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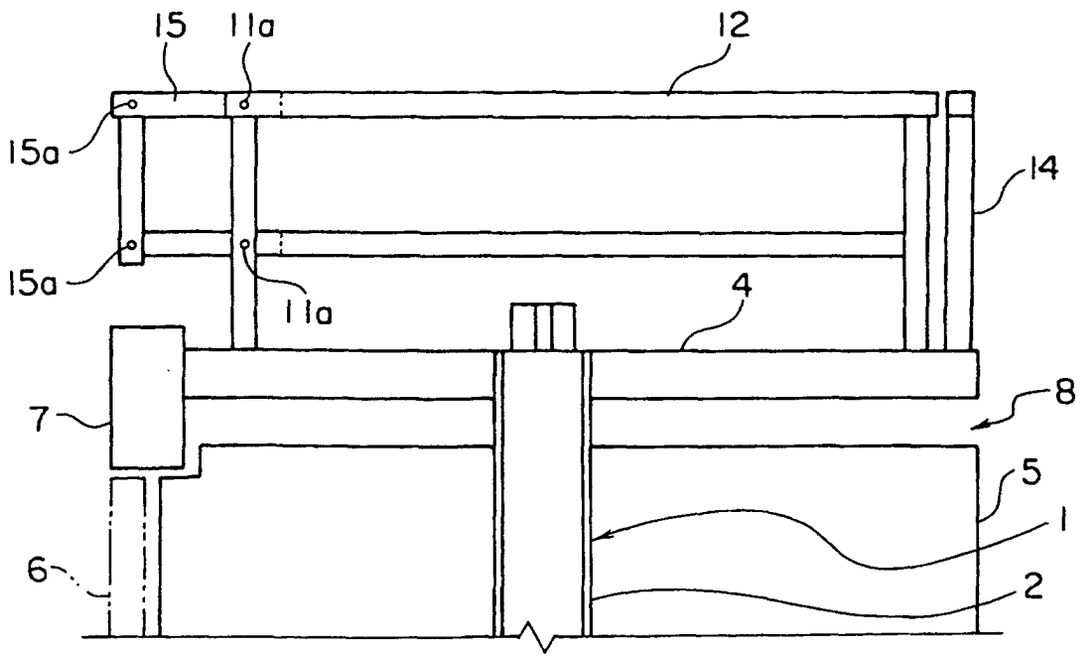
(54) **HANDRAIL ABOVE CAGE OF ELEVATOR**

(57) In a car top handrail device for an elevator, an extension handrail which is displaceable between its contracted position and its expanded position is connected to a handrail device main body. By displacing the extension handrail from the contracted position to the expanded position, an enclosed area surrounded by the handrail device main body and the extension handrail is expanded.

FIG. 2



EP 1 481 936 A1

Description

Technical Field

[0001] The present invention relates to a car top handrail device for an elevator, which is provided on top of a car and surrounds a working area for performing maintenance and inspection work on top of the car.

Background Art

[0002] Fig. 13 is a side view showing an example of a conventional elevator car. In the figure, a car frame 1 has a pair of vertical frames 2, a lower frame 3 provided between respective lower end portions of the vertical frames 2, and an upper frame 4 provided between respective upper end portions of the vertical frames 2. A cab 5 is supported on the lower frame 3. Arranged on the front of the cab 5 is a car door 6 for opening and closing a car doorway (not shown). A door machine 7 that drives the car door 6 is supported above the car door 6 to the upper frame 4. A car main body 8 includes the car frame 1, the cab 5, the car door 6, and the door machine 7.

[0003] Further, a handrail device 9 is fixed to the upper frame 4 through a connection member (not shown). The handrail device 9 has a plurality of fixed handrails 10. The handrail device 9 is arranged so as to surround a working area for performing maintenance or inspection work on top of the car. In the conventional elevator, however, it is necessary to secure a working space for installing the door machine 7, and thus the space above the door machine 7 cannot be surrounded by the handrail device 9.

Disclosure of the Invention

[0004] The present invention has been made in order to solve the above-mentioned problem, and accordingly it is an object of the present invention to obtain a car top handrail device for an elevator which is capable of surrounding a larger working area.

[0005] To this end, according to one aspect of the present invention, there is provided a car top handrail device for an elevator, which is provided on top of a car and surrounds a working area for performing maintenance and inspection work on top of the car, the device comprising: a handrail device main body; and an extension handrail connected to the handrail device main body, the extension handrail being displaceable between a contracted position and an expanded position, wherein an enclosed area surrounded by the handrail device main body and the extension handrail is expanded by displacing the extension handrail from the contracted position to the expanded position.

Brief Description of the Drawings

[0006]

Fig. 1 is a side view showing a car top handrail device for an elevator according to Embodiment 1 of the present invention;
Fig. 2 is a side view showing a state where an area surrounded by the car top handrail device of Fig. 1 is broadened;
Fig. 3 is a plan view showing the car top handrail device of Fig. 2;
Fig. 4 is a side view showing a car top handrail device for an elevator according to Embodiment 2 of the present invention;
Fig. 5 is a side view showing a state where an area surrounded by the car top handrail device of Fig. 4 is broadened;
Fig. 6 is a side view showing a car top handrail device for an elevator according to Embodiment 3 of the present invention;
Fig. 7 is a side view showing a state where an area surrounded by the car top handrail device of Fig. 6 is broadened;
Fig. 8 is a side view showing a car top handrail device for an elevator according to Embodiment 4 of the present invention;
Fig. 9 is a side view showing a state where an area surrounded by the car top handrail device of Fig. 8 is broadened;
Fig. 10 is a plan view showing the car top handrail device of Fig. 9;
Fig. 11 is a side view showing a car top handrail device for an elevator according to Embodiment 5 of the present invention;
Fig. 12 is a side view showing a state where an area surrounded by the car top handrail device of Fig. 11 is broadened; and
Fig. 13 is a side view showing an example of a conventional elevator car.

Best Mode for carrying out the Invention

[0007] Hereinbelow, preferred embodiments of the present invention will be described with reference to the drawings.

