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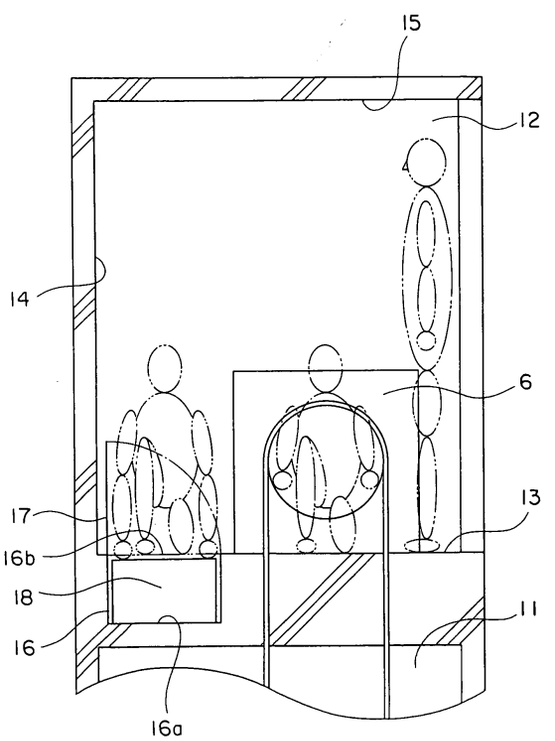
(54) ELEVATOR APPARATUS

(57) In an elevator apparatus, a driving machine for raising and lowering a car and a control device for controlling the driving machine are arranged in a machine room. A floor surface of the machine room is provided with a concave portion. The control device is received in the concave portion and the concave portion is provided with a lid for opening and closing the concave portion. The lid constitutes a flat surface continuous with the floor surface in a state where the concave portion is closed.

FIG. 2



EP 1 520 828 A1

Description

Technical Field

[0001] The present invention relates to an elevator apparatus in which a driving machine and a control device are arranged in a machine room.

Background Art

[0002] Fig. 9 is a plan view showing an example of a machine room of a conventional elevator apparatus, and Fig. 10 is a sectional view of the machine room in Fig. 9. In the figures, a machine room 2 is arranged above a hoistway 1 in which a car (not shown) is raised and lowered. The machine room 2 includes a floor surface 3, a side wall 4, and a ceiling 5. The side wall 4 is provided with a doorway 4a.

[0003] A driving machine (hoisting machine) 6 for raising and lowering the car and a control device (control panel) 7 for controlling the driving machine 6 are arranged on the floor surface 3. The driving machine 6 is arranged such that a working space for maintenance inspection is secured in the periphery thereof. Further, the control device 7 has a front door 7a, and is arranged such that maintenance inspection work for the control device 7 is performed with the front door 7a being opened.

[0004] In the above-described conventional elevator apparatus, a working space for maintenance inspection of the driving machine 6 and the control device 7 and a movement space for an operator at the time of the maintenance inspection work need to be secured in the machine room 2 besides installation spaces of the driving machine 6 and the control device 7. Therefore, a floor area of the machine room 2 becomes large.

Disclosure of the Invention

[0005] The present invention has been made in view of the above, and therefore has an object to obtain an elevator apparatus in which space can be saved in a machine room.

[0006] According to the present invention, there is provided an elevator apparatus including: a machine room having a floor surface; a driving machine for raising and lowering the car, arranged in the machine room; and a control device for controlling the driving machine, arranged in the machine room, in which: the floor surface of the machine room; is provided with a concave portion and the control device is received in the concave portion.

Brief Description of the Drawings

[0007]

Fig. 1 is a plan view showing an inner part of a machine room in an elevator apparatus in accordance with Embodiment 1 of the present invention;
Fig. 2 is a sectional view of the machine room in Fig. 1;
Fig. 3 is a plan view showing an inner part of a machine room in an elevator apparatus in accordance with Embodiment 2 of the present invention;
Fig. 4 is a sectional view of the machine room in Fig. 3;
Fig. 5 is a plan view showing an inner part of a machine room in an elevator apparatus in accordance with Embodiment 3 of the present invention;
Fig. 6 is a sectional view of the machine room in Fig. 5;
Fig. 7 is a plan view showing an inner part of a machine room in an elevator apparatus in accordance with Embodiment 4 of the present invention;
Fig. 8 is a sectional view of the machine room in Fig. 7;
Fig. 9 is a plan view showing an example of a machine room in a conventional elevator apparatus; and
Fig. 10 is a sectional view of the machine room shown in Fig. 9.

Best Mode for carrying out the Invention

[0008] Hereinafter, description will be made of preferred embodiments of the present invention with reference to the accompanying drawings.

Embodiment 1

[0009] Fig. 1 is a plan view showing an inner part of a machine room in an elevator apparatus in accordance with Embodiment 1 of the present invention, and Fig. 2 is a sectional view of the machine room in Fig. 1. In the figures, a machine room 12 is arranged above a hoistway 11 in which a car (not shown) is raised and lowered. The machine room 12 has a floor surface 13, a side wall 14, and a ceiling 15. The side wall 14 is provided with a doorway 14a. A driving machine (hoisting machine) 6 for raising and lowering the car is arranged on the floor surface 13.

[0010] The floor surface 13 is provided with a concave portion 16. The concave portion 16 has a bottom surface 16a and an opening portion 16b that faces the bottom surface 16a. The concave portion 16 is provided with a flat lid 17 for opening and closing the opening portion 16a. Fig. 1 shows a state where the lid 17 is closed, and Fig. 2 shows a state where the lid 17 is opened.

