

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
22 June 2006 (22.06.2006)

PCT

(10) International Publication Number
WO 2006/064307 A1

(51) International Patent Classification:
B66B 11/02 (2006.01) **B66B 1/50** (2006.01)

(21) International Application Number:
PCT/IB2004/004192

(22) International Filing Date:
17 December 2004 (17.12.2004)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

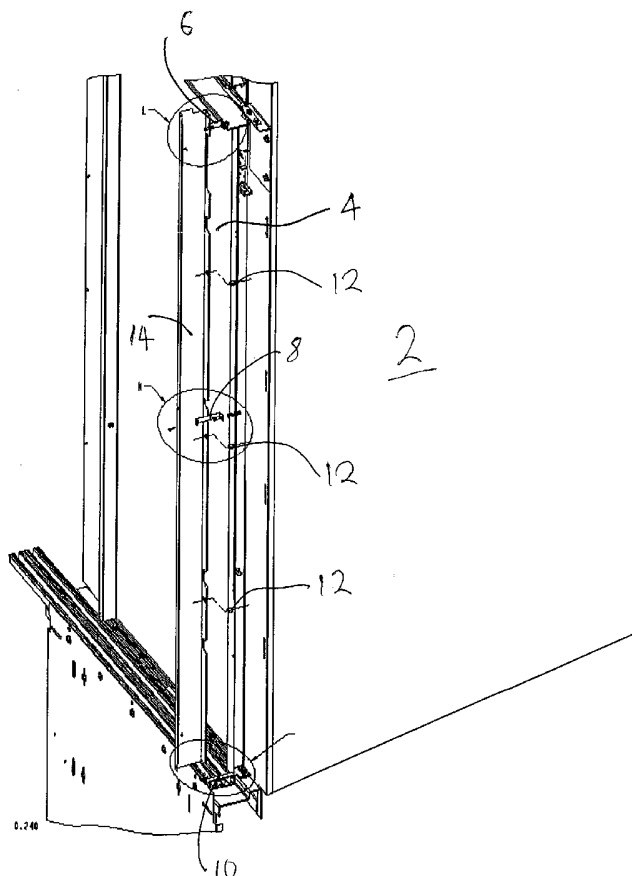
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv))

[Continued on next page]

(54) Title: IMPROVEMENTS IN MAINTENANCE OF ELEVATOR CARS



(57) Abstract: An elevator system comprises a hoistway having a plurality of landing openings and an elevator car (2) arranged to move vertically in said hoistway between said landing openings. The car (2) and the hoistway having co-operating means (36) for determining the vertical position of the car within the hoistway. The means (36) on the car are provided at the front thereof adjacent one of the landing openings when the car is aligned with the landing opening. The car (2) further comprises a detachable panel (14) for allowing access to said position determining means (36). Also disclosed is an elevator car (2) comprising a panel (14) arranged so as in use to be adjacent to a landing opening, the panel (14) being detachable to allow access for maintenance to components mounted at the front of the elevator car (2).



Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Improvements in Maintenance of Elevator Cars

5 This invention relates to arrangements for improving the ease with which certain elements of an elevator car, particularly but not exclusively the position reference system, may be maintained, repaired, installed or replaced.

10 In known elevator systems the components of the position reference system are typically arranged at the top of the elevator car with the corresponding hoistway components being provided on the elevator guide rails. However, this arrangement requires an engineer to access
15 the top of the elevator car in order to maintain or replace the components of the position reference system. It is desirable from a safety point of view though to limit the necessity for an engineer to access the top of the car.

20 When viewed from a first aspect the present invention provides an elevator system comprising a hoistway having a plurality of landing openings and an elevator car arranged to move vertically in said hoistway between said landing openings, the car and the
25 hoistway having co-operating means for determining the vertical position of the car within the hoistway wherein the means on the car are provided at the front thereof adjacent a said landing opening when the car is aligned with said landing opening, the car further comprising a
30 detachable panel for allowing access to said position determining means.

