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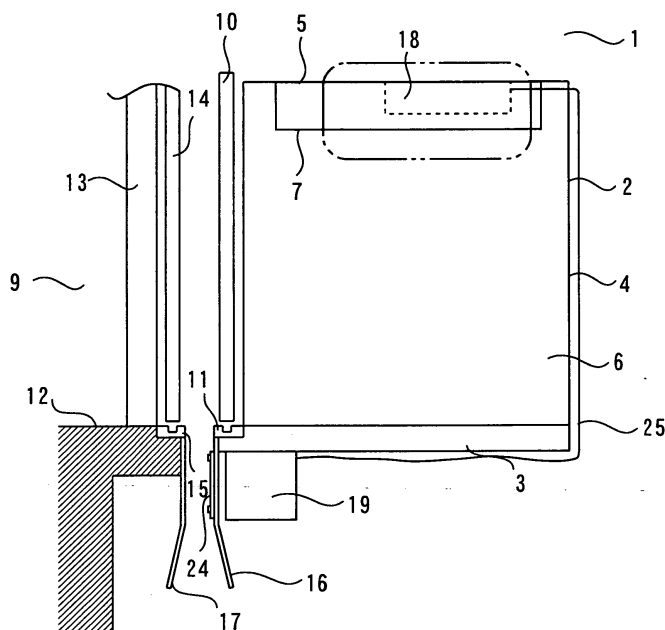
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(54) **CAR DEVICE OF ELEVATOR**

(57) A car apparatus of an elevator which enables the OH dimension of an elevator shaft to be shortened is provided. For this purpose, for a car apparatus which is comprising a car which ascends and descends within an elevator shaft, a suspended ceiling which is provided in a ceiling portion of the car, a car apron which is provided in an extended condition downward from a lower portion

of a car entrance side of the car, an indoor unit of an air conditioner is provided between the ceiling portion of the car and the suspended ceiling, an outdoor unit of the air conditioner is provided under a car platform of the car adjacent to the car apron, and an inspection hole for outdoor unit which can be opened and closed from the hall is formed in the car apron.

Fig. 2



Description

Technical Field

[0001] The present invention relates to a car apparatus of an elevator which is provided with an air conditioner constituted by an indoor unit and an outdoor unit.

Background Art

[0002] In general, an air conditioner of an elevator is disposed on a car, and warm air and cold air generated by this air conditioner, what is called conditioned air is guided into the car via guidance means. Incidentally, the air conditioner, along with other elevator equipment, is fixed onto a top surface of the car by use of mounting means, and arranged so as to protrude upward from the top surface of the car in the same way as other equipment.

[0003] As a conventional car apparatus of an elevator in which an air conditioner is installed on the car, there has been proposed a car apparatus which is provided with a heat storage/heat radiating body installed in an upper part of the car with a gap from a ceiling of the car and a damper which is provided in a flow passage of the air conditioner and switches, in a variable manner, the volume of the conditioned air supplied into a gap between the car ceiling and the heat storage/heat radiating body and into the car (refer to Patent Document 1, for example). In such a car apparatus, in a case where there are few passengers in the car, the volume of cold air supplied into the gap is increased by opening the damper, whereby heat is stored in the heat storage/heat radiating body. When there are many passengers in the car, the volume of cold air supplied into the car is increased by closing the damper, whereby the cooling of the interior of the car is performed by the cold air introduced into the car and the radiation of the cold air from the heat storage/heat radiating body.

Patent Document 1: Japanese Patent Laid-Open No. 5-787

Disclosure of the Invention

Problems to be Solved by the Invention

[0004] These days, space-saving designs of an elevator apparatus have been aimed at by using a machine room-less elevator which is not provided with a machine room above an elevator shaft. And in further saving the space of such an elevator apparatus, the shortening of the distance-from a top portion of the shaft to the highest floor, what is called the OH (overhead) dimension becomes the most effective means. However, in conventional car apparatus of an elevator, including the one described in Patent Document 1, an air conditioner is one of the devices installed on the car that protrude most upward, and this was one of the reasons why the OH

dimension cannot be shortened.

[0005] The present invention has been made to solve problems as described above and the object of the invention is to provide a car apparatus of an elevator which enables the OH dimension of an elevator shaft to be shortened.

