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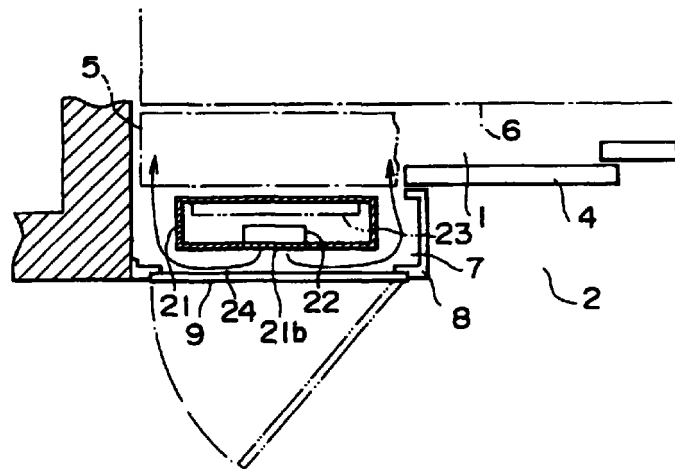
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(54) **APPARATUS FOR CONTROLLING ELEVATORS**

(57) In an elevator controlling apparatus, an installation chamber is disposed at a side of a landing doorway. An installation space adjacent to the elevator hall side of a door pocket space is defined within the installation chamber. A case made of an incombustible material is located in the installation space and receives control equipment. An inspection door for inspecting the control equipment from the elevator hall side is dis-

posed in the installation chamber. An air inlet and an air outlet which face the inspection door are disposed in the case. A gap is defined between the inspection door and the case, and the gap forms an air duct portion for preventing flames from reaching the hoist space if the control equipment catches fire.

FIG. 2



Description

TECHNICAL FIELD

[0001] The present invention relates to an elevator controlling apparatus disposed within a hoistway to face a hoist space.

BACKGROUND ART

[0002] Fig. 10 is a front view showing a conventional elevator controlling apparatus disclosed in, for example, Japanese Patent Application Laid-Open No. 4-365773, and Fig. 11 is a cross-sectional view showing the controlling apparatus in Fig. 10. In the figures, a doorway 3 between a hoistway 1 and an elevator hall 2 is opened and closed by a landing door 4. A door pocket space 5 into which the landing door 4 moves when the landing door 4 is opened is disposed at a side of the door way 3.

[0003] An installation chamber 8 which forms an installation space 7 is disposed to be adjacent to the elevator hall 2 side of the door pocket space 5. The installation space 7 communicates with a hoist space 6 through the door pocket space 5. The installation chamber 8 is equipped with an inspection door 9 as a wall portion for opening or closing the installation chamber 8 from the elevator hall 2 side.

[0004] A case 10 made of an incombustible material is disposed within the installation chamber 8. The case 10 has an air outlet 10a as a vent hole which faces the door pocket space 5. A cooling fan 11 is disposed inside of the air outlet 10a. Control equipment 12 is received within the case 10.

[0005] In the controlling apparatus thus structured, air within the case 10 which is heated by the control equipment 12 is exhausted to the exterior of the case 10 through the air outlet 10a by driving the cooling fan 11.

[0006] Next, Fig. 12 is a cross-sectional view showing another example of the conventional elevator controlling apparatus. In this example, radiating fins 13 are connected to the control equipment 12 such as a power device or a device that generates heat. The radiating fins 13 are fixed to the inside of the air outlet 10a. The cooling fan 11 is disposed within the case 10 so as to blow cooling air toward the radiating fins 13.

[0007] In the conventional controlling apparatus thus structured, since the air outlet 10a faces the hoist space 6, if the control equipment 12 catches on fire due to a fire at the elevator hall 2 side or over-heating of the control equipment 12 itself, there is a fear of the fire spreading to the upper floors through the hoist space 6 due to flames blown from the air outlet 10a to the exterior of the case 10 reaching the hoist space 6.

[0008] In general, in a building which is equipped with elevators, in order to prevent fires from spreading through the hoistway 1, a fire proof construction is generally required around the periphery of the door way 3.

