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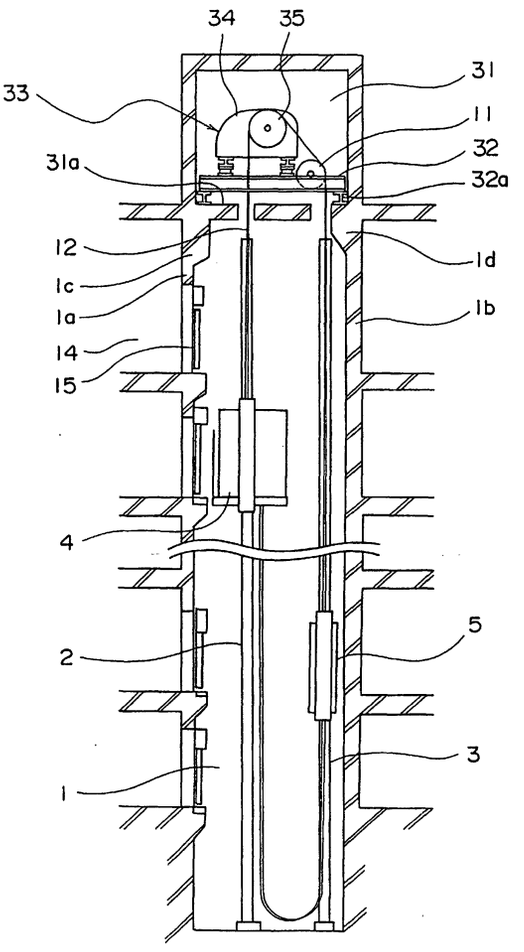
(54) ELEVATOR DEVICE

(57) In an elevator apparatus, a corbel portion is disposed on a hoistway wall portion in an uppermost portion of a hoistway by increasing a thickness dimension of the hoistway wall portion inside the hoistway. A mount portion of a machine base on a floor portion of a machine room is disposed directly above the corbel portion such that a load acting on the mount portion is supported by the corbel portion.

FIG. 1



EP 1 316 526 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to an elevator apparatus in which a driving machine for raising and lowering a car is installed inside a machine room at an upper portion of a hoistway.

BACKGROUND ART

[0002] Figure 5 is a block diagram showing a conventional elevator apparatus shown in Japanese Utility Model Laid-Open No. SHO 55-180680, for example, and Figure 6 is a block diagram showing a machine room from Figure 5 enlarged. In the figures, a pair of car guide rails 2 and a pair of counterweight guide rails 3 are installed inside a hoistway 1. A car 4 is guided by the car guide rails 2 so as to be raised and lowered inside the hoistway 1. A counterweight 5 is guided by the counterweight guide rails 3 so as to be raised and lowered inside the hoistway 1.

[0003] A machine room 6 is disposed at an upper portion of the hoistway 1. A machine base 7 is installed inside the machine room 6. A driving machine (a hoisting machine) 8 is mounted on the machine base 7. The driving machine 8 has: a driving machine body 9; and a drive sheave 10 rotated by the driving machine body 9. A rotatable deflection sheave 11 is also supported by the machine base 7. Main ropes 13 for suspending the car 4 and the counterweight 5 are wound around the drive sheave 10 and the deflection sheave 11. A landing door 15 is disposed on a landing 14.

[0004] Mount portions 7a of the machine base 7 on a floor portion 6a of the machine room 6 are disposed directly above hoistway wall portions 1a and 1b of the hoistway 1, thereby ensuring strength for supporting deadweight from the driving machine 8 and a load or the like acting on the driving machine 8.

[0005] In a conventional elevator apparatus of this kind, since it is necessary to dispose the mount portions 7a of the machine base 7 directly above the hoistway wall portions 1a and 1b, it has been necessary to make the machine base 7 large, irrespective of the size of the driving machine 8. Hence, it has been necessary to make the floor area of the machine room 6 larger than the horizontal cross-sectional area of the hoistway 1, reducing the utilization efficiency of a building. When the machine room is disposed on an intermediate floor in particular, building structure differs only on the floor where the machine room is disposed, making the building structure of the whole building complicated.

