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(54) **Procedure for the installation of the landing doors of an elevator**

Verfahren für die Installierung von die Schachttüren eines Aufzugs

Procédure pour l'installation des portes paliers d'un ascenseur

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• Manual "Méthode Montage DESIGN SC", Roux
Combaluzier Schindler, 30.03.1990.

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Description

[0001] The present invention relates to a procedure for the installation of the landing doors of an elevator, as defined in the introductory part of claim 1.

[0002] In some building projects, parts of the building can be taken into use before all the floors and e.g. the elevator system have been completed. On the floors in use, the elevator landings must be finished or at least the elevator shaft must be closed. In normal practice, the elevator landings can only be finished after completion of the elevator installation, which means that often the finished floors cannot be taken into use before the elevator installation has been completed. Shutting off the elevator spaces by temporary arrangements results in additional work and therefore additional costs.

[0003] In previously known techniques (patent application FI 873385, of 4.8.1987), the elevator doors are installed at an early stage of the building project. According to the application referred to, the doors are mounted from the landing with the aid of plumb lines placed in the elevator shaft. The plumb lines are suspended on a console, from which they hang at appropriate distances from each other. Since the plumb lines in this procedure run across the door opening, the doors must be installed from the landing and have to be transported to the landings. The positioning of the doors and the associated adjustments are difficult to carry out because weighty modules have to be moved about.

[0004] US-A-3,601,938 discloses a device for aligning door structures in an elevator after the elevator cabin has been installed in the elevator shaft. Connected to the elevator cabin an auxiliary device is used which comprises a pivotable lever. The elevator cabin is stopped at each floor and the lever is turned to the top of the floor, the lever comprising several holes which designate bore holes to be made in the floor for the installation of door modules. By this device the bore holes for door modules can be aligned after the cabin has been installed. However, on one hand this device requires that the elevator cabin is installed before-hand. On the other hand, this device leads not in any cases to satisfactory results, namely if the production tolerance of the mounting elements is very large or if mounting elements from different producers are used. Further inaccuracies may result from tensions in the floor and wall structures of the building which may be caused by a different water content of wall and floor structures of the building and not finished chemical reactions in the concrete of these parts.

[0005] From the Instruction Manual "Design SC" of the Company Roux Combaluzier Schindler it is known to install landing doors of an elevator on mounting elements which have been previously mounted at the landings.

[0006] The object of the present invention is to achieve a simple and advantageous door installation procedure which allows the drawbacks of previous tech-

niques to be avoided and permits quick, accurate and reliable installation of the doors.

[0007] The features characteristic of the invention are as presented in claim 1.

[0008] Instead of complete door modules, only the mounting elements of the door modules are installed at the first stage. The door modules, manufactured to precise dimensions, are attached to these mounting elements as part of the normal installation routine. This makes it possible to avoid moving the heavy and unwieldy door modules. During the alignment stage, the door modules are out of the way, and when the doors are to be installed, the plumb lines and equivalent can be removed from the door line. The modules can also be easily transported via the shaft to the landings.

[0009] The door installation work can be carried out quickly and will thus not cause prolonged disturbances in the rest of the building project. As the door modules are so designed that they come end to end against each other when mounted in place, they form a continuous door line which is safe in respect of fire resistance.

[0010] In the following, the invention is described in detail by referring to the drawings attached, in which

Fig. 1 presents a door module which can be used in the procedure of the invention.

Fig. 2 presents an elevator shaft in which the door modules are to be mounted,

Fig. 3 shows how the plumb-line fixing base is placed in the elevator shaft as seen from above,

Fig. 4 presents a mounting element usable in the procedure of the invention,

Fig. 5 illustrates the installation of the door modules, and

Fig. 6 shows another way of installing the door module.

[0011] Fig. 1 presents a door module 1 which can be used in the installation procedure of the invention. The module preferably comprises the whole front wall of the elevator shaft between two floors, consisting of a frame, wall parts, doors, control panels. The module is manufactured to precise dimensions and is completely finished before it is brought to the shaft. It is protected with a suitable covering during transportation and building. The door module may also consist of the door framework only, allowing the door itself to be mounted later.

