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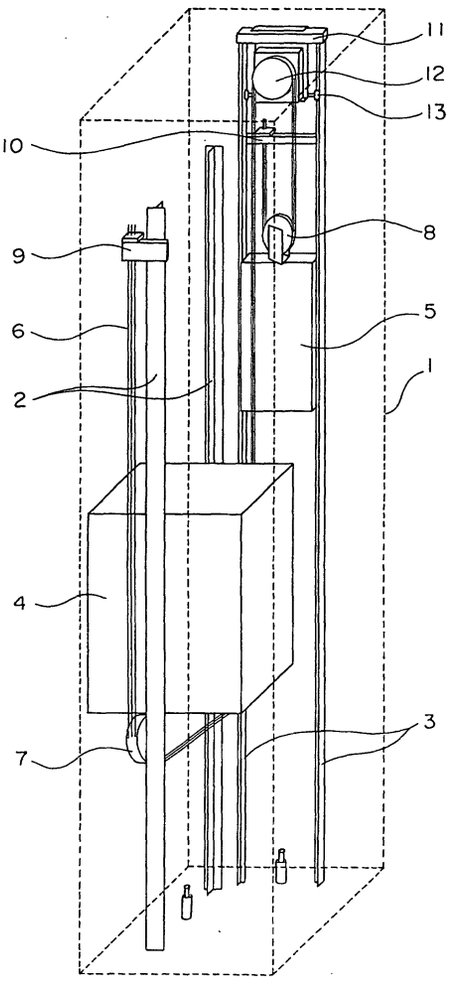
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(54) ELEVATOR DEVICE

(57) In an elevator apparatus, mounting brackets are fixed to top portions of a pair of guide rails, respectively, and a machine base is fixed between the mounting brackets. A hoisting machine for raising and lowering a car and a counterweight is supported by the guide rails by being suspended from the machine base. A bracketing for preventing the hoisting machine from swaying by engaging the guide rail is attached to the hoisting machine.

FIG. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to a machine-room-less type elevator apparatus that does not have a specialized machine room for installing a driving machine where the hoisting machine is disposed in a hoistway.

BACKGROUND ART

[0002] Conventionally, for example, Japanese Patent Application Laid-Open No. Hei 8-208152 shows an elevator in which a machine base is fixed to upper portions of one or more guide rails and a hoisting machine is installed on the machine base. However, in such a construction, there is a need to provide a bracketing (bracing) for the hoisting machine between the wall of the hoistway and the hoisting machine, thereby complicating the construction and increasing the cost.

[0003] Further, although a method where the hoisting machine is attached to the middle portions of the guide rails and the bracketing is supported by portions of the guide rails extending above the hoisting machine are conceivable, this requires special processes for providing reamer bolts, knock pins or the like to the guide rails for attaching the hoisting machine to the middle portions of the guide rails, thereby increasing the cost.

DISCLOSURE OF THE INVENTION

[0004] The present invention is made to solve the problems mentioned above, and an object of the present invention is to provide an elevator apparatus, wherein a hoisting machine can be supported by guide rails with a simple construction, thereby reducing the cost.

[0005] To this end, according to one aspect of the present invention, there is provided an elevator apparatus comprising: a hoistway; a plurality of guide rails installed in the hoistway; a car and a counterweight guided by the guide rails to be raised and lowered in the hoistway; a main rope suspending the car and the counterweight in the hoistway; and a hoisting machine suspended from a top portion of at least one of the guide rails to be supported by the guide rail for raising and lowering the car and the counterweight through the main rope.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

Fig. 1 is a perspective view showing an elevator apparatus according to a first embodiment of the present invention;
Fig. 2 is a front view showing an essential portion in Fig. 1;
Fig. 3 is a cross-sectional view along the line III-III in Fig. 2;
Fig. 4 is a cross-sectional view along the line IV-IV in Fig. 2;
Fig. 5 is a plan view showing the bracketing in Fig. 2;
Fig. 6 is a side view showing the bracketing in Fig. 5;
Fig. 7 is a front view showing the bracketing in Fig. 5;
Fig. 8 is a front view showing an essential portion of an elevator apparatus according to a second embodiment of the present invention;
Fig. 9 is a cross-sectional view along the line IX-IX in Fig. 8;
Fig. 10 is a cross-sectional view along the line X-X in Fig. 8;
Fig. 11 is a front view showing an essential portion of an elevator apparatus according to a third embodiment of the present invention;
Fig. 12 is a cross-sectional view along the line XII-XII in Fig. 11;
Fig. 13 is a cross-sectional view along the line XIII-XIII in Fig. 11;
Fig. 14 is a front view showing an essential portion of an elevator apparatus according to a fourth embodiment of the present invention;
Fig. 15 is a cross-sectional view along the line XV-XV in Fig. 14;
Fig. 16 is a cross-sectional view along the line XVI-XVI in Fig. 14;
Fig. 17 is a front view showing an essential portion of an elevator apparatus according to a fifth embodiment of the present invention;
Fig. 18 is a cross-sectional view along the line XVIII-XVIII in Fig. 17;
Fig. 19 is a cross-sectional view along the line XIX-XIX in Fig. 17;
Fig. 20 is a front view showing an essential portion of an elevator apparatus according to a sixth embodiment of the present invention;
Fig. 21 is a cross-sectional view along the line XXI-XXI in Fig. 20;
Fig. 22 is a cross-sectional view along the line XXII-XXII in Fig. 20;
Fig. 23 is a front view showing an essential portion of an elevator apparatus according to a seventh embodiment of the present invention;
Fig. 24 is a cross-sectional view along the line XXIV-XXIV in Fig. 23;
Fig. 25 is a cross-sectional view along the line XXV-XXV in Fig. 23;
Fig. 26 is a front view showing an essential portion of an elevator apparatus according to an eighth embodiment of the present invention;
Fig. 27 is a cross-sectional view along the line XXVII-XXVII in Fig. 26; and
Fig. 28 is a cross-sectional view along the line XXVIII-XXVIII in Fig. 26.