DISCLOSURE OF THE INVENTION

[0006] The present invention aims to solve the above problems and an object of the present invention is to provide an elevator apparatus enabling the utilization efficiency of a building to be improved by reducing the floor area of a machine room.

[0007] According to one aspect of the present invention, there is provided an elevator apparatus including: a hoistway having a hoistway wall portion; a car and a counterweight raised and lowered inside the hoistway; a main rope for suspending the car and the counterweight inside the hoistway; a machine room having a floor portion, being disposed at an upper portion of the hoistway; a machine base installed inside the machine room, having a mount portion mounted to the floor portion; and a driving machine for raising and lowering the car and the counterweight by means of the main rope, being mounted to the machine base, wherein a corbel portion is disposed on the hoistway wall portion in an uppermost portion of the hoistway by increasing a thickness dimension of the hoistway wall portion inside the hoistway, the mount portion being disposed directly above the corbel portion such that a load acting on the mount portion is supported by the corbel portion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Figure 1 is a block diagram showing an elevator apparatus according to Embodiment 1 of the present invention;
Figure 2 is a block diagram showing a machine room from Figure 1 enlarged;
Figure 3 is a perspective showing a construction of a main rope from Figure 1;
Figure 4 is a block diagram showing part of an elevator apparatus according to Embodiment 2 of the present invention;
Figure 5 is a block diagram showing an example of a conventional elevator apparatus; and
Figure 6 is a block diagram showing a machine room from Figure 5 enlarged.

BEST MODE FOR CARRYING OUT THE INVENTION

[0009] Preferred embodiments of the present invention will now be explained with reference to the drawings.

Embodiment 1

[0010] Figure 1 is a block diagram showing an elevator apparatus according to Embodiment 1 of the present invention, and Figure 2 is a block diagram showing a machine room from Figure 1 enlarged.

[0011] In the figures, a pair of car guide rails 2 and a pair of counterweight guide rails 3 are installed inside a hoistway 1. A car 4 is guided by the car guide rails 2 so as to be raised and lowered inside the hoistway 1. A counterweight 5 is guided by the counterweight guide rails 3 so as to be raised and lowered inside the hoistway

1.

[0012] A machine room 31 is disposed at an upper portion of the hoistway 1. A machine base 32 is installed inside the machine room 31. A driving machine (a hoisting machine) 33 is mounted on the machine base 32. The driving machine 33 has: a driving machine body 34; and a drive sheave 35 rotated by the driving machine body 34. A rotatable deflection sheave 11 is also supported by the machine base 32.

[0013] Main ropes 12 for suspending the car 4 and the counterweight 5 are wound around the drive sheave 10 and the deflection sheave 11. The main ropes 12 are composed of a synthetic fiber rope. A landing door 15 is disposed on a landing 14.

[0014] Corbel portions 1c and 1d are disposed on the hoistway wall portions 1a and 1b in an uppermost portion of the hoistway 1 by increasing thickness dimensions of the hoistway wall portions 1a and 1b inside the hoistway 1. Mount portions 32a of the machine base 32 on a floor portion 31a of the machine room 31 are disposed directly above the corbel portions 1c and 1d such that loads acting on the mount portions 32a are supported by the corbel portions 1c and id.

[0015] The corbel portions 1c and 1d are formed such that contact is prevented even when the car 4 and the counterweight 5 are moved to uppermost positions, as shown by the double-dotted chain lines in Figure 2. In addition, the corbel portion 1c on a side near the landing 14 is disposed directly above the installation space of the landing door 15.

[0016] Figure 3 is a perspective showing a construction of a main rope from Figure 1. In the figure, an inner strand layer 24 having a plurality of inner strands 22 and filler strands 23 disposed in gaps between these inner strands 22 is disposed around a core wire 21. Each of the inner strands 22 is composed of a plurality of aramid fibers and an impregnating material such as a polyurethane or the like. The filler strands 23 are composed of a polyamide, for example.

[0017] An outer strand layer 26 having a plurality of outer strands 25 is disposed around an outer circumference of the inner strand layer 24. Each of the outer strands 25 is composed of a plurality of aramid fibers and an impregnating material such as a polyurethane or the like in a similar manner to the inner strands 22.