[0012] The door module 1 is provided with holders 2 which extend in the vertical direction outside the module and are designed to be fitted into corresponding holes 14 in the adjacent door module or supporting element. According to the invention, the module is provided with lugs 3 designed to be connected to mounting elements

attached to the landing structures. A door module comprises at least two lugs and corresponding mounting elements at the same horizontal level. A module may also be provided with lugs at several horizontal levels.

[0013] As shown in Fig. 2, a fixing base 4 for the plumb-lines 6 is mounted in the top part of the elevator shaft 10 or in a space above it, e.g. the machine room, while another fixing base 5 is mounted at the bottom of the shaft. The fixing bases can be placed at any level in the elevator shaft as required by the alignment operations to be performed. Fig. 3 shows how the fixing base is placed in the shaft as seen from above. Instead of plumb-lines, it is also possible to use e.g. optical means of alignment. Laser sounders are commercially available.

[0014] The positions of the mounting elements 8 on the landings 7 are determined by means of plumb lines and in accordance with the dimensions of the module. To align the mounting elements, a gauge of a suitable form is used to determine the distance between the element and the plumb line. Once the mounting element has been positioned at exactly the right place, it is permanently and reliably secured on the landing structures. A suitable landing structure is a load-bearing structure on top of which the actual floor is to be built. The mounting element can be secured on the cover of the structure or other suitable places.

[0015] Fig. 4 presents a more detailed view of a mounting element designed for use in the present invention. The element consists of a frame part 21 which is secured on the landing structures or walls of the building. The frame part is provided with a slot 23 permitting the part to be moved mainly in a direction perpendicular to the door as indicated by arrows A-A. The frame part can be secured by means of bolts or equivalent going through the slot. The frame part is connected to an intermediate part 22 which is movable relative to the frame part and whose position can be adjusted mainly in the horizontal plane by moving it in a direction B-B perpendicular to the direction of adjustment of the frame part. Connected to the intermediate part is a bearing element 24 which is used for vertical adjustment of the position of the door module attached to the mounting element as indicated by arrows C-C. The mounting element is provided with the necessary tightening means with which the bearing element to be connected to the door module can be secured in the appropriate position. In principle, the mounting element may consist of any corresponding element permitting of the required adjustments.

[0016] Fig. 5 illustrates the manner in which the door modules are installed. At this stage of the procedure, the mounting elements 8 have already been installed on the landings. The plumb-line fixing base may also be ready in place for the subsequent stages of the elevator installation procedure. It can be used e.g. for the positioning of the guide rails. The plumb-lines have been moved aside or removed for the time required by the

installation of the door modules. Mounted in the lower part of the shaft, below the lowest landing, is a supporting element 12, which is attached in the same way as the door modules to mounting elements or to the shaft wall. The supporting element 12 is provided with a holder 13 which fits into a corresponding hole 14 in the lower edge of the door module. The door module 1, manufactured to precise dimensions, is lifted onto the supporting element by means of a hoisting apparatus and attached to the mounting element so that it comes exactly to the right position. The door modules can be brought into the elevator shaft either via the lowest landing or by means of a crane directly into the shaft. The mounting elements permit later fine adjustment if necessary.

[0017] Fig. 6 illustrates an alternative way of installing the door module. In this case, the supporting element 15 is mounted in the upper part of the shaft and the door modules are fixed to the mounting elements starting from the top. This is the best alternative in cases where all the door modules are installed at the same time in the whole building. In this case, too, the door modules can be brought to place via different routes.

[0018] In the above, the invention has been described in detail. The presentation is not to be regarded as limiting the invention, but the sphere of protection of the invention is determined in the way defined by the claims. For example, the procedure of the invention can be used at a later stage of construction, although in that case it is not possible to make full use of all the advantages provided by it.