However, in the case where the case 10 is located in the installation space 7 which communicates with the hoist space 6 as described above, because the control equipment 12, which may become a source of fire itself, is located inside of the fire proof construction, it is desirable to provide fire proofing means between the control equipment 12 and the hoist space 6 in addition to the above-described fire proof construction.

10 DISCLOSURE OF THE INVENTION

[0009] The present invention has been made in order to solve the above problem with the conventional devices, and therefore an object of the present invention is to provide an elevator controlling apparatus which can prevent fires from spreading to upper floors through a hoist space even if the control equipment itself catches fire.

[0010] According to the present invention, there is provided an elevator controlling apparatus comprising: a case made of an incombustible material which is disposed within an installation chamber that communicates with a hoist space and has a vent hole; control equipment received within the case; and an air duct portion disposed between the control equipment and the hoist space, for preventing a fire from reaching the hoist space if the control equipment catches fire.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 is a front view showing an elevator controlling apparatus in accordance with a first embodiment of the present invention;

Fig. 2 is a cross-sectional view showing the controlling apparatus in Fig. 1;

Fig. 3 is a front view showing an elevator controlling apparatus in accordance with a second embodiment of the present invention;

Fig. 4 is a front view showing an elevator controlling apparatus in accordance with a third embodiment of the present invention;

Fig. 5 is a front view showing an elevator controlling apparatus in accordance with a fourth embodiment of the present invention, viewed from a hoistway side;

Fig. 6 is a cross-sectional view showing the apparatus in Fig. 5;

Fig. 7 is a side view showing the interior of the case in Fig. 5;

Fig. 8 is an enlarged view showing the essential portion in Fig. 5;

Fig. 9 is a cross-sectional view taken along a line IX-IX of Fig. 8;

Fig. 10 is a front view showing one example of a conventional elevator controlling apparatus;

Fig. 11 is a cross-sectional view showing the controlling apparatus in Fig. 10; and

Fig. 12 is a cross-sectional view showing another example of the conventional elevator controlling apparatus.

through the air duct portion 24.

[0017] Also, if the control equipment 23 catches fire, and flames are blown to the exterior of the case 10 from the air inlet 21a or the air outlet 21b, since the air duct portion 24 having sufficient length and forms the bent path indicated by the arrows in Fig. 2, is disposed between both the air inlet 21a and air outlet 21b and the hoist space 6, flames are prevented from reaching the hoist space 6, and fire is prevented from spreading to the upper floors.

[0018] In addition, since the gap around the case 10 is utilized as the air duct portion 24, it is unnecessary to provide a member which forms the air duct within the case 10, so that space within the case 10 can be effectively utilized.

BEST MODE FOR CARRYING OUT THE INVENTION

[0012] Now, description will be given in more detail of preferred embodiments of the present invention with reference to the accompanying drawings.

First Embodiment

[0013] Fig. 1 is a front view showing an elevator controlling apparatus in accordance with a first embodiment of the present invention, and Fig. 2 is a cross-sectional view showing the controlling apparatus in Fig. 1. In the figures, a doorway 3 between a hoistway 1 and an elevator hall 2 is opened and closed by a landing door 4. A door pocket space 5 into which the landing door 4 moves when it is opened is disposed at a side of the door way 3.

[0014] An installation chamber 8 which forms an installation space 7 is disposed to be adjacent to the elevator hall 2 side of the door pocket space 5. The installation space 7 communicates with a hoist space 6 through the door pocket space 5. The installation chamber 8 is equipped with an inspection door 9 as a wall portion for opening or closing the installation chamber 8 from the elevator hall 2 side.

[0015] A case 21 made of an incombustible (fire resistant) material is disposed within the installation chamber 8. The case 21 has an air inlet 21a and an air outlet 21b as vent holes which face the inspection door 9, respectively. A cooling fan 22 is disposed inside of the air outlet 21b. Control equipment 23 for controlling the operation of the elevator is received within the case 21. Further, gaps are defined between the inspection door 9 and the case 21 and at both sides of the case 21, and those gaps constitute an air duct portion 24.

