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 <ul style="list-style-type: none"> KONE Elevators Co., Ltd.
Kunshan
Jiangsu (CN) </p> | <ul style="list-style-type: none"> KONE Corporation
00330 Helsinki (FI) <p>(72) Inventors:
 <ul style="list-style-type: none"> SUN, Guidong
Kunshan, Jiangsu (CN) JIANG, Jiesong
Kunshan, Jiangsu (CN) </p> <p>(74) Representative: Kolster Oy Ab
Salmisaarenaukio 1
P.O. Box 204
00181 Helsinki (FI)</p> |
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(54) **FREQUENCY CONVERSION CONTROL SYSTEM, PERSONNEL TRANSPORTATION APPARATUS AND METHOD FOR PROVIDING FREQUENCY CONVERSION FUNCTION THERETO**

(57) The present disclosure relates to a frequency conversion control system, a personnel transportation apparatus and a method for providing a frequency conversion function to the personnel transportation apparatus. The frequency conversion control system includes: a control panel; a frequency converter, communicatively connected to the control panel and communicatively connected to a driver of the personnel transportation apparatus; a light curtain, arranged on an entrance side of the personnel transportation apparatus and communicatively connected to the frequency converter, in a case where

no passenger uses the personnel transportation apparatus, the frequency converter controls the personnel transportation apparatus through the driver to run at a standby speed; in a case where the light curtain detects that there is a passenger using the personnel transportation apparatus, the light curtain sends a signal to the frequency converter, and the frequency converter controls an operation speed of the personnel transportation apparatus through the driver to increase from the standby speed to a rated speed after receiving the signal.

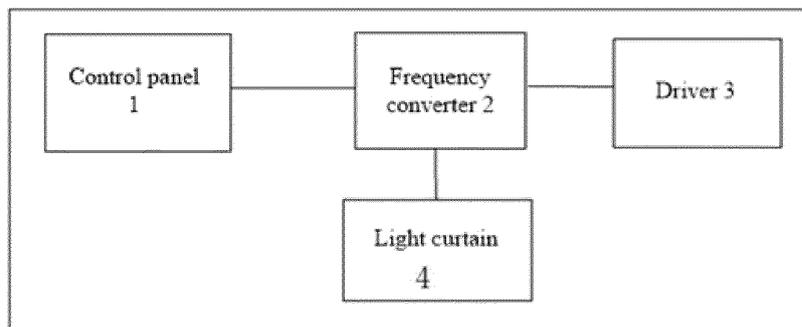


FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority of China Patent application No. CN202110923395.2 filed on August 12, 2021, the content of which is incorporated in its entirety as portion of the present application by reference herein.

TECHNICAL FIELD

[0002] The present disclosure relates to a frequency conversion system for a personnel transportation apparatus and a personnel transportation apparatus. The present disclosure further relates to a method for providing a frequency conversion function to a personnel transportation apparatus.

BACKGROUND

[0003] With the energy-saving requirements for personnel transportation apparatus such as escalators, it is desirable to make personnel transportation apparatus have a frequency conversion function, that is, run at a standby speed when there is no load, and run at a rated speed when there is a load. For the existing personnel transportation apparatus that does not have the frequency conversion function, it needs to be modified to make it have the frequency conversion function.

SUMMARY

[0004] Therefore, the present disclosure provides a frequency conversion control system for a personnel transportation apparatus, which includes: a control panel; a frequency converter, which is communicatively connected to the control panel and communicatively connected to a driver of the personnel transportation apparatus; a light curtain, which is arranged at an entrance side of the personnel transportation apparatus and communicatively connected to the frequency converter. In the case where no passengers use the personnel transportation apparatus, the frequency converter controls the personnel transportation apparatus through the driver to run at a standby speed, and in the case where the light curtain detects that there is a passenger using the personnel transportation apparatus, the light curtain sends a signal to the frequency converter, and the frequency converter controls a operation speed of the personnel transportation apparatus through the driver to increase from the standby speed to a rated speed after receiving the signal.

[0005] Advantageously, the rated speed is set by a predetermined parameter of the frequency converter.

[0006] Advantageously, the frequency converter and the light curtain are pre-assembled together to form a prefabricated assembly.

[0007] Advantageously, the light curtain detects whether there is a passenger using the personnel transportation apparatus at a predetermined frequency.