Claims

1. Procedure for the installation of the landing doors of an elevator, wherein aligning means are used, comprising at least one plumb line and/or optical means being fixed to the elevator shaft structure, and wherein the alignment is performed using an auxiliary device for determining a distance from the position indicated by the aligning means (6),

characterized in that

mounting elements (8) for door modules (1) are aligned by the use of the aligning means (4-6) and the auxiliary device, which mounting elements (8) are secured to landing structures (7) before the door modules (1) are fixed to the mounting elements (8), and that

- a) below the lowest floor a supporting element (12) for the door module is provided, that the module (1) of the lowest floor is attached with its lower part to said supporting element (12) and that the other modules (1) are attached with their lower part to an adjacent lower door module (1) and that all modules are fixed with their upper part to one of said mounting elements (8), or

b) in the upper part of the shaft a supporting element (15) for the door module is provided, and that the uppermost module (1) is attached with its upper part to said supporting element (15) and that the other modules (1) are attached with their upper part to an adjacent upper door module (1) and that all modules are fixed with their lower part to one of said mounting elements (8).

2. Procedure according to claim 1, **characterized** in that the final position of the door module (1) is fine-adjusted by means of the mounting elements (8) if necessary.

3. Procedure according to claim 1 or 2, **characterized** in that mutually corresponding mounting elements (8) placed at different levels are mutually aligned.

4. Procedure according to any one of claims 1 - 3, **characterized** in that the modules (1) are brought into the shaft (10) via the lowest landing and lifted into place by means of a hoisting apparatus (17).

5. Procedure according to any one of claims 1 - 3, **characterized** in that the modules (1) are brought into the shaft via the top opening, in which case they can be moved directly to their proper places with a hoisting apparatus (17).

6. Procedure according to one of the preceding claims, characterized in that the plumb-line (6) is attached to fixing bases (4, 5) in the lower part of the elevator shaft and above the level at which the door module is being installed.

7. Procedure according to one of the preceding claims, characterized in that the optical device is placed in the lower part of the shaft.

Patentansprüche

1. Verfahren zur Installation der Schachttüren eines Aufzugs, bei dem Vorrichtungen zum Ausrichten verwendet werden, die mindestens eine an der Aufzugsschachtkonstruktion befestigte Lotleine und/oder optische Vorrichtung umfassen, und bei dem das Ausrichten mittels einer Hilfsvorrichtung zur Bestimmung eines Abstands von der durch die Ausrichtungsvorrichtungen (6) angegebenen Position erfolgt, dadurch gekennzeichnet, daß Montageelemente (8) für Türmodule (1) durch Verwendung der Ausrichtungsvorrichtungen (4-6, 11) unter Benutzung

der Hilfsvorrichtung ausgerichtet werden, welche Montageelemente (8) an den Etagenstrukturen (7) befestigt werden, bevor die Türmodule (1) an den Montageelementen (8) befestigt werden, und daß

a) unterhalb der untersten Etage ein Halteelement (12) für das Türmodul vorgesehen ist, daß das Türmodul (1) der untersten Etage mit seinem unteren Teil an dem Halteelement (12) befestigt ist, und die anderen Türmodule (1) mit ihrem unteren Teil an einem benachbarten unteren Türmodul (1) und alle Türmodule mit ihrem oberen Teil an jeweils einem der Montageelemente (8) befestigt sind, oder

b) im oberen Teil des Schachtes ein Halteelement (15) für das Türmodul vorgesehen ist, daß das oberste Türmodul (1) mit seiner oberen Teil an dem Halteelement (15) befestigt ist, und die anderen Türmodule (1) mit ihrem oberen Teil an einem benachbarten oberen Türmodul (1) und alle Türmodule mit ihrem unteren Teil an jeweils einem der Montageelemente (8) befestigt sind.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Feineinstellung der endgültigen Position des Türmoduls (1), wenn nötig, mittels der Montageelemente (8) erfolgt.

3. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß einander entsprechende, in unterschiedlichen Höhen angeordnete Montageelemente (8) aufeinander ausgerichtet werden.

4. Verfahren nach einem der Ansprüche 1-3, dadurch gekennzeichnet, daß die Module (1) über den untersten Aufzugseingang in den Schacht (10) gebracht und mittels einer Hubvorrichtung (17) an Ort und Stelle gehievt werden.

