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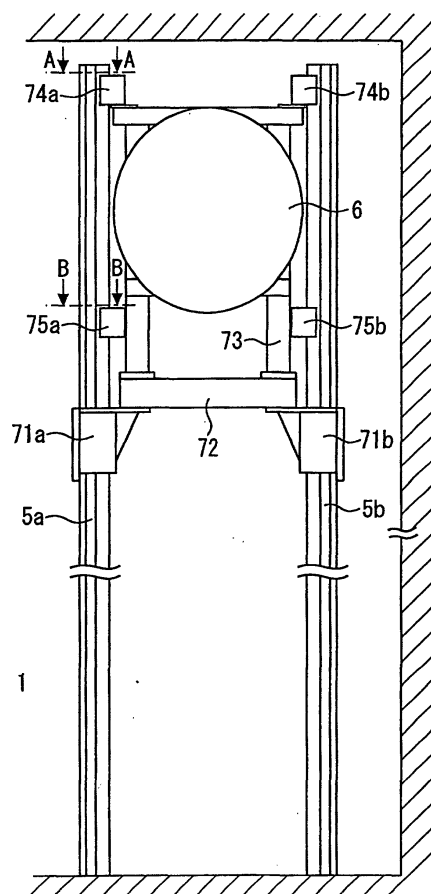
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(54) **METHOD FOR INSTALLING HOIST**

(57) A method of installing a hoisting machine according to the present invention includes a vertical setup process of setting upright guide rails 5a, 5b within a hoistway 1; an attachment process of attaching, to a mount frame 73, guide members 74a, 74b, 75a, 75b for retaining the mount frame 73 in such a manner that the mount frame 73 can slide over the guide rails 5a, 5b; a lifting process of lifting a hoisting machine 6 after the attachment process while the hoisting machine 6 is being slid in a longitudinal direction of the guide rails 5a, 5b; a fastening process of fastening, to the guide rails 5a, 5b, support tables 71a, 71b which support vertical load of the hoisting machine 6 and that of the mount frame 73 and a beam 72; and a setup process of setting the mount frame 73 and the hoisting machine 6 on the beam 72 after the fastening process.

**Fig. 2**



## Description

### Field of the Invention

**[0001]** The present invention relates to a hoisting machine installation method for setting a hoisting machine at a predetermined position from the bottom of a hoistway.

### Background Art

**[0002]** There is known an elevator that does not have a machine room and in which a hoisting machine is set at a predetermined position from the bottom of a hoistway, as disclosed in Japanese Utility Model Application Laid-Open No. 119579/1999 and Japanese Patent Application Laid-Open No. 10434/1995. In this elevator, the hoisting machine is placed at the top within the hoistway and interposed between a car and the wall of the hoistway. Since the elevator obviates a necessity for setting a machine room separately from the hoistway, the elevator is advantageous in terms of ability to save building space.

**[0003]** However, in order to set the hoisting machine at a predetermined height from the bottom of the hoistway, a hoisting machine must be lifted, and lifting of a hoisting machine, which is a heavy load, involves extensive work. For instance, an operation for anchoring the hoisting machine in a lifted state is unstable, and positional adjustment or assurance of setup precision is not simple.

### Disclosure of the Invention

**[0004]** The invention has been conceived to solve the previously-mentioned problem and aims at providing an installation method which enables easy installation of a hoisting machine at a predetermined height from the bottom of a hoistway.

**[0005]** A method of installing a hoisting machine according to the invention comprises a vertical setup process of setting upright a first guide rail and a second guide rail within a hoistway; an attachment process of attaching, to a mount member after the setup process, guide members for retaining the mount member in such a manner that the mount member can slide over the first and second guide rails; a lifting process of lifting a hoisting machine after the attachment process while the hoisting machine is attached to the mount member and while the mount member is being slid in a longitudinal direction of the first and second guide rails; a fastening process of fastening, to the first and second guide rails after the lifting process, support members which support vertical load of the hoisting machine and that of the mount member; and a setup process of setting the mount member and the hoisting machine on the support member after the fastening process.

**[0006]** A method of installing a hoisting machine ac-

cording to the present invention comprises a vertical setup process of setting upright a first guide rail and a second guide rail within a hoistway; an attachment process of attaching, to a hoisting machine after the setup process, guide members for retaining the hoisting machine in such a manner that the hoisting machine can slide over the first and second guide rails; a lifting process of lifting the hoisting machine after the attachment process while the hoisting machine is being slid in a longitudinal direction of the first and second guide rails; a fastening process of fastening, to the first and second guide rails after the lifting process, a support member which supports vertical load of the hoisting machine and that of the mount member; and a setup process of setting the hoisting machine on the support member after the fastening process.

**[0007]** Further, the lifting process includes a process of attaching a suspension jig to the hoisting machine or the mount member and lifting the hoisting machine while the suspension jig is taken as a point of suspension.

**[0008]** Moreover, in the lifting process, the hoisting machine is lifted through use of a suspension jig having a projecting section projecting from the hoisting machine or the mount member beyond the first guide rail and a projecting section projecting from the hoisting machine or the mount member beyond the second guide rail, while the projecting sections are taken as points of suspension.

**[0009]** Further, the lifting process includes a first lifting process of lifting the hoisting machine while the hoisting machine or the mount member is taken as a point of suspension; and a second lifting process of attaching, to the hoisting machine or the mount member after the first lifting process, a suspension jig having a projecting section projecting from the hoisting machine or the mount member beyond the first guide rail and a projecting section projecting from the hoisting machine or the mount member beyond the second guide rail, and lifting the hoisting machine while the projecting sections are taken as points of suspension.

