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(71) Applicant: **MITSUBISHI DENKI KABUSHIKI KAISHA**
Tokyo 100-8310 (JP)

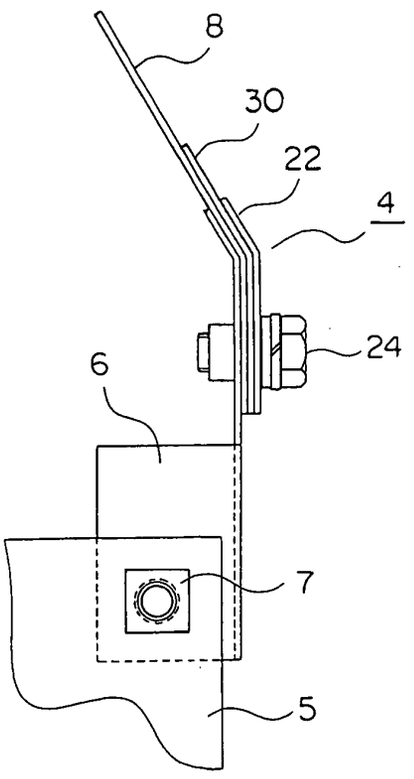
(72) Inventors:
- **KITAZAWA, Tadashi**
  Inazawa-shi, Aichi 492-8161 (JP)
- **URAKAWA, Hidehiko**
  Chiyoda-ku, Tokyo 100-8310 (JP)

(74) Representative: **HOFFMANN - EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

(54) ELEVATOR DEVICE

(57) The elevator system includes a cage moving up and down within an elevator shaft, a counterweight moving up and down within the elevator shaft in linkage with the cage, a rope (s) for suspending the cage and the counterweight within the elevator shaft, a wheel around which the rope (s) is wound partially, a drive unit for moving up and down the cage and the counterweight by driving the rope(s), and an intrusion preventing fixture disposed in the vicinity of an entrance/exit port for the rope (s) moving toward/away from the wheel for preventing falling objects from intruding into between the wheel and the rope(s) through the entrance/exit port for the rope (s), wherein the intrusion preventing fixture mounted on a mounting member is so arranged that the intrusion preventing fixture can be rotated relative to the mounting member around a pivotal point so that distance between a tip end of the intrusion preventing fixture and the rope (s) can be adjusted.

FIG. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to an elevator system in which an elevator car or cage and a counterweight are moved up and down by driving a rope or ropes wound partially around a sheave or the like.

BACKGROUND TECHNIQUE

[0002] Figure 10 is a side elevational view showing a major portion of a conventional elevator system known heretofore. Referring to the figure, intrusion preventing fixtures 20 are disposed in the vicinity of entrance/exit ports for a rope or ropes 2 moving toward/away from a sheave for preventing intrusion of falling objects into between the sheave and the rope(s) through the entrance/exit ports for the ropes 2.

[0003] The intrusion preventing fixture 20 mentioned above is comprised of a base member 21 which is slidingly movable relative to a hoisting machine 1, a bracket 26 of a chevron-like cross-section which is fixedly secured to the base member 21 by means of clamps 37, and a contact member 38 sandwiched between the bracket 26 and a holding plate 32 and fixedly secured by a clamp 34. The contact member 38 is made of urethane (carbamic acid ester) which is an elastic material and so disposed closely to the rope(s) 2 that a tip end of the contact member can be brought into contact with the rope(s) 2.

[0004] By the way, in the course of installation of the elevator system or maintenance and inspection thereof, there may occur such event that falling objects such as small concrete blocks, screws, nuts and/or the like fall from the top of the elevator shaft to intrude into between the rope(s) and the sheave. As the cage and the counterweight are moved up and down, the falling objects will become sandwiched between the sheave and the rope (s) 2, as a result of which the rope(s) is injured or damaged, whereby the life of the rope(s) 2 is remarkably shortened.

[0005] With a view to suppressing the inconvenience mentioned above, the intrusion preventing fixture(s) 20 is mounted in the vicinity of the entrance/exit ports for the rope (s) 2 moving to/away from the sheave in order to prevent the falling objects from entering or intruding into between the rope(s) and the sheave.

[0006] In this conjunction, it is noted that when a deflection angle of the rope changes in dependence on the layout of the installation, distance between the contact member 38 and the rope (s) 2 is adjusted by sliding the intrusion preventing fixture 20 relative to the hoisting machine 1. Accordingly, the distance mentioned above has to be set on the presumption of the maximum change of the deflection angle. As a result of this, the distance for which the intrusion preventing fixture 20 is moved relative to the hoisting machine 1 increases correspondingly, which in turn means that the space required for mounting the intrusion preventing fixture increases, giving rise to a problem.