5. Verfahren nach einem der Ansprüche 1-3, dadurch gekennzeichnet, daß die Module (1) über die obere Öffnung in den Schacht gebracht werden, in welchem Fall sie mittels einer Hubvorrichtung (17) direkt an ihren richtigen Platz bewegt werden können.

6. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Lotleine (6) an Befestigungssockeln (4, 5) im unteren Teil des Aufzugsschachts und über der Höhe, auf der das Türmodul installiert wird, befestigt ist.

7. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die optische Vorrichtung im unteren Teil des Schachtes angeordnet ist.

Revendications

1. Procédure pour l'installation des portes palières d'un ascenseur, dans laquelle on utilise des moyens d'alignement comprenant au moins un fil à plomb et/ou des moyens optiques fixés à la structure de la cage d'ascenseur, et dans laquelle l'alignement est effectué à l'aide d'un dispositif auxiliaire pour déterminer une distance par rapport à la position indiquée par les moyens d'alignement (6), caractérisée en ce que des éléments de montage (8) pour les modules de porte (1) sont alignés à l'aide des moyens d'alignement (4-6, 11) avec utilisation du dispositif auxiliaire, ces éléments de montage (8) étant fixés à des structures de palier (7) avant fixation des modules de porte (1) aux éléments de montage (8) et ce que
 - a) au-dessous du palier le plus bas un élément de support (12) pour le module de porte est situé, que le module de porte (1) de palier le plus bas est fixé par son partie inférieure à l'élément de support (12), et que les autres modules de porte (1) sont fixés par leur partie inférieure à un module de porte adjacent inférieure (1), et que tout les modules de porte sont fixés par leur partie supérieure à un des éléments de montage (8) respectivement, ou
 - b) dans la partie supérieure de la cage d'ascenseur un élément de support (15) pour le module de porte est situé, et que le module de porte (1) de palier plus supérieure est fixé par son partie supérieure à l'élément de support (15), et que les autres modules de porte (1) sont fixés par leur partie supérieure à un module de porte adjacent supérieure (1), et que tout les modules de porte sont fixés par leur partie inférieure à un des éléments de montage (8) respectivement.
2. Procédure suivant la revendication 1, caractérisée en ce qu'un réglage fin de la position finale du module de porte (1) est effectué au moyen des éléments de montage (8), si nécessaire.
3. Procédure suivant la revendication 1 ou 2, caractérisée en ce que les éléments de montage mutuellement correspondants (8) placés à différents niveaux sont mutuellement alignés.
4. Procédure suivant une quelconque des revendications 1 à 3, caractérisée en ce que les modules (1) sont introduits dans la cage (10) via le palier inférieur et levés en place au moyen d'un appareil de levage (17).
5. Procédure suivant une quelconque des revendications 1 à 3, caractérisée en ce que les modules (1) sont introduits dans la cage via l'ouverture supérieure et, dans ce cas, ils peuvent être amenés directement & leurs positions correctes au moyen d'un appareil de levage (17).
6. Procédure suivant une quelconque des revendications précédentes, caractérisée en ce que le fil à plomb (6) est attaché à des éléments d'attache (4, 5) prévus dans la partie inférieure de la cage d'ascenseur et au-dessus du niveau auquel le module de porte doit être installé, respectivement.
7. Procédure suivant une quelconque des revendications précédentes, caractérisée en ce que le dispositif optique est placé dans la partie inférieure de la cage.