### Brief Description of the Drawings

#### [0010]

Fig. 1 is an overall layout view of an elevator system to which the present invention is applied;

Fig. 2 is an enlarged view of a mounting mechanism 7 to which the invention is applied;

Fig. 3 is a view showing the structure of a guide member, wherein (a) is a view showing the structure of an upper guide member 74a, or a cross-sectional view of the same when viewed in direction A shown in Fig. 2; and (b) is a view showing the structure of a lower guide member 75a, or a cross-sectional view of the same when viewed in direction B shown in Fig. 2;

Fig. 4 is a flowchart showing procedures for install-

ing a hoisting machine 6;

Fig. 5 is a view showing a working status during the process of installing upper guide members 74a, 74b and lower guide members 75a, 75b;

Fig. 6 is a view showing a working status during the course of a first process for lifting the hoisting machine 6;

Fig. 7 is a view showing a working status during the course of a second process for lifting the hoisting machine 6; and

Fig. 8 is a view showing a status in which the hoisting machine 6 is placed at the top within the hoistway.

### Best Modes for Implementing the Invention

[0011] In relation to the present invention, embodiments will now be described hereinbelow.

### Embodiment 1

[0012] First, by reference to Fig. 1, there will be described an elevator system to which a method of installing a hoisting machine according to the present invention is applied.

[0013] As shown in Fig. 1, reference numeral 1 designates a hoistway; 2 designates a car which moves up and down within the hoistway 1; and 3a and 3b designate car guide rails provided on respective sides of the car 2 for guiding vertical movement of the car 2.

[0014] Reference numeral 4 designates a counterweight which moves up and down within the hoistway in the direction opposite the moving direction of the car 2. Reference numerals 5a, 5b designate counterweight guide rails provided on respective sides of the counterweight 4 for guiding vertical movement of the counterweight 4.

[0015] Reference numeral 6 designates a hoisting machine which serves as a power source for causing the car 2 and the counterweight 4 to ascend and descend. The hoisting machine 6 has a traction sheave 61 around which a main cable to be described later is to be wound; and a drive section 62 including a motor for rotating the traction sheave 61.

[0016] Reference numeral 7 designates a mounting mechanism for mounting the hoisting machine 6 between the guide rails 5a, 5b. In the present embodiment, the mounting mechanism 7 will be described in detail later.

[0017] Reference numeral 8 designates a counterweight pulley attached to an upper portion of the counterweight 4.

[0018] Reference numeral 9 designates an undercar pulley attached to a lower portion of the car 2. Two undercar pulleys 9 are provided on the lower portion of the car 2.

[0019] Reference numeral 10 designates a main cable passed around the counterweight pulley 8, the trac-

tion sheave 61, and the undercar pulleys 9. One end of the main cable 10 is anchored to a main cable attachment section 11 provided at the upper end of the guide rail 3a. The other end of the main cable 10 is anchored to a main cable attachment section 12 interposed between the guide rails 5a, 5b.

[0020] Since the counterweight pulley 8 is disposed at a position offset, in a plan view, from a plane in which the guide rails 5a, 5b are placed, the main cable 10 can be routed from the traction sheave 61 to the counterweight 8 and anchored to the main cable attachment section 12.

[0021] In the elevator system, the car 2 and the counterweight 4 are caused to ascend and descend by way of the main cable 10 as a result of rotation of the traction sheave 61 of the hoisting machine 6.

[0022] Next, the structure of the mounting mechanism 7 will be described in detail.

[0023] Fig. 2 is an enlarged view showing the structure of the mounting mechanism 7, and the remaining portions of the elevator system are omitted.

[0024] The mounting mechanism 7 comprises support tables 71a, 71b; a cable anchor beam 72; and a mount frame 73 serving as a mount member for the hoisting machine 6.

[0025] The support tables 71a, 71b are attached to the guide rails 5a, 5b, respectively. One end of the cable anchor beam 72 is fixed to the support table 71a, and the other end of the same is fixed to the support table 71b.

[0026] A mount frame 73 of the hoisting machine is set on the cable anchor beam 72, and the hoisting machine 6 is mounted to the mount frame 73. Further, upper guide members 74a, 74b and lower guide members 75a, 75b are attached to the mount frame 73.

[0027] As shown in Fig. 3, the upper guide member 74a and the lower guide member 75a catch a protuberance, which is a sliding surface of the guide rail 5a, by way of resilient members. The upper guide member 74b and the lower guide member 75b are identical in construction with the upper guide member 74a and the lower guide member 75a. Hence, the upper guide members 74a, 74b and the lower guide members 75a, 75b have the function of retaining the mount frame 73 in such a manner that the mount frame 73 is slidable in the longitudinal direction of the guide rails 5a, 5b.

[0028] At the time of operation of the elevator system, the upper guide members 74a, 74b and the lower guide members 75a, 75b also act as bracing members for diminishing horizontal deflection of the hoisting machine 6.

[0029] Vertical load of the hoisting machine 6 and that of the mount frame 73 are supported by the guide rails 5a, 5b by way of the support tables 71a, 71b.

[0030] There will now be described a method of installing a hoisting machine on the premise of the mounting mechanism 7 being employed. A flowchart shown in Fig. 4 and working status drawings of Figs. 5 through 8 are

used for description.

**[0031]** First, the guide rails 5a, 5b are provided in upright positions within the hoistway 1 (S1 shown in Fig. 4).

**[0032]** Next, the hoisting machine 6 is set on the bottom of the hoistway 1 while mounted on the mount frame 73 (S2 shown in Fig. 4). At this time, the hoisting machine 6 and the mount frame 73 are interposed between the guide rails 5a, 5b. Alternatively, the hoisting machine 6 and the mount frame 73 are separately interposed between the guide rails 5a, 5b, and subsequently the hoisting machine 6 is installed on the mount frame 73.

**[0033]** As shown in Fig. 5, the upper guide members 74a, 74b and the lower guide members 75a, 75b are mounted on the mount frame 73 (S3 shown in Fig. 4). As a result of the upper guide members 74a, 74b and the lower guide members 75a, 75b having been mounted, the mount frame 73 and the hoisting machine 6 are retained so as to be slidable in the longitudinal direction of the guide rails 5a, 5b.

**[0034]** As shown in Fig. 6, the hoisting machine 6 is lifted (S4 shown in Fig. 4). The hoisting machine 6 is suspended while the hoisting machine 6 or the mount frame 73 is taken as a point of suspension, and the hoisting machine is lifted. At this time, the mount frame 73 slides in the longitudinal direction of the guide rails 5a, 5b while mounting the hoisting machine 6.