Means for Solving the Problems

[0006] A car apparatus of an elevator related to the present invention comprises a car which ascends and descends within an elevator shaft, a suspended ceiling which is provided in a ceiling portion of the car, a car apron which is provided in an extended condition downward from a lower portion of a car entrance side of the car, an indoor unit of an air conditioner provided between the ceiling portion of the car and the suspended ceiling, an outdoor unit of the air conditioner which is provided under a car platform of the car adjacent to the car apron, and an inspection hole for outdoor unit which is provided in the car apron and can be opened and closed from the hall.

Effect of the Invention

[0007] The present invention enables the OH dimension of an elevator shaft to be shortened because the invention provides a car apparatus of an elevator comprising a car which ascends and descends within an elevator shaft, a suspended ceiling which is provided in a ceiling portion of the car, a car apron which is provided in an extended condition downward from a lower portion of a car entrance side of the car, an indoor unit of an air conditioner provided between the ceiling portion of the car and the suspended ceiling, an outdoor unit of the air conditioner which is provided under a car platform of the car adjacent to the car apron, and an inspection hole for outdoor unit which is provided in the car apron and can be opened and closed from the hall.

Brief Description of the Drawings

[0008]

Figure 1 is a front view of a car apparatus of an elevator in Embodiment 1 of the present invention. Figure 2 is a side view of a car apparatus of an elevator in Embodiment 1 of the present invention. Figure 3 is a partially enlarged view of Figure 2. Figure 4 is a partially enlarged view of Figure 1. Figure 5 is a diagram to explain a car apparatus of an elevator in Embodiment 1 of the present invention.

55 Description of Symbols

[0009] 1 shaft, 2 car, 3 car platform, 4 side wall portion, 5 ceiling portion, 6 cab, 7 suspended ceiling, 8 lighting

fixture, 9 hall, 10 car door, 11 sill, 12 hall floor surface, 13 hall jamb, 14 hatch door, 15 sill, 16 car apron, 17 hall apron, 18 indoor unit, 19 outdoor unit, 20 outlet port, 21 inlet port, 22 duct, 23 inspection hole for outdoor unit, 24 opening and closing lid, 25 connecting member

Best Mode for Carrying Out the Invention

[0010] In order to describe the present invention in further detail, the invention will be described with reference to the accompanying drawings. Incidentally, in each of the drawings, the same symbols are applied to the same or corresponding elements, and the duplicated explanation thereof is simplified or omitted appropriately.

Embodiment 1

[0011] Figure 1 is a front view of a car apparatus of an elevator in Embodiment 1 of the present invention, Figure 2 is a side view of the car apparatus, Figure 3 is a partially enlarged view of Figure 2, and Figure 4 is a partially enlarged view of Figure 1. In Figures 1 to 4, in a car 2 which ascends and descends within an elevator shaft 1 a cab 6 is formed by a car platform 3 fixed to a car frame (not shown), side wall portions 4 which are provided in a standing manner on the car platform 3, and a ceiling portion 5 provided in an upper part of the side wall portions 4. Incidentally, on a top surface of the ceiling portion 5, there is installed equipment which is necessary for the car apparatus of the elevator and whose height is not more than prescribed values. A suspended ceiling 7 is provided on a bottom surface of the ceiling portion 5 which becomes the interior of the cab 6, and a lighting fixture 8 which illuminates the interior of the cab 6 is installed between the ceiling portion 5 and the suspended ceiling 7.

[0012] On the hall 9 side of the car 2, a car entrance is formed so as to be opposed to a hall entrance provided on each floor, and a car door 10 which opens and closes the car entrance is provided on the hall 9 side of this car entrance. In this car door 10, an upper part thereof is driven by a door driving unit (not shown) and a lower part thereof is guided by a sill 11 provided substantially flush with the car platform 3.

[0013] The hall entrance provided in the hall 9 of each floor is formed by a hall floor surface 12 and a hall jamb 13 which is provided in a standing manner on the hall floor surface 12, and a hatch door 14 which opens and closes the hall entrance is provided on the shaft 1 side of this hall entrance. This hatch door 14 is such that an upper part thereof is suspended on a hanger roller and a hanger rail (neither are shown) and a lower part thereof is guided by a sill 15 which is provided substantially flush with the hall floor surface 12.