BEST MODE FOR CARRYING OUT THE INVENTION

[0007] Preferred embodiments of the present invention will be described below with reference to the accompanying drawings.

First Embodiment

[0008] Fig. 1 is a perspective view showing an elevator apparatus according to a first embodiment of the present invention. In the figure, a pair of car guide rails 2 and a pair of counterweight guide rails 3 are installed in a hoistway 1. A car 4 is guided by the car guide rails 2 and raised and lowered in the hoistway 1. A counterweight 5 is guided by the counterweight guide rails 3 and raised and lowered in the hoistway 1.

[0009] The car 4 and the counterweight 5 are suspended in the hoistway 1 by a main rope 6. A pair of car suspending sheaves 7 around which the main rope 6 is wound are provided at a bottom portion of the car 4. A counterweight suspending sheave 8 around which the main rope 6 is wound is provided at a top portion of the counterweight 5.

[0010] One end portion of the main rope 6 is fixed to a car side rope fixing member 9 fixed to a top portion of one of the car guide rails 2. The other end portion of the main rope 6 is fixed to a counterweight side rope fixing member 10 installed between the counterweight guide rails 3.

[0011] A machine base 11 is installed between the top portions of the pair of counterweight guide rails 3. A hoisting machine 12 for raising and lowering the car 4 and the counterweight 5 is suspended and supported by the machine base 11. A pair of bracketings 13 are fixed to the hoisting machine 12. These bracketings 13 prevent the hoisting machine 12 from swaying (swinging) in a horizontal direction by engaging with the counterweight guide rails 3.

[0012] Fig. 2 is a front view showing an essential portion in Fig. 1, Fig. 3 is a cross-sectional view along the line III-III in of Fig. 2, and Fig. 4 is a cross-sectional view along the line IV-IV in Fig. 2. In the figures, mounting brackets 14 are fixed to the top portions of the pair of counterweight guide rails 3, respectively. Each mounting bracket 14 has a horizontal contact portion 14a which contacts the upper end surface of the counterweight guide rail 3. Further, the mounting brackets 14 are fixed to the counterweight guide rails 3 by a plurality of nut and bolt sets 15 by using rail extension holes previously provided at the rail ends.

[0013] The machine base 11 is fixed on the pair of contact portions 14a. The hoisting machine 12 has a pair of hoisting machine suspending members 16 bolted to the machine base 11. The pair of bracketings 13 are fixed to the pair of hoisting machine suspending members 16, respectively.

[0014] Fig. 5 is a plan view showing the bracketing 13 in Fig. 2, Fig. 6 is a side view showing the bracketing 13 in Fig. 5, and Fig. 7 is a front view showing the bracketing 13 in Fig. 5. The bracketing 13 has a frame 13a made of metal and elastic members 13b adhered to the frame 13a to contact the counterweight guide rail 3.

[0015] In such an elevator apparatus, since the hoisting machine 12 is suspended from the top portions of the counterweight guide rails 3, the hoisting machine 12 can be supported with a simple construction, thereby reducing the cost. Also, since the bracketings 13 engaging with the counterweight guide rails 3 are used, installation is facilitated, and the construction can further be simplified as compared with a case where the bracketings are fixed to the wall of the hoistway 1.

[0016] Further, since the hoisting machine 12 is suspended through the machine base 11, differences in the distance between the counterweight guide rails 3 can be absorbed by the machine base 11, so that commonality in the hoisting machine 12 can be achieved.

[0017] Furthermore, since the mounting brackets 14 for fixing the machine base 11 to the counterweight guide rails 3 are fixed to the counterweight guide rails 3 by using the rail extension holes previously provided at the rail ends, there is no need to carry out a special process for providing reamer bolts, knock pins or the like to the counterweight guide rails 3, thereby reducing cost.

Second Embodiment

[0018] Next, Fig. 8 is a front view showing an essential portion of an elevator apparatus according to a second embodiment of the present invention, Fig. 9 is a cross-sectional view along the line IX-IX in Fig. 8, and Fig. 10 is a cross-sectional view along the line X-X in Fig. 8.

[0019] In the first embodiment, the hoisting machine 12 is suspended from the top portions of the counterweight guide rails 3 through the machine base 11. In contrast, connecting portions 12a provided at the hoisting machine 12 are fixed to the contact portions 14a of the mounting brackets 14 by a plurality of bolts 17 in the second embodiment. The connecting portions 12a are horizontally projected from the upper end portion of the hoisting machine 12. The other constructions are the same as in the first embodiment.

[0020] In such an elevator apparatus, since the connecting portions 12a of the hoisting machine 12 are directly fixed to the mounting brackets 14 without using the machine base, the construction can be simplified by reducing the number of parts, and installation can be facilitated.

Third Embodiment

[0021] It should be noted that, while, in the first embodiment, the bracketings 13 engaging with the counterweight guide rails 3 are fixed to the hoisting machine 12, the bracketings may be omitted, for example, as shown in Figs. 11 to 13 when the hoisting machine 12 is resistant to sway, for example, in the case where a

relatively small sized hoisting machine 12 is used.

Fourth Embodiment

[0022] Further, for example, as shown in Figs. 14 to 16, the bracketing may be omitted with a construction similar to that in the second embodiment.

