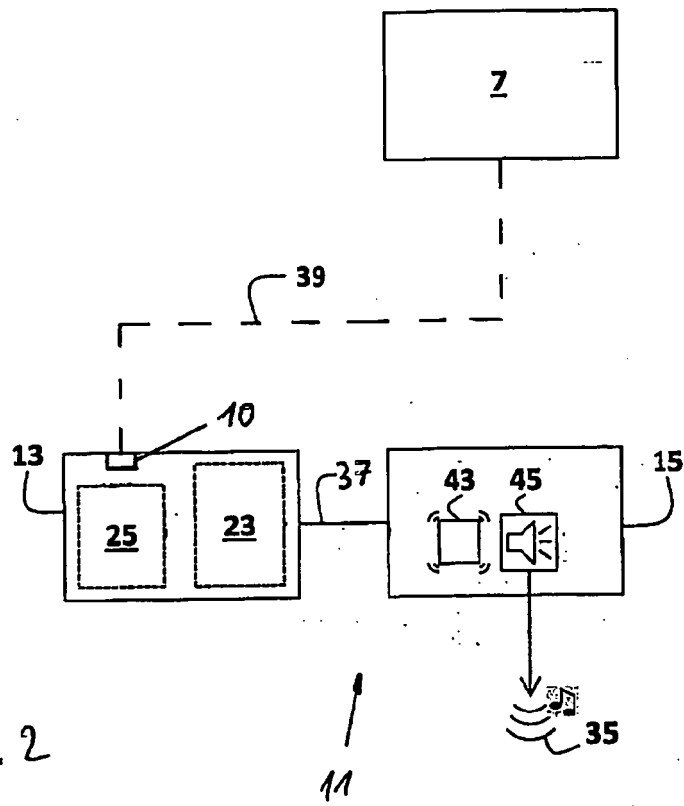


Fig. 1



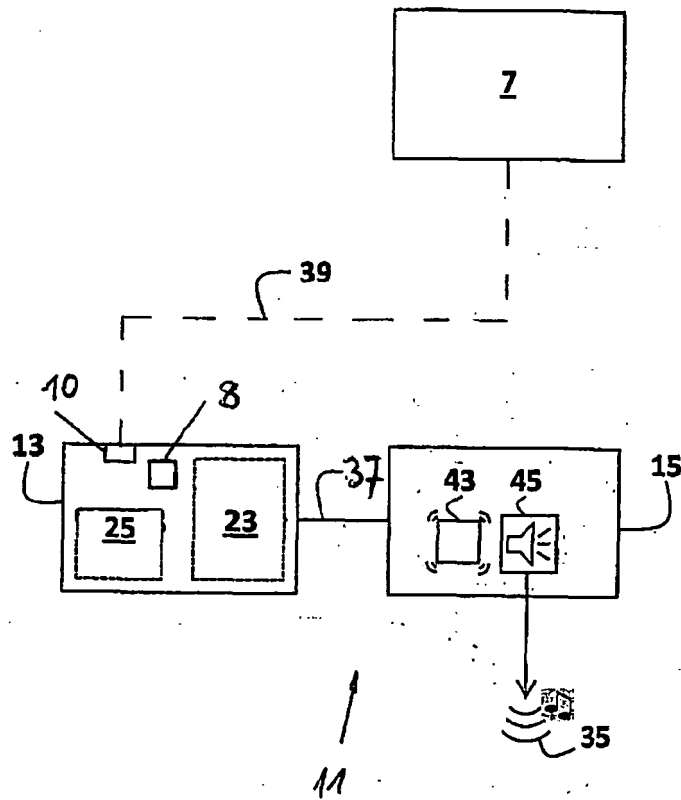