DISCLOSURE OF THE INVENTION

[0007] With the present invention, it is contemplated to solve the problem mentioned above, and thus it is an object of the present invention to provide an elevator system in which the space demanded for mounting the intrusion preventing fixture can be decreased without being influenced by a large change of the deflection angle of the rope(s).

[0008] The elevator system according to the present invention includes a cage moving up and down within an elevator shaft, a counterweight moving up and down within the elevator shaft in linkage with the cage, a rope (s) for suspending the cage and the counterweight within the elevator shaft, a wheel around which the rope(s) is wound partially, a drive unit for moving up and down the cage and the counterweight by driving the rope(s), and an intrusion preventing fixture disposed in the vicinity of an entrance/exit port for the rope (s) moving toward/away from the wheel for preventing falling objects from intruding into between the wheel and the rope(s) through the entrance/exit port for the rope(s), wherein the intrusion preventing fixture mounted on a mounting member is so arranged that the intrusion preventing fixture can be rotated relative to the mounting member around a pivotal point so that distance between a tip end of the intrusion preventing fixture and the rope(s) can be adjusted.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

Figure 1 is a front view showing an intrusion preventing fixture in the elevator system according to a first implementation mode of the present invention,

Fig. 2 is a right-hand side elevational view of the intrusion preventing fixture shown in Fig. 1,

Fig. 3 is a view showing a state in which the intrusion preventing fixtures shown in Fig. lare being put into action,

Fig. 4 is a right-hand side elevational view of the intrusion preventing fixture shown in Fig. 3,

Fig. 5 is a view for illustrating a manner in which a first contact member shown in Fig. 4 is detached from the intrusion preventing fixture,

Fig. 6 is a view showing a situation in which the intrusion preventing fixtures are being put into action upon driving of the elevator system,

Fig. 7 is an enlarged view of the intrusion preventing fixtures shown in Fig. 6,

Fig. 8 is a right-hand side elevational view of the intrusion preventing fixture shown in Fig. 7,

Fig. 9 is a view showing another mode in which the intrusion preventing fixtures are used, and
Fig. 10 is a front view of an intrusion preventing fixture employed heretofore in the elevator system known heretofore.

BEST MODES FOR CARRYING OUT THE INVENTION

[0010] In the following, description will be made of the preferred modes for carrying out the present invention, i.e., the implementation modes of the invention, by reference to the drawings in which components, members and locations which are same as or equivalent to those of the conventional system are denoted by like reference symbols.

Implementation Mode 1

[0011] Figure 1 is a front view showing an intrusion preventing fixture in the elevator system according to a first implementation mode of the present invention, Fig. 2 is a right-hand side elevational view of the intrusion preventing fixture shown in Fig. 1, Fig. 3 is a view showing a state in which the intrusion preventing fixture shown in Fig. 1 is being used or put into action, Fig. 4 is a right-hand side elevational view of the intrusion preventing fixture shown in Fig. 3, Fig. 5 is a view for illustrating a manner in which a first contact member shown in Fig. 4 is detached from the intrusion preventing fixture, Fig. 6 is a view showing a mode in which the intrusion preventing fixture is put into action upon driving of the elevator system, Fig. 7 is an enlarged view of the intrusion preventing fixture shown in Fig. 6, and Fig. 8 is a right-hand side elevational view of the intrusion preventing fixture shown in Fig. 7.

[0012] The elevator system now under consideration includes an elevator car or a cage (not shown) adapted to move up and down within an elevator shaft, a counterweight (not shown either) adapted to move up and down within the elevator shaft in linkage with the cage, ropes 2 for suspending the cage and the counterweight within the elevator shaft, a sheave 3 around which the ropes 2 are wound partially and an electric motor constituting a major part of a drive unit for driving the sheave 3. The elevator system is further equipped with a hoisting machine 1 for moving up or down the cage and the counterweight through the medium of the ropes 2 by driving the electric motor and intrusion preventing fixtures 4 disposed in the vicinity of both entrance/exit ports for the ropes 2 moving forward/away from the sheave 3 so as to be adjustable in respect to an angle relative to the ropes 2 for preventing falling objects from intruding into between the sheave 3 and the ropes 2 through the entrance/exit ports for the ropes 2.

[0013] The intrusion preventing fixture 4 is comprised of a bracket 6 fixedly secured by a first clamp 7 to a mounting platform 5 which in turn is secured to the hoisting machine 1 to serve as a mounting member, a holding plate 22, and a first contact member 8 and a second contact member 30 sandwiched between the bracket 6 and the holding plate 22 and secured together by means of second clamps 24. The first contact member 8 and the second contact member 30 are made of urethane (carbamic acid ester) which is a typical one of elastic materials.