[0008] Advantageously, after the personnel transportation apparatus is running at the rated speed for a predetermined time, if the light curtain does not detect that the passenger uses the personnel transportation apparatus, the frequency converter controls the operation speed of the personnel transportation apparatus through the drive to decrease from the rated speed to the standby speed.

[0009] Advantageously, the predetermined time is determined by a timer of the frequency converter.

[0010] The present disclosure also provides a personnel transportation apparatus, which includes the frequency conversion control system as described above.

[0011] The present disclosure also provides a method for providing a frequency conversion function for a personnel transportation apparatus, which includes: providing a control panel; providing a frequency converter and a light curtain, wherein the frequency converter is communicatively connected to the control panel and a driver of the personnel transportation apparatus, and the light curtain is arranged at an entrance side of the personnel transportation apparatus and is communicatively connected to the frequency converter. The frequency converter is configured in a way that, in the case where no passengers use the personnel transportation apparatus, the frequency converter controls the personnel transportation apparatus through the driver to run at a standby speed, and in the case where the light curtain detects that there is a passenger using the personnel transportation apparatus, the light curtain sends a signal to the frequency converter, and the frequency converter controls a operation speed of the personnel transportation apparatus through the driver to increase from the standby speed to a rated speed after receiving the signal.

[0012] Advantageously, the rated speed is set by a predetermined parameter of the frequency converter.

[0013] Advantageously, the method further includes: pre-assembling the frequency converter and the light curtain to form a prefabricated assembly.

[0014] Advantageously, the light curtain detects whether there is a passenger using the personnel transportation apparatus at a predetermined frequency.

[0015] Advantageously, after the personnel transportation apparatus is running at the rated speed for a predetermined time, if the light curtain does not detect that there is a passenger using the personnel transportation apparatus, the frequency converter controls the operation speed of the personnel transportation apparatus through the drive to decrease from the rated speed to the standby speed.

[0016] Advantageously, the predetermined time is determined by a timer of the frequency converter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] In the preferred embodiments of the present disclosure described in detail below in conjunction with the accompanying drawings, the advantages and objectives of the present disclosure can be better understood. In order to better show the relationship of the various components in the drawings, the drawings are not drawn to scale. In the accompanying drawings:

FIG. 1 shows a block diagram of a frequency conversion control system for a personnel transportation apparatus according to the present disclosure.

FIG. 2 shows a flowchart of a method for providing a frequency conversion function to a personnel transportation apparatus according to the present disclosure.

DETAILED DESCRIPTION

[0018] Various embodiments according to the present disclosure will be described in detail with reference to the accompanying drawings. Herein, it should be noted that in the drawings, the same reference numerals are given to constituent parts that basically have the same or similar structure and function, and repeated descriptions about them will be omitted. The term "includes A, B, C, etc. in sequence" only indicates the sequence of the included components A, B, C, etc., and does not exclude the possibility of including other components between A and B and/or between B and C.

[0019] The accompanying drawings in the present specification are schematic diagrams to assist in explaining the concept of the present disclosure, and schematically show the shape of each part and the relationship between them.

[0020] Hereinafter, referring to FIGS. 1 and 2, a preferred embodiment according to the present disclosure will be described in detail.

[0021] The frequency conversion control system for a personnel transportation apparatus according to the present disclosure includes a control panel 1. A frequency converter 2 is communicatively connected to the control panel 1 and communicatively connected to a driver 3 of the personnel transportation apparatus. For example, the frequency converter is connected to the control panel or the driver through wireless or wired means. The control panel can monitor the running status of the frequency converter, such as whether there is a fault, etc. The driver is used to drive the operation of the personnel transportation apparatus. A light curtain 4 is arranged on an entrance side of the personnel transportation apparatus and is communicatively connected with the frequency converter. Advantageously, the light curtain is arranged at opposite sides of the personnel transportation apparatus, so that when the operation direction of the personnel transportation apparatus changes, the light curtain can also be used to detect whether there is

a passenger entering the personnel transportation apparatus.

[0022] In the case where no passenger uses the personnel transportation apparatus, that is, in the case where the personnel transportation apparatus is not loaded, and the light curtain does not detect that the passenger enters the personnel transportation apparatus, the frequency converter controls the personnel transportation apparatus through the drive to run at a standby speed. In the case where the light curtain detects that there is a passenger entering the personnel transportation apparatus, the light curtain sends a signal as detected to the frequency converter. After receiving the signal, the frequency converter controls the operation speed of the personnel transportation apparatus through the driver to increase from the standby speed to a rated speed, so as to transport the passenger at a faster speed. The light curtain advantageously detects whether there is a passenger using the personnel transportation apparatus at a predetermined frequency.