**[0035]** When the hoisting machine 6 and the mount frame 73 have been lifted to a predetermined height, a suspension jig 14 is fixed to a lower portion of the hoisting machine 6 or that of the mount frame 73. Alternatively, the suspension jig 14 may be fastened beforehand.

**[0036]** As shown in Fig. 7, both sides of the suspension jig 14 are taken as points of suspension, and the hoisting machine 6 is lifted further by means of respective chain blocks 13a, 13b (S5 shown in Fig. 4). At this time the chain blocks 13a, 13b are operated simultaneously.

**[0037]** Since the suspension jig 14 is fixed to the lower portion of the hoisting machine 6 or that of the mount frame 73, a lifting margin requiring for setting up the chain blocks 13a, 13b can be reduced to the extent possible, and the hoisting machine 6 can be set close to the ceiling of the hoistway 1.

**[0038]** After the hoisting machine 6 has reached the top of the inside of the hoistway 1 (see Fig. 8), a support table 71a is attached to the guide rail 5a, and the support table 71b is attached to the guide rail 5b. A beam 72 is affixed to the support tables 71a, 71b (S6 shown in Fig. 4).

**[0039]** Subsequently, the mount frame 73 is lowered to the beam 72, and the mount frame 73 is set on the beam 72 (S7 shown in Fig. 4).

**[0040]** As shown in Fig. 2, the hoisting machine 6 is set at the top of the inside of the hoistway 1 through the above operation procedures.

**[0041]** According to the above-described installation method, limitations are imposed on horizontal move-

ment of the hoisting machine 6 and that of the mount frame 73. Hence, the hoisting machine 6 remains stable during the course of being lifted. Further, positional adjustment of the mount frame 73 and assurance of setup accuracy of the hoisting machine 6 can be performed readily.

**[0042]** Since the guide members are provided in the lateral and longitudinal directions, the hoisting machine 6 can be lifted stably even if a rotational moment is imposed on the mount frame 73 or the hoisting machine 6 during a lifting operation.

**[0043]** The process for lifting the hoisting machine 6 is divided into two stages. In the case shown in Fig. 7, the suspension jig 14 is fixed beneath the hoisting machine 6 or the mount frame 73. Hence, an upper space of the hoistway 1 required for lifting operation can be reduced. Further, the suspension jig 14 is longer than the interval between the guide rails 5a, 5b. Hence, both ends of the suspension jig 14 project from the hoisting machine 6 or the mount rail 73 beyond the guide rails 5a, 5b. Since the thus-projecting portions are suspended, the chain blocks 13a, 13b come into contact with neither the hoisting machine 6 nor the mount frame 73.

**[0044]** In the embodiment, the guide members 74a, 74b, 75a, and 75b are attached to the mount frame 73. However, the guide members may be attached directly to the hoisting machine 6 without use of the mount frame 73.

**[0045]** The embodiment has described a case where the hoisting machine 6 is attached to the counterweight guide rails 5a, 5b. However, the foregoing installation method can also be applied to a case where the hoisting machine 6 is attached to the car guide rails 3a, 3b.

**[0046]** In the embodiment, the support member for supporting the vertical load of the hoisting machine 6 and that of the mount frame 73 is constituted of the support tables 71a, 71b and the beam 72. However, the support member may be constituted of other members. Any member can be used for the support member, so long as the member is fixed to the guide rails 5a, 5b and supports the vertical load of the hoisting machine 6 and that of the mount frame 73.

**[0047]** Although the hoisting machine 6 and the mount frame 73 are finally set up on the beam 72, the hoisting machine 6 or the mount frame 73 may be set on the beam 72 by way of another member, such as an elastic member.

**[0048]** The embodiment has described a case where the hoisting machine 6 is set up at the top of the inside of the hoistway 1. However, the location of setup is not limited to the top; the invention can be applied to a case where a hoisting machine is set up at a predetermined height from the bottom of a hoistway.

**[0049]** The method of installing a hoisting machine according to the present invention yields the following advantages.

**[0050]** A method of installing a hoisting machine according to the invention comprises a vertical setup pro-

ess of setting upright a first guide rail and a second guide rail within a hoistway; an attachment process of attaching, to a mount member after the setup process, guide members for retaining the mount member in such a manner that the mount member can slide over the first and second guide rails; a lifting process of lifting a hoisting machine after the attachment process while the hoisting machine is attached to the mount member and while the mount member is being slid in a longitudinal direction of the first and second guide rails; a fastening process of fastening, to the first and second guide rails after the lifting process, support members which support vertical load of the hoisting machine and that of the mount member; and a setup process of setting the mount member and the hoisting machine on the support member after the fastening process. Accordingly, the hoisting machine can be set up readily.

**[0051]** A method of installing a hoisting machine according to the present invention comprises a vertical setup process of setting upright a first guide rail and a second guide rail within a hoistway; an attachment process of attaching, to a hoisting machine after the setup process, guide members for retaining the hoisting machine in such a manner that the hoisting machine can slide over the first and second guide rails; a lifting process of lifting the hoisting machine after the attachment process while the hoisting machine is being slid in a longitudinal direction of the first and second guide rails; a fastening process of fastening, to the first and second guide rails after the lifting process, a support member which supports vertical load of the hoisting machine and that of the mount member; and a setup process of setting the hoisting machine on the support member after the fastening process. Accordingly, the hoisting machine can be set up readily.

**[0052]** Further, the lifting process includes a process of attaching a suspension jig to the hoisting machine or the mount member and lifting the hoisting machine while the suspension jig is taken as a point of suspension. Hence, the hoisting machine can be set up readily.

**[0053]** Moreover, in the lifting process, the hoisting machine is lifted through use of a suspension jig having a projecting section projecting from the hoisting machine or the mount member beyond the first guide rail and a projecting section projecting from the hoisting machine or the mount member beyond the second guide rail, while the projecting sections are taken as points of suspension. Hence, an apparatus required for lifting operation does not come into contact with the hoisting machine or the mount member.