[0014] Formed in the first contact member 8 at a tip end portion thereof are a plurality of recesses 8a which are brought into contact with a plurality of ropes 2, respectively, while elongated through-holes 8b each of a large width are formed in a base end portion of the first contact member 8, extending in the direction in which the plural ropes 2 are arrayed, wherein the second clamp 24 are inserted into the elongated through-holes 8b, respectively. Further formed in the base end portion of the first contact member 8 are passages 8c extending to the elongated through-holes 8b, respectively. By providing these passages 8c, it is possible to detach the first contact member 8 from the bracket 6, the holding plate 22 and the second clamp 24.

[0015] The second contact member 30 superposed on the first contact member 8 is so arranged that the tip end thereof can be moved close to the ropes 2 by rotating the intrusion preventing fixture 4 around the first clamp 7 after the first contact member 8 has been detached.

[0016] Upon installation of the elevator system, the ropes 2 are firstly wound partially around the sheave 3 of the hoisting machine 1, whereon the intrusion preventing fixtures 4 are mounted on the mounting platform 5. In that case, the first clamp 7 and the second clamps 24 are loosened and then adjustment is so performed that the recesses 8a formed in the tip end portion of the first contact member 8 physically contact lightly the ropes 2, respectively. This adjustment can be realized by changing the angle of the bracket 6 relative to the mounting platform 6 and by moving leftward or rightward the first contact member 8 in the direction in which the ropes 2 are arrayed.

[0017] By virtue of the feature that the adjustment can be performed by rotating the intrusion preventing fixture 4 relative to the bracket 6 around the pivotal point defined by the first clamp 7, as described above, the space required for mounting the intrusion preventing fixture 4 can be reduced when compared with the conventional intrusion preventing fixture of sliding type.

[0018] Further, displacement of the first contact member 8 relative to the array of the ropes 2 can smoothly be realized because the elongated through-holes 8b extend in the direction in which the ropes are arrayed.

[0019] Furthermore, because the first contact member 8 is made of urethane, an elastic material, the ropes 2 brought into contact with the first contact member 8 can be protected against being injured or damaged.

[0020] Thus, by mounting at first the intrusion preventing fixture 4 upon installation of the elevator system as mentioned above, falling objects such as small concrete

blocks, screws, nuts and/or the like which may possibly fall from the top of the elevator shaft toward the sheave 3 in the course of installation strike against the first contact member 8 of the intrusion preventing fixture 4 to be thereby prevented from intruding into between the sheave 3 and the ropes 2.

[0021] After completion of the installation, the second clamp 24 is loosened and then the first contact member 8 is pulled out. In this conjunction, it will be appreciated that since the passages 8c communicating with the elongated through-holes 8b, respectively, are formed in the base end portion of the first contact member 8, it can easily be detached from the bracket 6, the holding plate 22 and the second clamp 24.

[0022] Subsequently, the second contact member 30 is fixedly secured between the bracket 6 and the holding plate 22 by tightening the second clamp 24.

[0023] In succession, the first clamp 7 is loosened, the intrusion preventing fixture 4 is rotated relative to the bracket 6 around the pivotal point defined by the first clamp 7 so that the distance t between the tip end of the second contact member 30 and the ropes 2 becomes equal to about 30 mm, and thereafter the first clamp 7 is tightened.

[0024] With the arrangement mentioned above, even when a few falling objects should fall from the top of the elevator shaft toward the sheave 3, as expected in the ordinary operation of the elevator system, the falling objects strike against the second contact member 30 of the intrusion preventing fixture 4 to be prevented from intruding into between the sheave 3 and the ropes 2.

[0025] Besides, because the second contact member 30 is made of urethane, an elastic material, the ropes 2 can be protected from being injured even if the ropes 2 contact with the second contact member 30.

[0026] In addition, even when the deflection angle of the ropes 2 changes in dependence on the layout for installation, this can be coped with by changing the angle of the intrusion preventing fixtures 4 relative to the mounting platform 5 in the vicinity of the entrance/exit ports located, respectively, on both sides of the sheave 3, as is shown in Fig. 9.

[0027] Incidentally, in the implementation mode of the invention described above, it has been assumed that the intrusion preventing fixture 4 is destined for preventing the falling objects from intruding into between the ropes 2 and the sheave 3 of the naked hoisting machine, i.e., the hoisting machine not housed within the machine room. However, it goes without saying that the intrusion preventing fixture can equally be provided for other wheels or roles such as suspension sheaves for the counterweight or the like destined for suspending the ropes within the elevator shaft.

[0028] Further, although it has been described that the contact members 8 and 30 are made of urethane, an elastic material, other material such as, for example, rubber can be employed, needless to say. Furthermore, exchange of the contact members 8 and 30 can easily be performed by detaching the second clamp 24 from the intrusion preventing fixture 4.

[0029] Moreover, although the mounting platform 5 secured to the hoisting machine 1 is employed as the mounting member for mounting the intrusion preventing fixtures 4 thereon, the intrusion preventing fixture may also be mounted directly on the hoisting machine itself, as the case may be.