[0016] In the controlling apparatus thus structured, air within the hoistway 1 is made to flow into the case 21 from the air inlet 21a through the air duct portion 24 by driving the cooling fan 22. The air that flows into the case 21 is exhausted to the exterior of the case 21 from the air outlet 21b after the control equipment 23 is cooled. Then, the air is returned to the hoistway 1

Second Embodiment

[0019] Next, Fig. 3 is a front view showing an elevator controlling apparatus in accordance with a second embodiment of the present invention. In this example, a space between the case 21 and the inspection door 9 is partially filled with a plurality of incombustible (fire resistant) members 25 which surround the air inlet 21a and the air outlet 21b except for the lower portion. The incombustible members 25 may be attached to the case 21 or the inspection door 9. Other structures are identical with those in the first embodiment.

[0020] In the controlling apparatus thus structured, even if flames extend upward when flames are blown from the air inlet 21a or the air outlet 21b, since the incombustible members 25 are disposed around the air inlet 21a and the air outlet 21b, spread of the fire is more surely prevented to the surrounding area.

Third Embodiment

[0021] Fig. 4 is a front view showing an elevator controlling apparatus in accordance with a third embodiment of the present invention. In this example, a plurality of reinforcement members 26 made of an incombustible material are formed integrally with or fixed onto the back surface of the inspection door 9. The reinforcement members 26 contact the case 21 whereby the periphery of the air inlet 21a and the air outlet 21b except for the lower portion is surrounded by the reinforcement members 26. Other structures are identical with those in the first embodiment.

[0022] In the controlling apparatus thus structured, even if flames extend upward when flames are blown from the air inlet 21a or the air outlet 21b, since the reinforcement members 26 are disposed around the air inlet 21a and the air outlet 21b, spread of the fire is more surely prevented to the surrounding area. Also, since the reinforcement members 26 of the inspection door 9 are used, it is unnecessary to use the specific incombustible members shown in the second embodiment.

Fourth Embodiment

[0023] Next, Fig. 5 is a front view showing an elevator controlling apparatus in accordance with a fourth embodiment of the present invention, viewed from a hoistway side, Fig. 6 is a cross-sectional view showing the controlling apparatus in Fig. 5, Fig. 7 is a side view showing the interior of a case shown in Fig. 5, Fig. 8 is an enlarged view showing the essential portion in Fig. 5, and Fig. 9 is a cross-sectional view taken along a line IX-IX of Fig. 8.

[0024] In the figures, a case 31 made of an incombustible (fire resistant) material is disposed within the installation chamber 8. An air inlet 31a as a vent hole is disposed on the bottom portion of the case 31. Also, an air outlet 31b as a vent hole which faces the hoist space 6 is disposed on the case 31. Control equipment 32 for controlling the operation of the elevator and a cylindrical member (duct) 33 as an air duct portion are received within the case 31.

[0025] One end portion (lower portion) 33a of the cylindrical member 33 is connected to the air outlet 31b. Also, the other end portion (upper portion) 33b of the cylindrical member 33 is disposed above the one end portion 33a. In addition, a substantially Z-shaped bent portion 33c is disposed on the middle portion of the cylindrical member 33.

[0026] A cooling fan 34 which faces the other end portion 33b of the cylindrical member 33 is disposed within the case 31. As shown in Fig. 7, radiating fins 35 which are connected to the control equipment 32 such as a power device or a device that generates heat are disposed between the cooling fan 34 and the other end portion 33b of the cylindrical member 33. The cylindrical member 33 is partially filled with an incombustible member (fire resistant material) 36, such as steel wool, that is air permeable.

[0027] A plate-like shield body (shutter) 37 for opening and closing the air outlet 31b and a pair of guides 38a and 38b for guiding the movement of the shield body 37 are disposed on the outer peripheral portion of the case 31. The shield body 37 is held normally by a holding member 39 at a position where the air outlet 31b is opened.