[0011] Further, the lid 17 constitutes a flat surface continuous with the floor surface 13 in the state where the concave portion 16 is closed. In addition, an operator can step on the lid 17, and a space above the lid 17 serves as a movement space or working space at the

time of the maintenance inspection work for the driving machine 6.

[0012] A control device (control panel) 18 for controlling the driving machine 6 and other devices is received in the concave portion 16. The control device 18 is received in the concave portion 16 in such fashion as to enable the maintenance inspection thereof to be performed by only opening the lid 17 without the control device 18 being removed from the concave portion 16. That is, the control device 18 is placed on the bottom surface 16a such that a front surface of the control device 18 faces upward.

[0013] In the above-described elevator apparatus, an installation space of the control device 18 also serves as the movement space or working space at the time of the maintenance inspection work for the driving machine 6. Therefore, space can be saved in the machine room 12.

[0014] Further, the maintenance inspection work for the control device 18 can be easily performed by only opening the lid 17.

[0015] Moreover, the lid 17 for opening and closing the opening portion 16b of the concave portion 16 is provided, and thus, a sufficient strength of the lid 17 as a part of a floor for the movement space or working space can be secured without changing the strength of the control device 18. Accordingly, the control device 18 can be protected.

[0016] Note that the opening portion 16b is opened / closed by one lid in Embodiment 1, but may be opened / closed partially by plural lids. In such a case, each of the lids is light in weight to enable opening / closing operations to be carried out with ease.

[0017] Further, the lid 17 which is opened / closed through pivotal movement is shown in Embodiment 1. However, there may be adopted a lid that is opened / closed through sliding movement in parallel with the floor surface 13 or a lid that is completely removed from the floor surface 13.

[0018] Moreover, the lid may be provided with a handle gripped by an operator at the time of opening / closing. In addition, the handle may be temporarily attached to the lid at the time of opening / closing. In this case, the surface of the lid can be kept flat except at the time of opening / closing. Thus, the handle cannot be an obstacle to the movement or work made by the operator.

[0019] Furthermore, the lid 17 which is opened / closed through manual operation is shown in Embodiment 1; however, there may be adopted a lid that is driven by an electric motor or the like to be opened / closed.

[0020] Moreover, the lid may be provided with a transparent window, or the whole lid may be formed of a transparent material. This enables visual inspection of the control device 18 to be carried out with the lid being closed.

[0021] Further, the lid may be provided with an air hole. In addition, the air hole may be provided with a fan device.

[0022] Furthermore, the control device 18 is placed on the bottom surface 16a in Embodiment 1. However, the control device may be mounted on a back surface of the lid in the case where the control device is light in weight.

Embodiment 2

[0023] Next, Fig. 3 is a plan view showing an inner part of a machine room in an elevator apparatus in accordance with Embodiment 2 of the present invention, and Fig. 4 is a sectional view of the machine room in Fig. 3. Further, Figs. 3 and 4 show a state where the lid 17 is opened. In the figures, a control device (control panel) 19 for controlling the driving machine 6 and other devices is received in the concave portion 16. The control device 19 includes a control device main body 19a, which is placed on the bottom surface 16a, and a divided portion 19b, which is mounted on the back surface of the lid 17. Other structures in Embodiment 2 are the same as those in Embodiment 1.

[0024] In the above-described elevator apparatus, an installation space of the control device 19 also serves as the movement space or working space at the time of the maintenance inspection work for the driving machine 6. Therefore, space can be saved in the machine room 12.

[0025] Further, the divided portion 19b is mounted on the back surface of the lid 17, and thus, the area of the control device 19, which is exposed when the lid 17 is opened, is expanded. That is, the arrangement area of the control device, which can be subjected to maintenance inspection, becomes approximately twice as large as the area in the case where the divided portion 19b is not mounted on the lid 17. Therefore, working performance of the maintenance inspection work for the control device 19 can be improved.

Embodiment 3

[0026] Next, Fig. 5 is a plan view showing an inner part of a machine room in an elevator apparatus in accordance with Embodiment 3 of the present invention, and Fig. 6 is a sectional view of the machine room in Fig. 5. In the figures, a control device (control panel) 20 for controlling the driving machine 6 and other devices is received in the concave portion 16. The control device 20 is divided into first and second division units 21 and 22. Each of the division units 21 and 22 can be independently removed from the concave portion 16. Further, each of the division units 21 and 22 is structured to have a weight at which an operator can carry the unit.

[0027] Further, the first and second division units 21 and 22 have casings 21a and 22a, respectively. The casings 21a and 22a have casing upper surfaces 21b and 22b, which constitute flat surfaces continuous with the floor surface 13, respectively. An operator can step on the casing upper surfaces 21b and 22b, and the cas-

ing upper surfaces 21b and 22b each serve as the movement space or working space at the time of the maintenance inspection work for the driving machine 6.

[0028] Further, the casing upper surfaces 21b and 22b are provided with handles 21c and 22c, respectively. The handles 21c and 22c are arranged not so as to protrude from the casing upper surfaces 21b and 22b, respectively. Other structures in Embodiment 3 are the same as those in Embodiment 1.

[0029] In the above-described elevator apparatus, an installation space of the control device 20 also serves as the movement space or working space at the time of the maintenance inspection work for the driving machine 6. Therefore, space can be saved in the machine room 12.

[0030] Further, the casing upper surfaces 21b and 22b, which are parts of the control device 20, serve as parts of the floor for the movement space or working space. Thus, the concave portion 16 is kept open. Therefore, the structure is simple, and also, the maintenance inspection work for the control device 20 can be performed with ease.