Fifth Embodiment

[0023] Next, Fig. 17 is a front view showing an essential portion of an elevator apparatus according to a fifth embodiment of the present invention, Fig. 18 is a cross-sectional view along the line XVIII-XVIII in Fig. 17, and Fig. 19 is a cross-sectional view along the line XIX-XIX in Fig. 17.

[0024] In this fifth embodiment, elastic members 21 are interposed between the mounting brackets 14 and the machine base 11. The other constructions are the same as in the first embodiment.

[0025] In such an elevator apparatus, vibrations from the hoisting machine 12 can be prevented by the elastic members 21 from being transmitted to the counterweight guide rails 3.

Sixth Embodiment

[0026] Next, Fig. 20 is a front view showing an essential portion of an elevator apparatus according to a sixth embodiment of the present invention, Fig. 21 is a cross-sectional view along the line XXI-XXI in Fig. 20, and Fig. 22 is a cross-sectional view along the line XXII-XXII in Fig. 20.

[0027] In this sixth embodiment, the elastic members 21 are interposed between the connecting portions 12a of the machine base 12 and the mounting brackets 14. The other constructions are the same as in the second embodiment.

[0028] In such an elevator apparatus, vibrations from the hoisting machine 12 can be prevented by the elastic members 21 from being transmitted to the counterweight guide rails 3.

Seventh Embodiment

[0029] It should be noted that, while, in the fifth embodiment, the bracketings 13 engaging with the counterweight guide rails 3 are fixed to the hoisting machine 12, the bracketings may be omitted, for example, as shown in Figs. 23 to 25 when the hoisting machine 12 is resistant to sway, for example, in the case where a relatively small sized hoisting machine 12 is used.

Eighth Embodiment

[0030] Further, for example, as shown in Figs. 26 to 28, the bracketing may be omitted with a construction similar to that in the sixth embodiment.

[0031] It should be noted that, while, in the fifth to eighth embodiments, the hoisting machine 12 is supported by the counterweight guide rails 3, it is also possible for the hoisting machine 12 to be supported by the car guide rails 2 or by the car guide rails 2 and the counterweight guide rails 3 depending upon the layout.

Claims

1. An elevator apparatus comprising:

   a hoistway;
   a plurality of guide rails installed in said hoistway;
   a car and a counterweight guided by said guide rails to be raised and lowered in said hoistway;
   a main rope suspending said car and said counterweight in said hoistway; and
   a hoisting machine suspended from a top portion of at least one of said guide rails to be supported by said guide rail for raising and lowering said car and said counterweight through said main rope.

2. An elevator apparatus according to claim 1, further comprising a machine base installed between the top portions of said guide rails, wherein said hoisting machine is suspended under said machine base.

3. An elevator apparatus according to claim 1, wherein a bracketing for preventing said hoisting machine from swaying by engaging with said guide rail is attached to said hoisting machine.

4. An elevator apparatus according to claim 3, wherein said bracketing has a frame fixed to said hoisting machine, and an elastic member provided at said frame to contact said guide rail.

5. An elevator apparatus according to claim 1, wherein said hoisting machine is provided with a connecting portion horizontally projected from its upper end portion, and said connecting portion is fixed to the top portion of said guide rail.

6. An elevator apparatus according to claim 1, further comprising a mounting bracket fixed to the top portion of said guide rail by using a previously provided rail extension hole, wherein said hoisting machine is suspended from the top portion of said guide rail through said mounting bracket.

7. An elevator apparatus according to claim 1, wherein an elastic member for preventing vibrations of said hoisting machine from transmitting to said guide rail is interposed between said hoisting machine and

said guide rail.