[0028] The holding member 39 is made of a low-melting-point material such as a low-melting-point metal, for example, solder. Also, one end portion of the holding member 39 is connected to the shield body 37, and the other end portion of the holding member 39 is drawn within the case 31 and fixed to the inner wall portion of the cylindrical member 33. If the holding member 39 is melted and cut by a fire, the shield body 37 drops by its own weight, and the air outlet 31b is closed.

[0029] In the controlling apparatus of this type, air is drawn into the case 31 from the air inlet 31a by driving the cooling fan 34. The air flown into the case 31 is exhausted to the exterior of the case 31 from the air outlet 31b through the cylindrical member 33 after the con-

trol equipment 32 is cooled.

[0030] Also, if the control equipment 32 catches fire, because the air inlet 31a is disposed on the bottom portion of the case 31, flames are prevented from being blown to the exterior of the case 31. In addition, because the cylindrical member 33 is disposed between the space within the case 31 and the air outlet 31b, flames are prevented from being blown from the air outlet 31b. As a result, fire is prevented from spreading to the upper floors.

[0031] Further, because the other end portion 33b of the cylindrical member 33 is situated above the one end portion 33a connected to the air outlet 31b, flames must go down within the cylindrical member 33 in order to for the flames to be blown from the air outlet 31b. Accordingly, flames are effectively prevented from being blown from the air outlet 31b.

[0032] In addition, because the bent portion 33c is disposed along the cylindrical member 33, the distance up to the air outlet 31b can be lengthened, thereby preventing flames from reaching the air outlet 31b. Still further, because the porous incombustible member 36 is disposed within the cylindrical member 33, flame progress is further suppressed.

[0033] Also, because the holding member 39 is melted and breaks to close the air outlet 31b when the interior within the cylindrical member 33 increases in temperature due to a fire or the like, flames are more surely prevented from being blown out from the air outlet 31b.

[0034] Further, since the air outlet 31b can face the hoist space 6 while fires are prevented, from spreading to the upper floors, the wall portion of the installation chamber 8 at the elevator hall 2 side is not heated by air flow exhausted (heated air) during normal times.

[0035] The above description was given of a case in which the installation space 7 is disposed to be adjacent to the elevator hall 2 side of the door pocket space 5. However, the present invention is also applicable to any controlling apparatus located in an installation space from which a fire may spread through the hoist space 6.

Claims

1. An elevator controlling apparatus comprising:

a case made of an incombustible material and disposed within an installation space which communicates with a hoist space in which a car moves up and down, said case having a vent hole;

control equipment received within said case; and

an air duct portion disposed between said control equipment and said hoist space, for preventing a fire from reaching said hoist space if said control equipment catches on fire.

2. The elevator controlling apparatus as claimed in claim 1, further comprising an installation chamber having a wall portion which faces the outer peripheral surface of said case to form said installation space, wherein said vent hole is disposed to face said wall portion, and said air duct portion is constituted by gaps between said case and said wall portion. 5
3. The elevator controlling apparatus as claimed in claim 2, further comprising an incombustible member disposed between said case and said wall portion and substantially surrounding the periphery of said vent hole except for the lower portion thereof. 10
15
4. The elevator controlling apparatus as claimed in claim 2, wherein said installation chamber is adjacent to an elevator hall side of a door pocket space into which a landing door moves when said landing door is opened. 20
5. The elevator controlling apparatus as claimed in claim 4, wherein said wall portion comprises an inspection door for opening and closing the installation chamber from the elevator hall side, and a reinforcement member which substantially surrounds the periphery of said vent hole except for the lower portion thereof by contacting said case is disposed on a back surface of said inspection door. 25
30
6. The elevator controlling apparatus as claimed in claim 1, wherein said air duct portion comprises a cylindrical member disposed within said case, and one end portion of said cylindrical member is connected to said vent hole. 35
7. The elevator controlling apparatus as claimed in claim 6, wherein said vent hole in said case comprises an air inlet and an air outlet, one end portion of said cylindrical member being connected to said air outlet, and the other end portion of said cylindrical member being disposed above said one end portion. 40
8. The elevator controlling apparatus as claimed in claim 6, wherein a bent portion is provided at a middle portion of said cylindrical member. 45
9. The elevator controlling apparatus as claimed in claim 6, wherein an incombustible member which is air permeable and permits ventilation is received within said cylindrical member. 50
10. The elevator controlling apparatus as claimed in claim 1, further comprising: 55