 Thus it will be seen by those skilled in the art that in accordance with the present invention rather than providing the position reference system components
35 on the top of the car thereby requiring access to the top of the car for maintenance, the position reference system is provided at the front of the car with a

detachable panel providing access to the Position Reference System (PRS) components from inside the car. This is beneficial in improving the safety and ease with which the PRS components may be maintained, installed or replaced etc. It also means that maintenance can be carried out at any convenient landing without the car having to move to another landing.

The detachable panel could be in the form of a flap or door which remains partially attached when opened to allow access, but in presently preferred embodiments, the panel is completely removable.

The panel may be a simple cover preventing access to the components by occupants of the elevator car in normal use. Alternatively, it is envisaged that the panel could itself carry one or more such components. This could further enhance ease of maintenance, particularly where the panel is completely removable since it may then be removed for maintenance outside the car or simply completely replaced with a replacement panel bearing replacement components.

Although the detachable panel of the invention is of particular benefit in allowing access to PRS components, the inventors have further appreciated that other components of the elevator car may be equally easily maintained, installed or replaced. Typically these will be components that are normally found at the front of the car such as a control panel, direction indicator, floor indicator etc.

Thus when viewed from a second aspect the invention provides an elevator car comprising a panel arranged so as in use to be adjacent to a landing opening, the panel being detachable to allow access for maintenance to components mounted at the front of the elevator car.

As previously set out, the panel could be a flap or door but is preferably completely removable. Furthermore, it may be a simple cover or may carry the aforesaid components.

Preferably the detachable panel extends substantially perpendicularly to the plane of the landing opening. Preferably the panel is attached by means of one or more forward facing fixings said
5 fixing(s) being accessible when the car is at a landing and a landing and/or car door is open.

A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

10 Fig. 1 is a perspective view of part of an elevator car in accordance with the invention;

Fig. 2 is an enlarged detailed view of the top front corner of the car;

15 Fig. 3 is an enlarged view of the vertical mid-section of the front corner of the car;

Fig. 4 is an enlarged view of the bottom front corner of the car;

20 Fig. 5 is a partial view of the front of the car with the removable column removed as seen from a landing; and

Fig. 6 is an enlarged view of the upper part of Fig. 5.

Turning firstly to Fig. 1, there may be seen an elevator car 2, at the front side of which is a vertical
25 panel 4 extending a short way across the open front face of the car. The panel 4 is fixed to the floor, ceiling and side wall of the car 2. Extending forwardly from the panel 4 are three rectangular C-shaped brackets 6, 8, 10 at the top, middle and bottom of the panel 4
30 respectively. These are shown more clearly in Figs. 2, 3 and 4 respectively. Also disposed on the panel 4 are three mushroom bolts 12 which, as may be seen in Fig. 3, each have an enlarged head spaced in front of the surface of the panel 4 so as to leave a waisted portion
35 immediately adjacent the surface of the panel.

An elongate detachable panel 14 may be seen in Figs. 1-4 and is shown separated for the sake of

clarity. It will be seen that the detachable panel 14 has a wide, rectangular U-shaped cross-sectional profile with a laterally facing main surface 16 and front and rear flanges 18, 20 respectively. The detachable panel 14 is attached to the fixed panel 4 at six separate points.

Firstly, each of the three mushroom-head bolts 12 is received in a corresponding keyhole aperture 22 in the rear flange 20. As will be clear from Fig. 3, the wide portion of the keyhole slot 20 accommodates the head of the bolt 12 whilst the narrow portion may be slid around the waisted portion of the bolt head to attach the panel 14 securely. To prevent unauthorised removal of the detachable panel 14 it is also bolted to the top, middle and lower (6, 8, 10) by anti-tamper bolts 24 secured to the corresponding brackets 6, 8 10. The anti-tamper bolts 24 at the top and bottom of the panel 14 are received in specially shaped slots 26, 28 respectively, whereas the bolt 24 into the mid-height bracket 8 passes through an aperture 30 in the front flange 18. The anti-tamper bolts 24 are specially designed so that they may only be removed with a special corresponding tool.