[0018] A friction-reducing coating layer 27 for preventing abrasion of the strands 22 and 25 due to friction among the strands 22 and 25 in the sheaves such as the drive sheave 11, etc., is disposed between the inner strand layer 24 and the outer strand layer 26. A protective coating layer 28 is also disposed on an outer circumferential portion of the outer strand layer 26.

[0019] The car 4 and the counterweight 5 are suspended inside the hoistway 1 by a plurality of main ropes 12 having the above construction. The synthetic fiber rope has a high coefficient of friction compared to a steel rope and is superior in flexibility.

[0020] In an elevator apparatus of this kind, deadweight from the driving machine 33 and loads, etc., acting on the driving machine 33 are supported by the corbel portions 1c and id. Since the corbel portions 1c and 1d project inside the hoistway 1 and the mount portions 32a are disposed directly above the corbel portions 1c and 1d, the utilization efficiency of a building can be improved by making the floor area of the machine room 31 equivalent to the horizontal cross-sectional area of the hoistway 1. Furthermore, construction can be standardized with other floors even if the machine room 31 is disposed on an intermediate floor, preventing the building structure of the whole building from becoming complicated.

[0021] Here, where main ropes 12 composed of a synthetic fiber rope having a high coefficient of friction and superior flexibility are used, the diameter of the drive sheave 35 can be reduced. The driving machine body 34 can also be reduced in size by using a compact a motor having a permanent magnet. Hence, the floor area of the machine room 31 can be effectively reduced by adopting the support construction shown in Embodiment 1 when the driving machine 33 has been reduced in size.

[0022] Even if, by some chance, the car 4 and the counterweight 5 do move to the uppermost portion inside the hoistway 1, damage to the corbel portions 1c and id, the car 4, and the counterweight 5 is prevented because no contact can be made with the corbel portions 1c and 1d. In addition, since the corbel portion 1c on the side near the landing 14 is disposed directly above the installation space of the landing door 15 and does not interfere with the landing door 15, space inside the hoistway 1 can be utilized effectively.

Embodiment 2

[0023] Figure 4 is a block diagram showing part of an elevator apparatus according to Embodiment 2 of the present invention. In the figure, recess portions 31c into which portions of the machine base 32 are inserted are formed in side walls 31b of the machine room 31. The rest of the construction is similar to that of Embodiment 1.

[0024] In an elevator apparatus of this kind, since the recess portions 31c are formed in the side walls 31b and portions of the machine base 32 are inserted into the recess portions 31c, the machine base 32 can be installed easily. Furthermore, the amount of projection of the corbel portions 1c and 1d into the hoistway 1 can be kept small.

Claims

1. An elevator apparatus comprising:

a hoistway having a hoistway wall portion;
a car and a counterweight raised and lowered

inside said hoistway;
a main rope for suspending said car and said counterweight inside said hoistway;
a machine room having a floor portion, being disposed at an upper portion of said hoistway;
a machine base installed inside said machine room, having a mount portion mounted to said floor portion; and
a driving machine for raising and lowering said car and said counterweight by means of said main rope, being mounted to said machine base,

wherein a corbel portion is disposed on said hoistway wall portion in an uppermost portion of said hoistway by increasing a thickness dimension of said hoistway wall portion inside said hoistway, said mount portion being disposed directly above said corbel portion such that a load acting on said mount portion is supported by said corbel portion.

2. The elevator apparatus according to Claim 1, wherein said corbel portion is formed so as to prevent contact with said car even if said car moves to an uppermost position and to prevent contact with said counterweight even if said counterweight moves to an uppermost position.

3. The elevator apparatus according to Claim 1, wherein a landing door is disposed on a landing of an uppermost floor, said corbel portion being disposed directly above an installation space of said landing door.

4. The elevator apparatus according to Claim 1, wherein a recess portion into which a portion of said machine base is inserted is formed in a side wall of said machine room.

