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W-8000 München 19(DE)(54) **Procedure for the installation of the landing doors of an elevator.**

(57) The invention relates to a procedure for the installation of the landing doors of an elevator, in which procedure aligning means (4-6,11) are used. According to the invention, the mounting elements (8) of the door modules are positioned in the landing structures by means of the aligning means. Next, the door modules (1), finished and manufactured to precise dimensions, are brought to place, and the door modules (1) are fixed to the mounting elements (8).

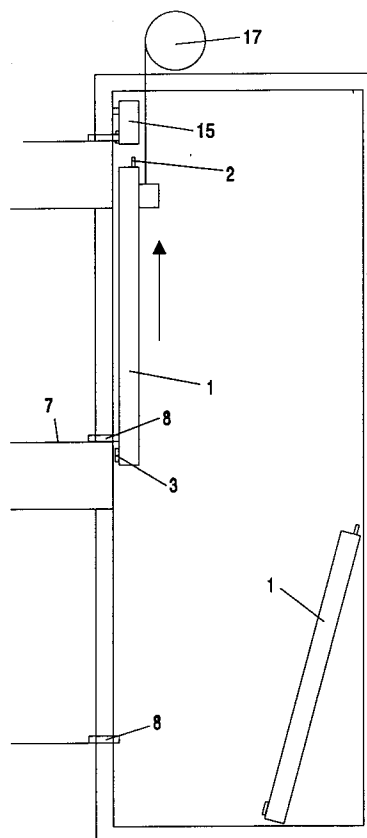


fig. 6

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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.

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.

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.

The object of the present invention is to achieve a simple and advantageous door installation procedure which allows the drawbacks of previous techniques to be avoided and permits quick, accurate and reliable installation of the doors.

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

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.

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.

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.

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.

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.

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.

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 can be used to determine the distance between the element and the plumb line, if necessary. 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.

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.

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.

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.

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, in which procedure aligning means (4-6,11) are used, **characterized** in that the mounting elements (8) of the door modules are aligned by means of the aligning means (4-6,11), the mounting elements (8) of the door modules are secured on the landing structures (7), the door modules (1) are brought to place, and the door modules (1) are fixed to the 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 alignment is performed using an auxiliary device to determine the distance between the mounting elements (8) and the position indicated by the aligning means (6).
5. Procedure according to any one of claims 1 - 4, **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).
6. Procedure according to any one of claims 1 - 4, **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).
7. Procedure according to any one of the preceding claims, **characterized** in that the door modules (1) are attached by their upper part to mounting elements (8) and by their lower part

to a door module or supporting element (12) below it.

8. Procedure according to any one of claims 1 - 6, **characterized** in that the door modules (1) are attached by their lower part to mounting elements (8) and by their upper part to a module or supporting element (15) above it. 5
9. Procedure according to any one of claims 1 - 8, **characterized** in that the aligning means consists of a plumb-line (6) 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. 10 15
10. Procedure according to any one of claims 1 - 9, **characterized** in that the aligning means is an optical device and that it is placed in the lower part of the shaft. 20

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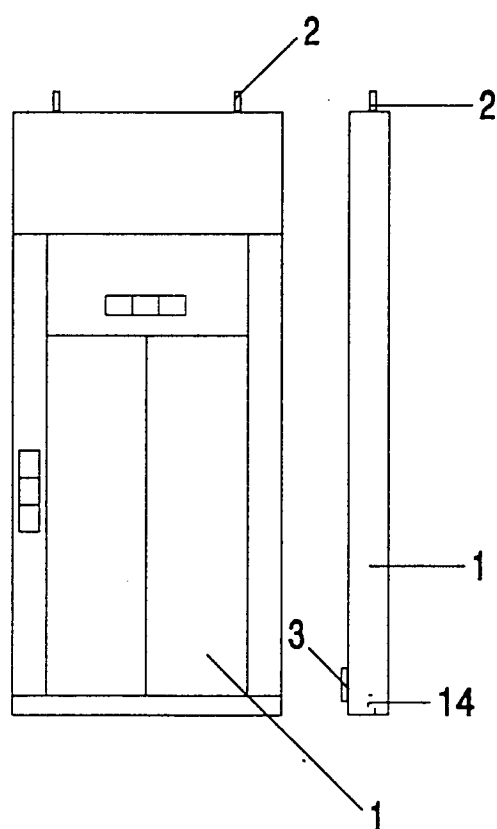