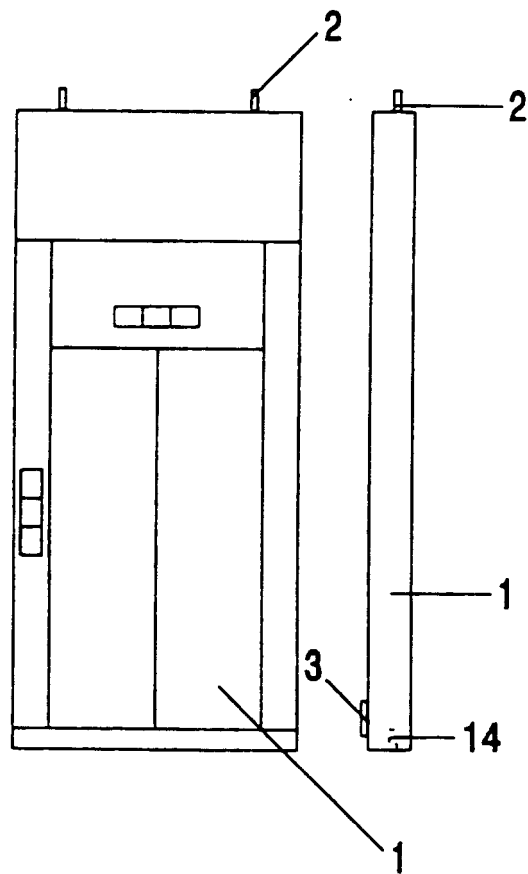


fig. 1

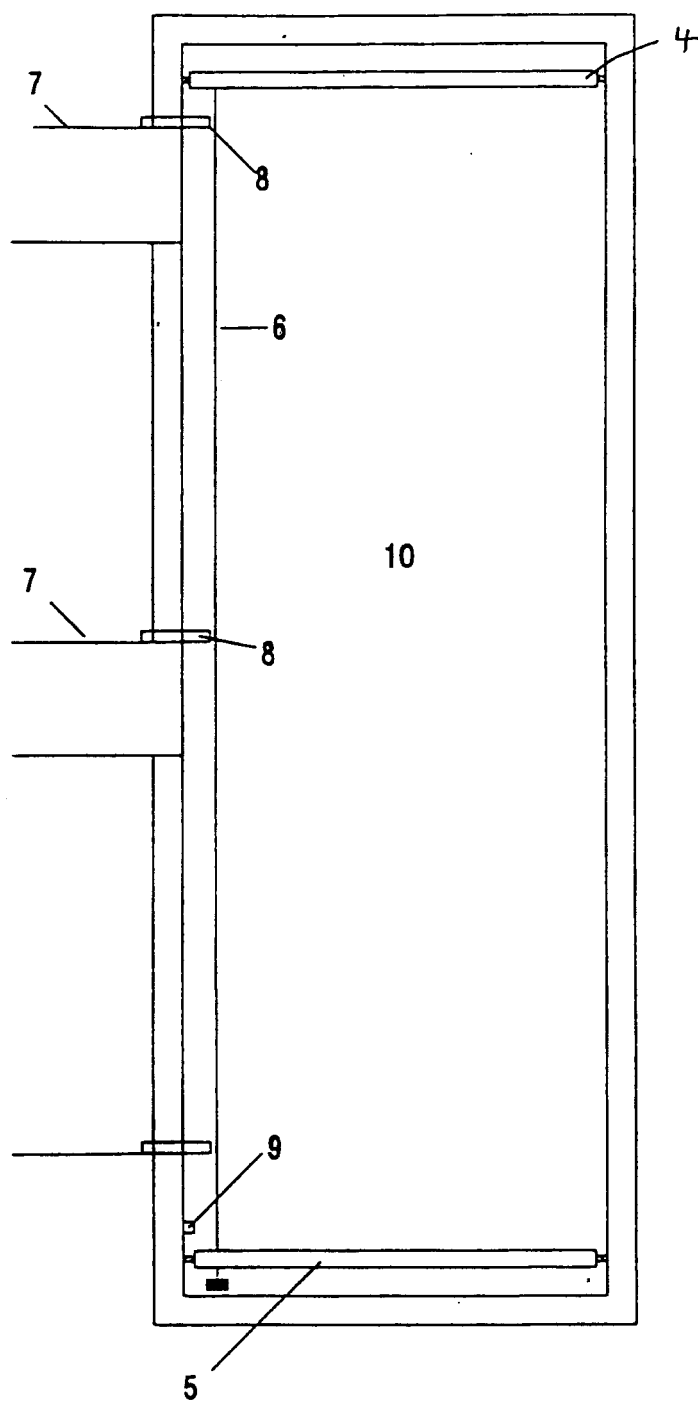