5. The elevator apparatus according to Claim 1, wherein said main rope is composed of a synthetic fiber rope.

FIG. 1

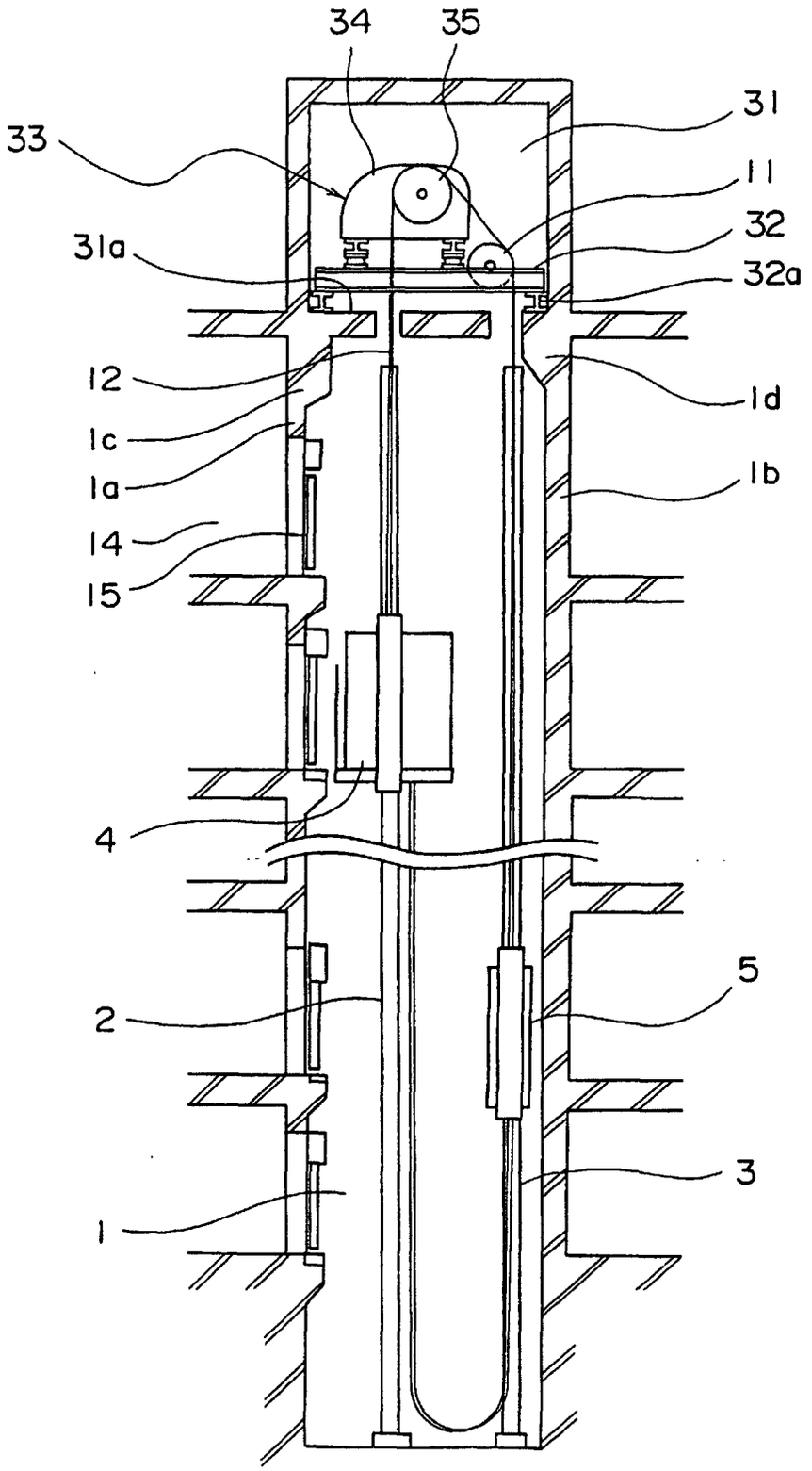


FIG. 2

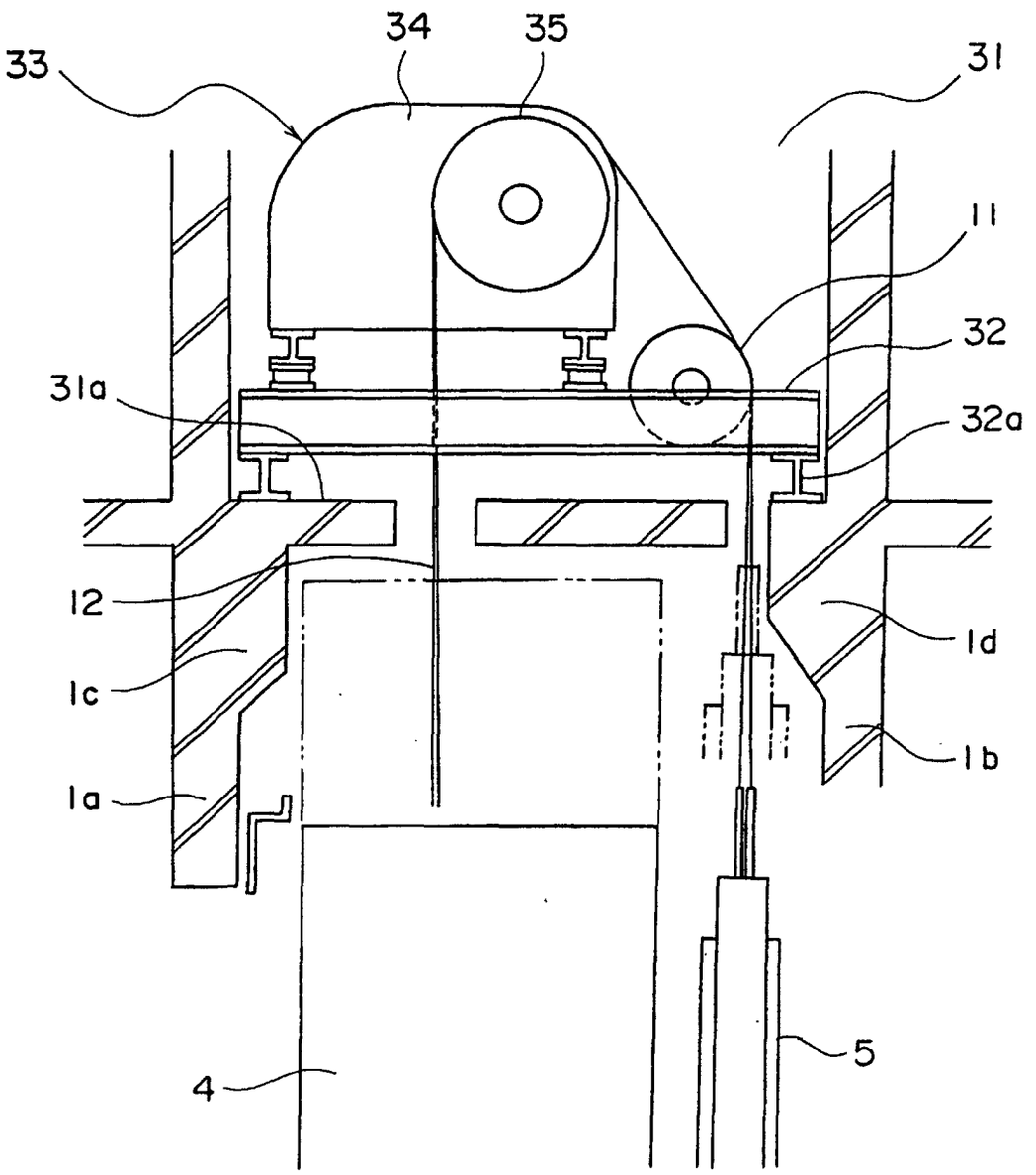


FIG. 3

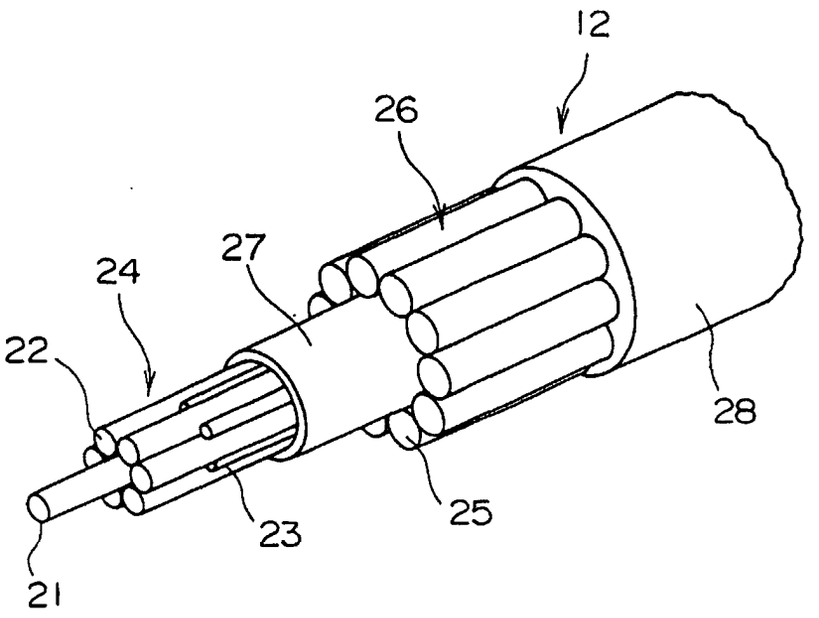


FIG. 4