It will be appreciated therefore by considering Figs. 1-4 that the detachable panel 14 will remain securely in place during normal use and in the event of any attempt to tamper with it, but when required by an authorised service technician it may be easily removed by removing the three anti-tamper bolts 24 and sliding the panel 14 radially inwardly to move the heads of the enlarged-head bolts 12 to the wide portions of the keyhole slots and so remove the panel 14. the heads of the anti-tamper bolts 24 are located in use in a small vertical recess between the panel 14 and the inner face of the open car doors. This allows the panel to be removed easily at any landing by a mechanic with the correct tool.

Figs. 5 and 6 show the car at a landing and viewed from the opposite direction with the removable panel 14 removed. It will be seen from these Figures that with this panel removed, a service technician has ready
5 access to the position reference system (PRS) module 32. The PRS module 32 comprises a magnetic sensor 33 which detects the presence of a magnet in the region of its tip, such magnets being provided on the inner wall of the hoistway facing away from the landings to enable the
10 car to determine when it is at a landing and potentially also which landing it is at.

By in turn removing the PRS module 32, access may
15 be gained to the car direction indicator 34 which is visible to the occupants of the car and adjacent the removable panel 14 in use.

It will also be observed that a limit switch module 36 is also easily accessible in the space behind the detachable panel. The limit switch module 36 comprises
20 a sprung roller sensor 38 which is deflected by corresponding cam surfaces (not shown) provided at the top and bottom of the hoistway to provide a safety backup to the PRS

25 Thus it will be seen that by removing the panel 14 installation, maintenance or replacement of the PRS module 32, car direction indicator 34 or limit switch 36 may be carried out conveniently from a landing without having to access the top of the elevator car which
30 involves a time-consuming procedure in order to carry it out safely.

The embodiment described above is purely exemplary and there are many other ways in which the invention could be implemented. For example the detachable panel
35 need not be completely removable. Furthermore the panel itself could mount one or more components to facilitate maintenance thereof.

Claims:

1. An elevator system comprising a hoistway having a plurality of landing openings and an elevator car (2) arranged to move vertically in said hoistway between said landing openings, the car and the hoistway having co-operating means (36) for determining the vertical position of the car within the hoistway wherein the means (36) on the car are provided at the front thereof adjacent a said landing opening when the car is aligned with said landing opening, the car further comprising a detachable panel (14) for allowing access to said position determining means (36).
2. An elevator system as claimed in claim 1 wherein said panel (14) is completely removable.
3. An elevator system as claimed in claim 1 or 2 wherein said panel (14) comprises a simple cover.
3. An elevator system as claimed in claim 1 or 2 wherein the panel (14) carries one or more components for operating said elevator system.
4. An elevator car (2) comprising a panel (14) arranged so as in use to be adjacent to a landing opening, the panel (14) being detachable to allow access for maintenance to components mounted at the front of the elevator car (2).
5. An elevator car (2) as claimed in claim 4 wherein said panel (14) is completely removable.
6. An elevator car (2) as claimed in claim 4 or 5 wherein said panel (14) comprises a simple cover.

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7. An elevator car (2) as claimed in claim 4 or 5 wherein the panel (14) carries one or more components for operating said elevator system.
- 5 8. An elevator system or car (2) as claimed in any preceding claim wherein the detachable panel (14) extends substantially perpendicularly to the plane of the landing openings.
- 10 9. An elevator system or car (2) as claimed in any preceding claim wherein the detachable panel (14) is attached to the car by means of one or more forward facing fixings (24), said fixing(s) being accessible when the car (2) is at a landing and a landing and/or
- 15 car door is open.