Embodiment 1

[0008] Fig. 1 is a side view showing a car top handrail device for an elevator according to Embodiment 1 of the present invention, Fig. 2 is a side view showing a state where an area enclosed with the car top handrail device of Fig. 1 is broadened, and Fig. 3 is a plan view showing the car top handrail device of Fig. 2.

[0009] Referring to the figures, a car frame 1 has a pair of vertical frames 2, a lower frame 3 (see Fig. 13) provided between respective lower end portions of the

vertical frames 2, and an upper frame 4 provided between respective upper end portions of the vertical frames 2. A cab 5 is supported on the lower frame 3. Arranged on the front of the cab 5 is a car door 6 for opening and closing a car doorway (not shown). A door machine 7 that drives the car door 6 is supported above the car door 6 to the upper frame 4. A car main body 8 includes the car frame 1, the cab 5, the car door 6, and the door machine 7.

[0010] A handrail device main body 11 is provided upright on the upper frame 4. The handrail device main body 11 has first to third fixed handrails 12 to 14. Connected to a front end portion of the handrail device main body 11 is an extension handrail 15 which is displaceable between its contracted position shown in Fig. 1 and its expanded position shown in Fig. 2. In Fig. 3, the expanded position is indicated by a solid line whereas the contracted position is indicated by a two-dot chain line.

[0011] By displacing the extension handrail 15 from the contracted position to the expanded position, an enclosed area surrounded by the handrail device main body 11 and the extension handrail 15 is expanded. More specifically, when the extension handrail 15 is in its contracted position, a door-machine installation space 16 located above the door machine 7 is located outside the enclosed area. By displacing the extension handrail 15 from the contracted position to the expanded position, the door-machine installation space 16 becomes included within the enclosed area.

[0012] The handrail device main body 11 is provided with a plurality of main body side mounting holes 11a for connecting the extension handrail 15. Further, the extension handrail 15 is provided with a plurality of first mounting holes 15a that are combined with the main body side mounting holes 11a when the extension handrail 15 is in the contracted position, and a plurality of second mounting holes 15b that are combined with the main body side mounting holes 11a when the extension handrail 15 is in the expanded position. The extension handrail 15 is connected to the handrail device main body 11 by passing a fastener (not shown) through each main body side mounting hole 11a and each first mounting hole 15a or each second mounting hole 15b.

[0013] The car top handrail device, having the handrail device main body 11 and the extension handrail 15, is arranged so as to surround a working area for performing maintenance and inspection work on top of the car main body 8.

[0014] In the car top handrail device for an elevator which is constructed as described above, by causing the extension handrail 15 to be located at its contracted position, it is possible to secure a sufficient space for performing installation of the door machine 7. In addition, by causing the extension handrail 15 to be located at its expanded position after completing the installation of the door machine 7, it is possible for the car top handrail device to surround a larger working area.

Embodiment 2

[0015] Next, Fig. 4 is a side view showing a car top handrail device for an elevator according to Embodiment 2 of the present invention, and Fig. 5 is a side view showing a state where an area enclosed with the car top handrail device of Fig. 4 is broadened. Referring to the figures, connected to a front end portion of a handrail device main body 11 is an extension handrail 21 which is displaceable between its contracted position shown in Fig. 4 and its expanded position shown in Fig. 5. The extension handrail 21 is moved to slide between the expanded position and the contracted position. Fixed handrails 12 and 13 also serve as guides for sliding of the extension handrail 21. Further, the handrail device main body 11 is provided with fixtures 22 for fixing the extension handrail 21 in the expanded position and in the contracted position. Otherwise, the construction of Embodiment 2 is the same as that of Embodiment 1.

[0016] In the car top handrail device for an elevator which is constructed as described above, by causing the extension handrail 21 to be located at its contracted position, it is possible to secure a sufficient space for performing installation of the door machine 7. In addition, by causing the extension handrail 21 to be located at its expanded position after completing the installation of the door machine 7, it is possible for the car top handrail device to surround a larger working area.

Embodiment 3

[0017] Next, Fig. 6 is a side view showing a car top handrail device for an elevator according to Embodiment 3 of the present invention, and Fig. 7 is a side view showing a state where an area enclosed with the car top handrail device of Fig. 6 is broadened. Referring to the figures, connected to a front end portion of a handrail device main body 11 is an extension handrail 23 which is displaceable between its contracted position shown in Fig. 6 and its expanded position shown in Fig. 7. The extension handrail 23 has a parallel link mechanism and is folded from its expanded position for displacement to its contracted position.

[0018] Further, the extension handrail 23 is provided with a swingable arm 24. In addition, the handrail device main body 11 is provided with an engagement portion 25 with which the arm 24 is engaged. The extension handrail 23 is retained at the expanded position by engaging the arm 24 with the engagement portion 25. Otherwise, the construction of Embodiment 3 is the same as that of Embodiment 1.

[0019] In the car top handrail device for an elevator which is constructed as described above, by causing the extension handrail 23 to be located at its contracted position, it is possible to secure a sufficient space for performing installation of the door machine 7. In addition, by causing the extension handrail 23 to be located at its expanded position after completing the installation of

the door machine 7, it is possible for the car top handrail device to surround a larger working area.

Embodiment 4

[0020] Next, Fig. 8 is a side view showing a car top handrail device for an elevator according to Embodiment 4 of the present invention, Fig. 9 is a side view showing a state where an area enclosed with the car top handrail device of Fig. 8 is broadened, and Fig. 10 is a plan view showing the car top handrail device of Fig. 9.

[0021] Referring to the figures, connected to a front end portion of a handrail device main body 11 is an extension handrail 26 which is displaceable between its contracted position shown in Fig. 8 and its expanded position shown in Fig. 9. In Fig. 10, the expanded position is indicated by a solid line whereas the contracted position is indicated by a two-dot chain line.

[0022] The extension handrail 26 includes a first side handrail 27, a second side handrail 28, a first front handrail 29, and a second front handrail 30. The first side handrail 27 is connected to a first fixed rail 12 so as to be swingable about a vertical axis 27a. The second side handrail 28 is connected to a second fixed rail 13 so as to be swingable about a vertical axis 28a.