**[0054]** Further, the lifting process includes a first lifting process of lifting the hoisting machine while the hoisting machine or the mount member is taken as a point of suspension; and a second lifting process of attaching, to the hoisting machine or the mount member after the first lifting process, a suspension jig having a projecting section projecting from the hoisting machine or the mount member beyond the first guide rail and a project-

ing section projecting from the hoisting machine or the mount member beyond the second guide rail, and lifting the hoisting machine while the projecting sections are taken as points of suspension. Hence, an apparatus required for lifting operation does not come into contact with the hoisting machine or the mount member.

## Industrial Applicability

**[0055]** As has been described, the invention is applied to an elevator system that does not require any machine room and in which a hoisting machine is set at a predetermined height from the bottom of a hoistway.

## Claims

1. A method of installing a hoisting machine, comprising:

a vertical setup process of setting upright a first guide rail and a second guide rail within a hoistway;

an attachment process of attaching, to a mount member after the setup process, guide members for retaining the mount member in such a manner that the mount member can slide over the first and second guide rails;

a lifting process of lifting a hoisting machine after the attachment process while the hoisting machine is attached to the mount member and while the mount member is being slid in a longitudinal direction of the first and second guide rails;

a fastening process of fastening, to the first and second guide rails after the lifting process, support members which support vertical load of the hoisting machine and that of the mount member; and

a setup process of setting the mount member and the hoisting machine on the support member after the fastening process.

2. A method of installing a hoisting machine, comprising:

a vertical setup process of setting upright a first guide rail and a second guide rail within a hoistway;

an attachment process of attaching, to a hoisting machine after the setup process, guide members for retaining the hoisting machine in such a manner that the hoisting machine can slide over the first and second guide rails;

a lifting process of lifting the hoisting machine after the attachment process while the hoisting machine is being slid in a longitudinal direction of the first and second guide rails;

a fastening process of fastening, to the first and second guide rails after the lifting process, a support member which supports vertical load of the hoisting machine and that of the mount member; and

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a setup process of setting the hoisting machine on the support member after the fastening process.

3. The method of installing a hoisting machine according to claim 1 or 2, wherein the lifting process includes a process of attaching a suspension jig to the hoisting machine or the mount member and lifting the hoisting machine while the suspension jig is taken as a point of suspension.

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4. The method of installing a hoisting machine according to claim 3, wherein, in the lifting process, the hoisting machine is lifted through use of a suspension jig having a projecting section projecting from the hoisting machine or the mount member beyond the first guide rail and a projecting section projecting from the hoisting machine or the mount member beyond the second guide rail, while the projecting sections are taken as points of suspension.

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5. The method of installing a hoisting machine according to claim 1 or 2, wherein the lifting process includes:

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a first lifting process of lifting the hoisting machine while the hoisting machine or the mount member is taken as a point of suspension; and

a second lifting process of attaching, to the hoisting machine or the mount member after

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a suspension jig having a projecting section projecting from the hoisting machine or the mount member beyond the first guide rail and a projecting section projecting from the hoisting machine or the mount member beyond the second guide rail, and lifting the

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hoisting machine while the projecting sections are taken as points of suspension.