[0023] The rated speed can be set by a predetermined parameter of the frequency converter, so that, by setting the predetermined parameter of the frequency converter, the rated speed of the personnel transportation apparatus can be changed.

[0024] The frequency converter and the light curtain can be pre-assembled to form a prefabricated assembly, so that only the frequency converter is required to be connected to the control panel and the driver to provide a frequency conversion function for the personnel transportation apparatus.

[0025] After the personnel transportation apparatus is running at the rated speed for a predetermined time, if the light curtain does not detect that there is a passenger using the personnel transportation apparatus, the frequency converter controls the operation speed of the personnel transportation apparatus through the drive to decrease from the rated speed to the standby speed. The predetermined time can be determined by a timer of the frequency converter.

[0026] In this way, by connecting the frequency converter to the control panel and controlling the driver through the frequency converter to change the operation speed of the personnel transportation apparatus, there is no need for the control panel to control the driver to change the operation speed of the personnel transportation apparatus. In short, the operation speed is controlled by the frequency converter, and the operation speed of the personnel transportation apparatus is not controlled by the control panel. In this way, the transformation time of the personnel transportation apparatus is saved, and it can be adapted to a variety of different personnel transportation apparatus. In addition, the frequency converter and light curtain are pre-assembled, which reduces on-site installation time and saves costs.

[0027] FIG. 2 shows a flowchart of a method for providing a frequency conversion function to a personnel transportation apparatus.

[0028] In step 101, a control panel is provided, and the control panel may be the control panel of the personnel transportation apparatus itself. Next, in step 102, a frequency converter and a light curtain are provided, the frequency converter is communicatively connected to the control panel and the driver of the personnel transportation apparatus, and the light curtain is arranged at an entrance side of the personnel transportation apparatus and is communicatively connected to the frequency converter. The frequency converter is configured in a way that, in the case where no passengers use the personnel transportation apparatus, the frequency converter controls the personnel transportation apparatus through the driver to run at a standby speed, in the case where the light curtain detects that there is a passenger using the personnel transportation apparatus, the light curtain sends a signal to the frequency converter, the frequency converter controls an operation speed of the personnel transportation apparatus by the driver to increase from the standby speed to a rated speed after receiving the signal.

[0029] The above description is only an explanation of the present disclosure, so that those skilled in the art can fully implement the solution, but it is not a limitation of the present disclosure. The technical features disclosed above are not limited to the disclosed combination with other features, and those skilled in the art can also make other combinations between the technical features according to the purpose of the invention, so as to achieve the purpose of the present disclosure.

Claims

1. A frequency conversion control system for a personnel transportation apparatus, which is **characterized in that**, the frequency conversion control system comprises:

a control panel (1);
 a frequency converter (2), communicatively connected to the control panel (1) and communicatively connected to a driver (3) of the personnel transportation apparatus;
 a light curtain (4), arranged on an entrance side of the personnel transportation apparatus and communicatively connected to the frequency converter (2),
 wherein, in a case where no passenger uses the personnel transportation apparatus, the frequency converter (2) is configured to control the personnel transportation apparatus through the driver (3) to run at a standby speed; in a case where the light curtain (4) detects that there is a passenger using the personnel transportation apparatus, the light curtain (4) is configured to send a signal to the frequency converter (2), and the frequency converter (2) controls an operation

speed of the personnel transportation apparatus through the driver (3) to increase from the standby speed to a rated speed after receiving the signal.

2. The frequency conversion control system according to claim 1, which is **characterized in that** the rated speed is set by a predetermined parameter of the frequency converter (2).
3. The frequency conversion control system according to claim 1, which is **characterized in that** the frequency converter (2) and the light curtain (4) are pre-assembled to form a prefabricated assembly.
4. The frequency conversion control system according to claim 1, which is **characterized in that** the light curtain (4) is configured to detect whether there is a passenger using the personnel transportation apparatus at a predetermined frequency.
5. The frequency conversion control system according to claim 1, which is **characterized in that**, after the personnel transportation apparatus is running at the rated speed for a predetermined time, if the light curtain (4) does not detect that there is a passenger using the personnel transportation apparatus, the frequency converter (2) controls the operation speed of the personnel transportation apparatus through the driver (3) to reduce from the rated speed to the standby speed.
6. The frequency conversion control system according to claim 5, which is **characterized in that** the predetermined time is determined by a timer of the frequency converter (2).
7. A personnel transportation apparatus, which is **characterized in that** the personnel transportation apparatus comprises the frequency conversion control system according to any one of claims 1-6.
8. A method for providing a frequency conversion function to a personnel transportation apparatus, which is **characterized in that** the method comprises:

(101) providing a control panel (1);
 (102) providing a frequency converter (2) and a light curtain (4), wherein the frequency converter is communicatively connected to the control panel (1) and a driver (3) of the personnel transportation apparatus, and the light curtain (4) is arranged at an entrance side of the personnel transportation apparatus and is communicatively connected to the frequency converter (2),
 the frequency converter (2) is configured in a way that, in a case where no passenger uses the personnel transportation apparatus, the fre-

quency converter (2) controls the personnel transportation apparatus to run at a standby speed through the driver (3); in a case where the light curtain (4) detects that there is a passenger using the personnel transportation apparatus, the light curtain (4) sends a signal to the frequency converter (2), and, after receiving the signal, the frequency converter (2) controls an operation speed of the personnel transportation apparatus through the driver (3) to increase from the standby speed to a rated speed.

9. The method according to claim 8, which is **characterized in that** the rated speed is set by a predetermined parameter of the frequency converter (2).

10. The method according to claim 8, which is **characterized in that**, the method further comprising: pre-assembling the frequency converter (2) and the light curtain (4) to form a prefabricated assembly.

11. The method according to claim 8, which is **characterized in that** the light curtain (4) is configured to detect whether there is a passenger using the personnel transportation apparatus at a predetermined frequency.

12. The method according to claim 8, which is **characterized in that**, after the personnel transportation apparatus is running at the rated speed for a predetermined time, if the light curtain (4) does not detect that there is a passenger uses the personnel transportation apparatus, the frequency converter (2) controls the operation speed of the personnel transportation apparatus through the driver (3) to reduce from the rated speed to the standby speed.

13. The method according to claim 12, which is **characterized in that** the predetermined time is determined by a timer of the frequency converter (2).

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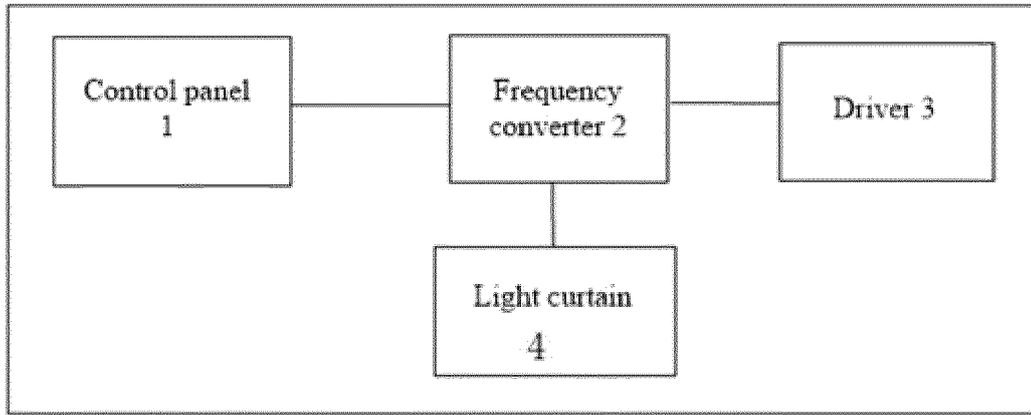


FIG. 1

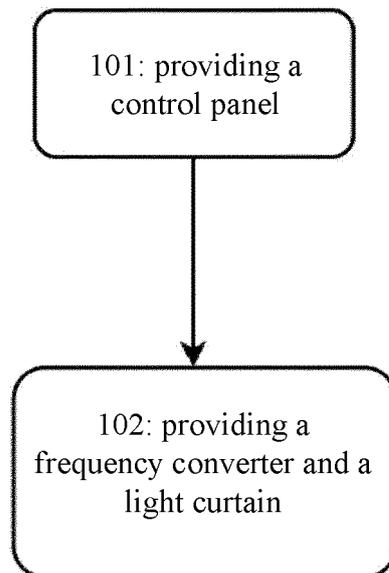


FIG. 2



EUROPEAN SEARCH REPORT

Application Number
EP 22 18 9960

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 December 2022	Examiner Oosterom, Marcel
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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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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14-12-2022

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