[0023] The first front handrail 29 is connected to the first side handrail 27 so as to be swingable about a vertical axis 29a. The second front handrail 30 is connected to the second side handrail 28 so as to be swingable about a vertical axis 30a. The first and second front handrails 29 and 30 are connected to each other so as to be swingable about a vertical bend axis 31.

[0024] The first and second side handrails 27 and 28 are each provided with a plurality of engagement portions 32. The first and second fixed handrails 12 and 13 are each provided with a plurality of hooks 33 that engage with the engagement portions 32.

[0025] The extension handrail 26 is displaced between its expanded position and its contracted position by swinging the first and second side handrails 27 and 28. Further, in the course of the displacement, the first and second front handrails 29 and 30 are bent along the bend axis 31. Otherwise, the construction of Embodiment 4 is the same as that of Embodiment 1.

[0026] In the car top handrail device for an elevator which is constructed as described above, by causing the extension handrail 26 to be located at its contracted position, it is possible to secure a sufficient space for performing installation of the door machine 7. In addition, by causing the extension handrail 26 to be located at its expanded position after completing the installation of the door machine 7, it is possible for the car top handrail device to surround a larger working area.

[0027] Note that it is also possible to omit the front handrails and use an extension handrail with only the side handrails.

[0028] Further, it is also possible for the front handrails to be constructed of a member having flexibility, such as a chain.

Embodiment 5

[0029] Fig. 11 is a side view showing a car top handrail device for an elevator according to Embodiment 5 of the present invention, and Fig. 12 is a side view showing a state where an area enclosed with the car top handrail device of Fig. 11 is broadened. In those examples, first to third fixed handrails 12 to 14 are each swingable about a horizontal axis 34. This allows the first to third fixed handrails 12 to 14 to be collapsed onto a car main body 8. Further, a member having flexibility, such as a chain, is used for front handrails (not shown) of the extension handrail 26. Note that the front handrails may be omitted. Otherwise, the construction of Embodiment 5 is the same as that of Embodiment 4.

[0030] In the car top handrail device which is constructed as described above, the handrail device main body 11 can be folded and collapsed on the car main body 8 except for during maintenance and inspection, and thus the overall height of the car including the car top handrail device can be made small during normal operation. Therefore, an overhead clearance in the hoistway can be made small. Furthermore, by collapsing the handrail device main body 11 in the state where the extension handrail 26 is at its contracted position, the space occupied by the car handrail device in its collapsed state can be made small.

Claims

1. A car top handrail device for an elevator, which is provided on top of a car and surrounds a working area for performing maintenance and inspection work on top of the car, the device comprising:

a handrail device main body; and
an extension handrail connected to the handrail device main body, the extension handrail being displaceable between a contracted position and an expanded position,

wherein an enclosed area surrounded by the handrail device main body and the extension handrail is expanded by displacing the extension handrail from the contracted position to the expanded position.

2. A car top handrail device for an elevator according to Claim 1, wherein when the extension handrail is in the contracted position, a door-machine installation space located above a door machine that opens and closes a car door is located outside the enclosed area, and wherein the door-machine installation space is included within the enclosed area by displacing the extension handrail from the con-

tracted position to the expanded position.

3. A car top handrail device for an elevator according to Claim 1, wherein the extension handrail is moved to slide between the contracted position and the expanded position.

4. A car top handrail device for an elevator according to Claim 1, wherein the extension handrail has a parallel link mechanism and is displaced from the expanded position to the contracted position by folding the parallel link mechanism.

5. A car top handrail device for an elevator according to Claim 1, wherein the extension handrail is displaced between the contracted position and the expanded position by being swung about a vertical axis.

6. A car top handrail device for an elevator according to Claim 1, wherein the handrail device main body is capable of being collapsed onto the top of the car.