[0031] Moreover, the control device 20 is divided into the first and second division units 21 and 22, and each of the division units 21 and 22 can be independently removed from the concave portion 16. Therefore, partial replacement of the control device 20 can be carried out with ease.

[0032] Note that the control device 20 is divided into the two division units 21 and 22 in Embodiment 3, but may be divided into three or more division units.

[0033] Further, the division units have sizes and shapes different from one another.

[0034] Furthermore, the two division units 21 and 22 are received in the common concave portion 16 in Embodiment 3. However, plural concave portions may be provided to the floor surface to separately receive the division units.

Embodiment 4

[0035] Next, Fig. 7 is a plan view showing an inner part of a machine room in an elevator apparatus in accordance with Embodiment 4 of the present invention, and Fig. 8 is a sectional view of the machine room in Fig. 7. In the figures, a control device (control panel) 23 for controlling the driving machine 6 and other devices is received in the concave portion 16. The control device 23 includes a casing 22a.

[0036] The casing 23a has a casing upper surface 23b that constitutes a flat surface continuous with the floor surface 13. An operator can step on the casing upper surface 23b, and a space above the casing upper surface 23b serves as the movement space or working space at the time of the maintenance inspection work for the driving machine 6.

[0037] A hook 24 is fixed to the ceiling 15 above the concave portion 16. The hook 24 is attached with a lifting device 25 for lifting the control device 23 through a lifting accessory 26 such as a wire. As the lifting device 25, for example, a chain block or a winch is used. Other structures in Embodiment 4 are the same as those in Embodiment 1.

[0038] In the above-described elevator apparatus, an installation space of the control device 23 also serves as the movement space or working space at the time of the maintenance inspection work for the driving machine 6. Therefore, space can be saved in the machine room 12.

[0039] Further, the casing upper surface 23b, which is a part of the control device 23, serves as a part of the floor for the movement space or working space. Thus, the concave portion 16 is kept open. Therefore, the structure is simple, and also, the maintenance inspection work for the control device 23 can be performed with ease.

[0040] Moreover, the control device 23 can be lifted by the lifting device 25. Therefore, replacement of the whole control device 23 can be performed with ease.

Claims

1. An elevator apparatus, comprising:

a machine room having a floor surface;
a driving machine for raising and lowering a car, arranged in the machine room; and
a control device for controlling the driving machine, arranged in the machine room,

wherein:

the floor surface of the machine room is provided with a concave portion; and
the control device is received in the concave portion.

2. An elevator apparatus according to claim 1, wherein the concave portion is provided with a lid for opening and closing the concave portion, and the lid constitutes a flat surface continuous with the floor surface in a state where the concave portion is closed.

3. An elevator apparatus according to claim 2, wherein a part of the control device is mounted on a back surface of the lid.

4. An elevator apparatus according to claim 1, wherein the control device has a casing, and the casing has a casing upper surface that constitutes a flat surface continuous with the floor surface.

5. An elevator apparatus according to claim 1, wherein the control device is divided into plural division units, and each of the division units can be inde-

pendently removed from the concave portion.

6. An elevator apparatus according to claim 1, wherein a lifting device that lifts the control device is provided above the concave portion in the machine room.