INDUSTRIAL APPLICABLITY

[0030] As is apparent from the foregoing, the present invention can find application to the elevator system in which the cage and the counterweight are moved up and down by driving the ropes wound around the sheave and the like.

Claims

1. An elevator system, comprising a cage moving up and down within an elevator shaft, a counterweight moving up and down within said elevator shaft in linkage with said cage, a rope(s) for suspending said cage and said counterweight within the elevator shaft, a wheel around which said rope (s) is wound partially, a drive unit for moving up and down said cage and said counterweight by driving said rope(s), and an intrusion preventing fixture disposed in the vicinity of an entrance/exit port for said rope(s) moving toward/away from said wheel for preventing falling objects from intruding into between said wheel and said rope(s) through said entrance/exit port for said rope(s),

   wherein said intrusion preventing fixture mounted on a mounting member is so arranged that said intrusion preventing fixture can be rotated relative to said mounting member around a pivotal point so that distance between a tip end of said intrusion preventing fixture and said rope(s) can be adjusted.

2. An elevator system set forth in claim 1, wherein the intrusion preventing fixtures are disposed in the vicinity of both said entrance/exit ports which are provided on both sides of said wheel, respectively.

3. An elevator system set forth in claim 1 or claim 2, wherein said intrusion preventing fixture is comprised of a bracket fixedly secured to said mounting member by means of a first clamp at a location of said pivotal point, a holding plate, and a contact member sandwiched between said bracket and said holding plate and secured fixedly by means of a second clamp, and wherein the tip end of said contact member points to said ropes.

4. An elevator system set forth in claim 3, wherein said

contact member is made of an elastic material.

5. An elevator system set forth in claim 3 or claim 4, wherein a tip end portion of said contact member is formed with a plurality of recesses which are brought into contact with a plurality of said ropes, respectively.

6. An elevator system set forth in any one of claims 3 to 5, wherein a plurality of elongated through-holes each of a large width extending in the direction in which said plural ropes are arrayed are formed in a base end portion of said contact member with said second clamps being inserted into said elongated through-holes, respectively, and wherein said contact member can adjustably be displaced relative to said bracket in said direction in which said ropes are arrayed.

7. An elevator system set forth in claim 6, wherein passages communicating with said elongated through-holes, respectively, are formed in said base end portion of said contact member such that said contact member can be detached from said bracket, said holding plate and said second clamp through the medium of said passages.

8. An elevator system set forth in any one of claims 5 to 7, wherein an additional contact member is provided, being superposed on said contact member, and wherein said additional contact member is so arranged that a tip end thereof can be moved closely to said ropes by rotation of said intrusion preventing fixture around said first clamp.