fig. 2

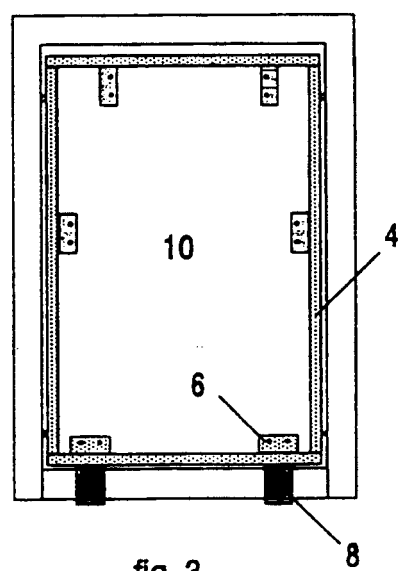


fig. 3

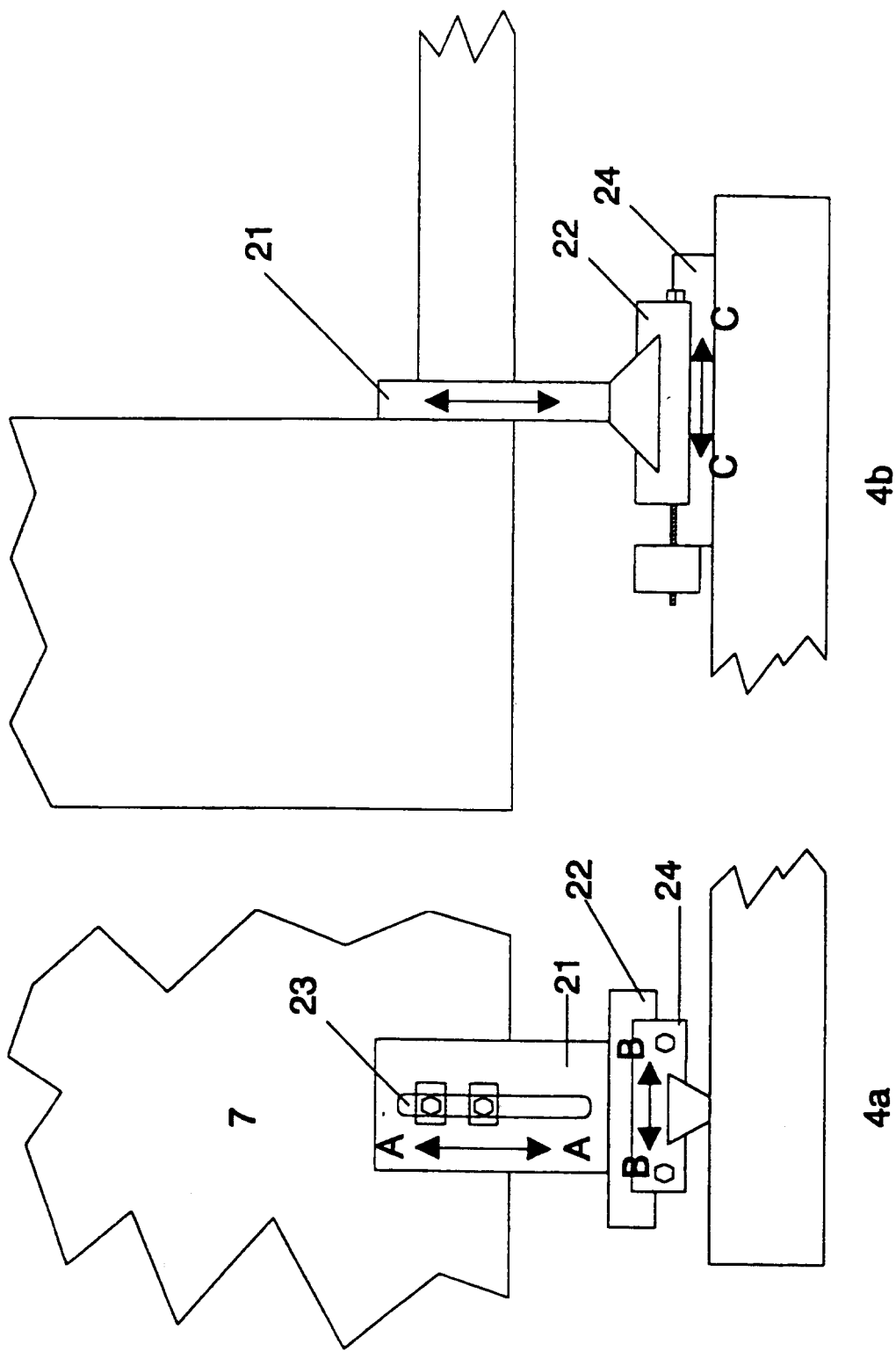


fig. 4

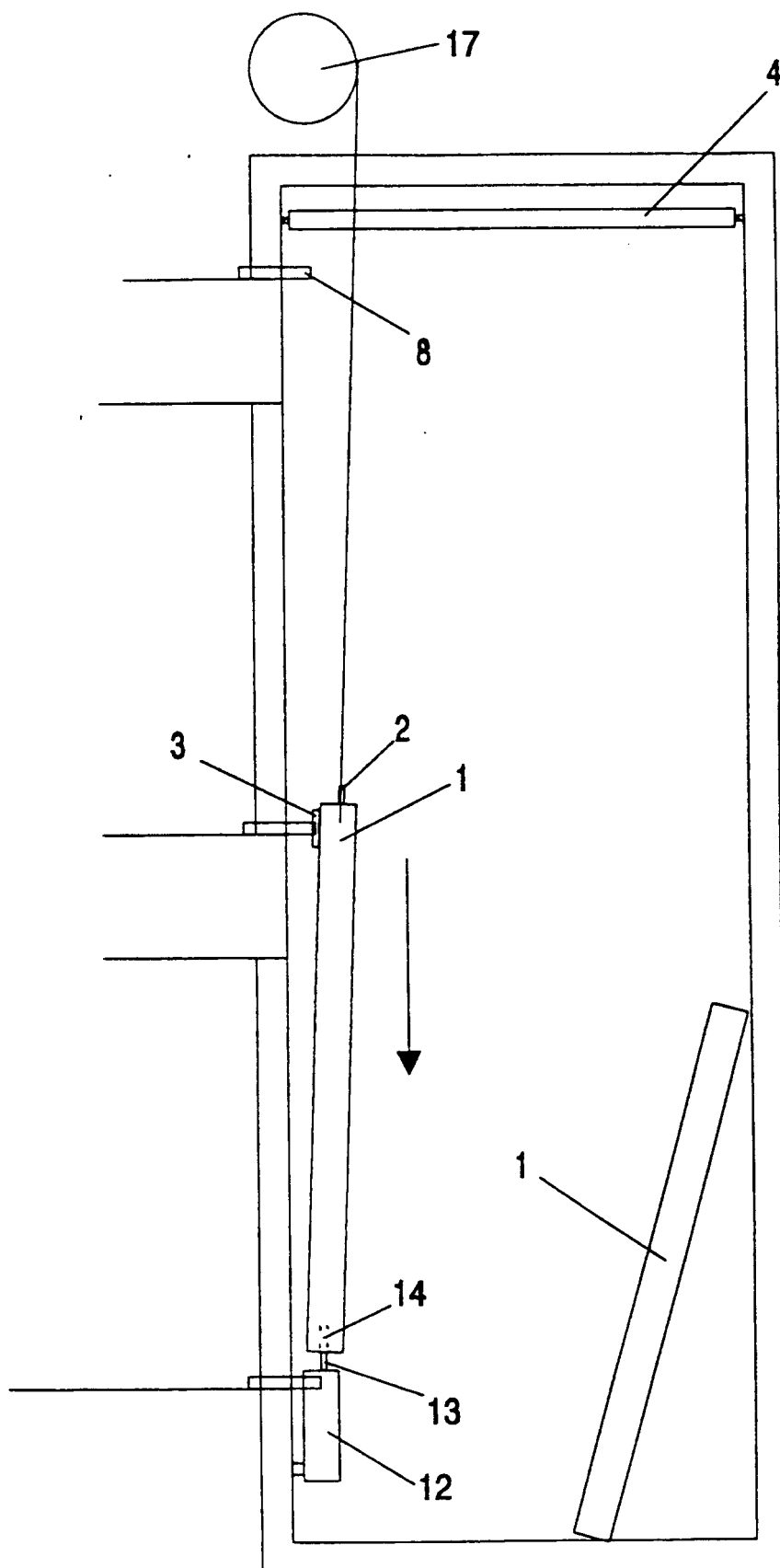


