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(54) **VISUAL ILLUMINATION MEANS OF AN ELEVATOR CAR**

(57) The present invention relates to a visual illumination means (1) of an elevator car (2) which is moveable in a shaft between a plurality landing stops, a method for indicating movement of an elevator car (2), and an elevator with such an elevator car (2). The visual illumination

means (1) comprises at least one light source (5) arranged and configured for illuminating to indicate in real-time a moving direction and a moving performance of the elevator car (2).

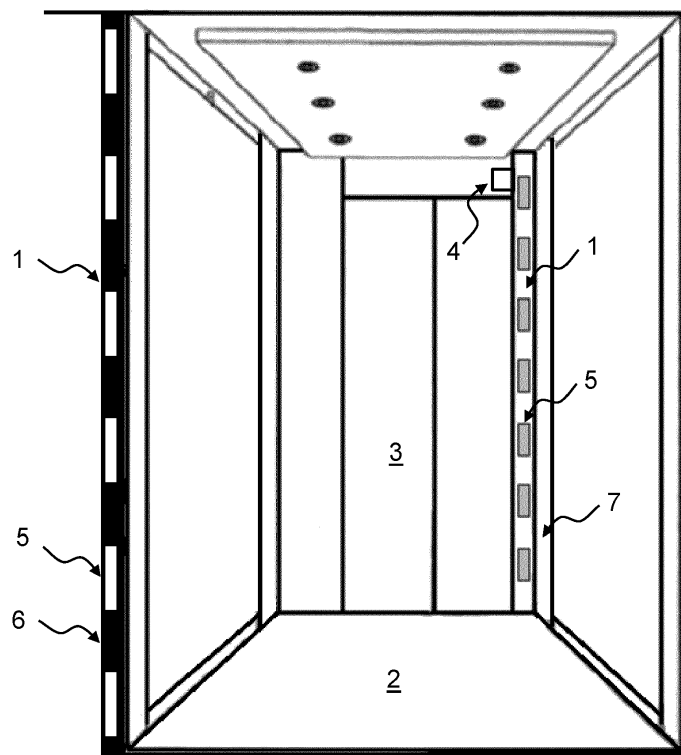


Fig. 1

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Description

[0001] The present invention relates to a visual illumination means for indicating movement of the elevator car. This invention further relates to Method for indicating movement of an elevator car. This invention relates also to an elevator car comprising such a visual illumination means.

[0002] Elevator cars are usually equipped with position indicator displays to inform passengers of the actual car location. The displays are often a part of the elevator control system and are updated as position sensors located along the elevator shaft are passed by the elevator car. The displays usually include static alphanumeric characters which correspond to the closest floor. The characters are changed as a particular floor is reached or passed. Thus, the display changes in discrete steps. For example, an electronic device consisting of light-emitting diodes (LEDs) arranged in numbers is used to show the moving direction of the car. Upward and downward travel can be indicated with different colors.

[0003] Just as a passenger suffering from motion sickness such as motion sickness, seasickness, or airsickness may experience motion sickness, an elevator ride can also be uncomfortable and disorienting for passengers, despite an indication of the direction of a travel of the elevator car, as passengers travelling in the elevator car may experience discomfort due to changes and jerks in movement/motion (not intended movement) such as during acceleration or deceleration phases, while changes in speed are not easily perceptible to humans. This may cause passengers to feel disoriented or uneasy during travel. In physics, jerk is the rate at which acceleration changes with respect to time (derivative of acceleration) so that it is a vector quantity.

[0004] Existing solutions to mitigate this problem often involve audio cues or visual displays that can distract passengers. However, conventional elevators do not provide any visual information to passengers about changes in movement/motion, for example, the indication does not incorporate a measure of jerk. Since humans generally only perceive changes in acceleration and have difficulty discerning changes in velocity, the use of jerk provides a more stable and accurate measure of movement that reflects human perception. On low-rise elevators, it may be sufficient to alter illumination based on velocity. However, this approach does not translate well to high-rise products due to the longer duration of change in velocity. Therefore, there is a need to improve the format and accuracy of the visual information that may help passengers on reducing risk of getting sick during elevator rides.