FIG. 1

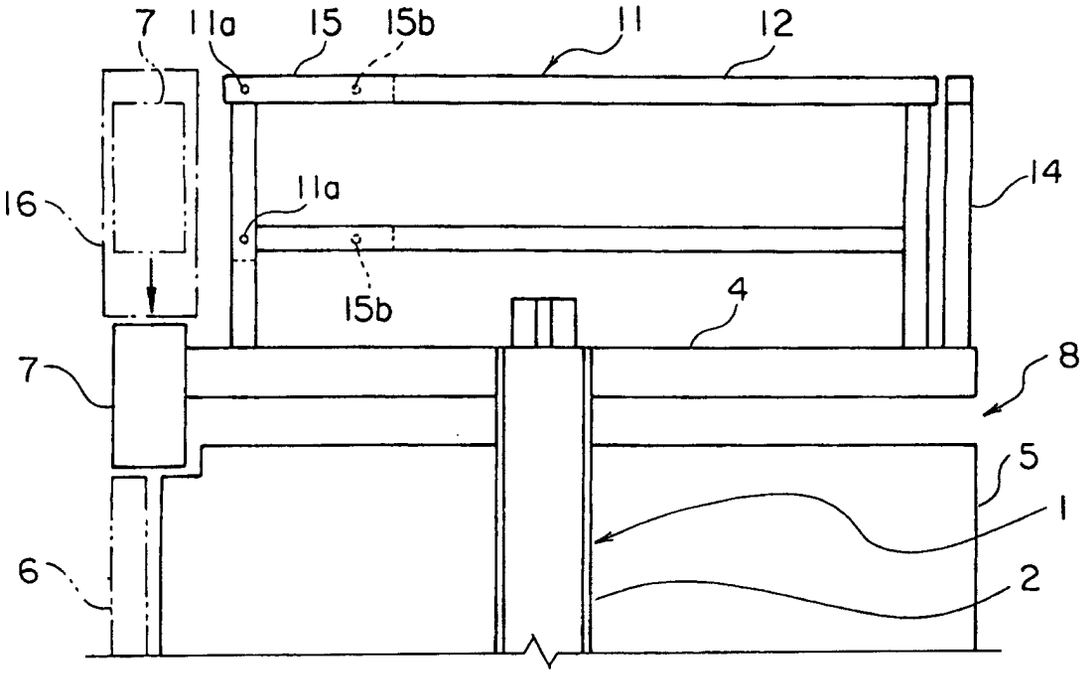

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FIG. 2

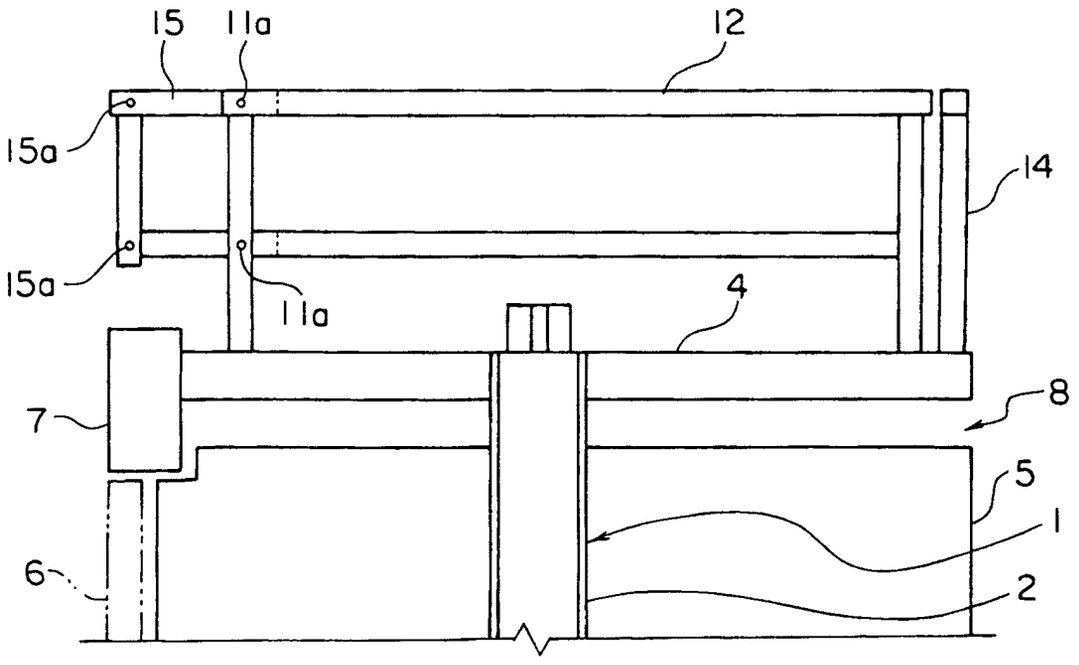
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FIG. 3