FIG. 1

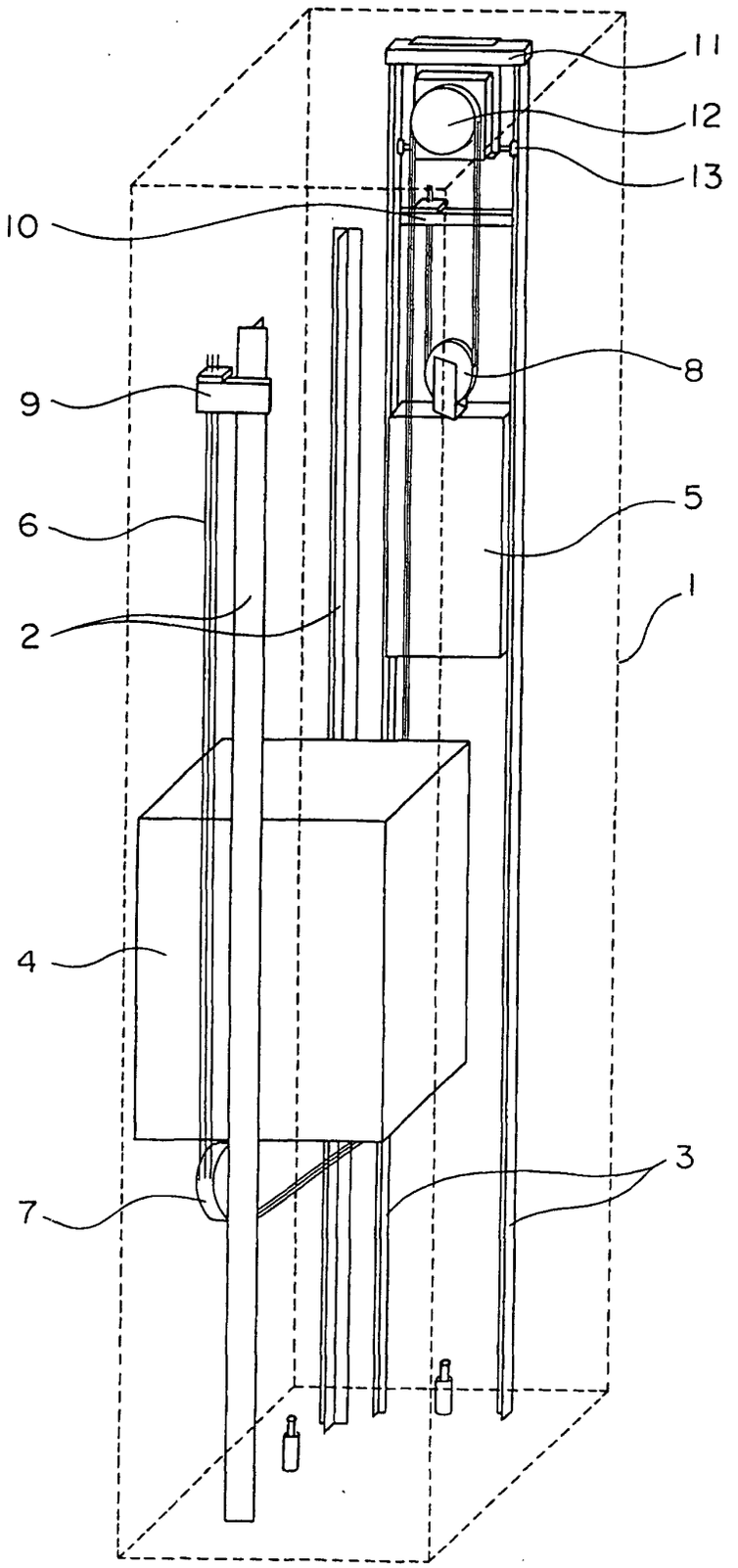


FIG. 2

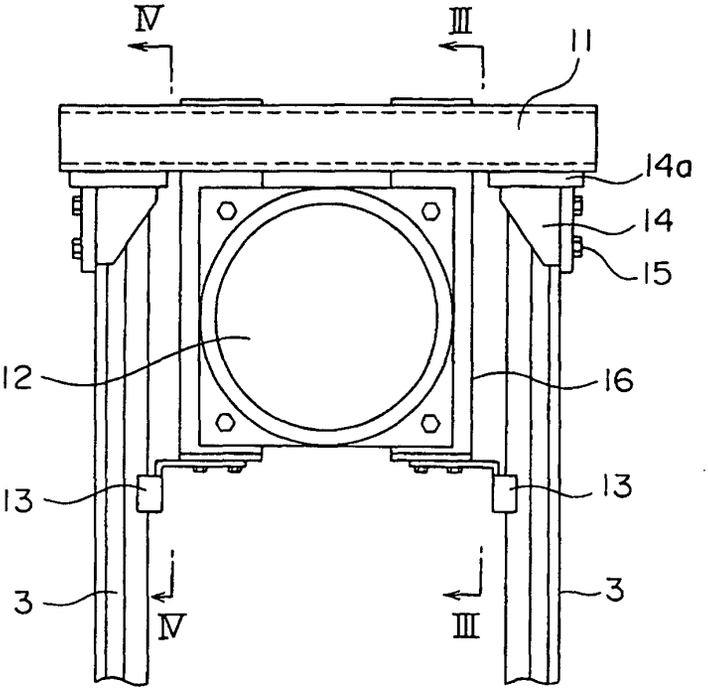


FIG. 3

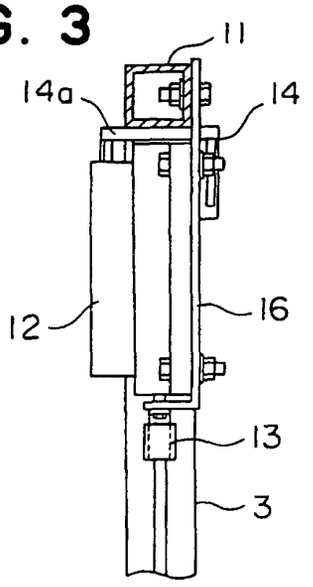


FIG. 4

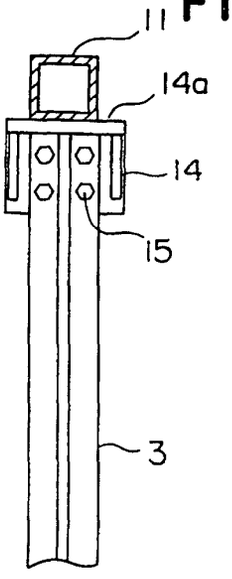


FIG. 5

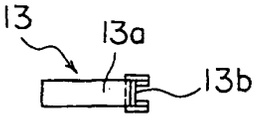
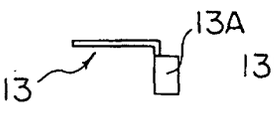