[0005] The purpose of the invention is to enhance the comfort of passengers during elevator rides by improving existing solutions.

[0006] This object is solved by the features indicated in independent claims. Advantageous embodiments and further developments of the invention are given in de-

pendent claims.

[0007] According to the first aspect of the present invention, a visual illumination means of an elevator car is provided for indicating movement of the elevator car which is moveable in a shaft between a plurality landing stops, for example, floors, the said illumination means comprises at least one light source arranged and configured for illuminating to indicate in real-time a direction and a performance of the movement of the elevator car. That means the illumination not only indicates the moving direction, but also reflects or respond to the moving performance of the elevator car, so such illumination can be used as a dynamic indicator reflecting the moving performance of the elevator car.

[0008] According to an embodiment in respect of the first aspect of the invention, the elevator car is vertically, horizontally, and/or obliquely moveable in the shaft. According to different direction, the illumination is also able to indicate the movement direction and reflect or respond to the moving performance of the elevator car.

[0009] According to an embodiment in respect of the first aspect of the invention, the visual illumination means comprises a control unit capable of regulating the at least one light source to indicate speed, acceleration, deceleration, and/or jerk of movement of the elevator car, and wherein the regulation is based on sensing signals received by the control unit sensing the movement of the elevator car, so that a dynamic visual reference can be generated according to the moving performance of the elevator car. Such a visual illumination may help the passengers more on reducing risk of getting sick during elevator rides.

[0010] According to an embodiment in respect of the first aspect of the invention, the visual illumination means is constructed as a strip or bar of two or more lights, especially of LEDs (light-emitting diodes). Such a LED-strip can be cut to any length and curved vertically up to 90 degrees to fit the exact needs of installation the visual illumination means in the elevator car. The LED-strip is easy to install and can be retrofitted to existing elevator designs. The LED-strip also cost-effective and requires minimal maintenance. And LEDs are versatile and available up to any color and brightness. Moreover, LEDs need 50% less energy than traditional fluorescent, incandescent, and halogen lights. LEDs have a long service life and may last more than 50,000 hours keeping the need for a replacement for every 5-10 years.

[0011] According to an embodiment in respect of the first aspect of the invention, the LED-strip is programmable to illuminate and scroll in a direction of movement of the elevator car. Moreover, the scrolling of the strip of the lightning LEDs is able to indicate a performance of movement of the elevator car. For instance, as the elevator car is accelerating or decelerating, a few illuminated LEDs scroll vertically up or down (depending on the direction of movement) to reflect the movement of the elevator car. On the other hand, in a color scrolling method, the light, for example, is separated into R

(red), G (green), and B (blue) colors, and the three colors are sent to different location of the strip successively in a certain order, so it can make color patterns move at an appropriate speed according to the movement of the elevator car.

[0012] According to an embodiment in respect of the first aspect of the invention, the scrolling rate and the scrolling speed of the LEDs are capable of reflecting a change in acceleration, deceleration, and/or speed of the moving elevator car. Since jerk is a measure of the change in acceleration over time, it reflects the human perception of motion (not intended movement) more accurately than changes in velocity. Thus, when the jerk is positive, the light pattern shall increase its scrolling speed. When the jerk is 0, then the scrolling rate of the LEDs is also constant, then the light pattern shall be in constant (no moving) or just move at a constant speed, depending on if the elevator car is in motion or not. When the jerk is negative, the light pattern shall decrease its scrolling speed. For example, when the elevator car is accelerating or decelerating, the illuminated LEDs scroll vertically up or down at a speed that corresponds to the magnitude of the acceleration or deceleration. And the scrolling rate constant if the acceleration and/or the speed of the moving elevator car is constant.

[0013] According to an embodiment in respect of the first aspect of the invention, the LED-strip is placed along a seam in a door and/or along a side door jamb of an elevator car. The LED-strip may provide beautiful aesthetics with decorative lighting throughout the elevator car and are perfect for drawing attention of passengers in the car, while creating a relaxed atmosphere. This will also help passengers more on reducing risk of getting sick during elevator rides.