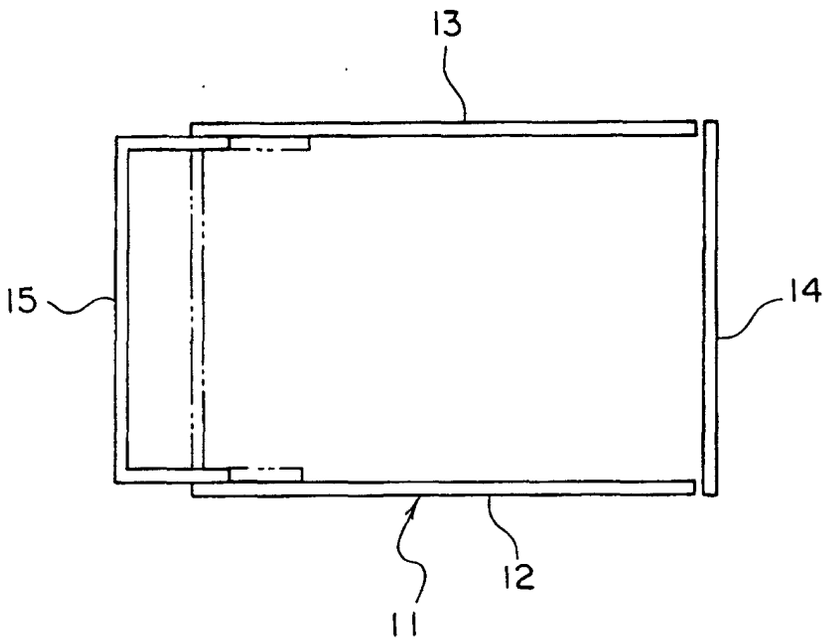

FIG. 4

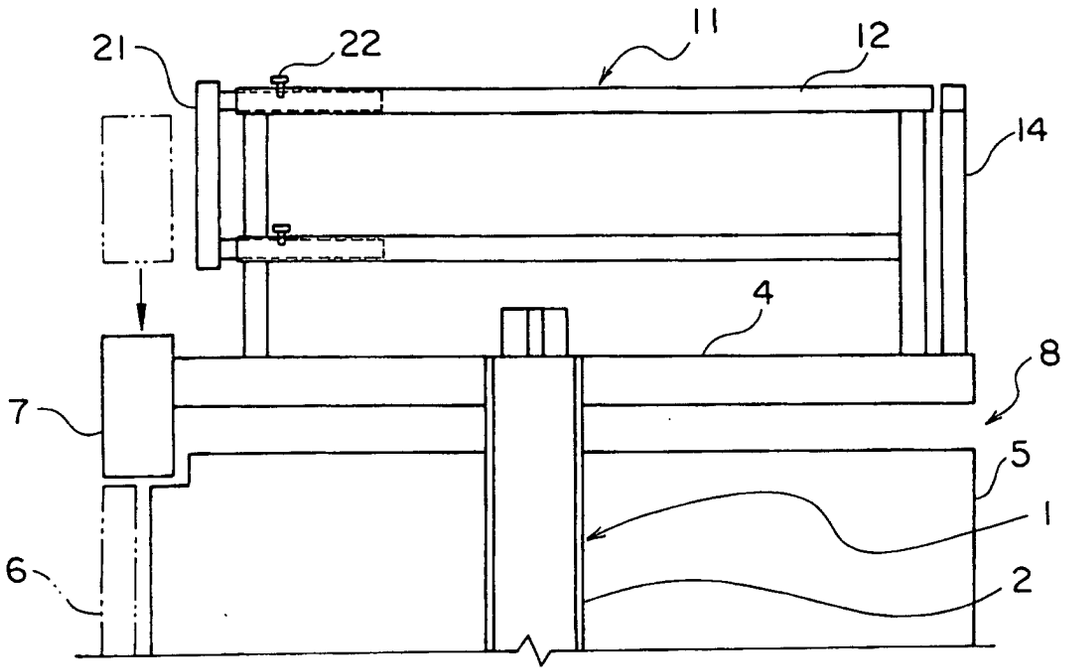

FIG. 5

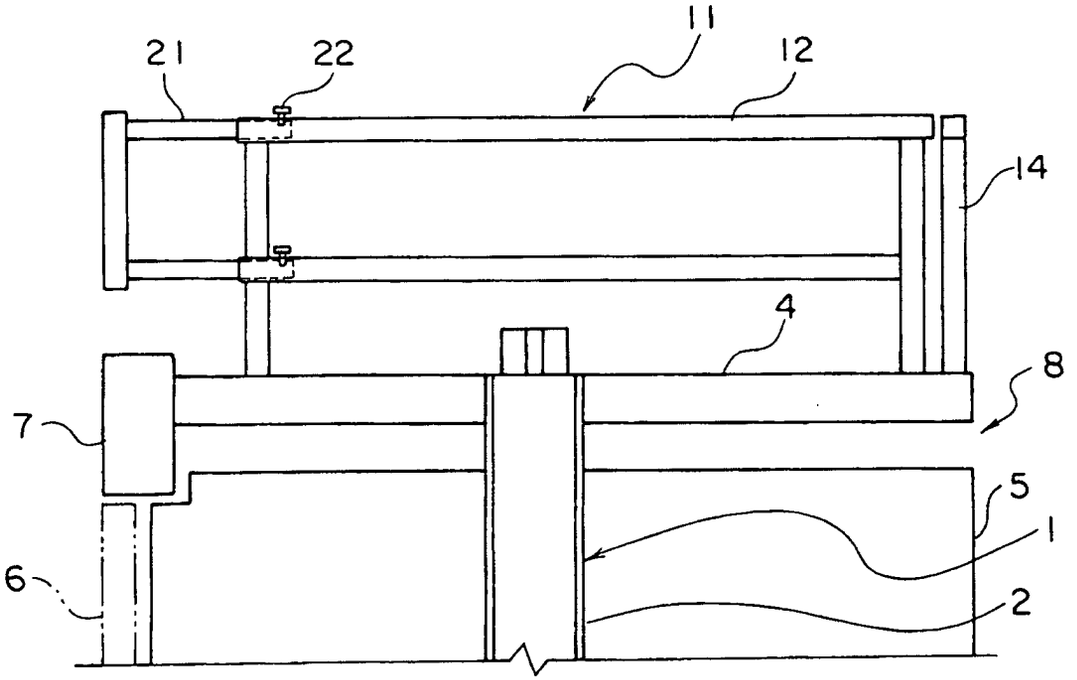

FIG. 6