FIG. 6



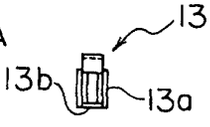


FIG. 7

FIG. 8

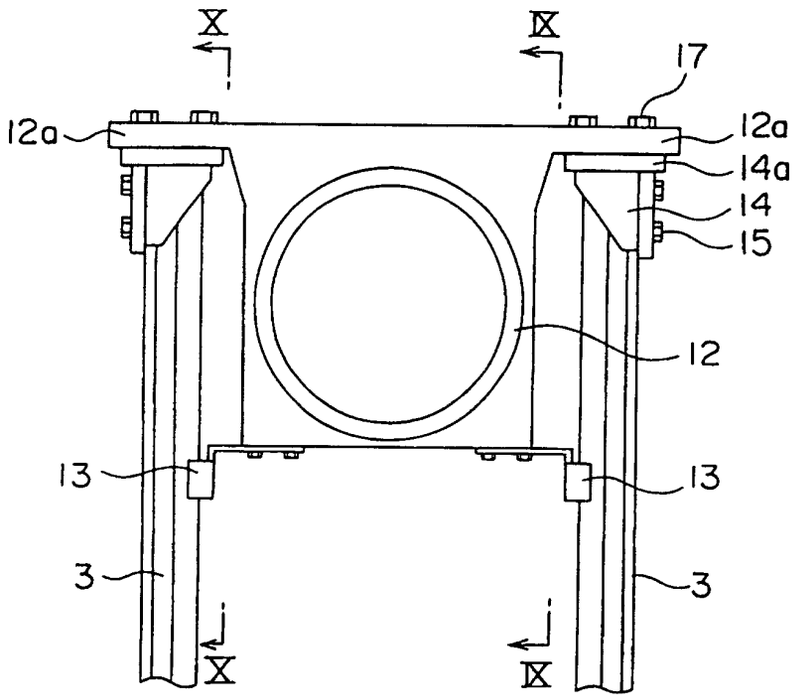


FIG. 9

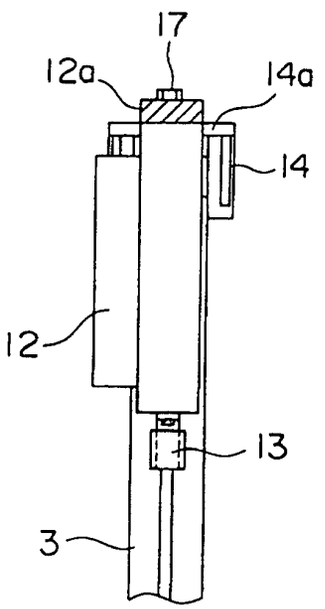


FIG. 10

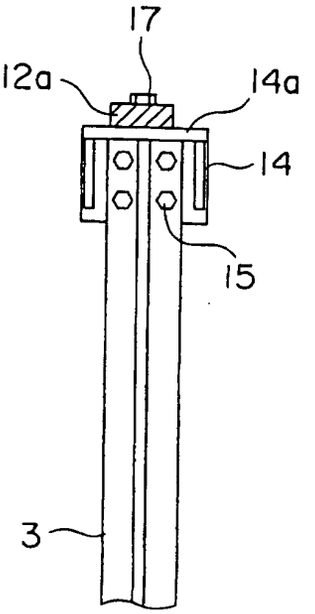


FIG. 11

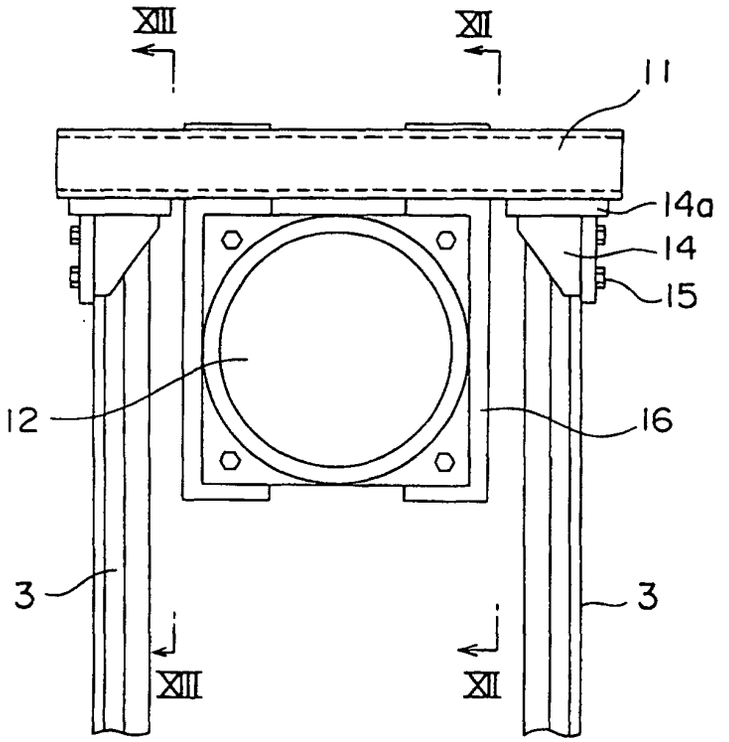


FIG. 12

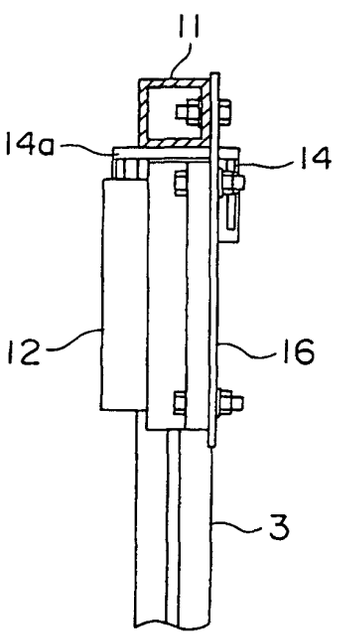


FIG. 13

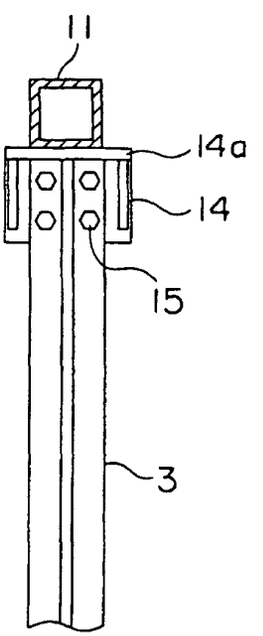


FIG. 14

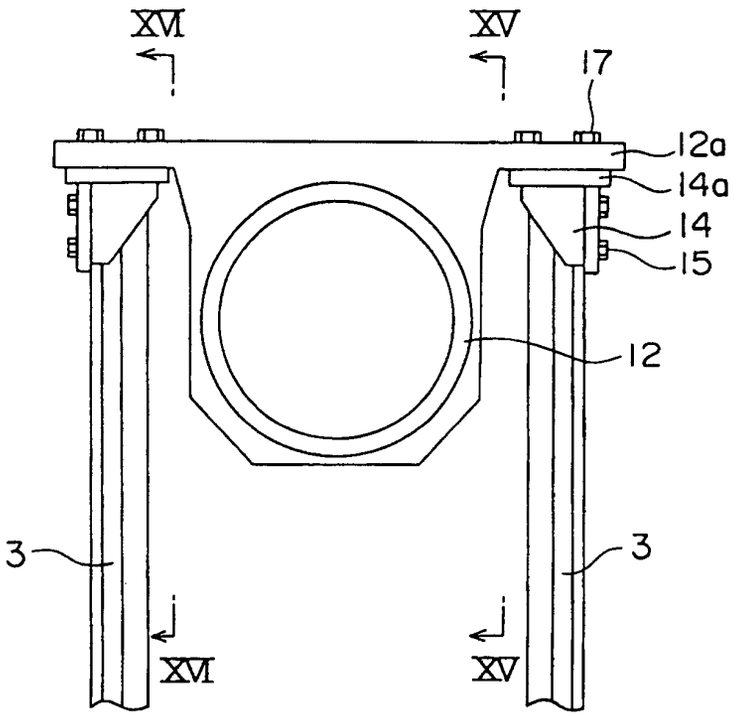


FIG. 15

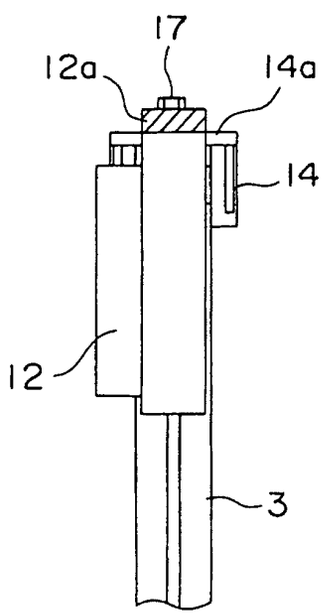


FIG. 16

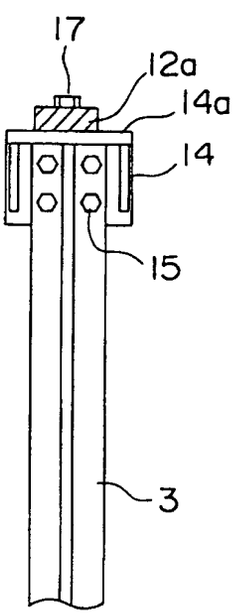