[0014] According to the second aspect of the present invention, it is provided with a method for indicating movement of an elevator car which is moving in a shaft between a plurality landing stops, wherein a moving direction and a moving performance of the elevator car are indicated visually in real-time by a dynamic light reference illuminated in the elevator car.

[0015] According to an embodiment in respect of the second aspect of the invention, acceleration, deceleration, jerk, and/or speed of movement of the elevator car are indicated by the dynamic light reference. For example, the dynamic light reference is illuminated by a visual illumination means in the elevator car.

[0016] According to an embodiment in respect of the second aspect of the invention, the visual illumination means is constructed as a strip of LEDs, light-emitting diodes, with two or more LEDs light up and scroll in a direction of the movement of the moving elevator car for indicating a moving performance of the elevator car.

[0017] According to an embodiment in respect of the second aspect of the invention, the scrolling rate of the LEDs reflects a change in the acceleration and/or the speed of the moving elevator car.

[0018] According to the third aspect of the present

invention, an elevator having an elevator car comprises a visual illumination means according to the first aspect of the invention inside of the elevator car.

[0019] Further advantageous features of the invention can be seen from the following exemplary explanation thereof with reference to the drawings. However, neither the drawings nor the description shall be interpreted as limiting the invention.

[0020] Figure 1 a visual illumination means of an elevator car according to the invention.

[0021] Fig. 1 shows a visual illumination means 1 arranged in an elevator car 2 which is moveable in a shaft between a plurality of landing stops or floors. In this embodiment, the elevator car 2 moves vertically in the shaft, but it may also move horizontally, and/or obliquely.

[0022] The visual illumination means 1, for example, is constructed as a LED-strip 1 having a plurality of LEDs (light-emitting diodes) 5. A control unit 4 of the LED-strip 1 is connected with the LEDs 5, so that illumination of the LEDs 5 can be regulated by the control unit 4 based on sensing signals received by the control unit 2. The sensing signals are sent from sensors installed in the shaft or in the elevator car 2 for sensing the movement of the elevator car 2. By receiving such sensing signals, the control unit 4 can detect in real-time the moving changes in acceleration, deceleration, and jerks, wherein the sensors, for example, are installed in the elevator shaft or in the elevator car 2 itself. In this manner, the LED-strip 1 is able to accurately provide a dynamic reference responding to the elevator car 2 moving, so that the LED-strip 1 can illuminate and scroll vertically up or down according to movement of the elevator car 2. The scrolling of the strip of the light emitting LEDs 5 is able to indicate the movement performance of the elevator car 2. That means the visual illumination means 1 may generate a scrolling pattern to reflect a moving direction and motion performance of the elevator car 2, wherein the scrolling rate and the scrolling speed of the LEDs 5 can reflect a change in the acceleration and/or the speed of the moving elevator car. When the elevator car 2 is accelerating, a few illuminated LEDs 5 will scroll vertically up to reflect the upward movement. If the elevator car 2 is decelerating, a few illuminated LEDs 5 will scroll vertically down to reflect downward movement. The speed of scrolling will be proportional to the magnitude of acceleration.

[0023] In particular, the LED-strip 1 lights to reflect or respond to changes in a jerk in the movement as follows:

- When the value of the jerk is positive, the scrolling speed of the light pattern shall be increased to reflect the increase in acceleration.
- When the value of the jerk is zero, the light pattern shall keep the current scrolling speed or stop scrolling, depending on whether the elevator is moving or not.
- When the value of the jerk is negative, the scrolling speed of the light pattern shall be reduced to reflect

the decrease in acceleration.

[0024] Such a LED-strip 1 is able to adjust the scrolling speed of the illumination in real-time to reflect changes in acceleration or deceleration in movement, providing passengers with clear and intuitive visual references that may enhance their sense of movement and reduce discomfort during acceleration and deceleration on an elevator trip.

[0025] The LED-strip 1, for example, can be placed along a seam 6 in a door 3 of the elevator car 2 and/or along the side door jamb 7 so that dynamic visual reference feedback on the moving performance of the elevator car 2 can be provided in real-time to passengers. On the other hand, such a LED-strip may also provide decorative lighting inside the elevator car 2, and it is ideal for attracting passengers' attention and reducing their risk of getting sick for them during taking an elevator.