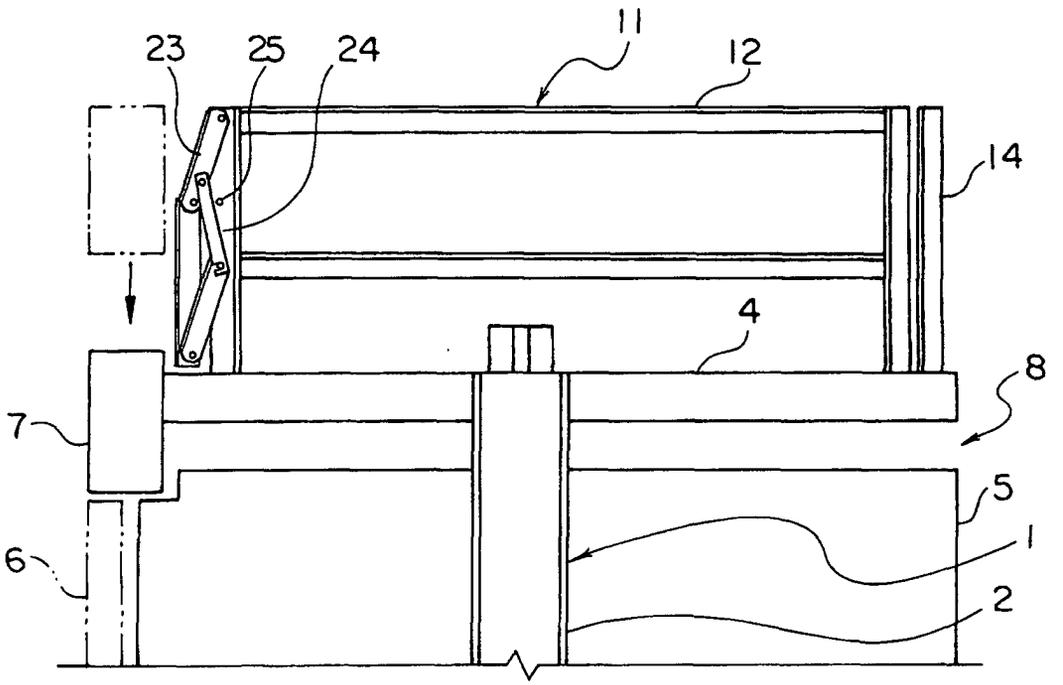

FIG. 7

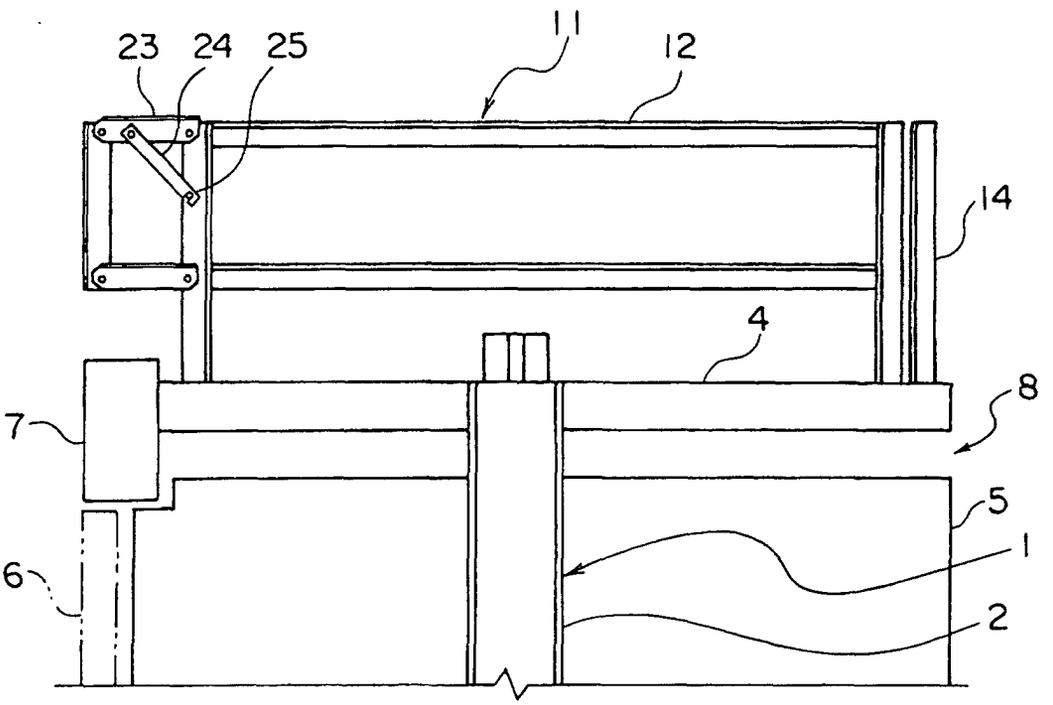

FIG. 8

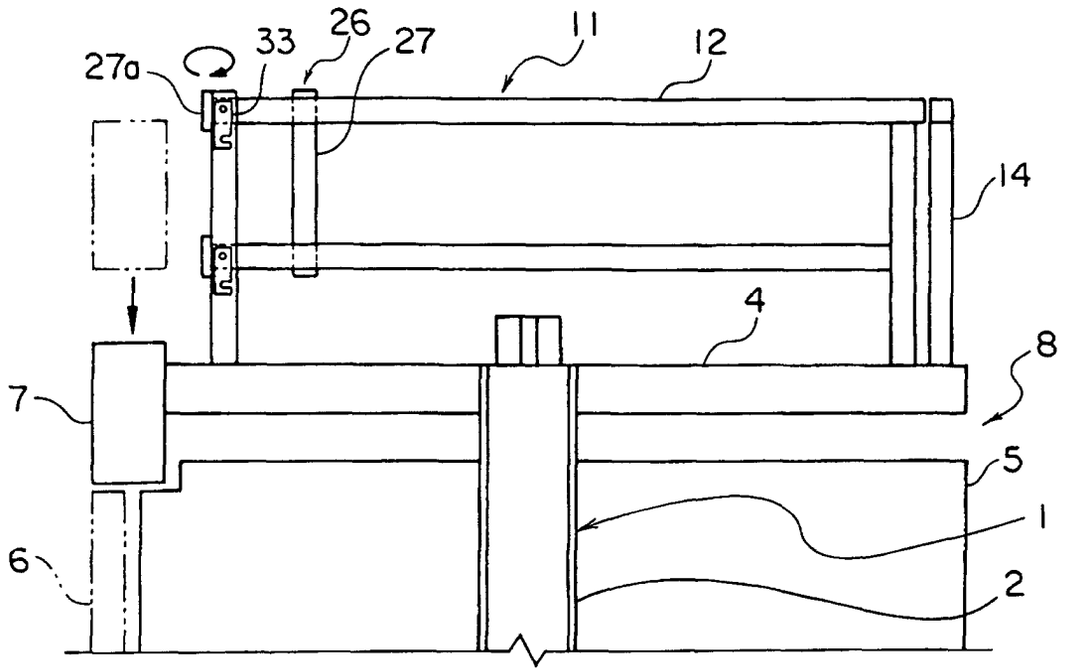

FIG. 9

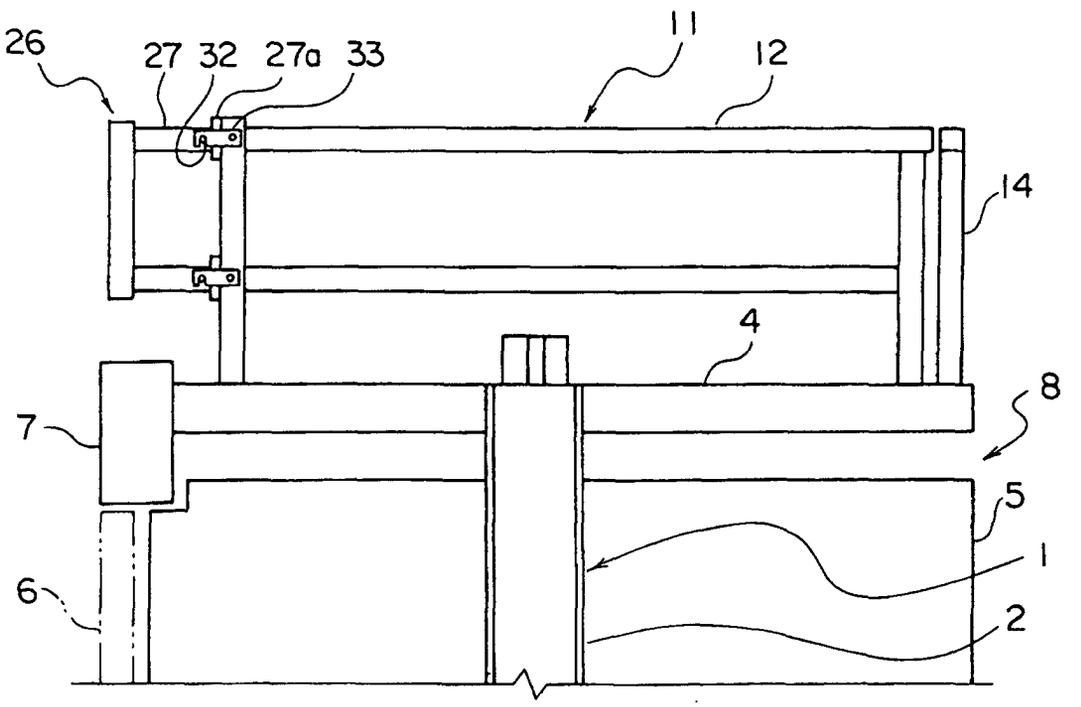