[0014] A car apron 16 and a hall apron 17 are respectively provided in the car 2 and the hall 9 so as to become opposed to each other with a prescribed gap from each other when the car 2 comes to a standstill at the hall 9,

and the car apron 16 is disposed so as to extend downward from a lower part on the car entrance side of the car 2. Incidentally, the car apron 16 and the hall apron 17 are installed to prevent passengers within the car 2 and passengers on the hall 9 from being sandwiched between the car 2 and the hall 9 or falling into the shaft 1 when the inaccurate car leveling for landing happens for some reason, and provided under the sills 11 and 15, respectively, in a hanging condition.

[0015] In a car apparatus having this construction, an air conditioner of the elevator is constituted by an indoor unit 18 and an outdoor unit 19 in a divided manner, the indoor unit 18 being provided in the cab 6 and the outdoor unit 19 being provided under the car platform 3 of the car 2. The indoor unit 18 of the air conditioner is fixed to a bottom surface of the ceiling portion 5 from below and disposed between the ceiling portion 5 and the suspended ceiling 7. The indoor unit 18 of the air conditioner is disposed above the lighting fixture 8 so that its shade cannot be seen from passengers in the cab 6. In order to prevent a short cycle in which the conditioned air delivered from the air conditioner is immediately sucked into the air conditioner, an outlet port 20 of conditioned air is provided on one side surface of the suspended ceiling 7 and an inlet port 21 which sucks the air in the cab 6 is provided on the other side surface opposite to this side so as to face the direction opposite to the outlet port 20. That is, the outlet port 20 and inlet port 21 of the air conditioner are provided in close vicinity to opposite side wall portions 4 in the cab 6, whereby a prescribed distance is kept. Incidentally, in a case where there is a prescribed distance between the inlet port 21 formed on the other side surface of the suspended ceiling 7 and the indoor unit 18, as shown in Figure 1, the spacing between the inlet port 21 and the indoor unit 18 can be connected by use of a duct 22 or the like.

[0016] The outdoor unit 19 of the air conditioner is fixed to a bottom surface of the car platform 3 from below and disposed in a middle part on the car entrance side. That is, the outdoor unit 19 is disposed on the back side of the car apron 16 provided in a hanging condition from the car platform 3 downward and adjacent to this car apron 16. Incidentally, a portion of the car apron 16 corresponding to the outdoor unit 19 is provided with an inspection hole for outdoor unit 23, and an opening and closing lid 24 which can be opened and closed from the hall 9 side is provided on this inspection hole for outdoor unit 23.

[0017] The spacing between the indoor unit 18 and outdoor unit 19 of the air conditioner is connected by a connecting member 25, such as a drain hose, a coolant tube and wiring or the like, and this connecting member 25 extends from the interior of the cab 6 to the back surface and bottom surface of the car 2 and is fixed to the outside of the car 2 so as to avoid the car entrance. Therefore, the drain generated within the indoor unit 18 is conveyed via the drain hose to the outdoor unit 19 provided under the car 2 and is subjected to evaporation treatment in the outdoor unit 19.

[0018] Thanks to this construction, it becomes unnecessary to dispose the air conditioner of the elevator on the top surface of the car 2 and it becomes possible to shorten the OH dimension of the shaft 1. That is, by dividing the air conditioner into the indoor unit 18 and the outdoor unit 19, it becomes possible to dispose the miniaturized indoor unit 18 between the ceiling portion 5 and the suspended ceiling 7. Incidentally, in performing the maintenance work of the indoor unit 18, by removing a lighting panel (not shown) which is provided on the suspended ceiling 7 or removing the suspended ceiling 7 itself, it becomes possible to perform the work easily from inside of the cab 6. Therefore, it is unnecessary for the maintenance person to mount onto the top surface of the car 2 as during the maintenance of a conventional air conditioner and the maintenance work of indoor unit 18 is excellent in workability and safety.