Claims

1. A visual illumination means (1) of an elevator car (2) for indicating movement of the elevator car (2) which is moveable in a shaft, the said illumination means (1) comprising:
at least one light source (5) arranged and configured for illuminating to indicate in real-time a moving direction and a moving performance of the elevator car (2).
2. The visual illumination means (1) according to claim 1, wherein
the elevator car (2) is vertically, horizontally, and/or obliquely moveable in the shaft.
3. The visual illumination means according to claim 1 or 2, wherein
the visual illumination means (1) comprises a control unit (8) capable of regulating the at least one light source (5) to indicate speed, acceleration, deceleration, and/or jerk of movement of the elevator car (2), and wherein the regulation is based on sensing signals received by the control unit (4) sensing the movement of the elevator car (2).
4. The visual illumination means (1) according to one of claim 1 to 3, wherein
the visual illumination means (1) is a strip of LEDs, light-emitting diodes, with two or more LEDs.
5. The visual illumination means (1) according to claim 4, wherein
the strip of LEDs (5) is programmable to illuminate and scroll in a direction of movement of the elevator car (2).
6. The visual illumination means according to claim 5,

wherein

the scrolling of the strip of the illuminating LEDs (5) is able to indicate a performance of movement of the elevator car (2).

7. The visual illumination means (1) according to claim 6, wherein
the scrolling rate of the LEDs (5) is capable of reflecting a change in the acceleration, deceleration, and/or the speed of the moving elevator car (2).
8. The visual illumination means (1) according to one of claims 5 to 7, wherein
the strip of LEDs (5) is placed along a seam (6) in a door (3) and/or along a side door jamb (7) of an elevator car (2).
9. Method for indicating movement of an elevator car (2) which is moving in a shaft (4) between a plurality landing stops (3), wherein
a moving direction and a moving performance of the elevator car (2) are indicated visually in real-time by a dynamic light reference illuminated in the elevator car (2).
10. Method according to claim 9, wherein
acceleration, deceleration, jerk, and/or speed of movement of the elevator car (2) are indicated through the dynamic light reference.
11. Method according to claim 9 or 10, wherein
the dynamic light reference is illuminated by a visual illumination means (1) in the elevator car (2) based on sensing the movement of the elevator car (2).
12. Method according to claim 11, wherein
the visual illumination means (1) is constructed as a strip of LEDs, light-emitting diodes, with two or more LEDs illuminating and scrolling in a direction of movement of the moving elevator car (2) for indicating moving performance of the elevator car (2).
13. Method according to claim 12, wherein
the scrolling rate of the LEDs (5) reflects a change in acceleration, deceleration, jerk, and/or speed of the moving elevator car (2).
14. Elevator having an elevator car (2), wherein a visual illumination means (1) according to one of claims 1 to 8 is arranged inside of the elevator car (2).
15. Elevator according to claim 14, wherein
the visual illumination means (1) constructed as a strip of LEDs (5) is placed along a seam (6) in a door (3) and/or along a side door jamb (7) of an elevator car (2).