fig. 5

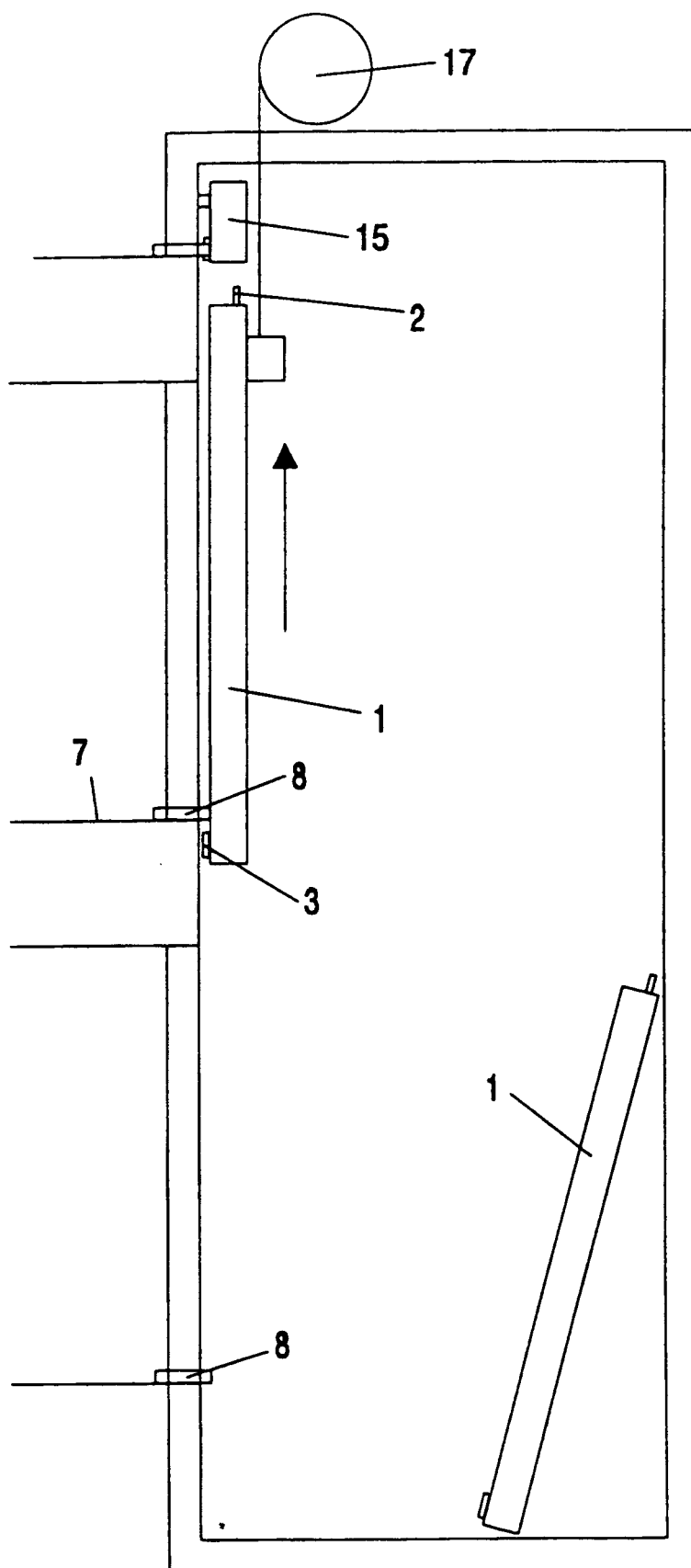


fig. 6