FIG.10

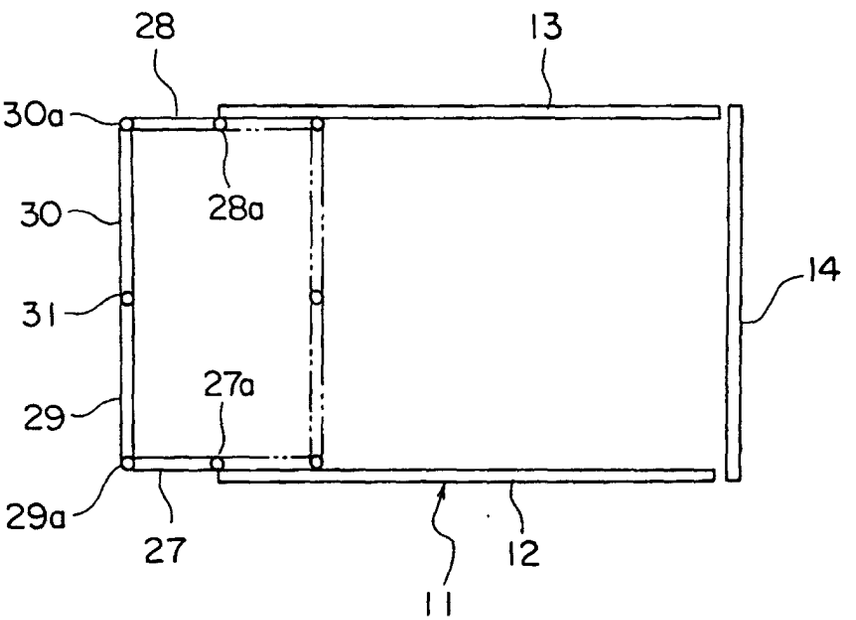

FIG.11

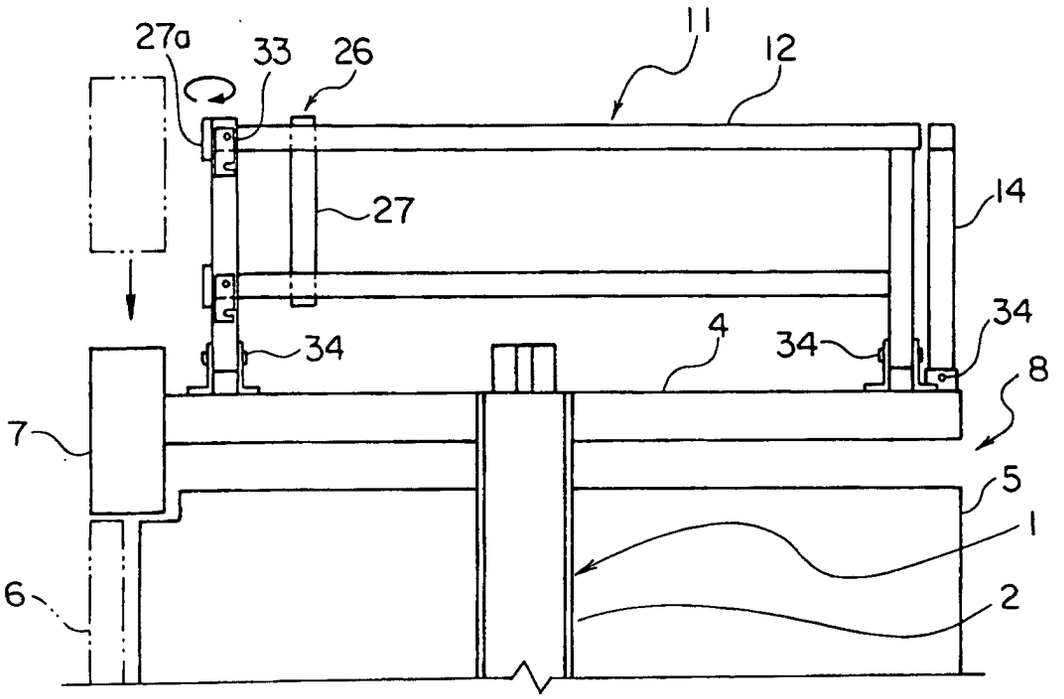
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FIG.12