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Fig. 1

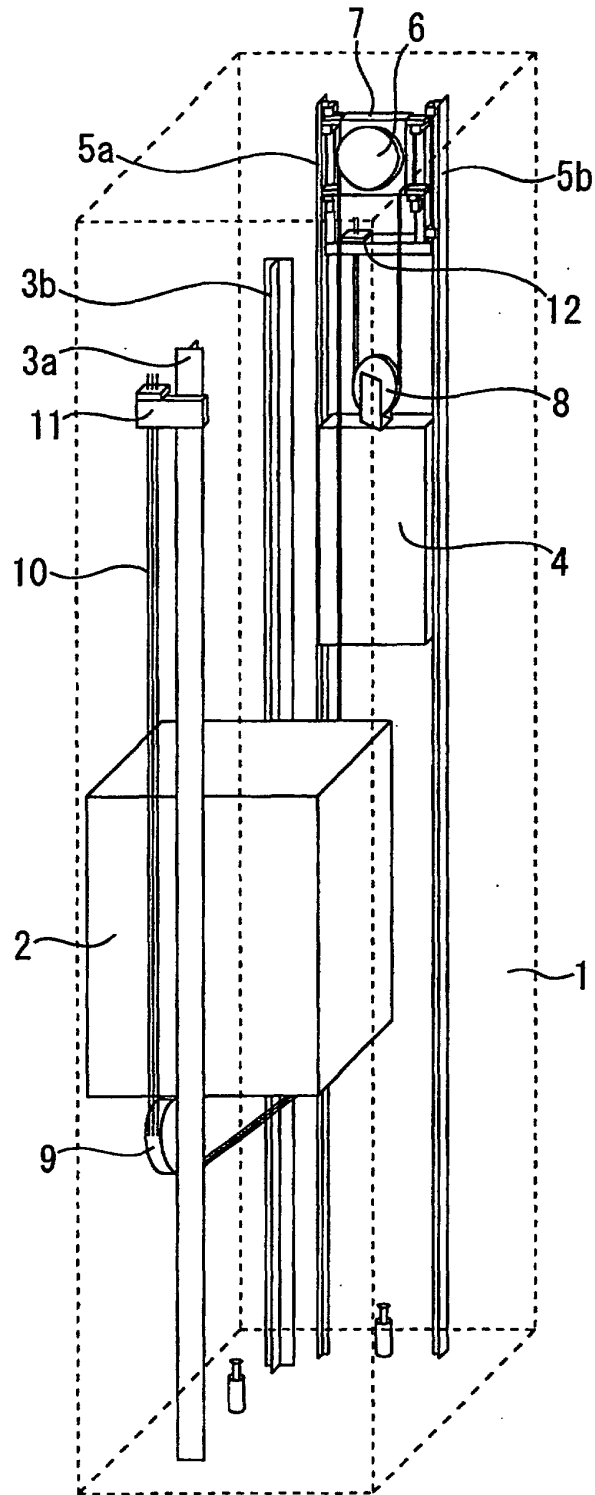


Fig. 2

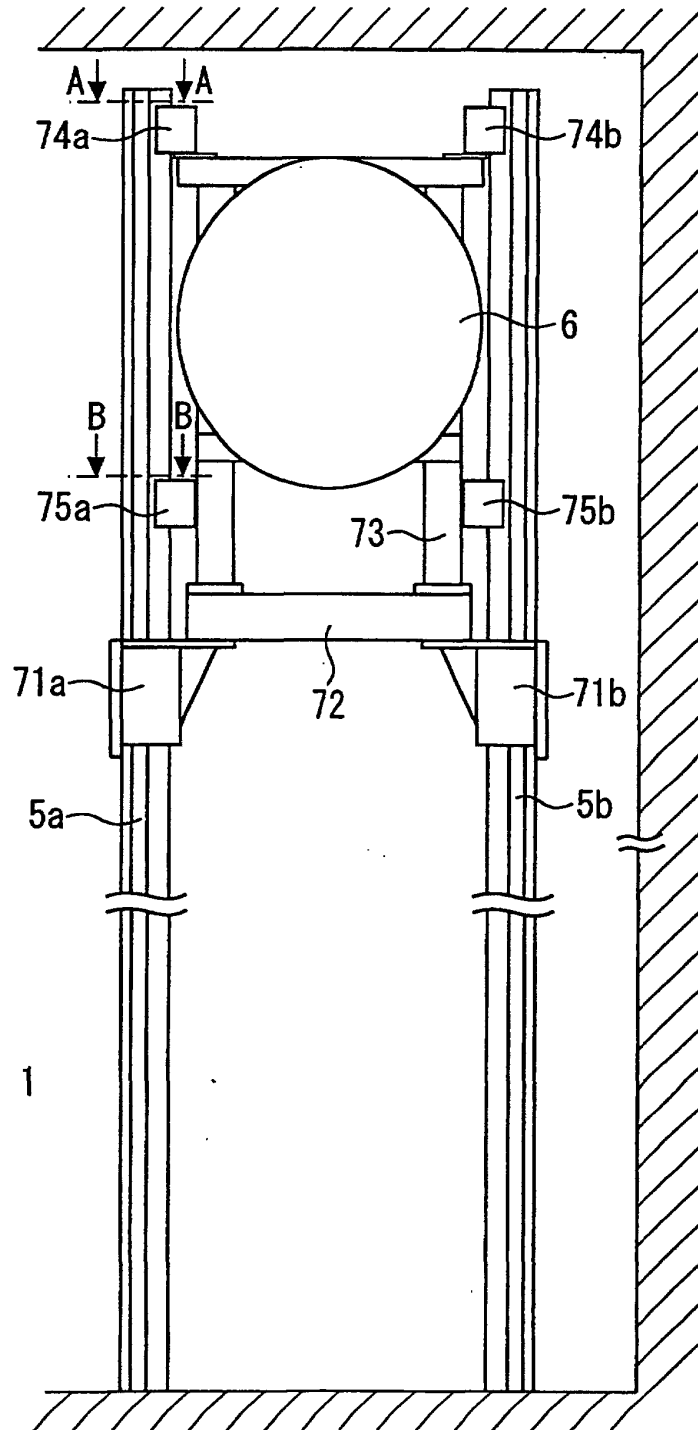
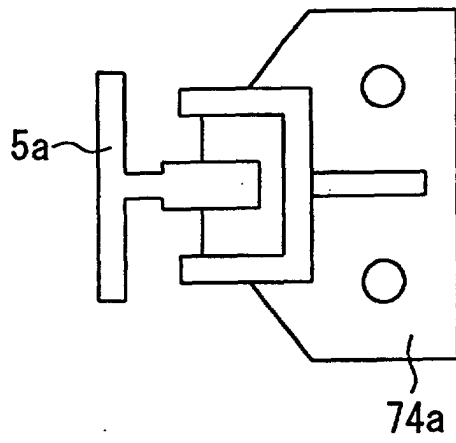




Fig. 3

(a)



(b)