[0019] On the other hand, the outdoor unit 19 of the air conditioner is installed under the car platform 3 of the car 2 which has not hitherto been used. Therefore, the outdoor unit 19 of the air conditioner does not interfere with other elevator equipment installed within the shaft 1 during the ascent and descent of the car 2, and it becomes possible to ensure a sufficient work space on the top surface of the car 2. Incidentally, in performing the maintenance work of the outdoor unit 19, first, the maintenance person of the elevator in a prescribed hall 9 causes the car 2 which is at a standstill at the hall to ascend at a low speed. Then, the car 2 is stopped the instant the inspection hole for outdoor unit 23 provided in the car apron 16 has come to a position where the work is easily performed, and the maintenance work is performed via the inspection hole for outdoor unit 23 from the hall 9. Figure 5 shows the condition of a car apparatus during such maintenance work. Therefore, also the maintenance work of the outdoor unit 19 of the air conditioner can be performed from the hall 9 safely and easily.

[0020] Incidentally, it is needless to say that the car apparatus of an elevator related to the present invention is effective in both a machine room-less elevator and an elevator having a machine room.

Industrial Applicability

[0021] As described above, according to the car apparatus of an elevator related to the present invention, it is possible to shorten the OH dimension of the shaft by dividing an air conditioner of the elevator into an indoor unit and an outdoor unit and disposing the indoor unit between a ceiling portion of a car and an suspended ceiling and disposing the outdoor unit under a car platform of the car. Incidentally, because the maintenance work can be easily performed for the indoor unit from inside the cab and for the outdoor unit from the hall, the maintenance work of the air conditioner is excellent in workability and safety.

Claims

1. An car apparatus of an elevator comprising:

5 a car which ascends and descends within an elevator shaft;
a suspended ceiling which is provided in a ceiling portion of the car;
a car apron which is provided in an extended condition downward from a lower portion of a car entrance side of the car;
10 an indoor unit of an air conditioner provided between the ceiling portion of the car and the suspended ceiling;
15 an outdoor unit of the air conditioner which is provided under a car platform of the car adjacent to the car apron; and
an inspection hole for outdoor unit which is provided in the car apron and can be opened and closed from the hall.

2. The car apparatus of an elevator according to claim 1, **characterized in that** an outlet port and an inlet port of the air conditioner provided in the suspended ceiling are respectively installed in close vicinity to opposite side wall portions in the cab.

3. The car apparatus of an elevator according to claim 1 or 2, **characterized in that** the indoor unit of the air conditioner is disposed above a lighting fixture provided between the ceiling portion of the car and the suspended ceiling.

4. The car apparatus of an elevator according to any of claims 1 to 3, **characterized in that** a coolant tube and a drain hose connected to the indoor unit and outdoor unit of the air conditioner are provided outside the car by avoiding the car entrance.