fig. 1

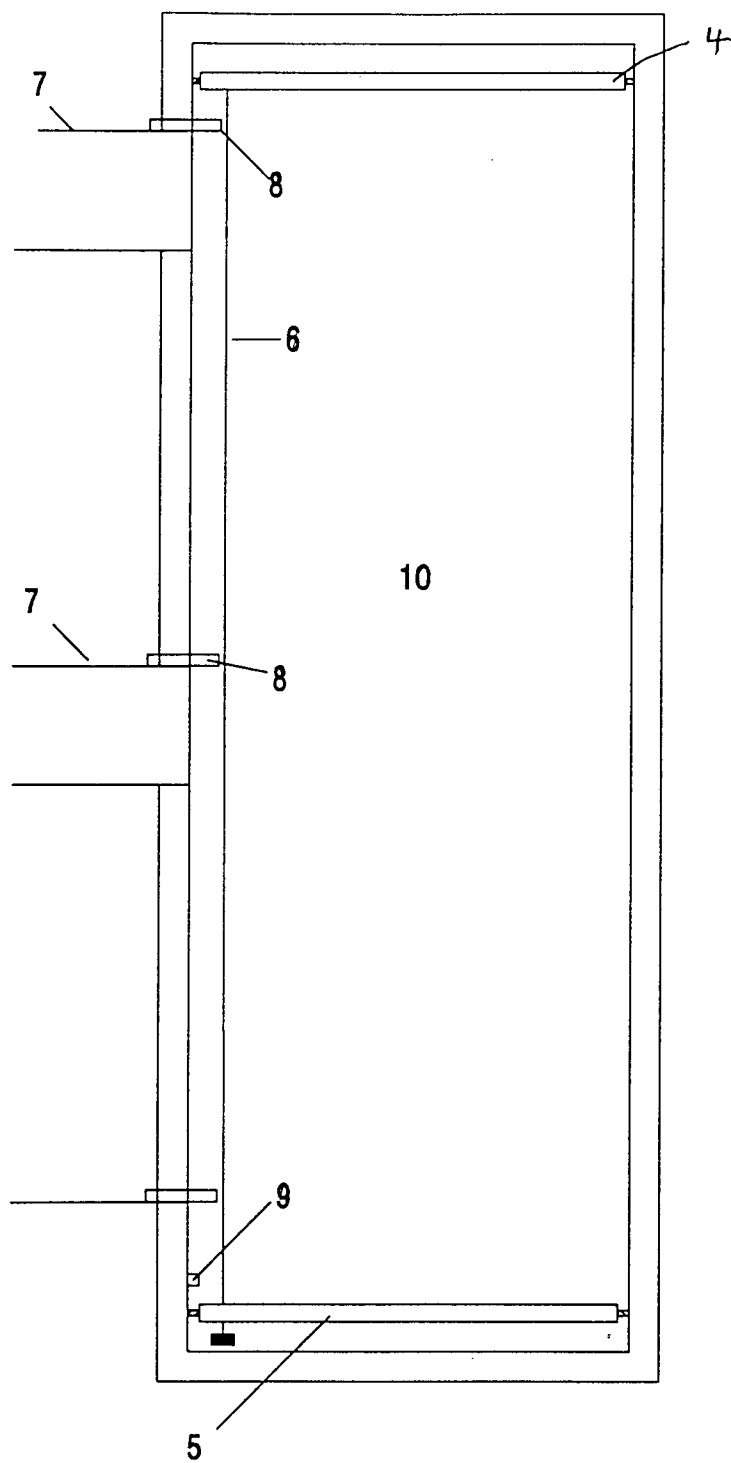


fig. 2

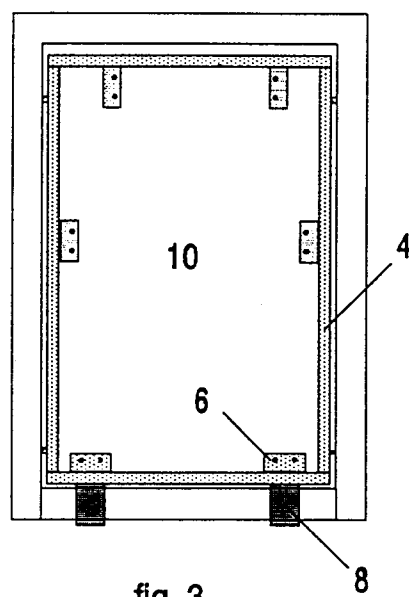


fig. 3

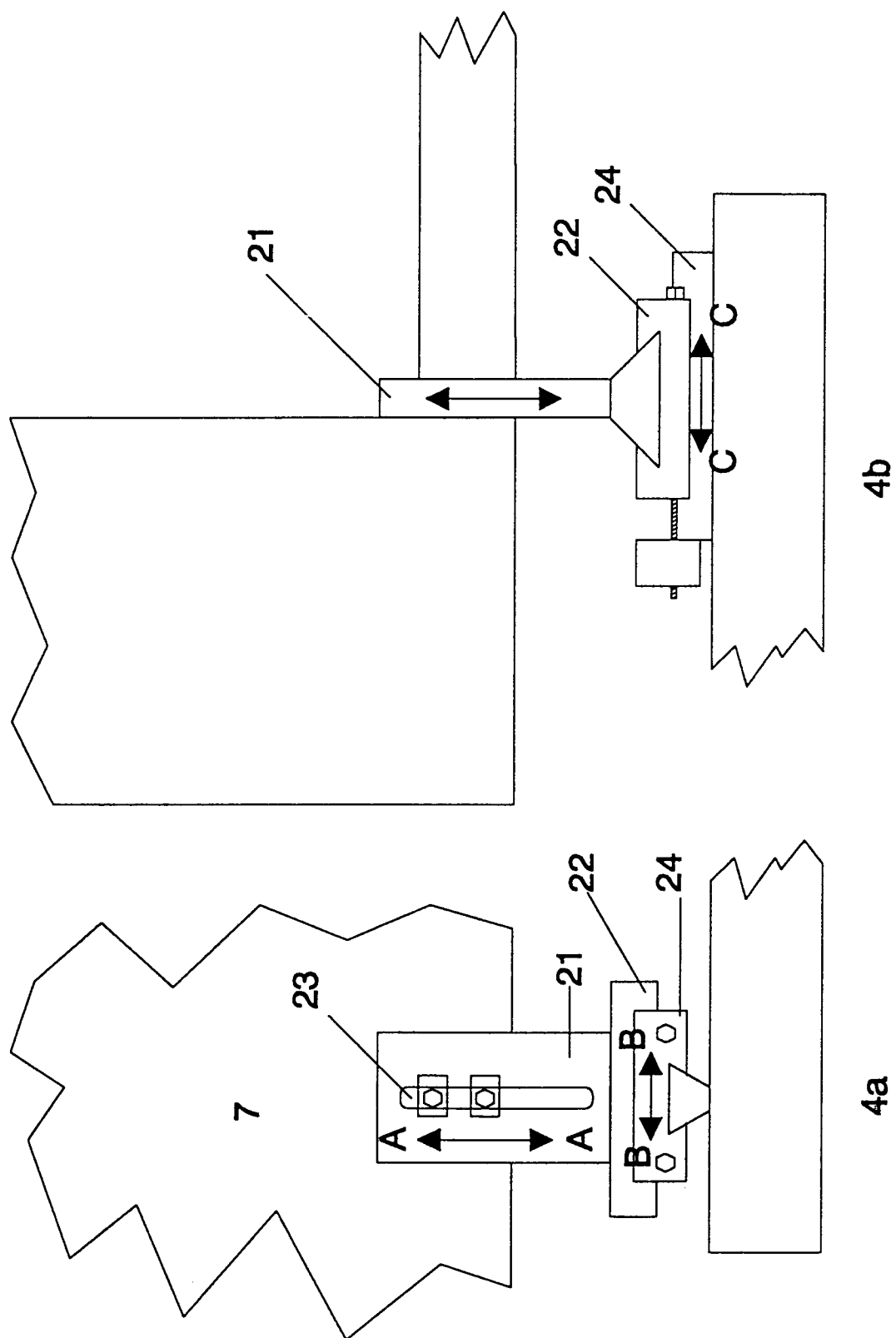


fig. 4

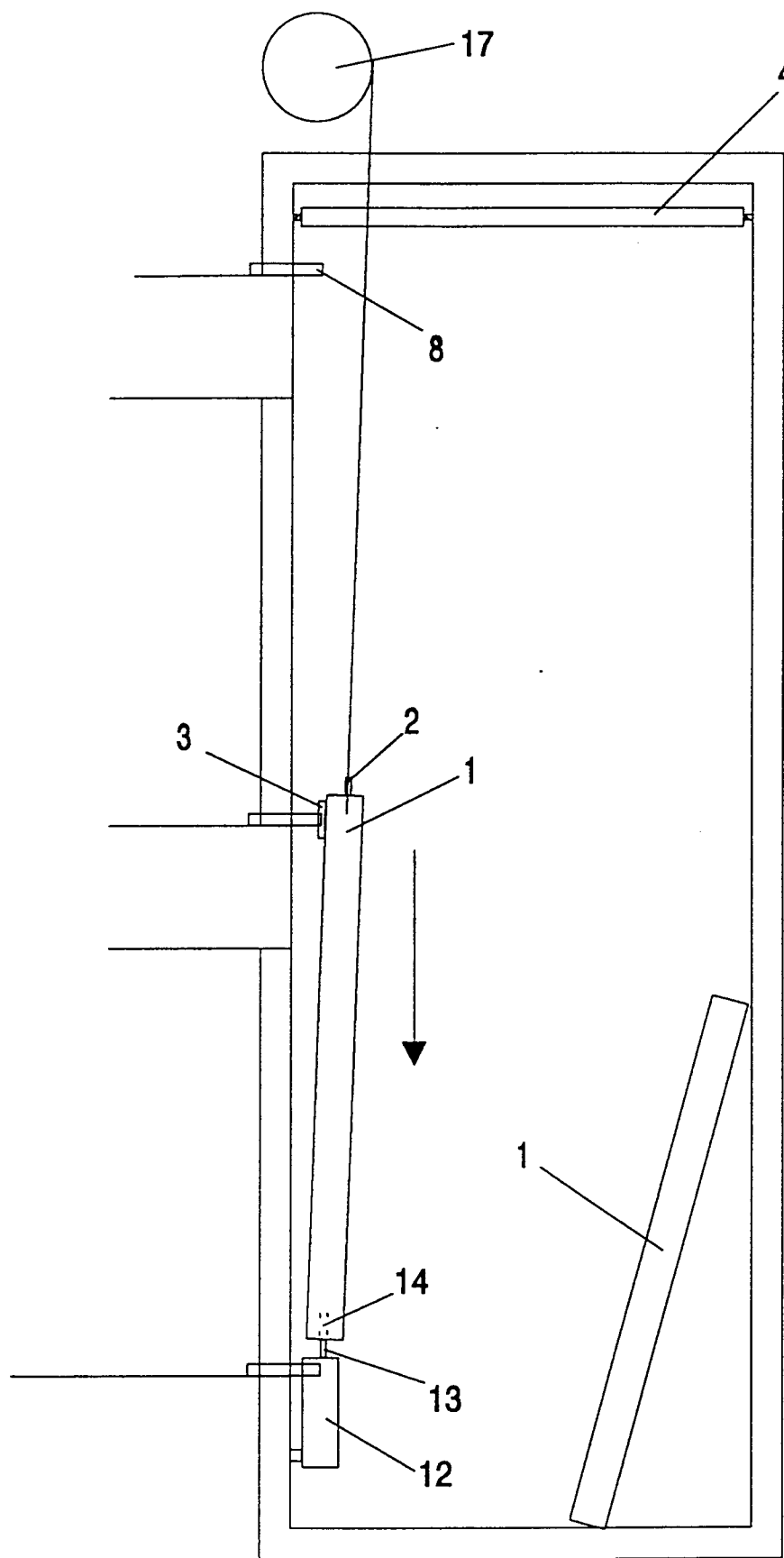


fig. 5

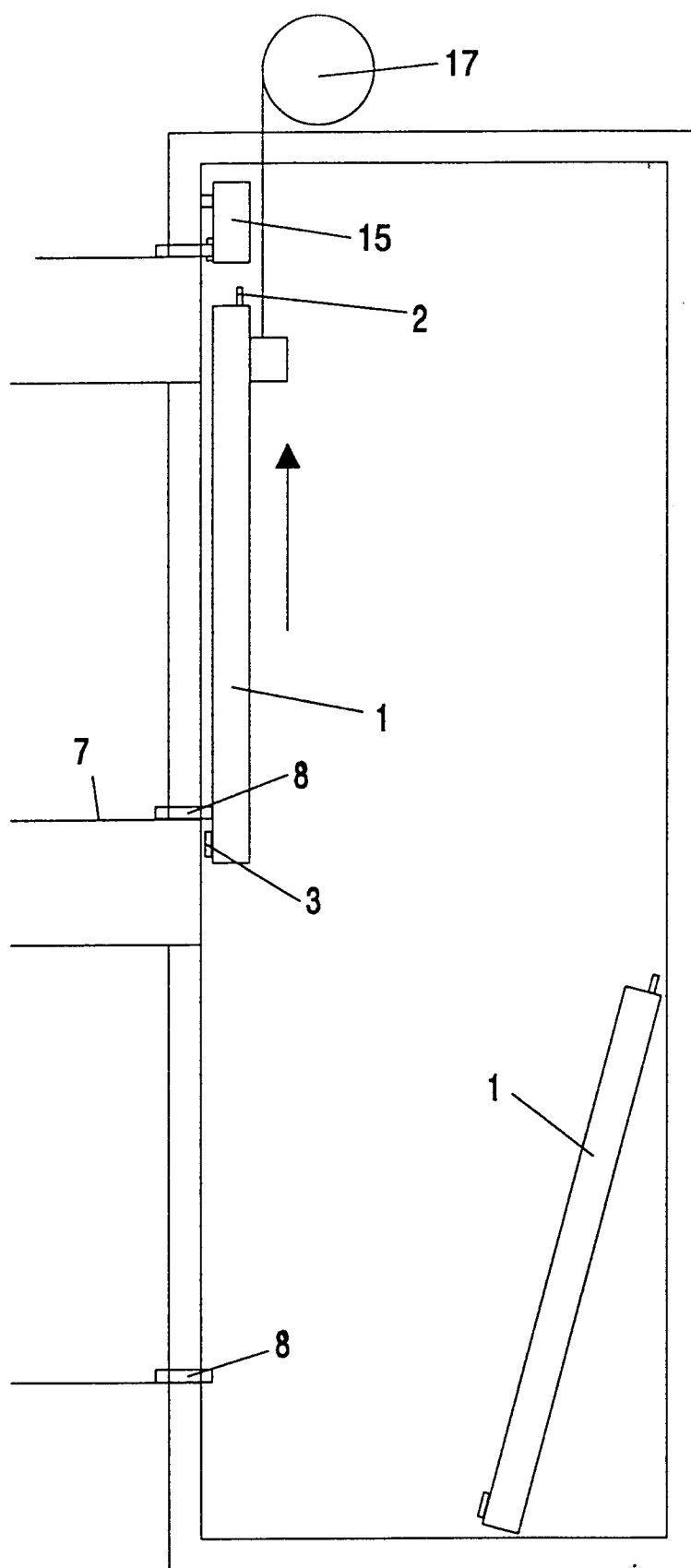


fig. 6



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EUROPEAN SEARCH REPORT

Application Number

EP 91 11 3219

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	GB-A-2 194 984 (OTIS ELEVATOR CO.) * Page 2, lines 20-101; figures 1,2 * - - -	1-4,9	B 66 B 13/30
A	US-A-3 741 351 (SUOZZO) * Column 3, line 3 - column 4, line 31; figures 1-5 * - - -	1	
A	US-A-4 099 599 (RANDALL) * Column 5, line 10 - column 6, line 30; figures 4-6 * - - -	2,7,8	
A	US-A-3 771 268 (LOOMIS) * Column 3, line 40 - column 4, line 21; figures 1-4 * - - - - -	7,8	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 66 B
Place of search		Date of completion of search	Examiner
The Hague		16 December 91	CLEARY F.M.
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