FIG. 17

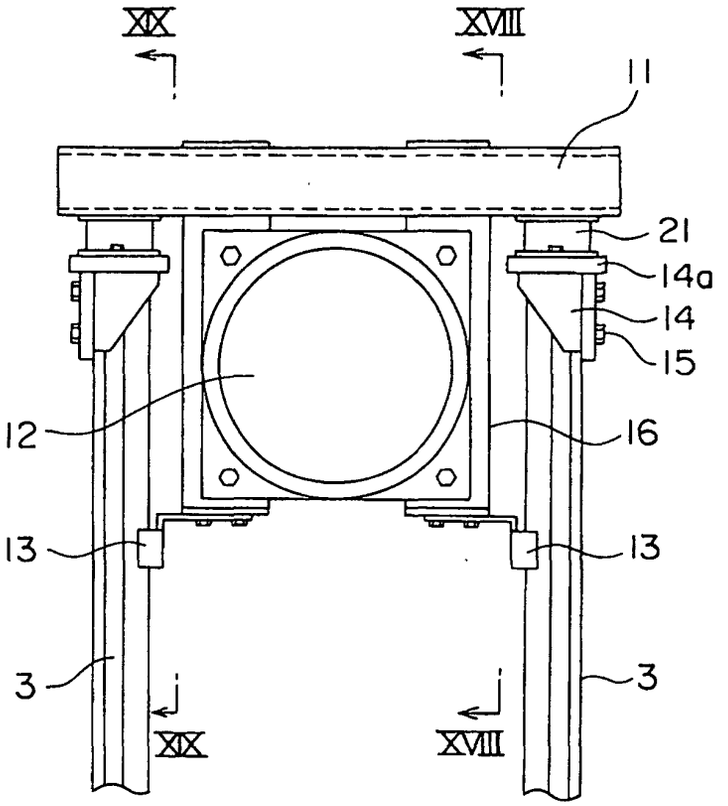


FIG. 18

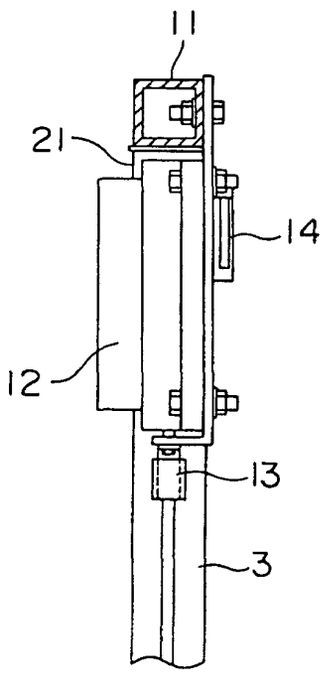


FIG. 19

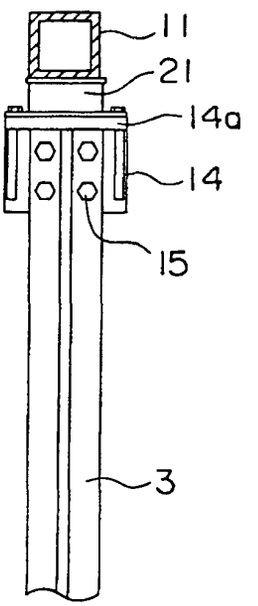


FIG. 20

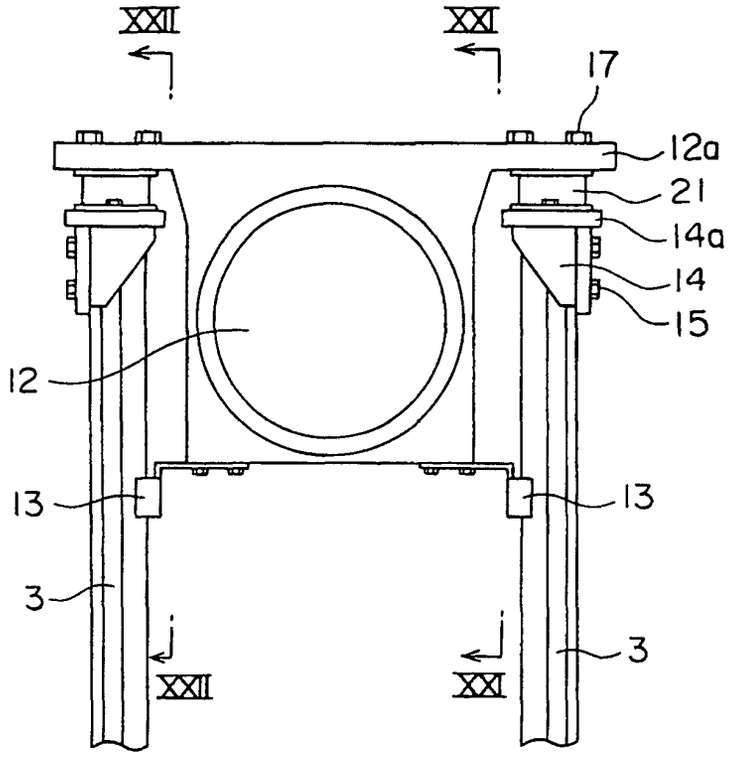


FIG. 21

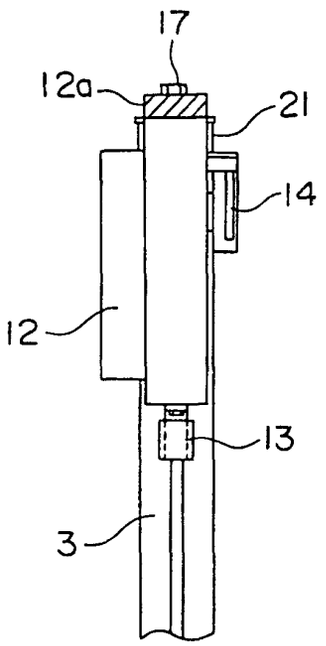


FIG. 22

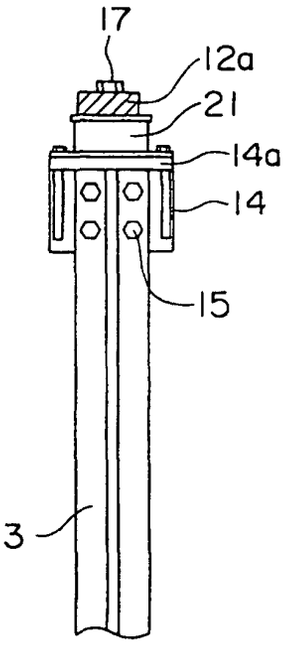


FIG. 23

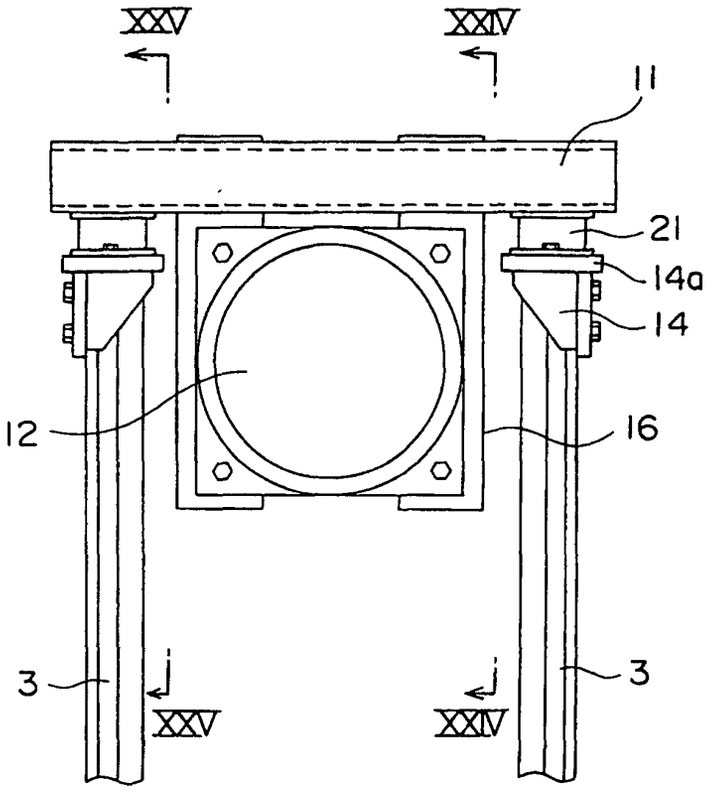


FIG. 24

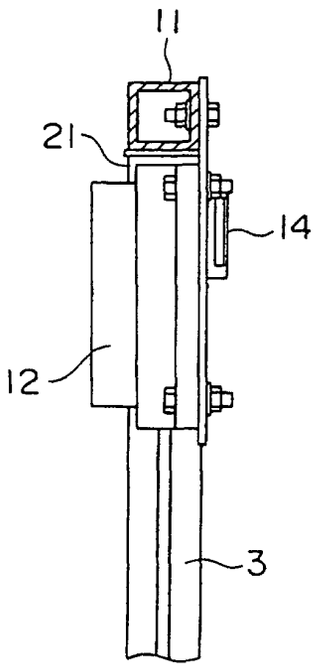


FIG. 25

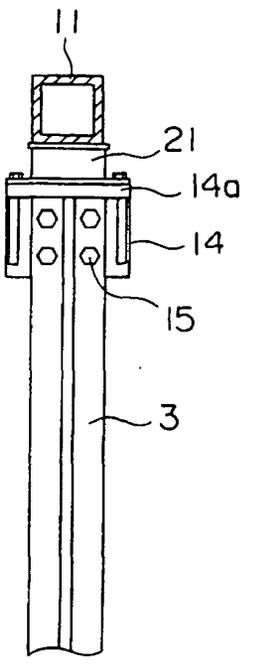


FIG. 26

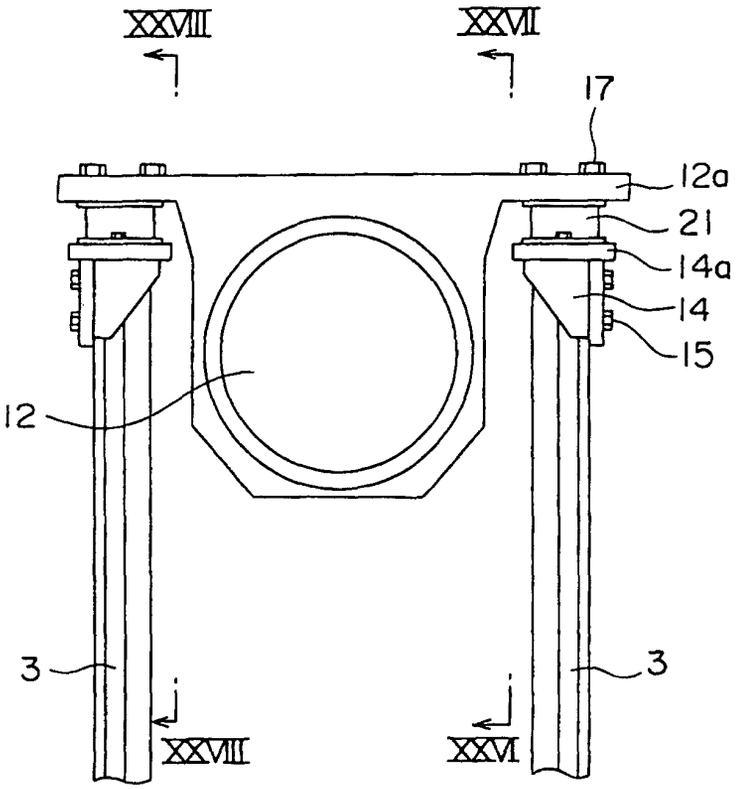