FIG. 1

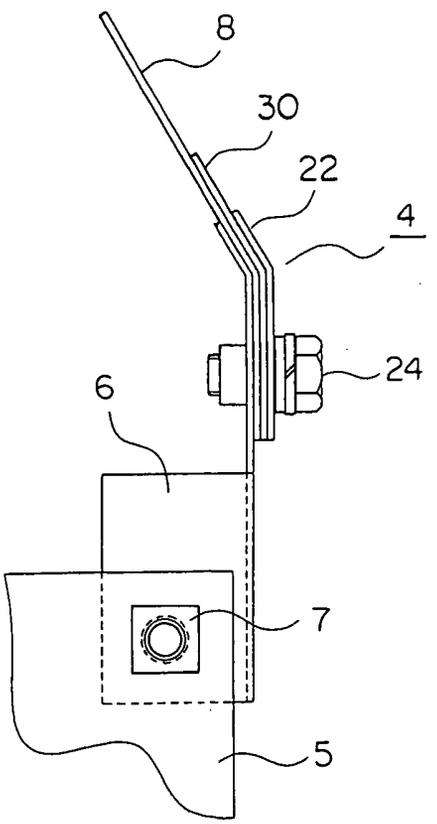


FIG. 2

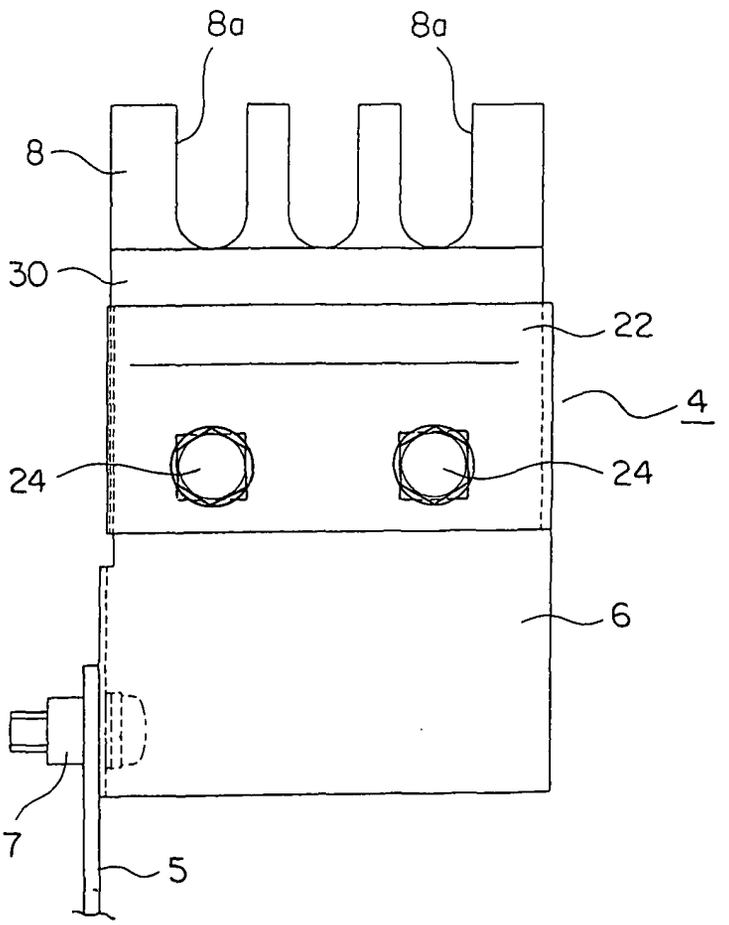


FIG. 3

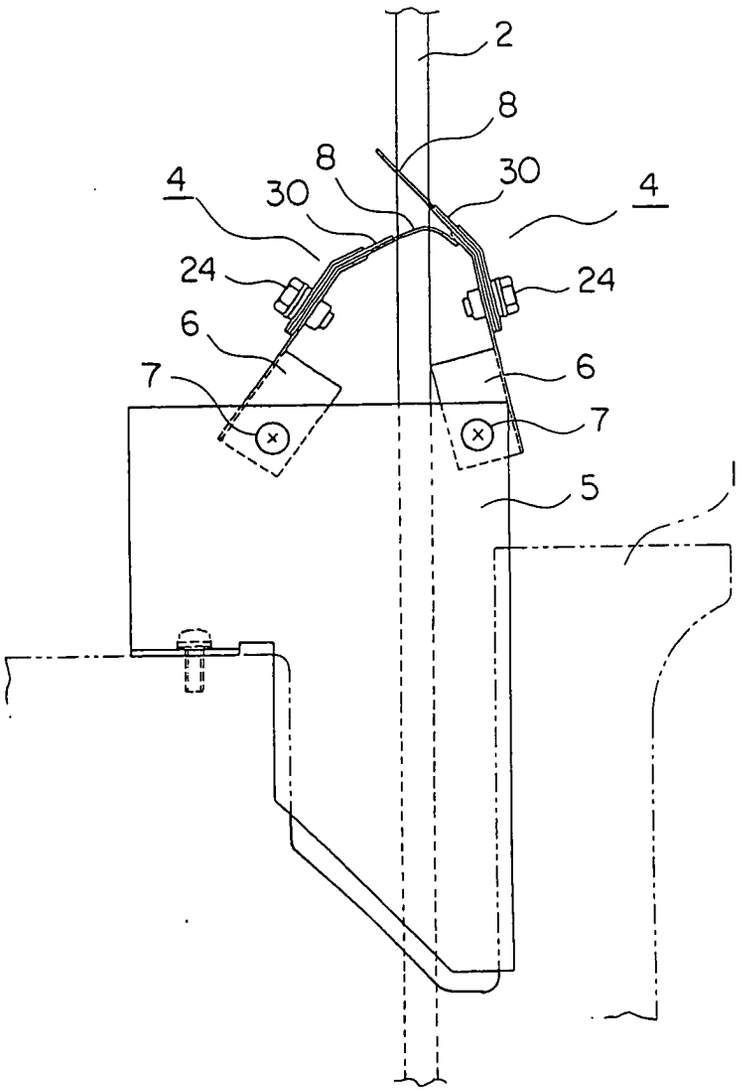


FIG. 4

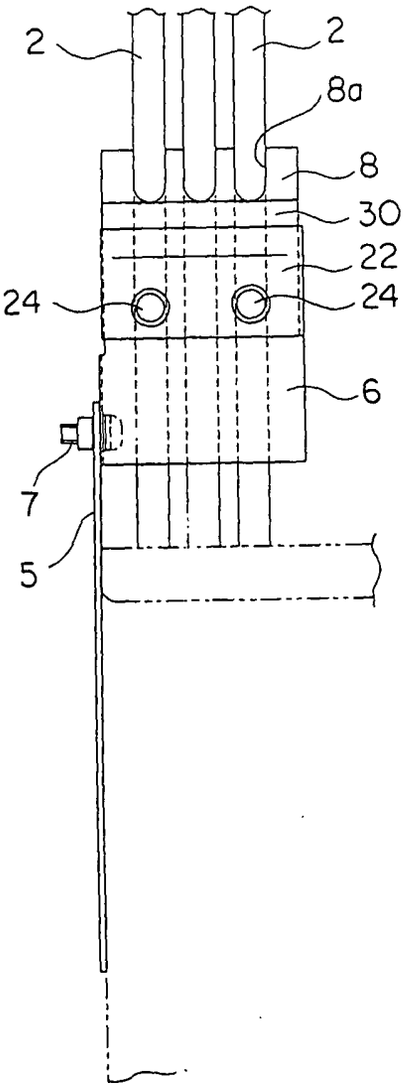


FIG. 5

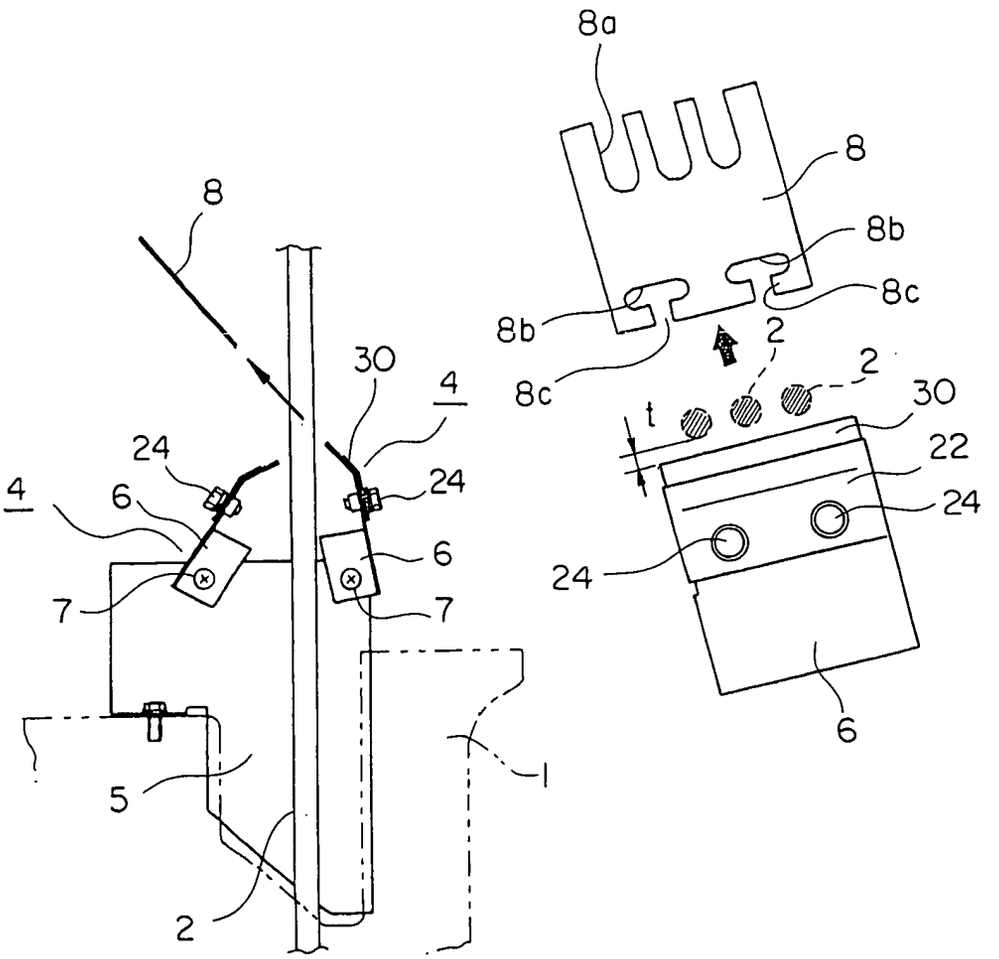


FIG. 6

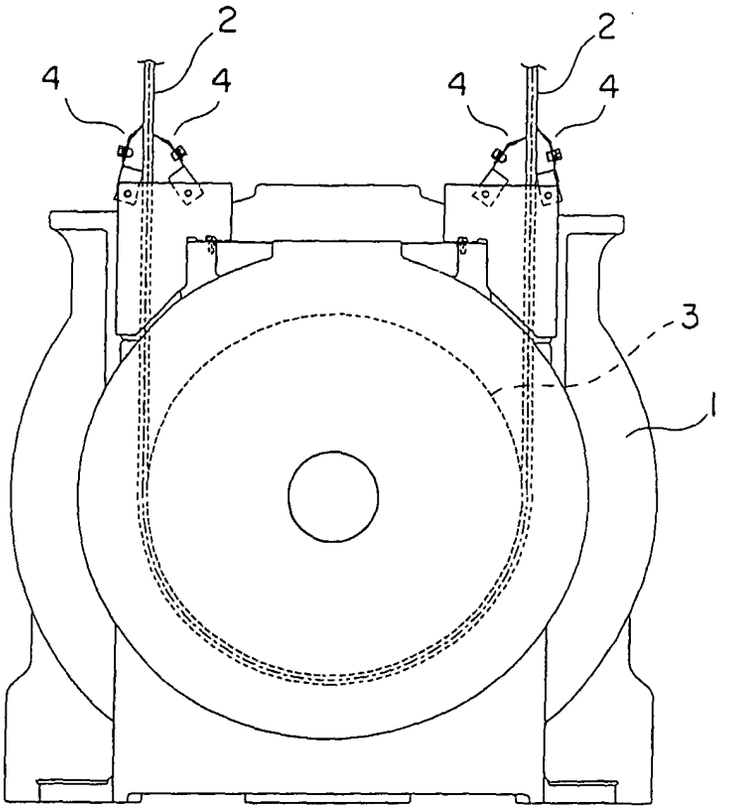


FIG. 7

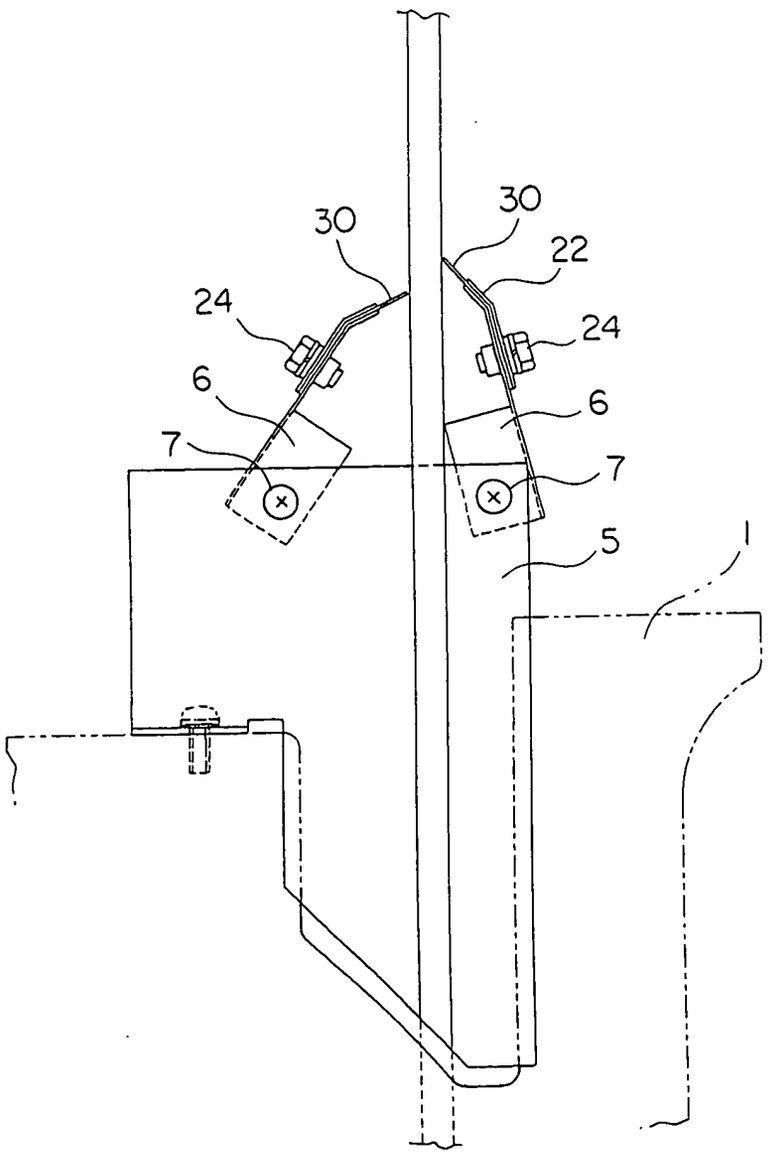


FIG. 8