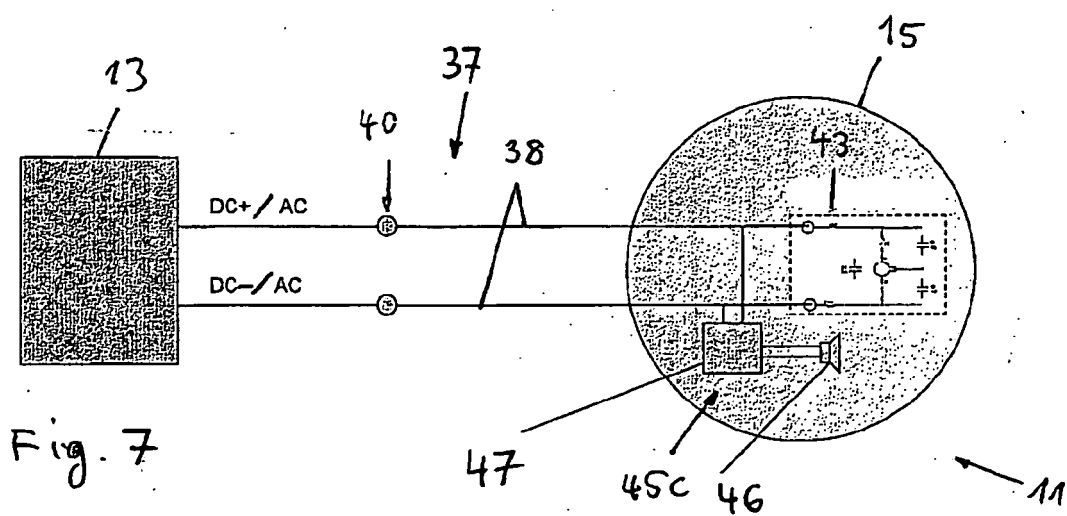
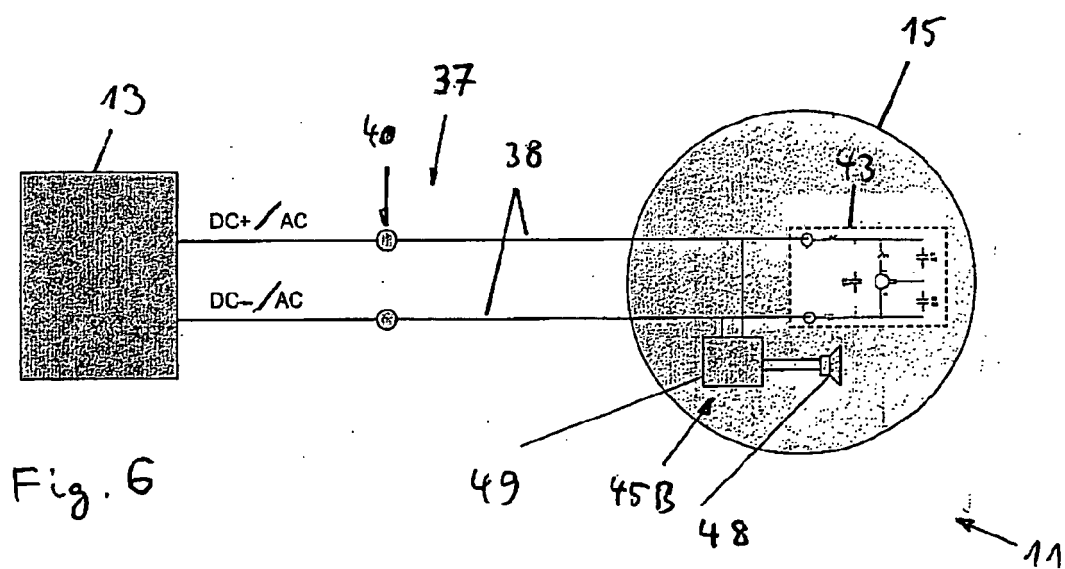
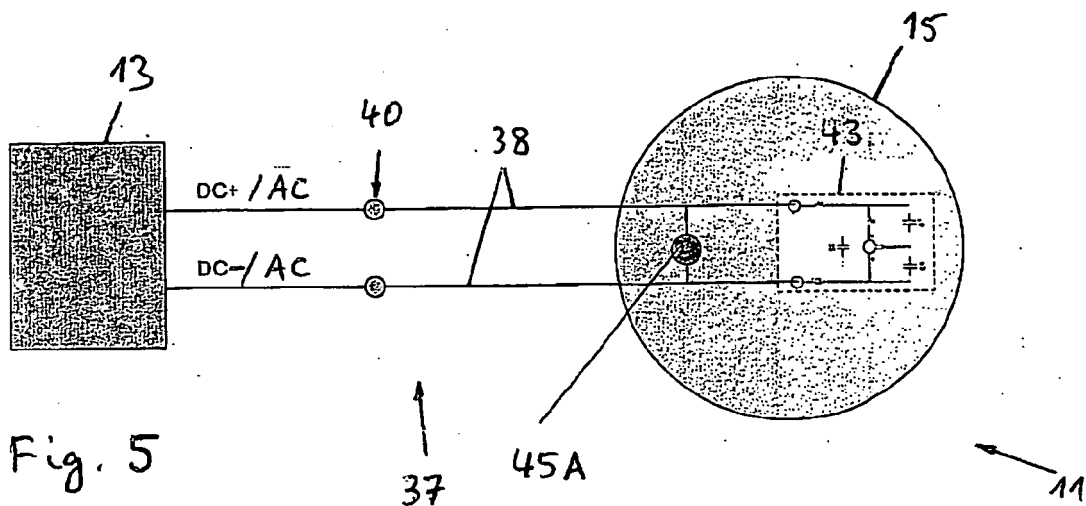