FIG. 27

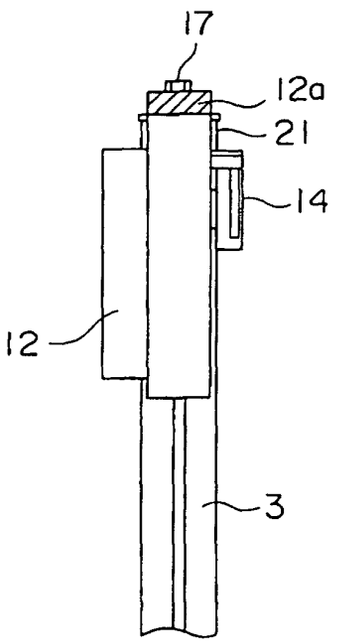
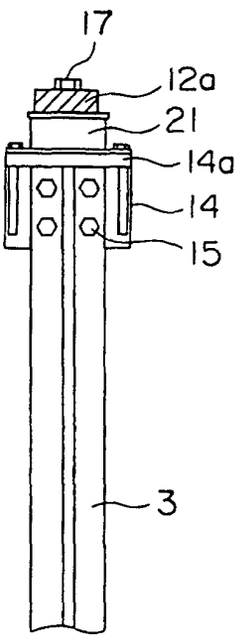


FIG. 28



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP00/02668

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B 7/00, 11/04

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] B66B 7/00-11/08

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 1996-2000
Kokai Jitsuyo Shinan Koho 1971-2000 Toroku Jitsuyo Shinan Koho 1994-2000

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, 2000-153973, A (Nippon Elevator Seizou K.K.), 06 June, 2000 (06.06.00), (Family: none)	1-7
Y	JP, 2000-44146, A (Hitachi Ltd.), 15 February, 2000 (15.02.00), (Family: none)	1-7
Y	JP, 7-144857, A (Kone Oy) 06 June, 1995 (06.06.95), & EP, 0631966, A2 & SI, 631966, T & US, 5490578, A & CA, 2126259, A & BR, 9402574, A & AU, 6590794, A & FI, 942432, A & CN, 1105339, A	1-7
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12 September, 2000 (12.09.00)	19 September, 2000 (19.09.00)
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