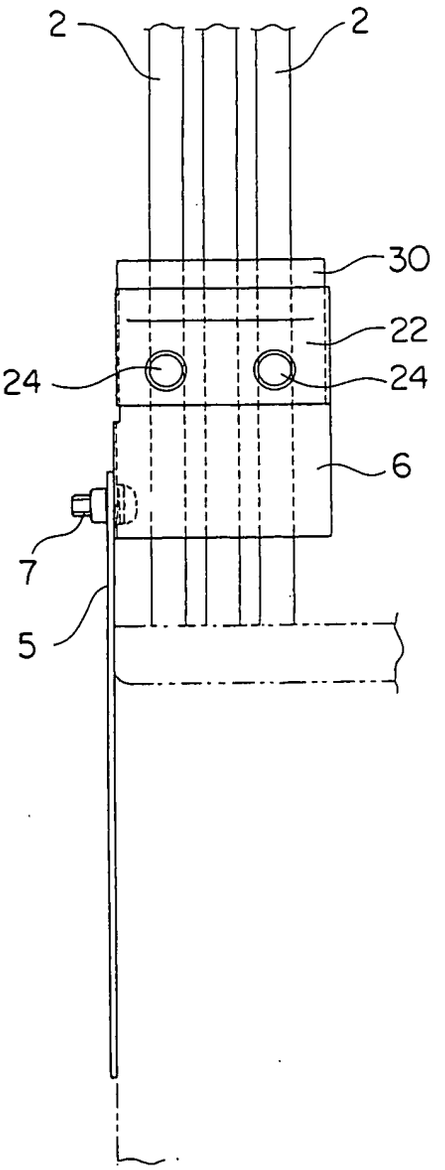


FIG. 9

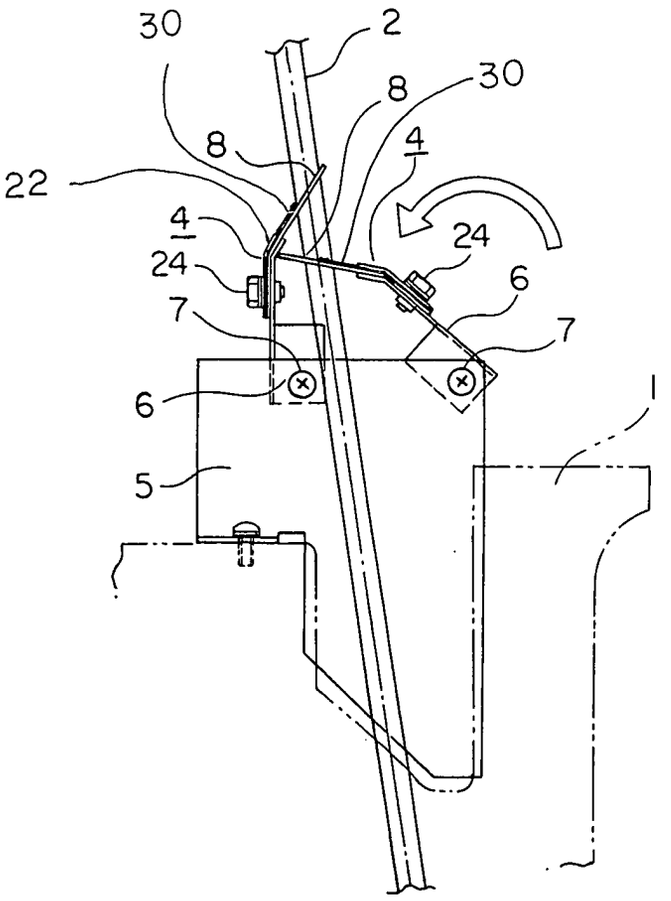
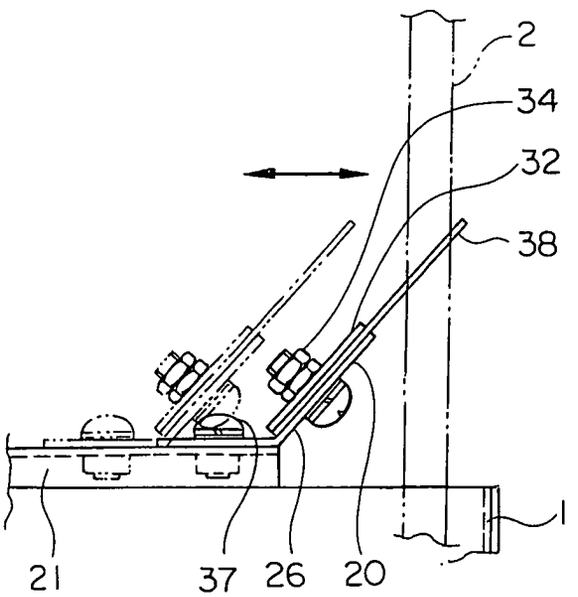


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/08026

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B7/06, B66B11/08

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] B66B7/00-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	1996-2003
Kokai Jitsuyo Shinan Koho	1971-2003	Toroku Jitsuyo Shinan Koho	1994-2003

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.
A	JP 55-98070 A (Hitachi, Ltd.), 25 July, 1980 (25.07.80), (Family: none)	1-8
A	JP 5-105365 A (Mitsubishi Electric Building Techno-Service Co., Ltd., Mitsubishi Electric Corp.), 27 April, 1993 (27.04.93), (Family: none)	1-8
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 65894/1975(Laid-open No. 146648/1976) (Tokyo Shibaura Electric Co., Ltd.), 25 November, 1976 (25.11.76), (Family: none)	1-8

☐ 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
25 April, 2003 (25.04.03)	13 May, 2003 (13.05.03)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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