Fig. 1

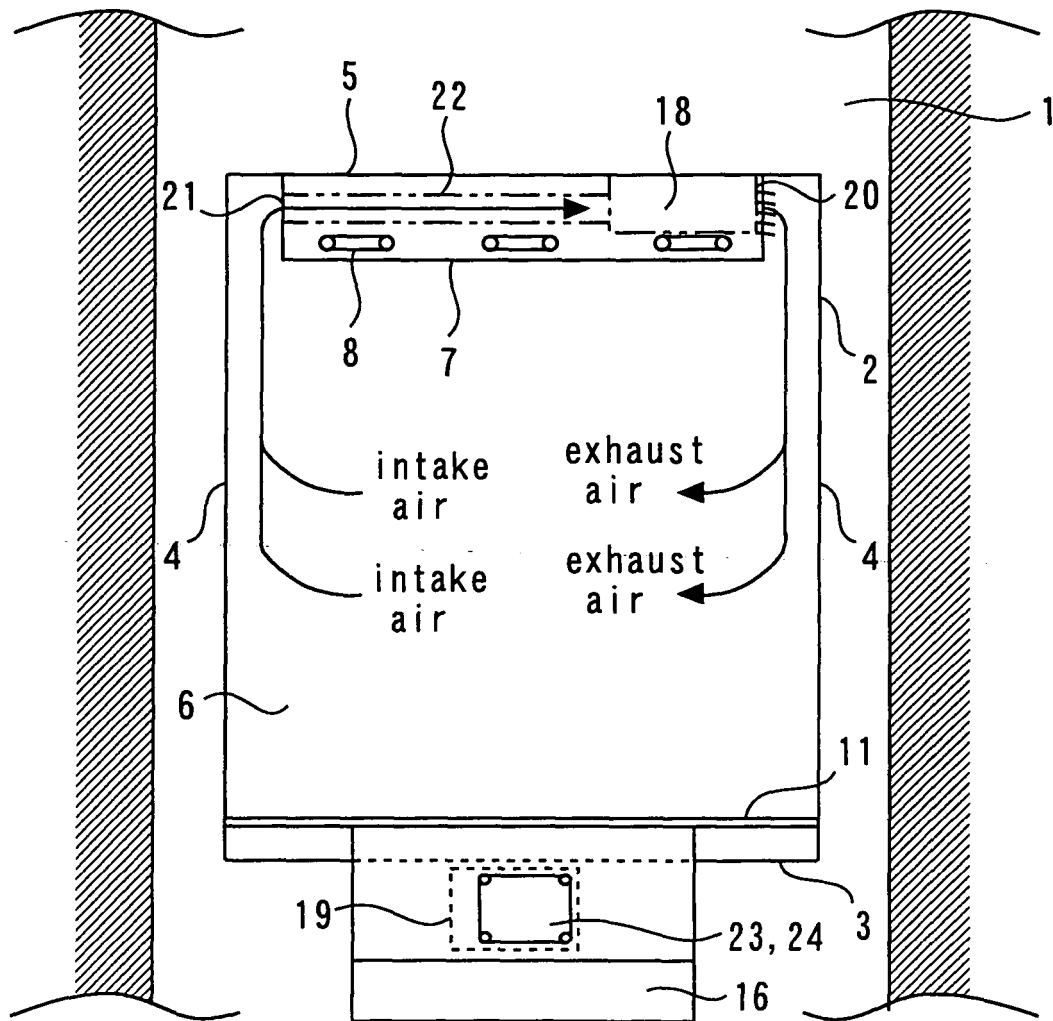


Fig. 2

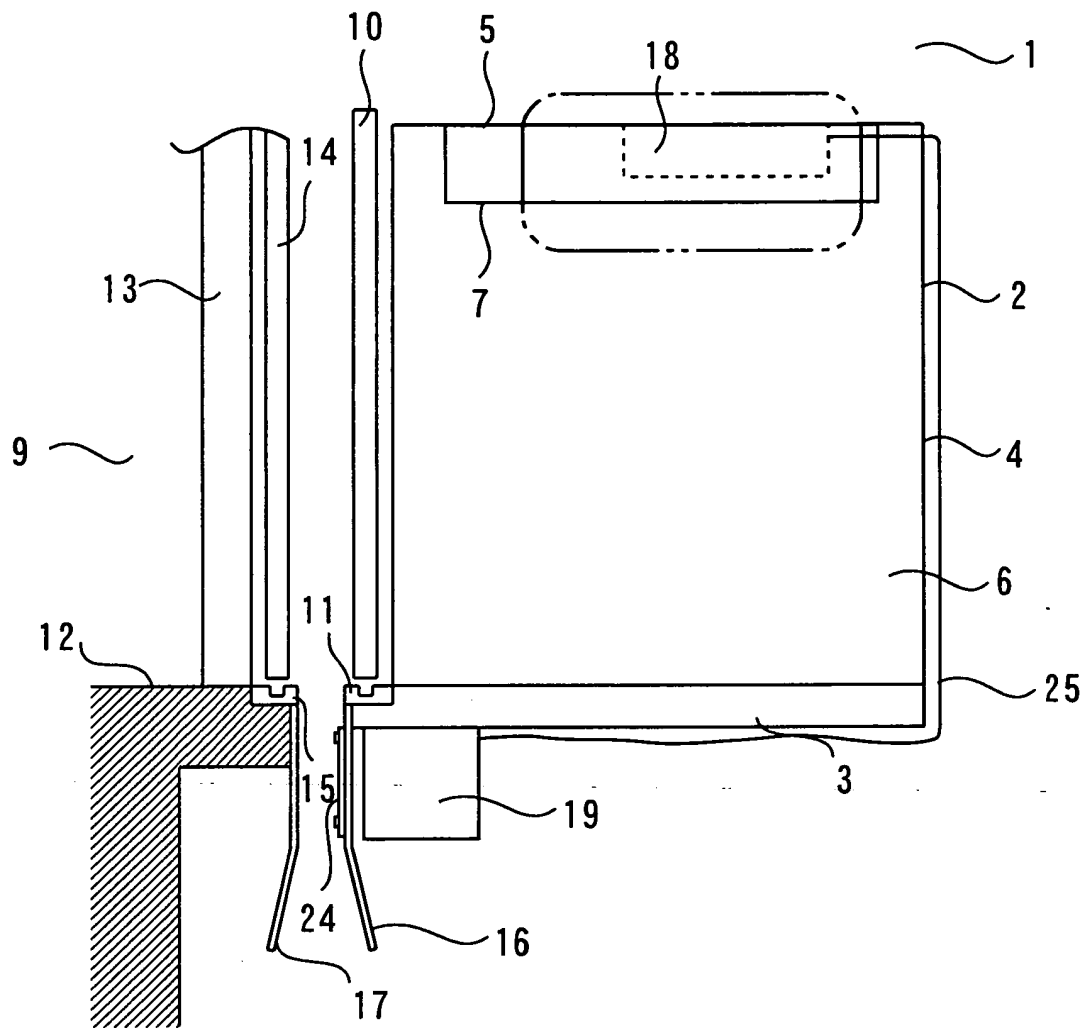


Fig. 3

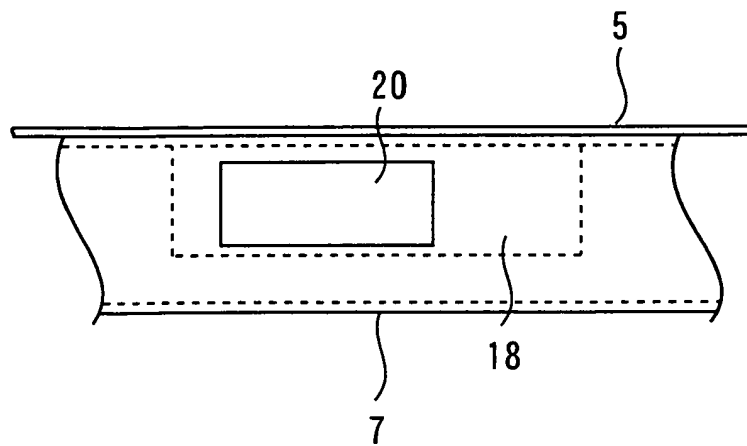


Fig. 4

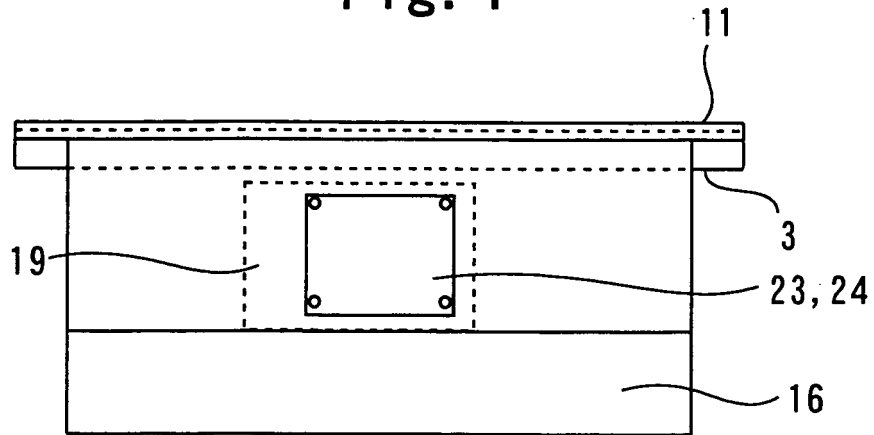
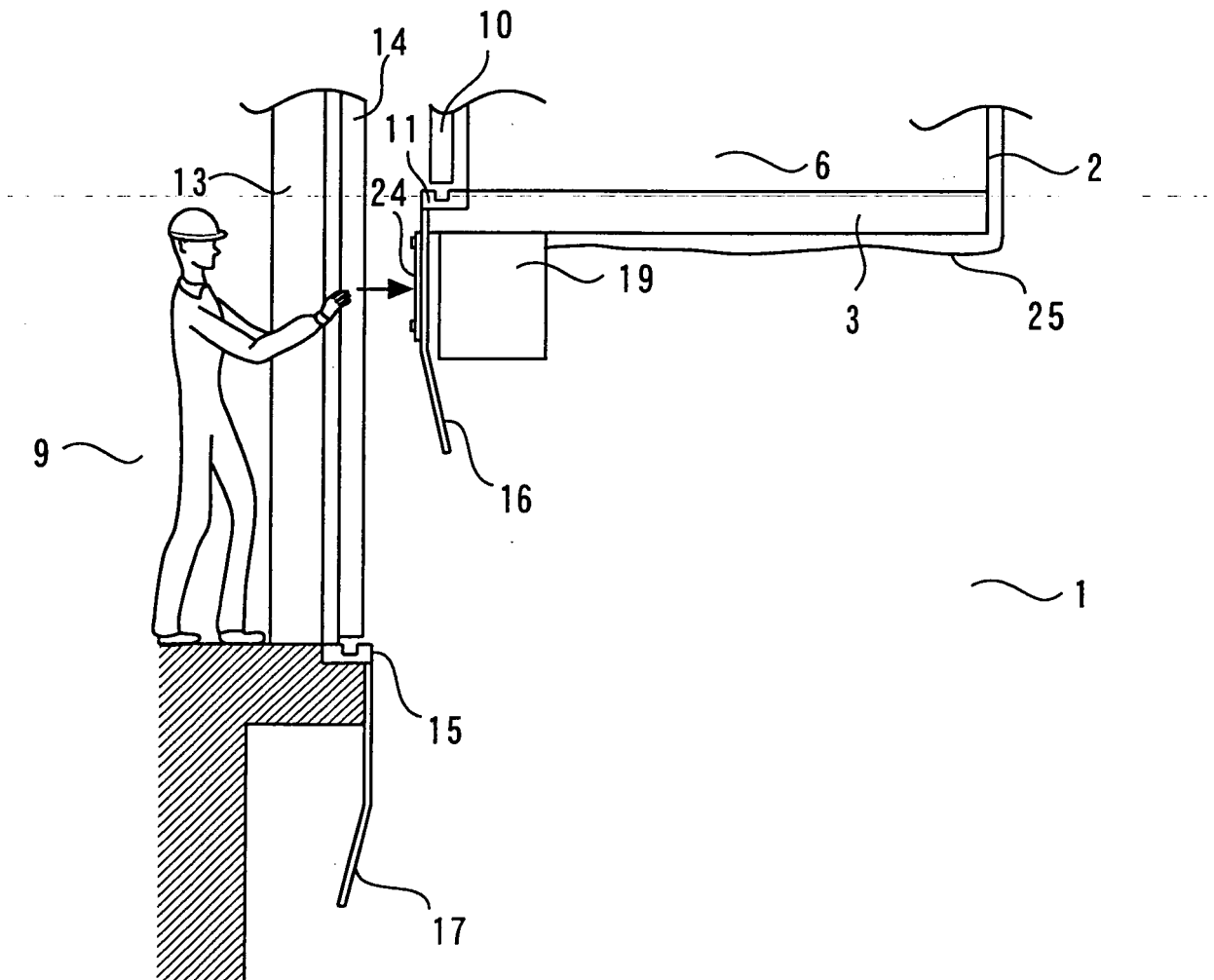


Fig. 5



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/301840

A. CLASSIFICATION OF SUBJECT MATTER

B66B11/02(2006.01), **B66B5/00**(2006.01), **B66B13/28**(2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B66B1/00(2006.01) - **B66B13/30**(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2006
Kokai Jitsuyo Shinan Koho	1971-2006	Toroku Jitsuyo Shinan Koho	1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 4-7288 A (Mitsubishi Electric Corp.), 10 January, 1992 (10.01.92), Pages 1 to 2; prior art; Fig. 3 (Family: none)	1-4
Y	JP 8-208156 A (Hitachi, Ltd.), 13 August, 1996 (13.08.96), Par. Nos. [0011] to [0012]; Figs. 1 to 2 (Family: none)	1-4
Y	JP 2002-265169 A (Toshiba Elevator and Building Systems Corp.), 18 September, 2002 (18.09.02), Par. Nos. [0041] to [0042]; Fig. 6	2
Y	Par. No. [0002]; Fig. 7 (Family: none)	3-4

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:	"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
10 May, 2006 (10.05.06)Date of mailing of the international search report
16 May, 2006 (16.05.06)Name and mailing address of the ISA/
Japanese Patent Office

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 5000787 A [0003]