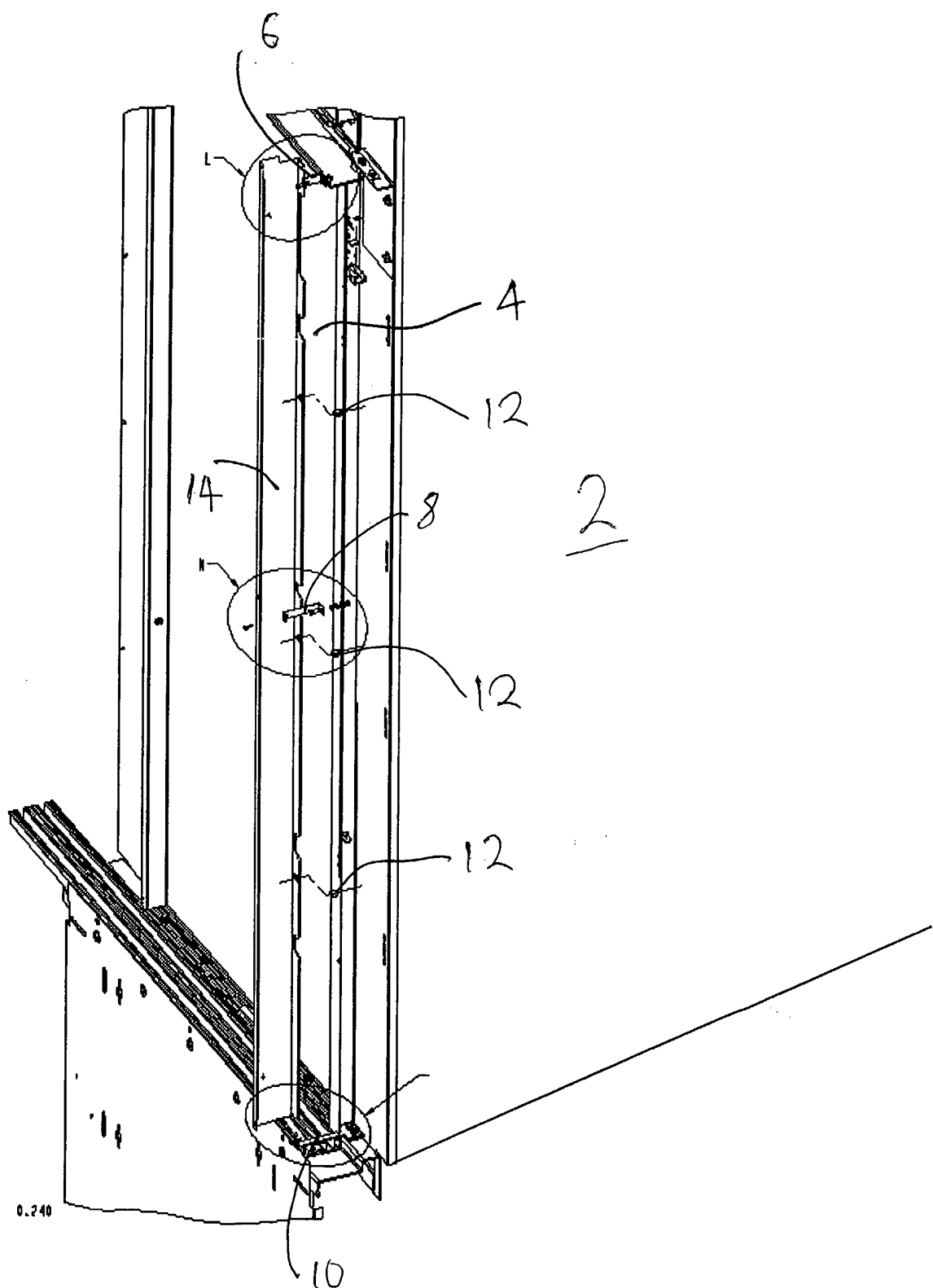


Fig 1

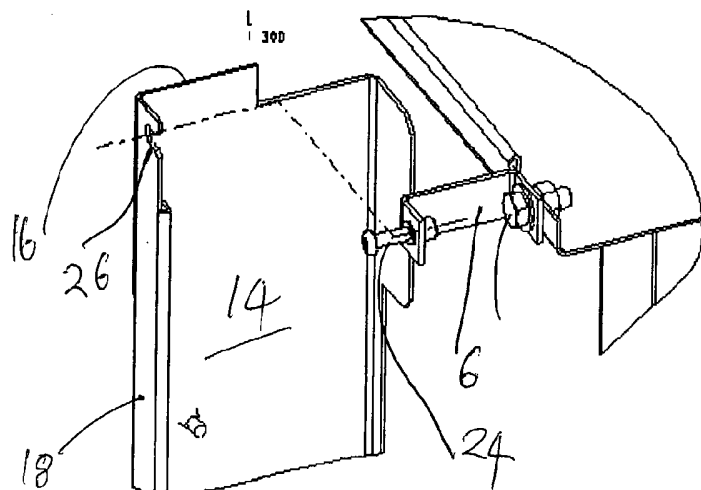


Fig 2

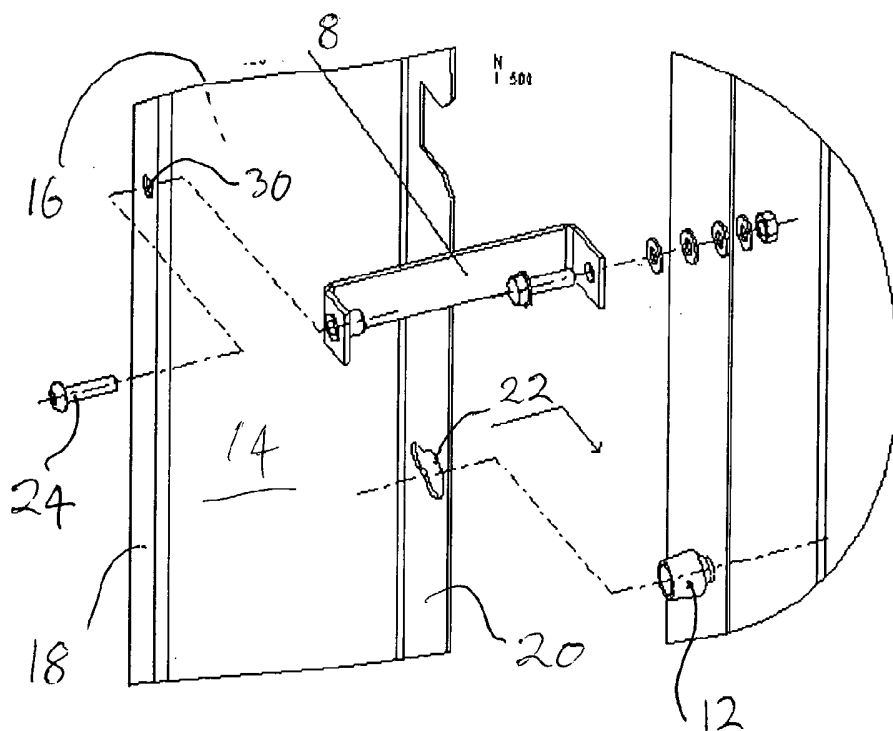


Fig 3

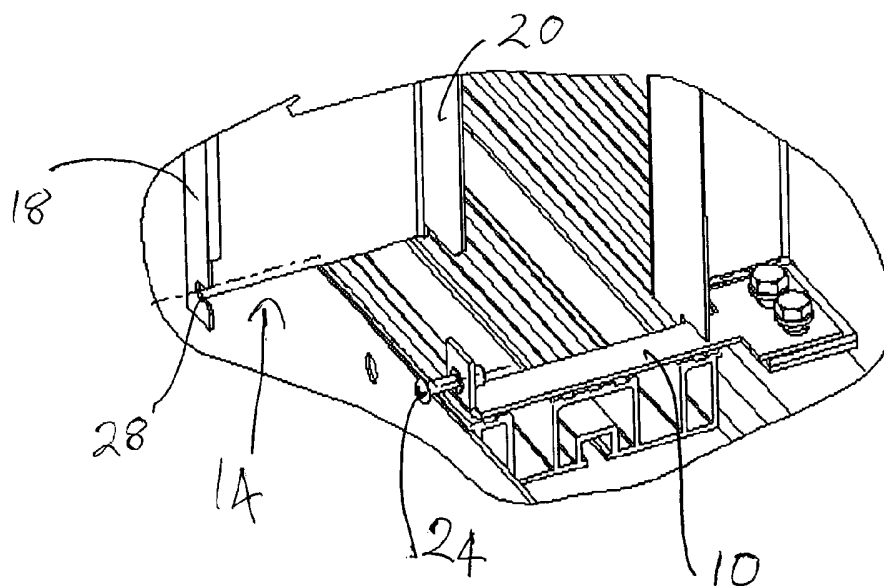


Fig 4

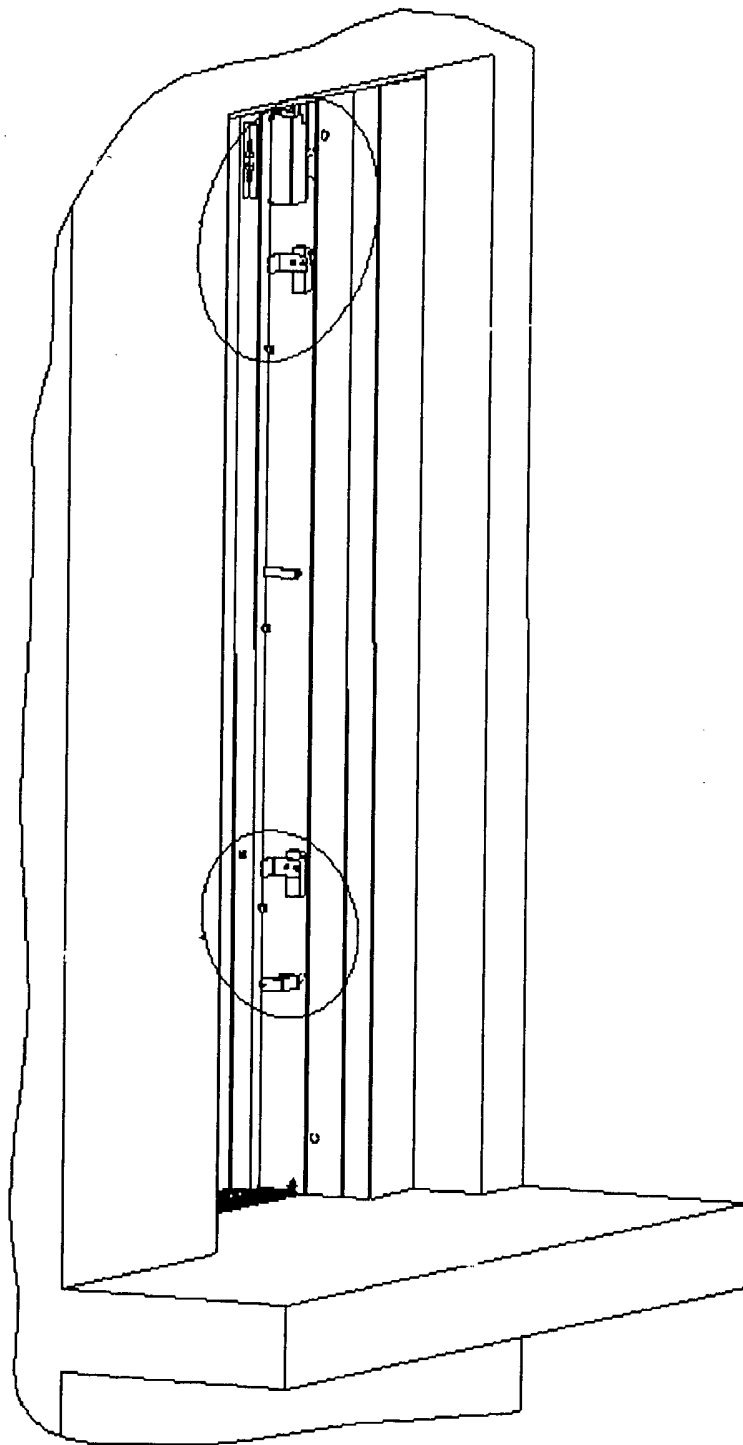


Fig 5

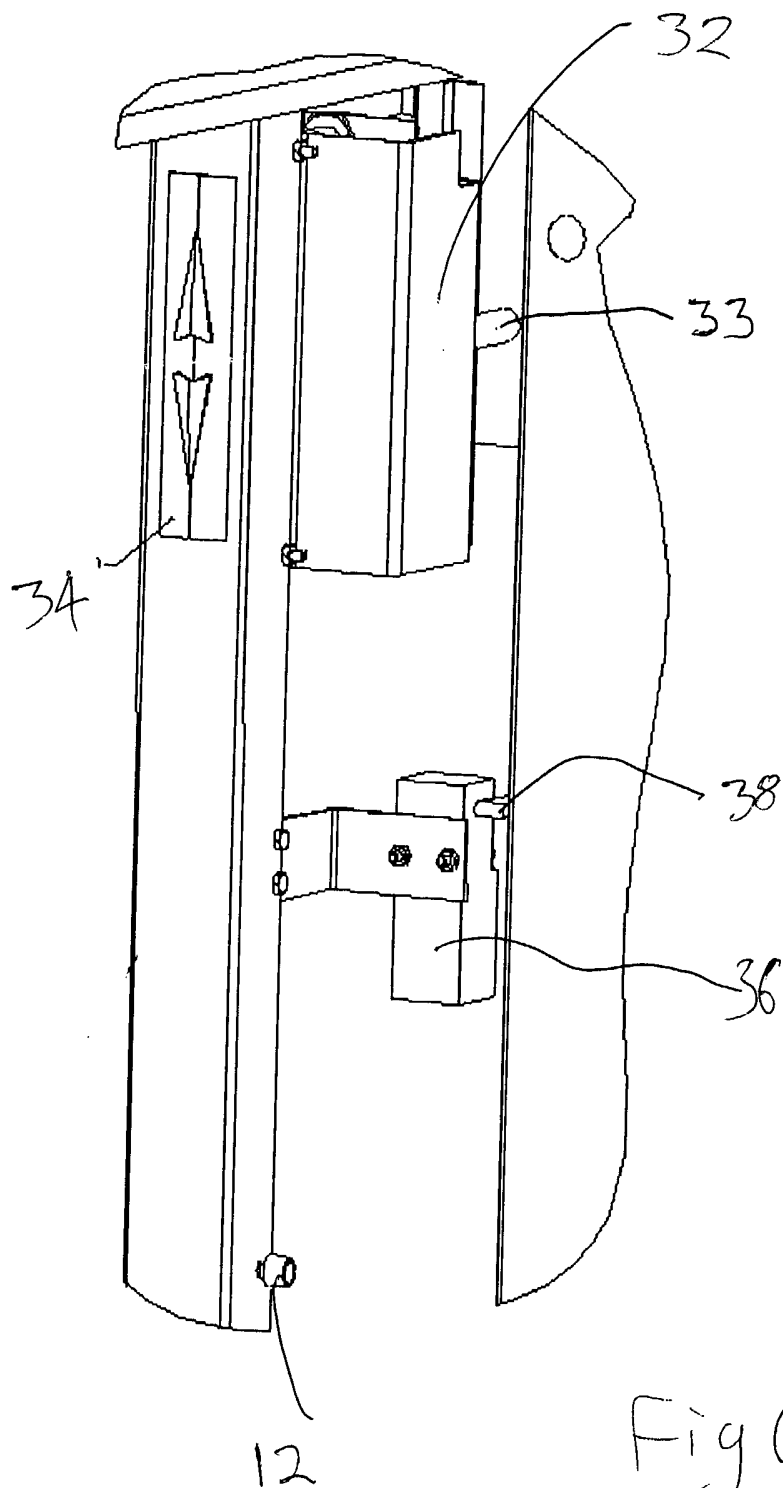


Fig 6

INTERNATIONAL SEARCH REPORT

Intel al Application No
PCT/IB2004/004192

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B66B11/02 B66B1/50

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)
IPC 7 B66B

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

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

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 12, 5 December 2003 (2003-12-05) -& JP 2004 149261 A (HITACHI BUILDING SYSTEMS CO LTD), 27 May 2004 (2004-05-27) abstract	1-7
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A	-----	8,9
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

25 August 2005

Date of mailing of the international search report

08/09/2005

Name and mailing address of the ISA
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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 12, 3 January 2001 (2001-01-03) -& JP 2000 247563 A (HITACHI LTD), 12 September 2000 (2000-09-12) abstract -----	1-9
A	WO 01/79104 A (OTIS ELEVATOR COMPANY) 25 October 2001 (2001-10-25) abstract -----	1-9

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Information on patent family members

International Application No
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