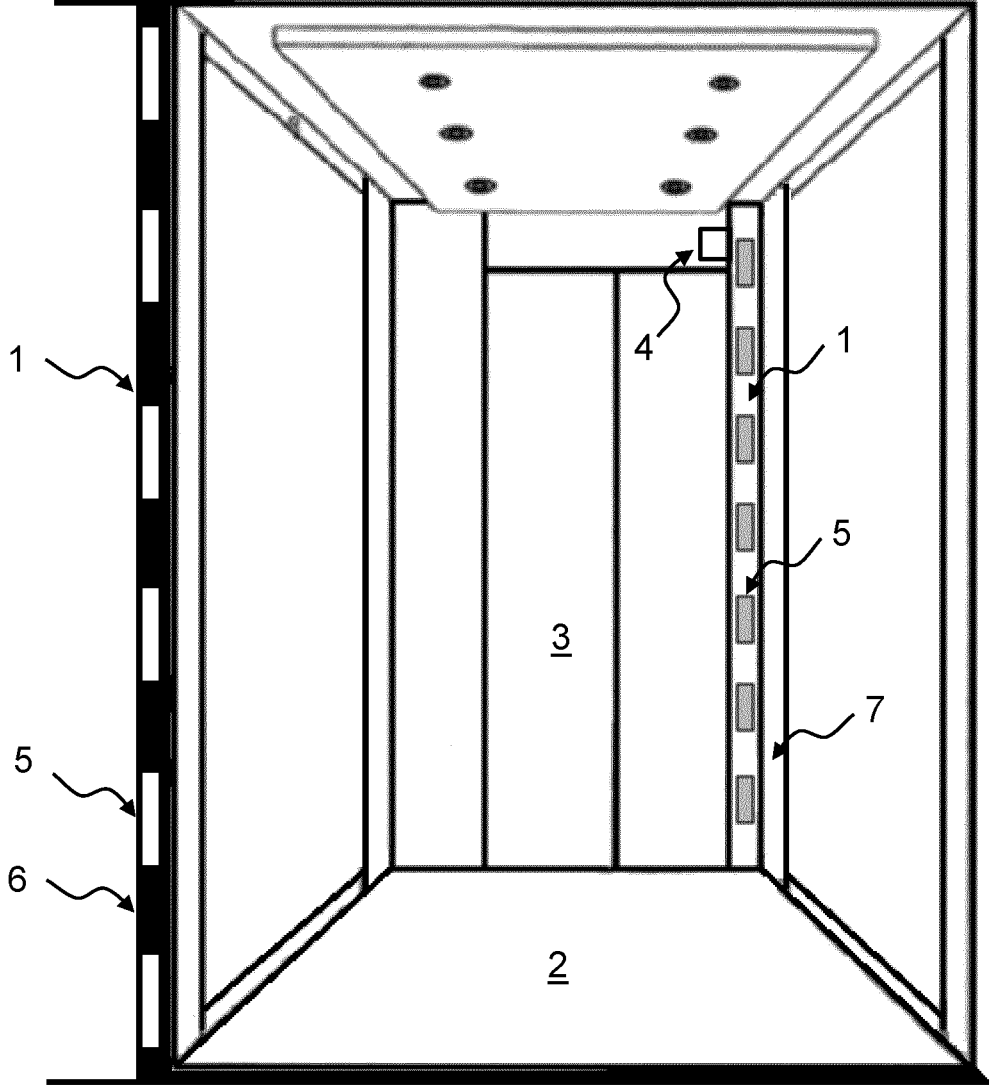


Fig. 1



EUROPEAN SEARCH REPORT

Application Number

EP 23 19 5730

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2008/004300 A1 (MITSUBISHI ELECTRIC CORP [JP]; TAKEUCHI NOBUKAZU [JP]) 10 January 2008 (2008-01-10) * abstract * * paragraphs [0015], [0018] - [0022] * * figures 1, 3 - 5 *	1-15	INV. B66B3/02
X	US 5 194 702 A (SWONGER JR KARL W [US]) 16 March 1993 (1993-03-16) * abstract * * column 2, line 50 - column 5, line 15 * * figures 1 - 4 *	1-15	
X	US 5 886 696 A (KAKKO MARKKU [FI] ET AL) 23 March 1999 (1999-03-23) * abstract * * column 2, line 60 - column 5, line 23 * * figures 1 - 3 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B66B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		29 December 2023	Dogantan, Umut H.
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			
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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29-12-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008004300 A1	10-01-2008	CN 101203449 A	18-06-2008
		JP WO2008004300 A1	03-12-2009
		WO 2008004300 A1	10-01-2008
US 5194702 A	16-03-1993	NONE	
US 5886696 A	23-03-1999	AT E161516 T1	15-01-1998
		AU 687154 B2	19-02-1998
		BR 9501087 A	24-10-1995
		CA 2144608 A1	16-09-1995
		CN 1124224 A	12-06-1996
		DE 69501275 T2	14-05-1998
		EP 0672608 A2	20-09-1995
		ES 2111979 T3	16-03-1998
		FI 941226 A	16-09-1995
		JP H0834573 A	06-02-1996
		US 5886696 A	23-03-1999