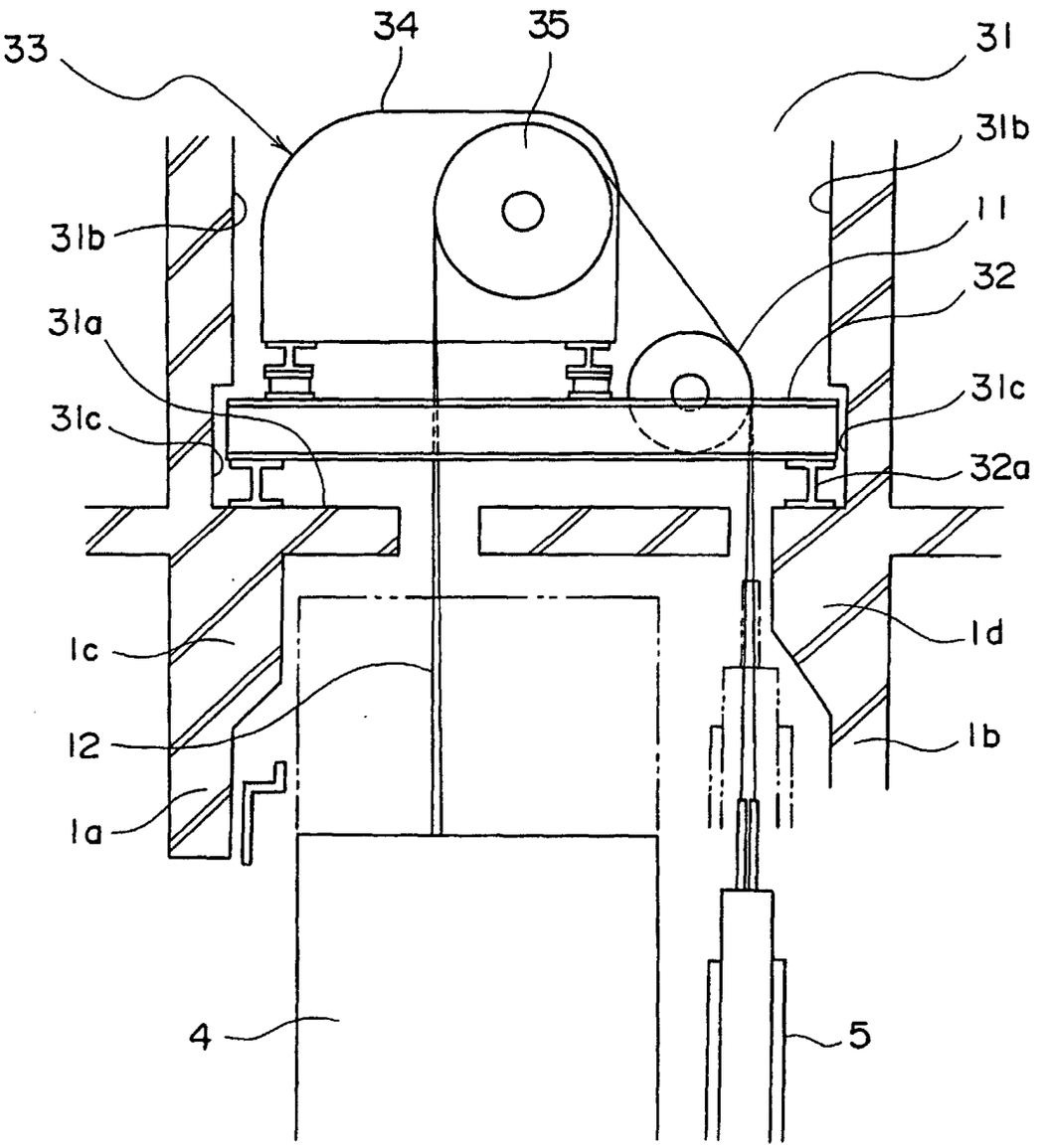


FIG. 5

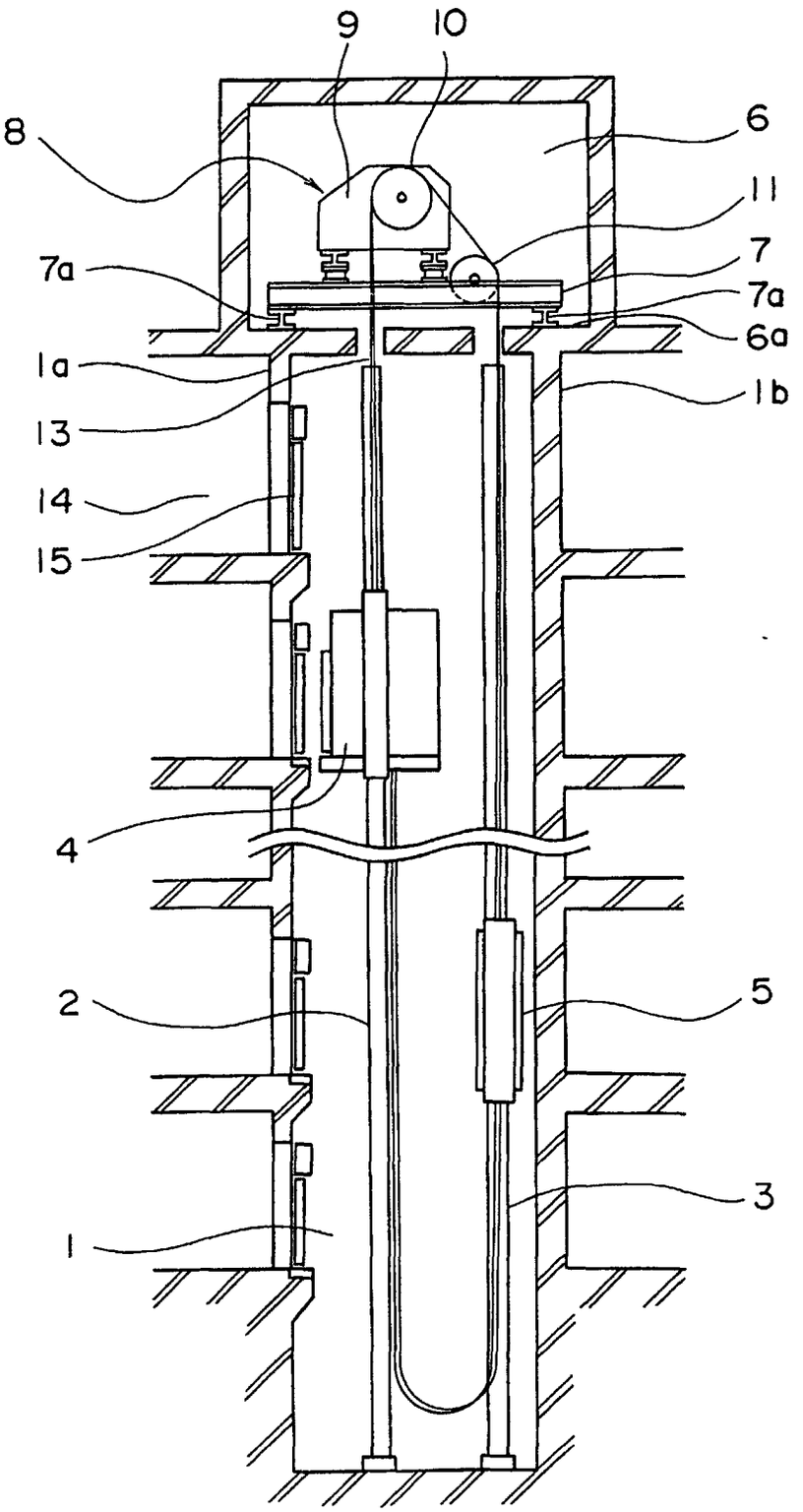
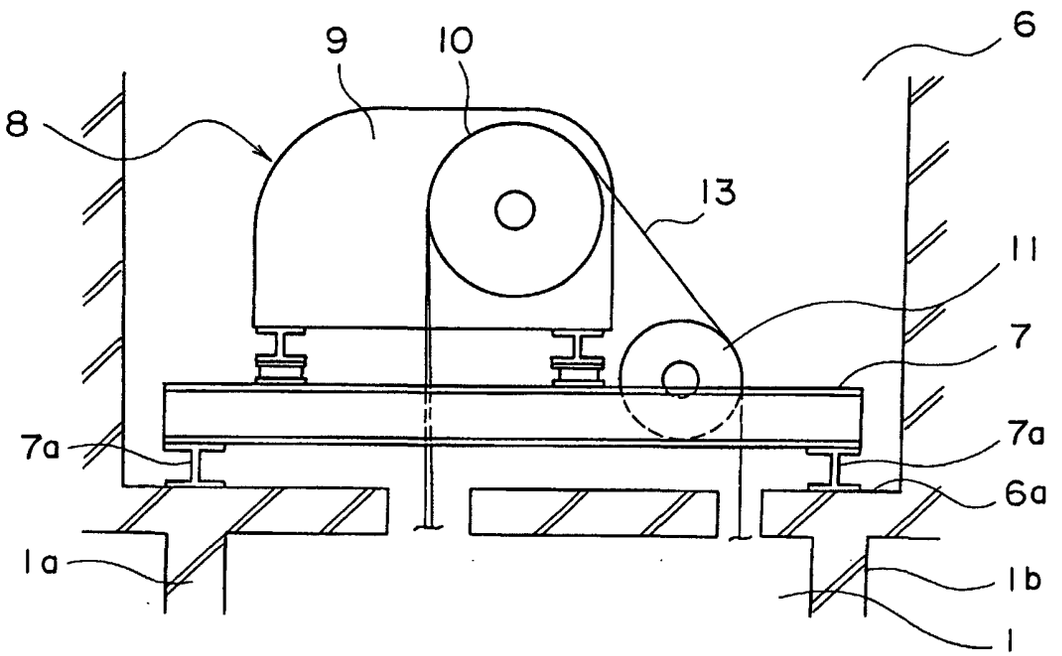


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP00/06099

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B11/04, B66B 7/00

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[7] B66B11/04, B66B 7/00

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.
X Y	JP, 4-7292, A (Mitsubishi Electric Corporation), 10 January, 1992 (10.01.92), (Family: none)	1-2 3-5
Y	JP, 61-248884, A (Mitsubishi Electric Corporation), 06 November, 1986 (06.11.86), (Family: none)	3-4
Y	JP, 7-267534, A (Inventio AG), 17 October, 1995 (17.10.95), & AU, 1353495, A & BR, 9500779, A & CA, 2142072, A & CZ, 9500523, A & EP, 0672781, A1 & FI, 950936, A & HK, 1011392, A & NO, 950796, A & PL, 307384, A	5
A	JP, 60-87181, A (Shouzou TAKEMURA, Hitachi Seisakusho K.K.), 16 May, 1985 (16.05.85), (Family: none)	1-5

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 May, 2001 (22.05.01)	29 May, 2001 (29.05.01)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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