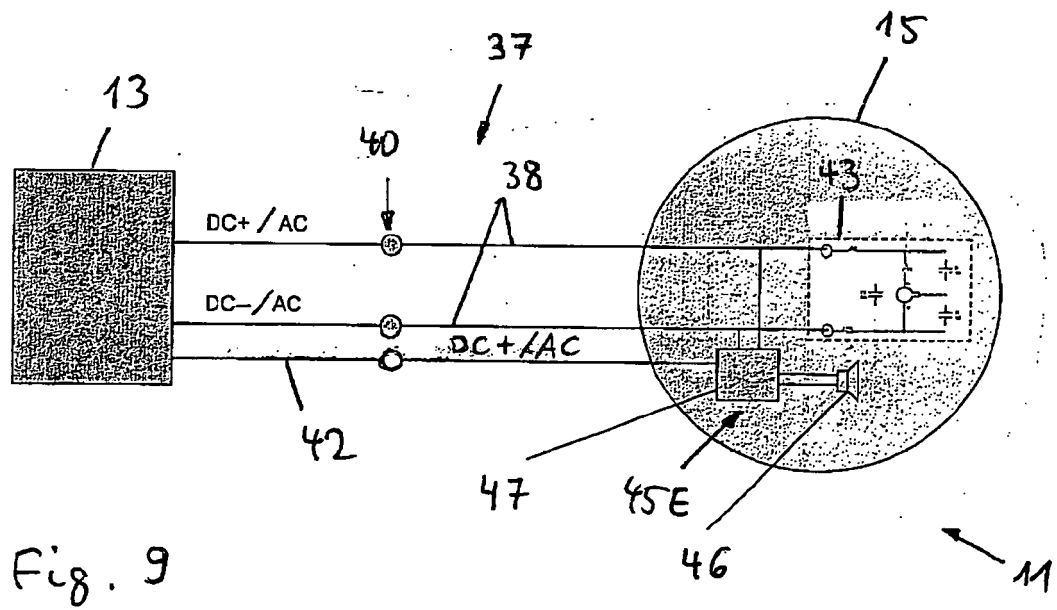
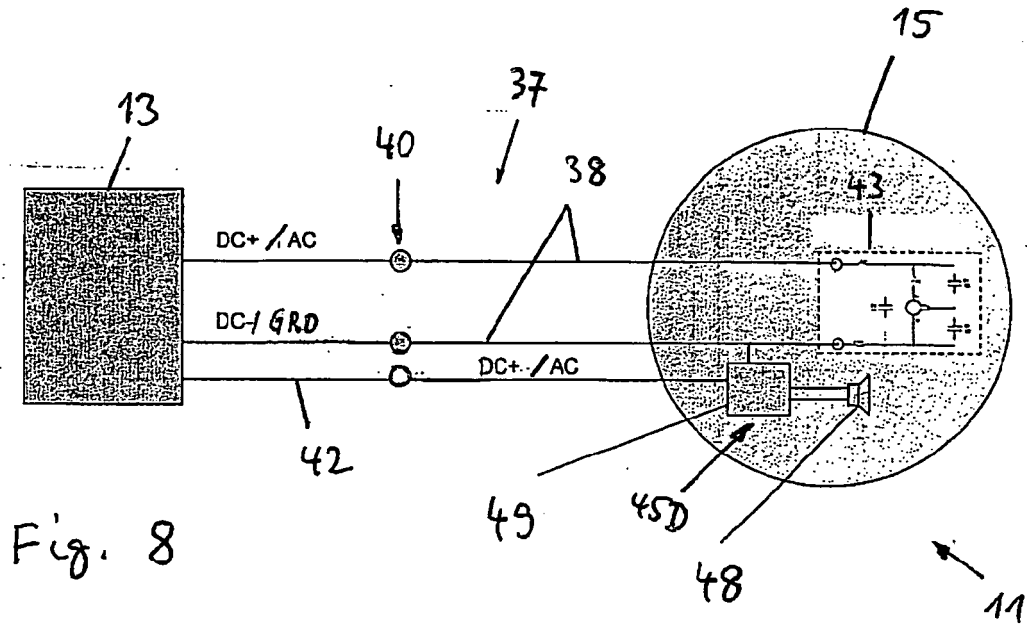