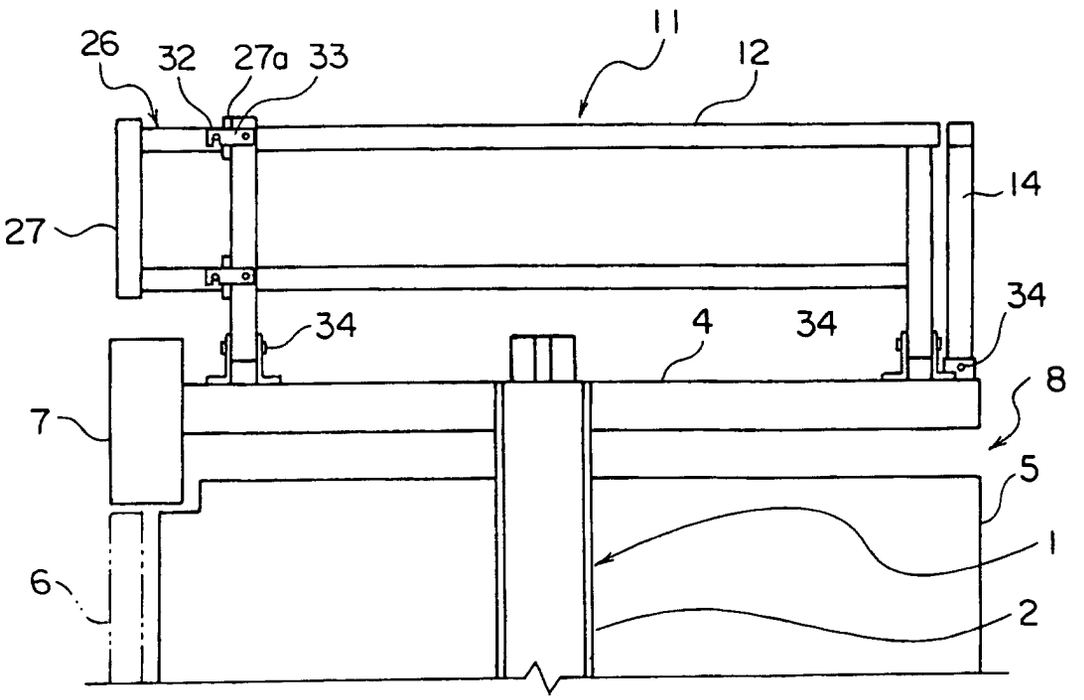
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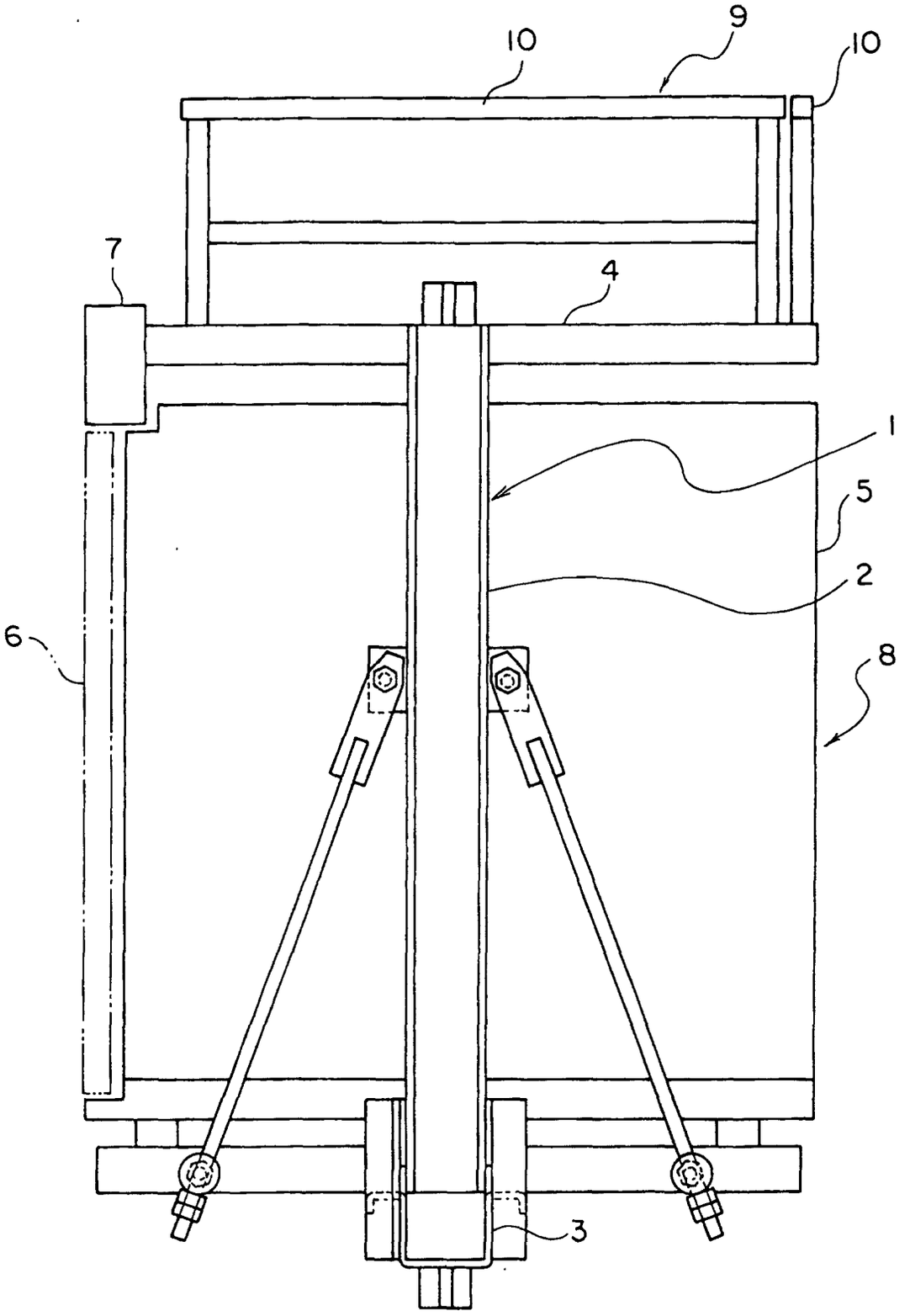
FIG.13



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/02140

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B11/02

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] B66B5/00-11/08

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	1996-2002
Kokai Jitsuyo Shinan Koho	1971-2002	Toroku Jitsuyo Shinan Koho	1994-2002

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.
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Y	JP 63-48763 Y2 (Mitsubishi Electric Corp.), 15 December, 1988 (15.12.88), & JP 58-138760 U	1,3-6
Y	JP 8-198549 A (Mitsubishi Electric Building Techno-Service), 06 August, 1996 (06.08.96), (Family: none)	1,3-6
Y A	JP 2000-143125 A (Toshiba Corp.), 23 May, 2000 (23.05.00), (Family: none)	3 2

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

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Date of the actual completion of the international search	Date of mailing of the international search report
29 November, 2002 (29.11.02)	10 December, 2002 (10.12.02)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/02140

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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Y	JP 4-292386 A (Toshiba Corp.), 16 October, 1992 (16.10.92), (Family: none)	5

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