FIG. 1

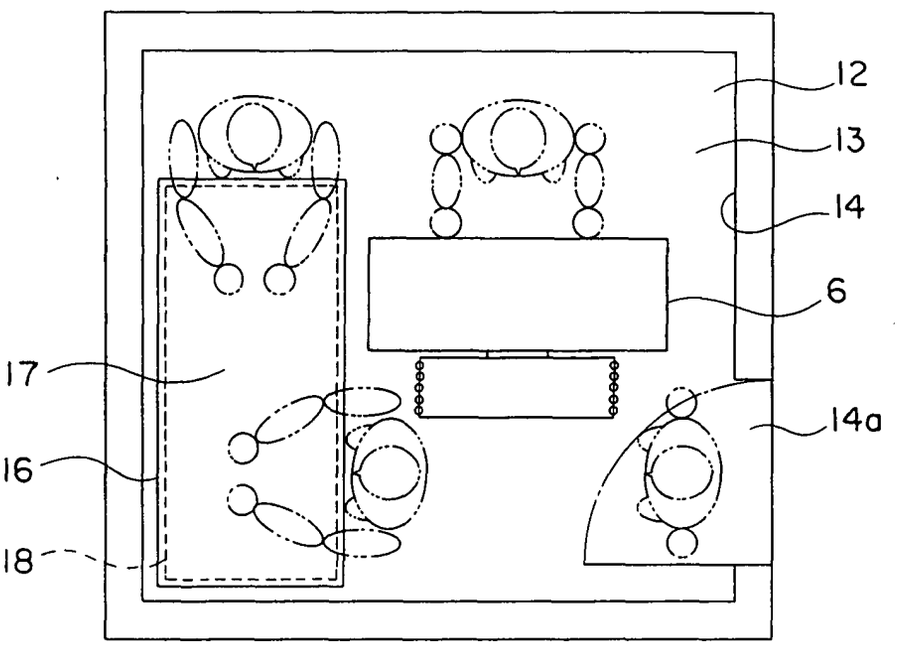


FIG. 2

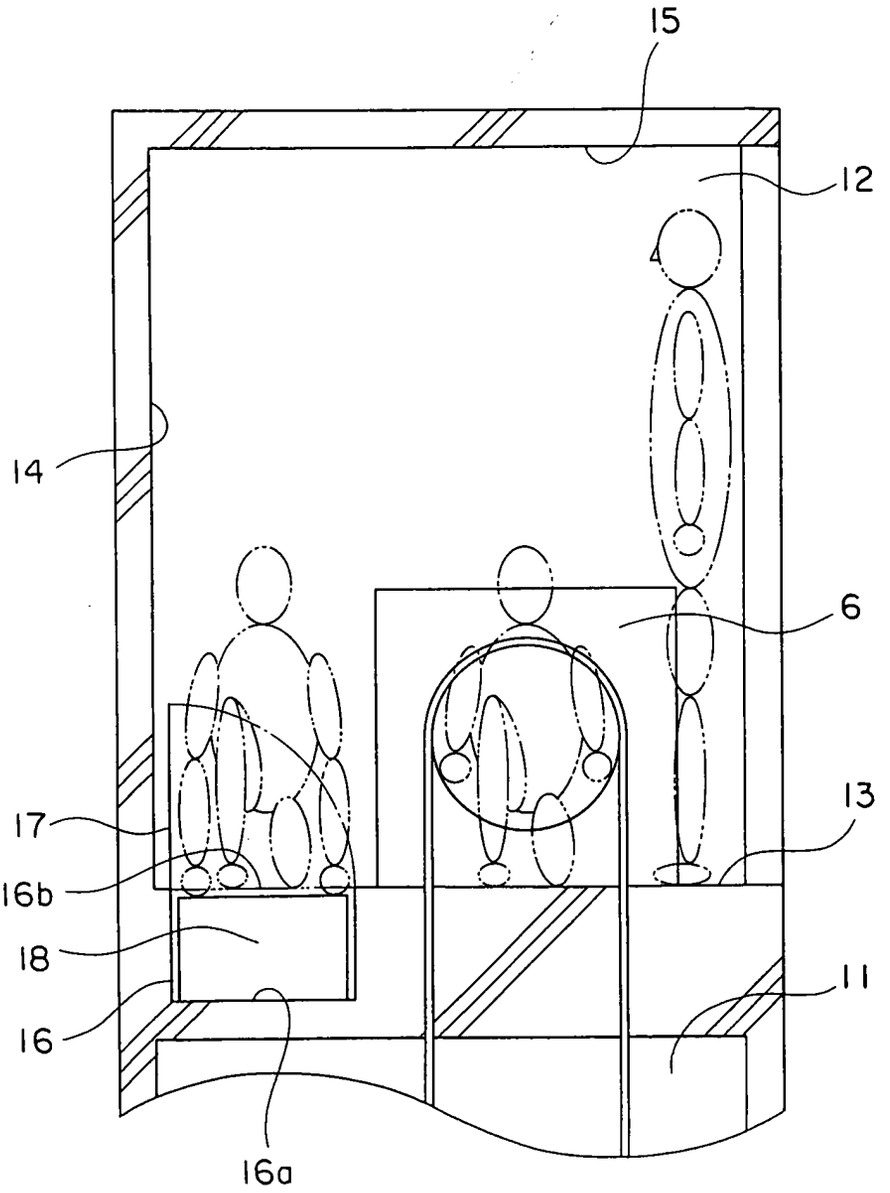


FIG. 3

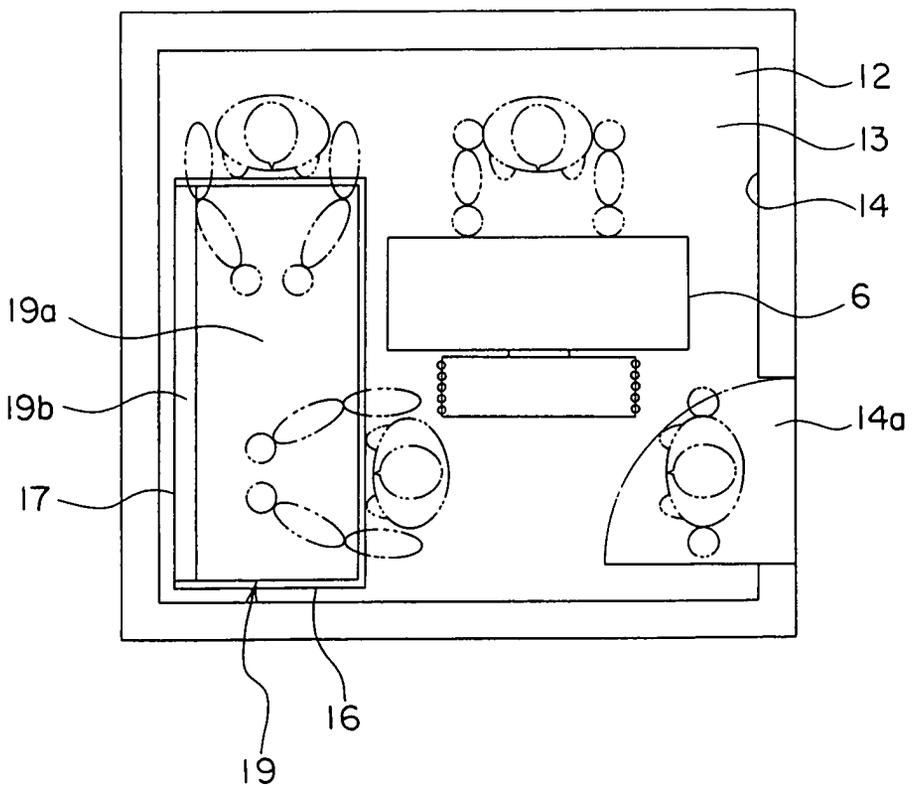


FIG. 4

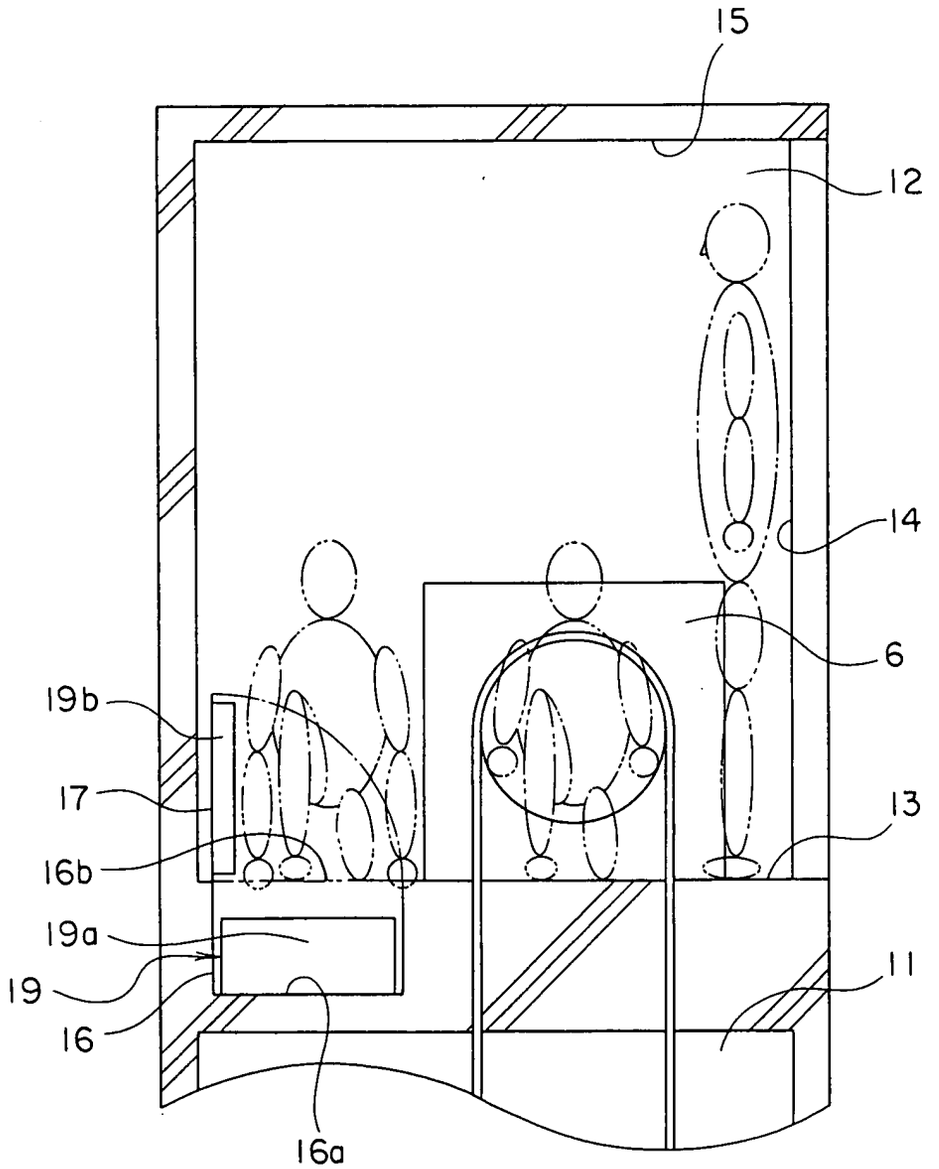


FIG. 5

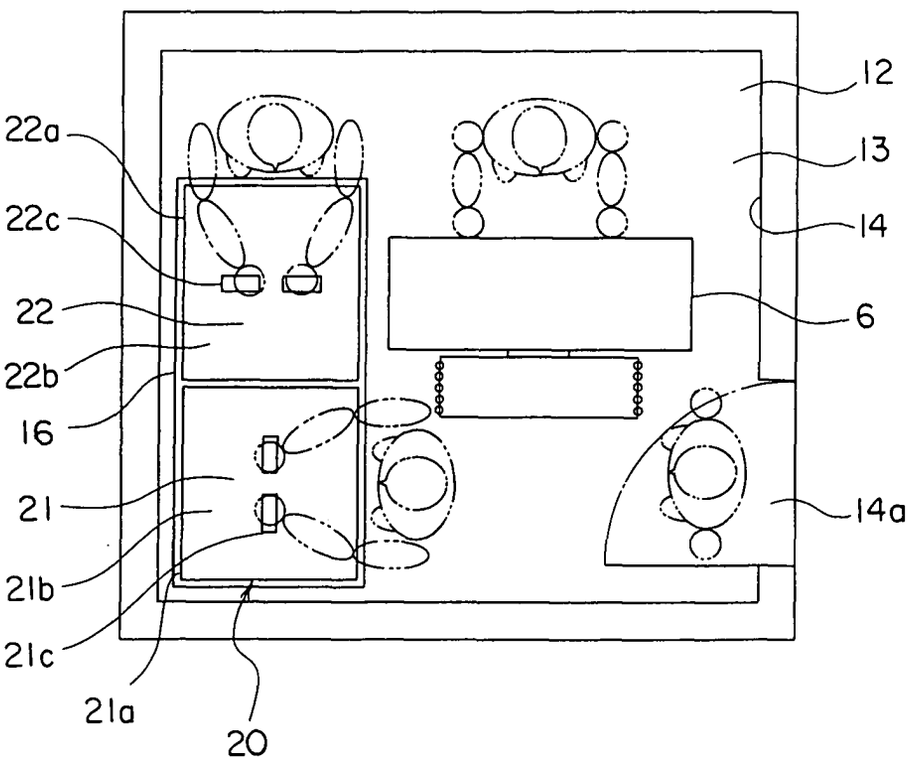


FIG. 6

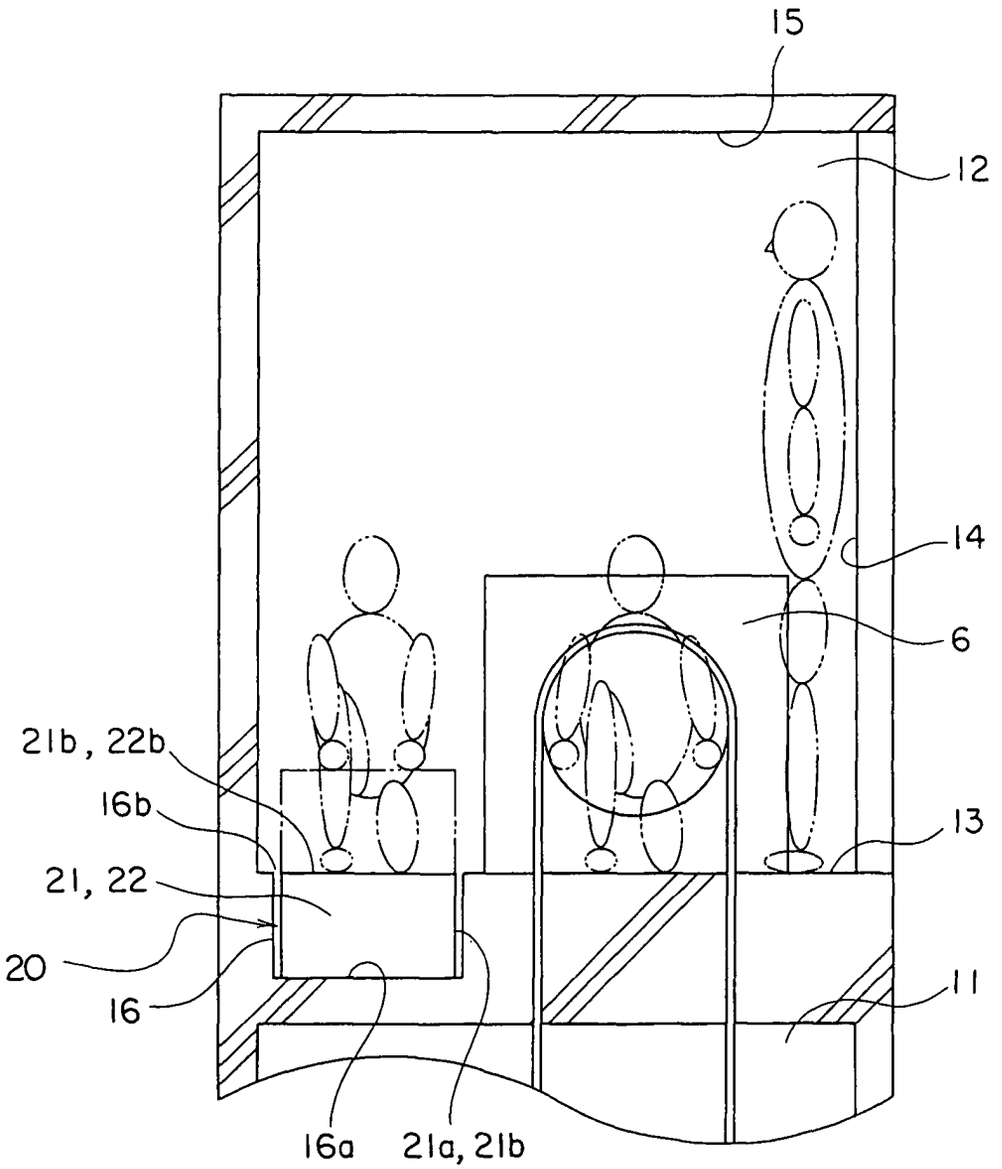


FIG. 7