Fig. 4







EUROPEAN SEARCH REPORT

Application Number
EP 11 00 5141

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 2006/060679 A2 (COMB SCIENCE & ENGINEERING INC [US]; ASHLEY ERIN [US]; KLASSEN MICHAEL) 8 June 2006 (2006-06-08) * the whole document * * paragraphs [0002], [0007], [0012], [0014], [0015], [0016], [0017], [0027], [0028], [0029], [0034] - [0036], [0039] - [0040]; figures 1-7 *	1-15	INV. G08B6/00 G08B25/00 H04R25/00
Y	US 2007/290817 A1 (HUANG YUNG-CHING [TW]) 20 December 2007 (2007-12-20) * the whole document * * paragraphs [0003] - [0007], [0015] - [0019]; figure 2 *	1-15	
A	JP 2002 065434 A (EISHIN DENKI KK) 5 March 2002 (2002-03-05) * abstract *	5	
A	JP 10 197657 A (HAYAKAWA MITSURU) 31 July 1998 (1998-07-31) * abstract *	1-15	TECHNICAL FIELDS SEARCHED (IPC) G08B H04R G04C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 August 2011	Examiner Wright, Jonathan
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 00 5141

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09-08-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2006060679 A2	08-06-2006	AT 461558 T	15-04-2010
		AU 2005311712 A1	08-06-2006
		BR PI0518822 A2	09-12-2008
		CA 2589903 A1	08-06-2006
		CN 101069363 A	07-11-2007
		DK 1817850 T3	12-07-2010
		EP 1817850 A2	15-08-2007
		ES 2343021 T3	21-07-2010
		HK 1107734 A1	10-09-2010
		JP 2008522330 A	26-06-2008
		NZ 555469 A	29-10-2010
		ZA 200704942 A	29-10-2008
US 2007290817 A1	20-12-2007	TW M302340 U	11-12-2006
JP 2002065434 A	05-03-2002	NONE	
JP 10197657 A	31-07-1998	NONE	

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CA 1123945 [0002]
- JP 2008194148 A [0003]