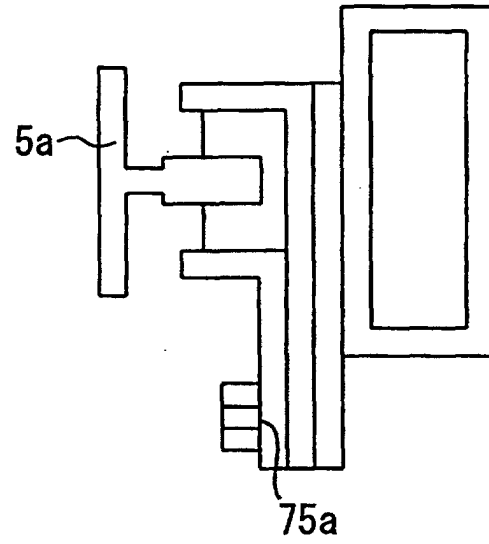


Fig. 4

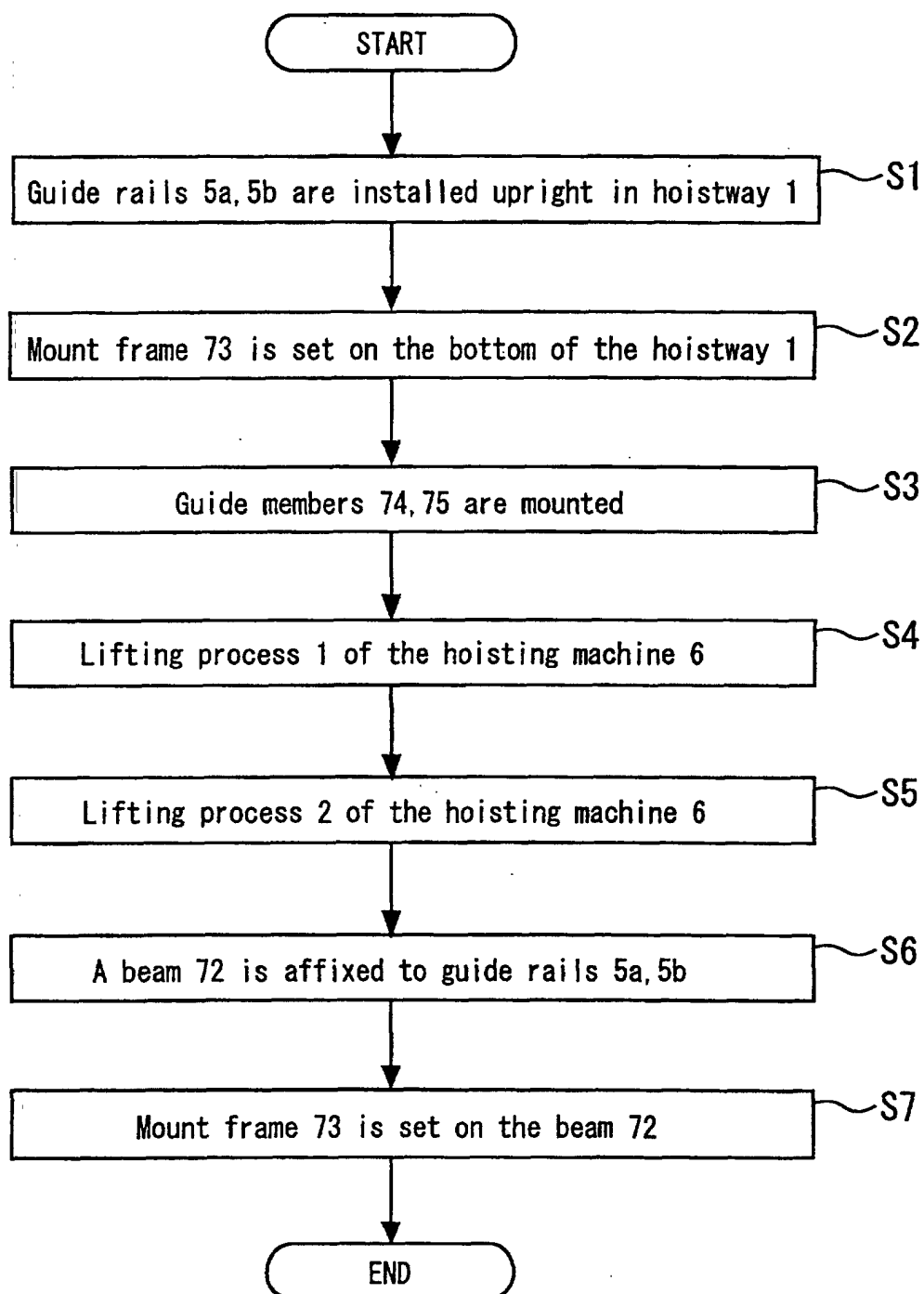


Fig. 5

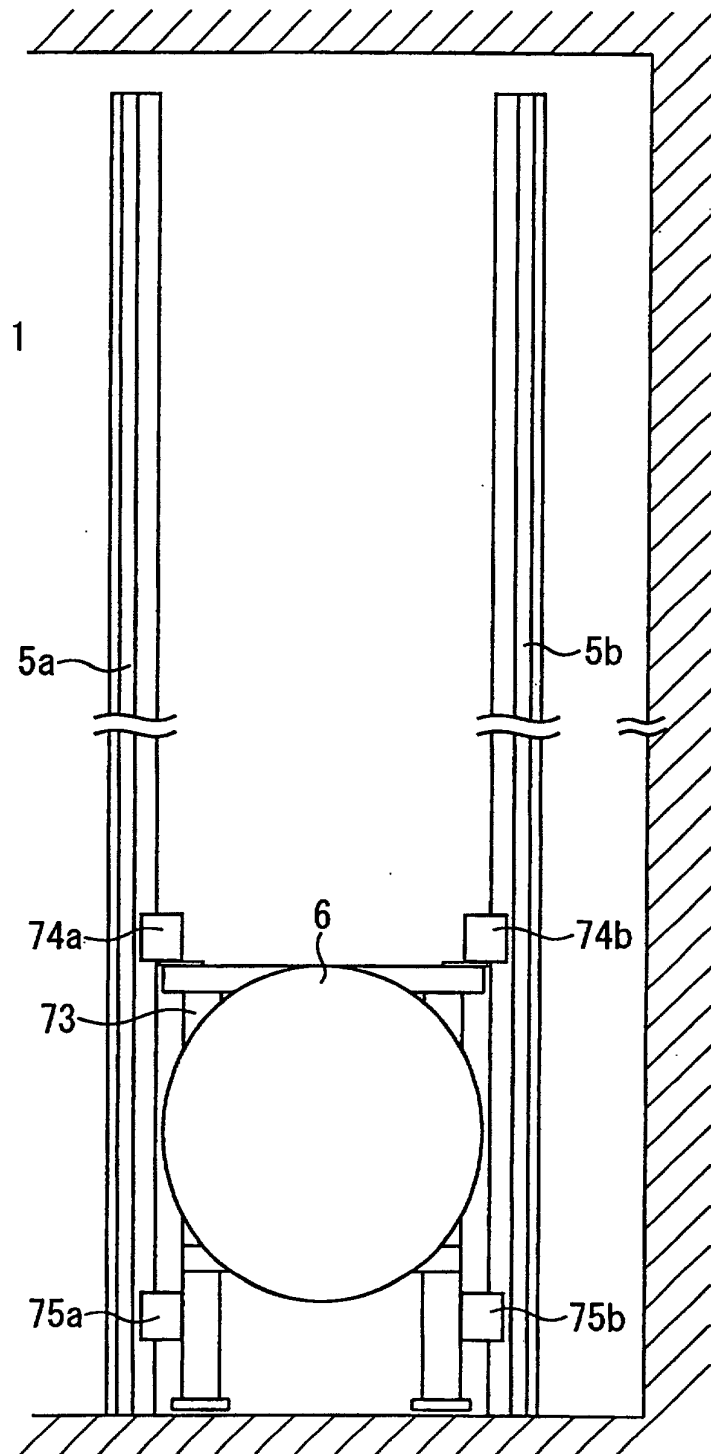


Fig. 6

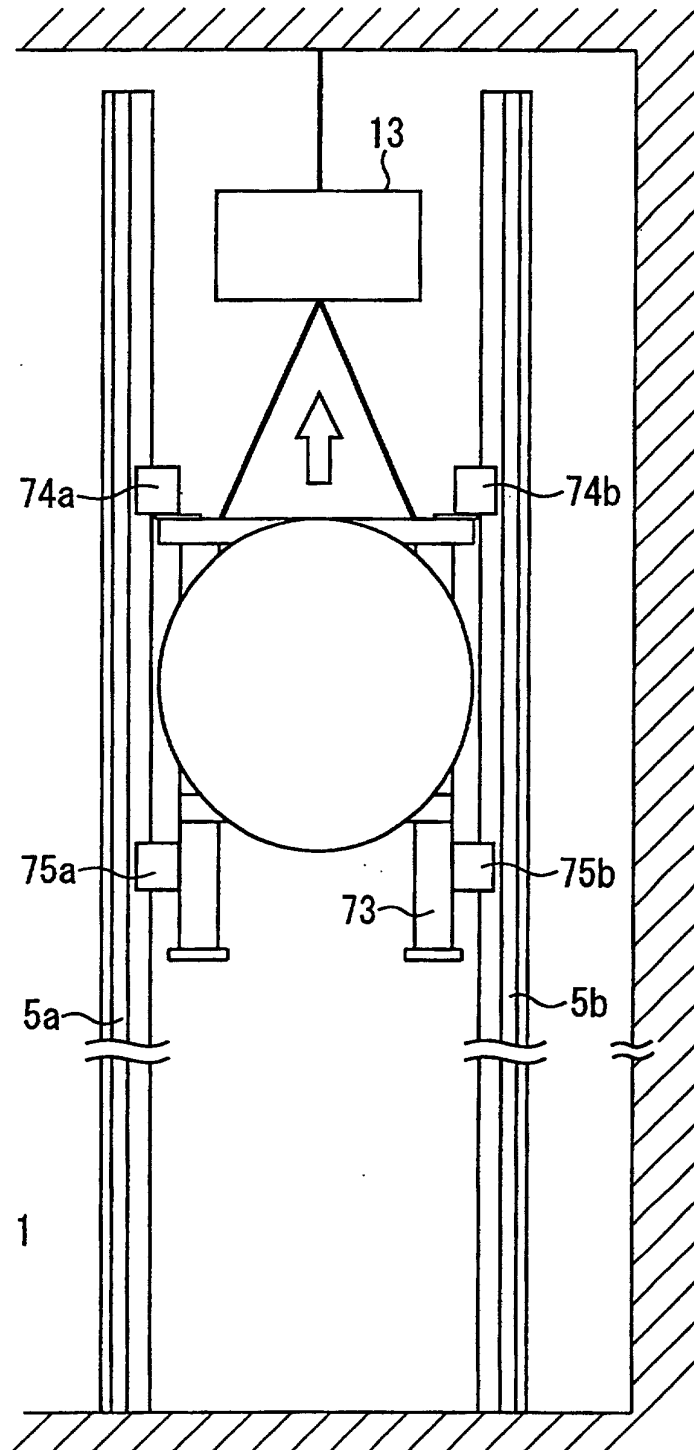


Fig. 7

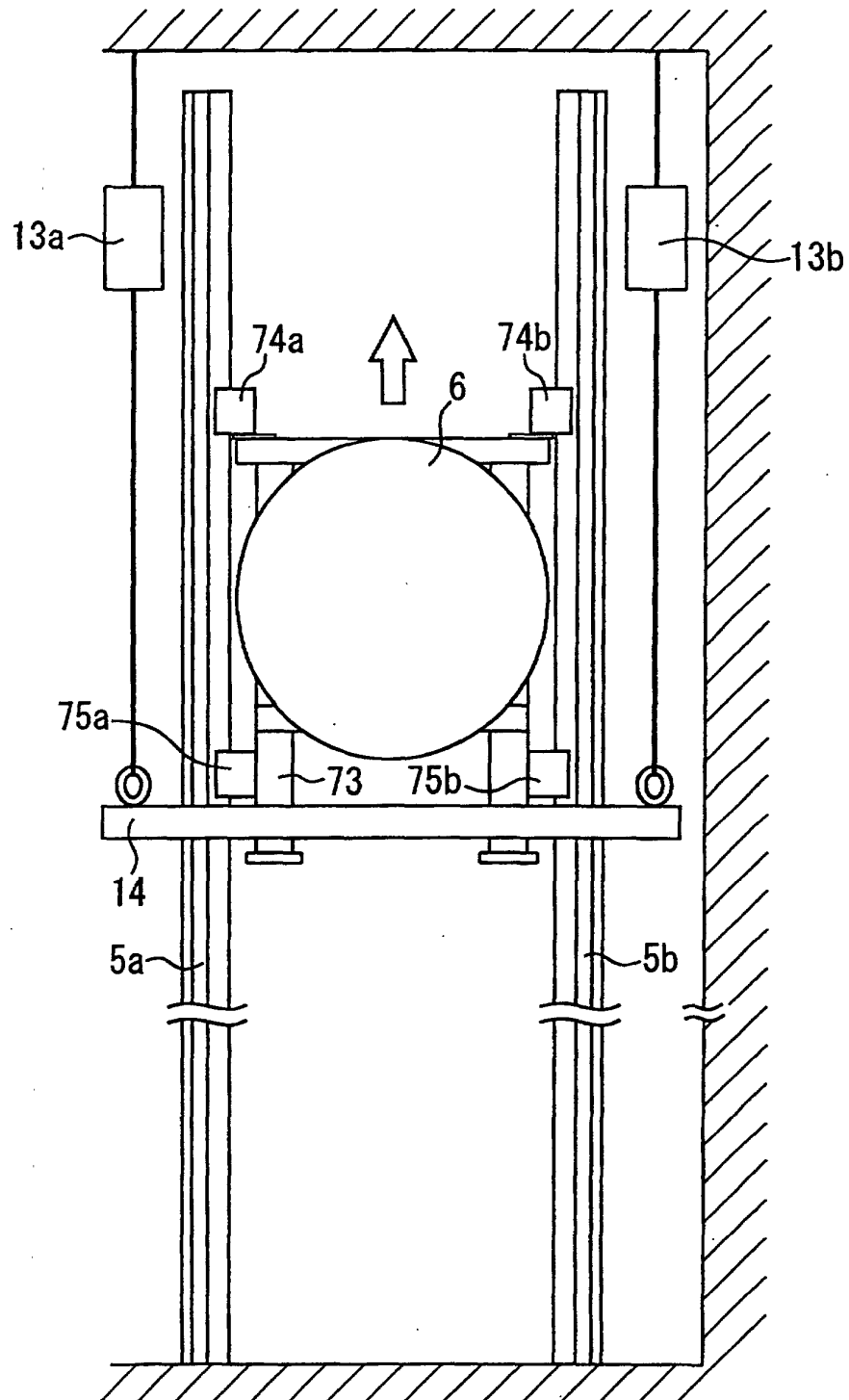
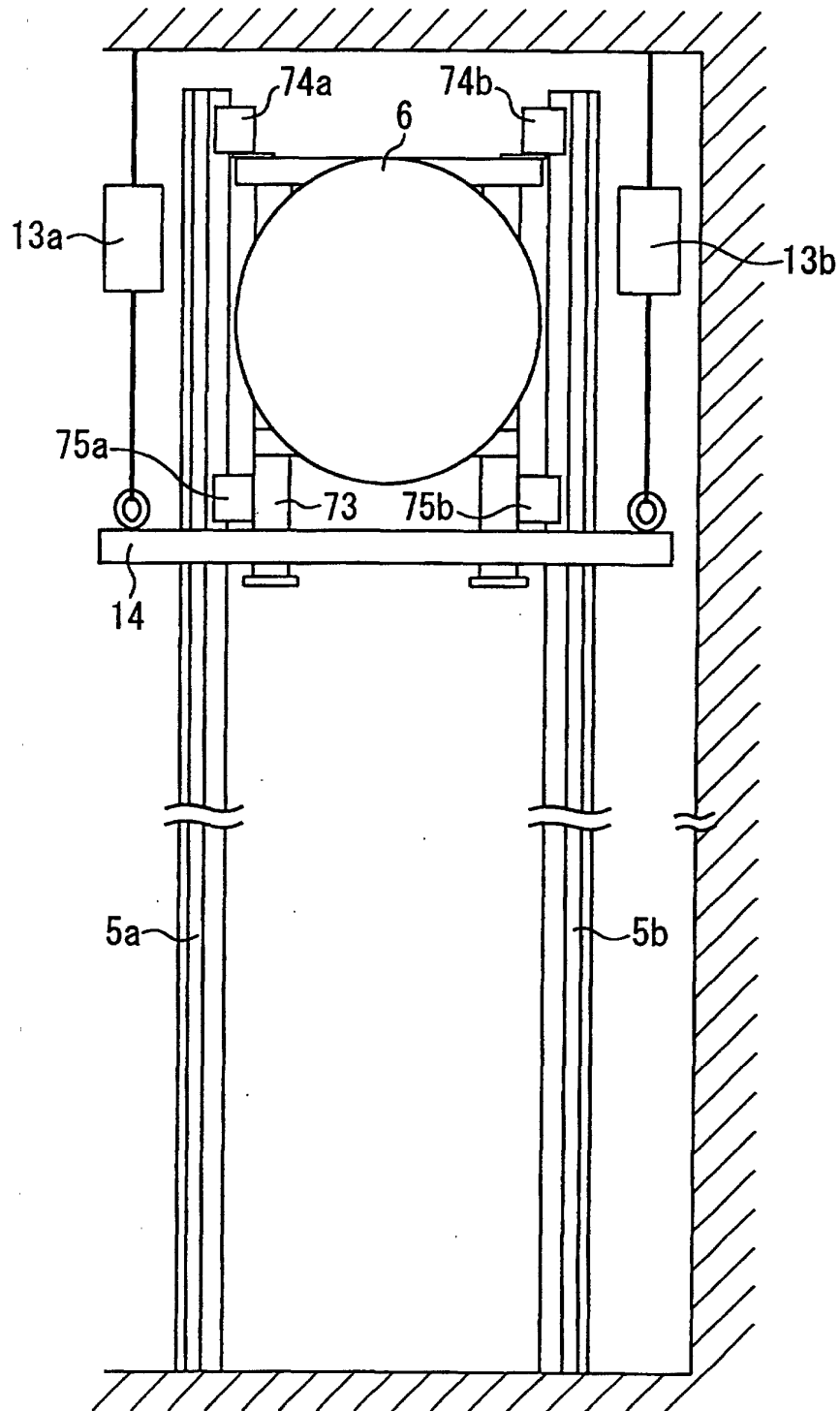


Fig. 8



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP01/02667

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl <sup>7</sup> B66B7/00		
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) Int.Cl <sup>7</sup> B66B1/00-B66B11/08		
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 1996-2001 Kokai Jitsuyo Shinan Koho 1971-2001 Toroku Jitsuyo Shinan Koho 1994-2001		
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.
EX	JP 2001-106461 A (Matsushita Electric Works Ltd.),	1-2
EA	17 April, 2001 (17.04.01) (Family: none)	3-5
EX	JP 2001-171953 A (Fujitec Co., Ltd.),	1-2
EA	26 June, 2001 (26.06.01) (Family: none)	3-5
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A	JP 2000-169059 A (Mitsubishi Electric Corporation),	1-2
	20 June, 2000 (20.06.00) (Family: none)	3-5
A	JP 7-10434 A (Kone CY), 13 January, 1995 (13.01.95), & AU 6595794 A & FI 941719 A & CA 2126492 A & EP 0631967 A2 & BR 9402573 A & US 5429211 A & CN 1105337 A & SG 45255 A & JP 2593288 B2	1-5
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
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Date of the actual completion of the international search 17 December, 2001 (17.12.01)		Date of mailing of the international search report 25 December, 2001 (25.12.01)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP01/02667

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No.27645/1975 (Laid-open No.109563/1976), (Tokyo Shibaura Denki K.K.) 03 September, 1976 (03.09.76) (Family: none)	1-5
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