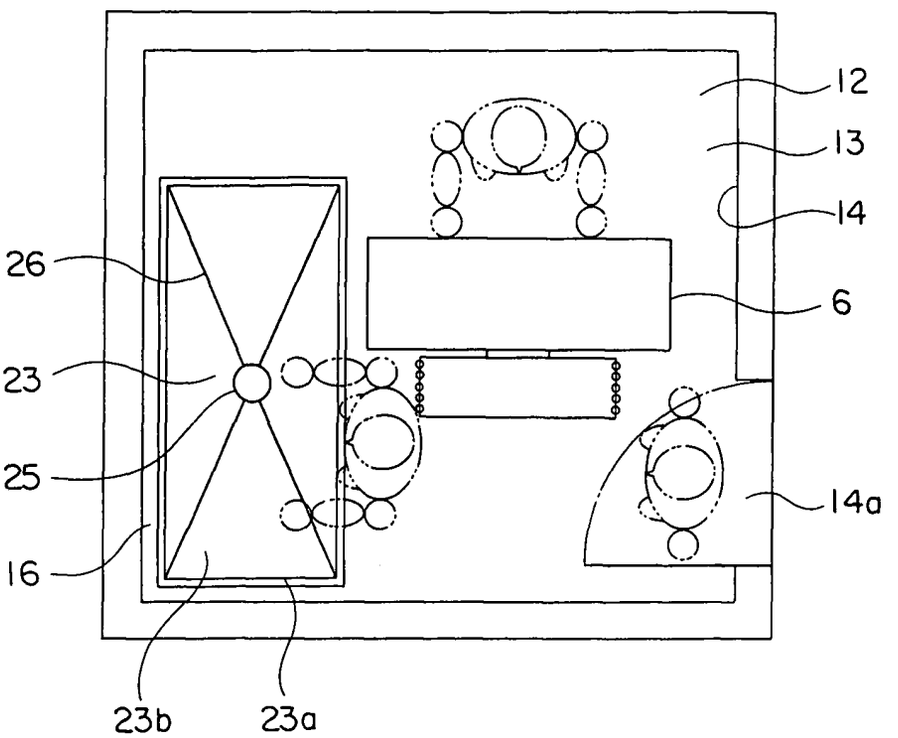


FIG. 8

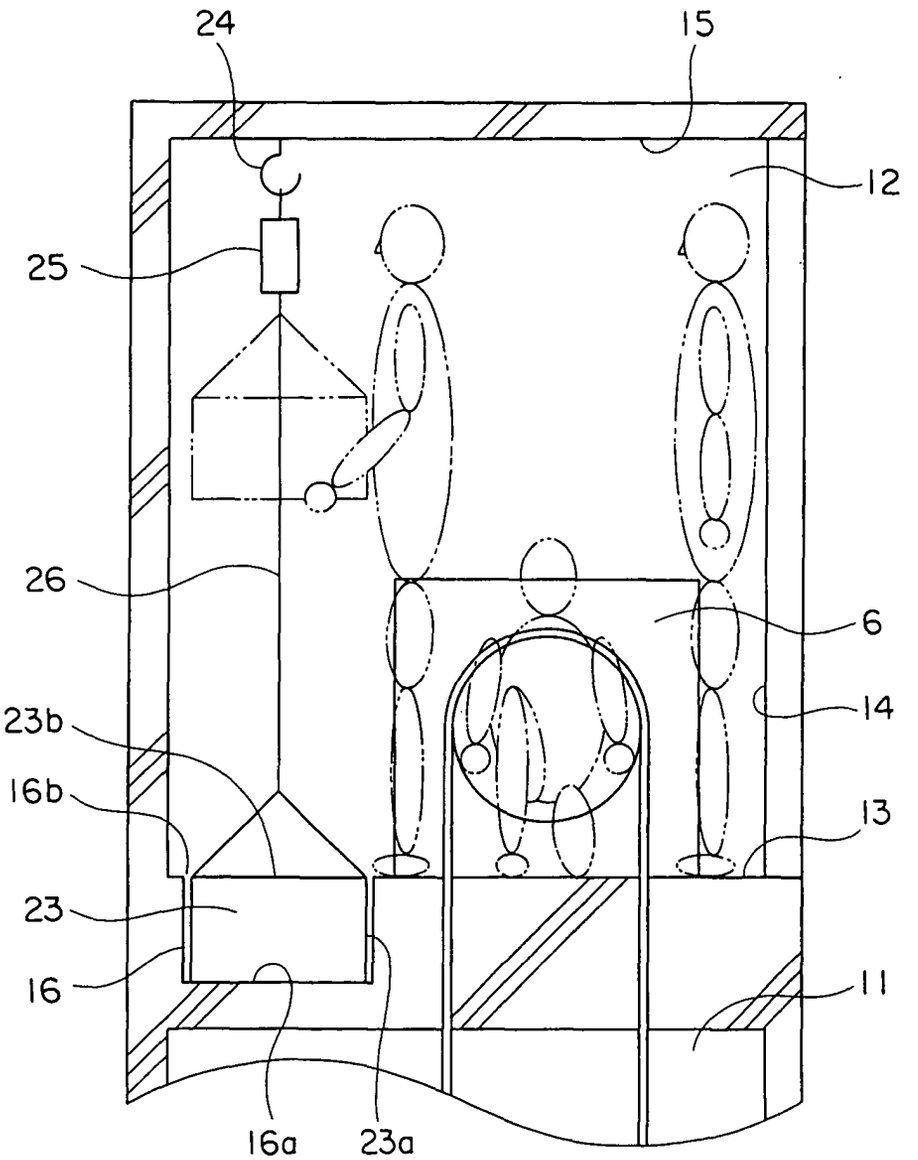


FIG. 9

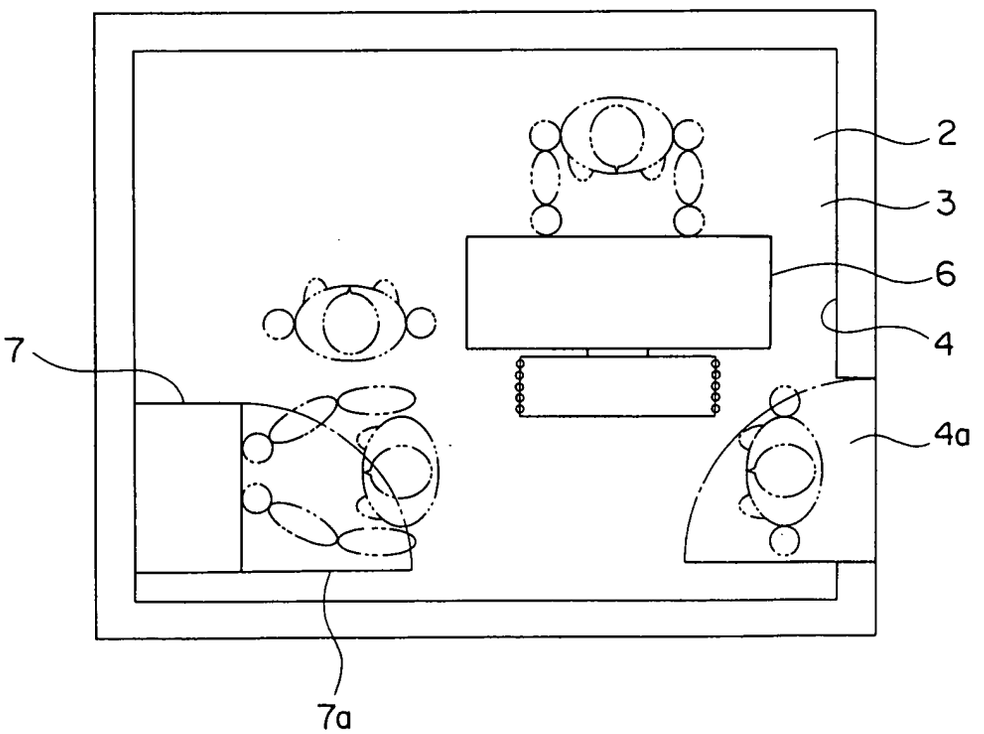
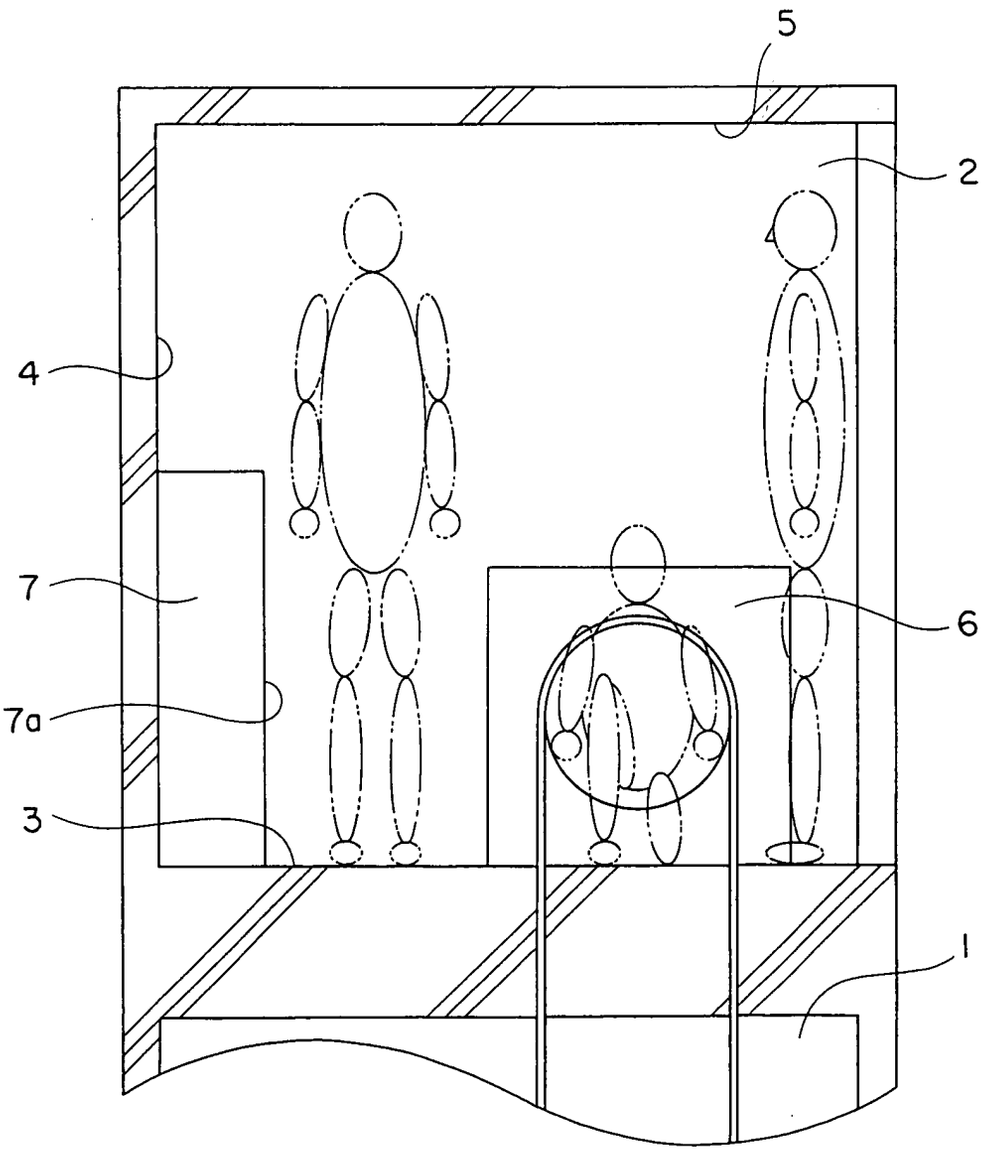


FIG.10



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/06954

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B1/34, B66B11/04

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] 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	1996-2003
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.
X Y	JP 5-34273 B2 (Toshiba Corp.), 21 May, 1993 (21.05.93), Column 5, line 1 to column 6, line 36; Figs. 3 to 6 & JP 60-137783 A	1-2 3-6
Y	JP 9-2762 A (Mitsubishi Electric Corp.), 07 January, 1997 (07.01.97), Par. Nos. [0036] to [0038]; Fig. 3 (Family: none)	3-4
Y	JP 2001-2353 A (Toshiba Corp.), 09 January, 2001 (09.01.01), Par. Nos. [0029] to [0030]; Fig. 4 (Family: none)	5

☒ 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
03 April, 2003 (03.04.03)	22 April, 2003 (22.04.03)
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/JP02/06954

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2001-2352 A (Toshiba Corp.), 09 January, 2001 (09.01.01), Par. Nos. [0021] to [0025]; Fig. 3 (Family: none)	6

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