a shield body provided at said air duct portion, for opening and closing said air duct portion;

and

a holding member for normally holding said shield body at a position where said air duct portion is opened, and constituted to melt and break to allow said shield body to move to a position where said air duct portion is closed when a fire occurs.

FIG. 1

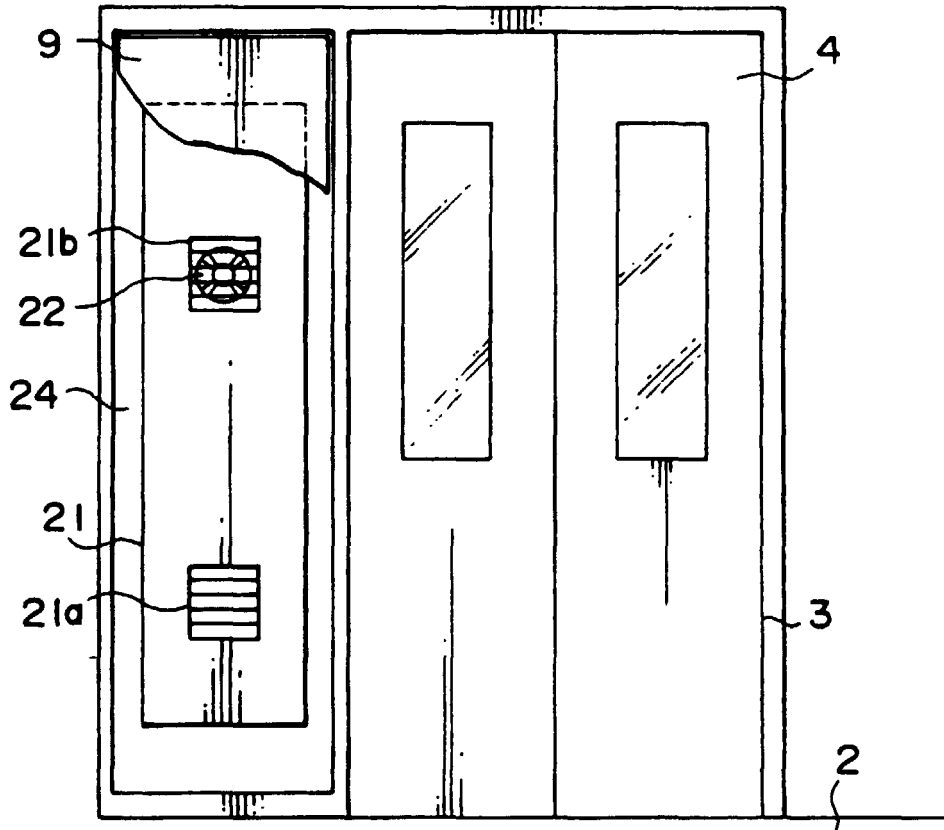


FIG. 2

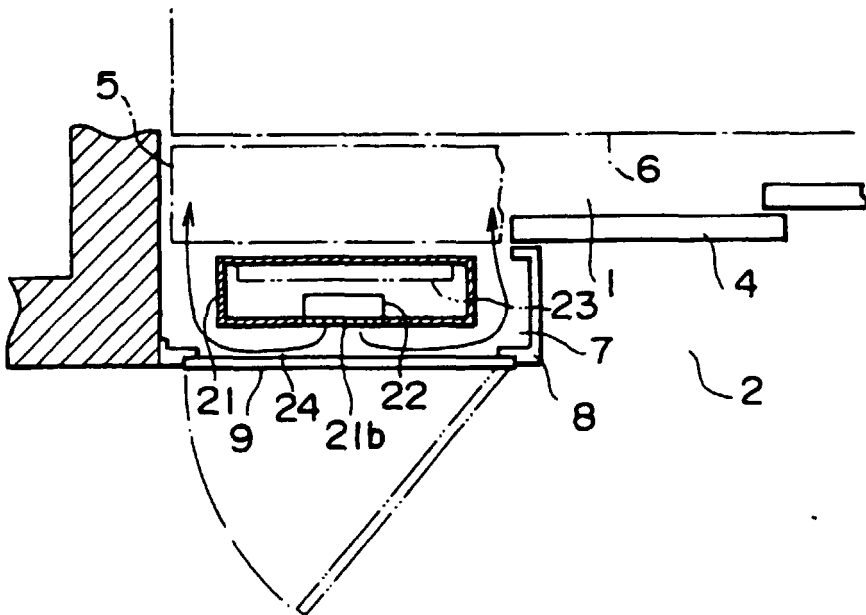


FIG. 3

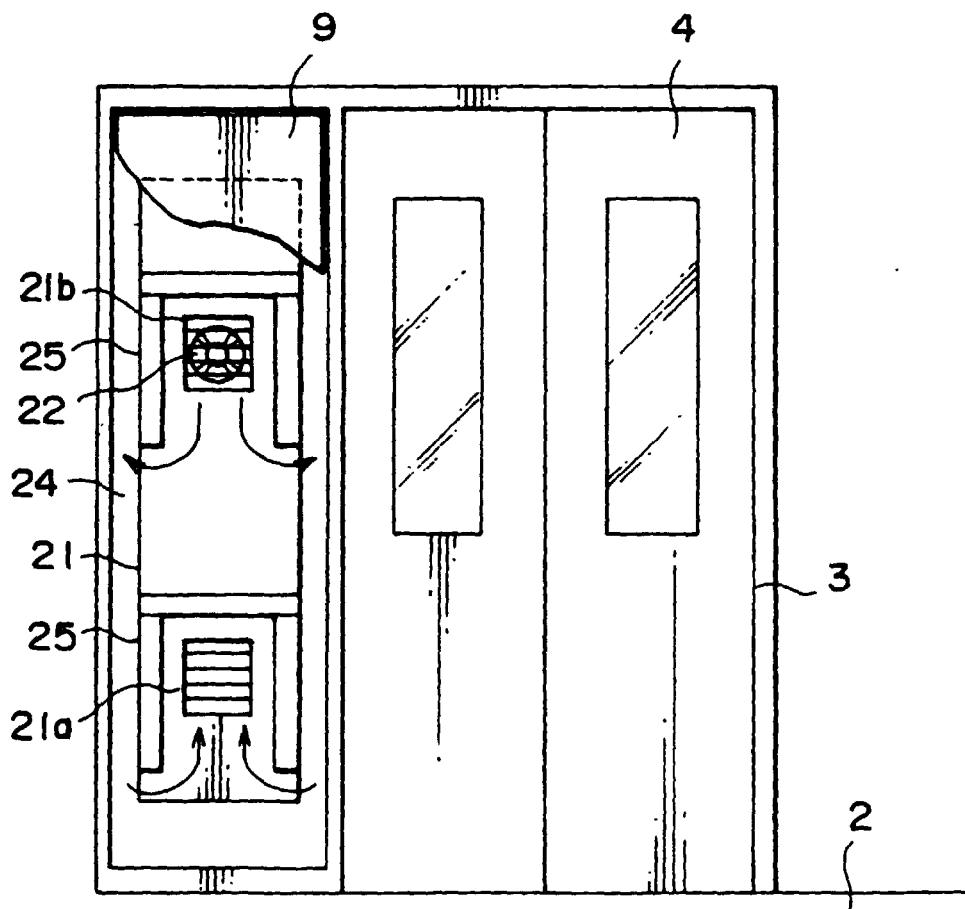


FIG. 4

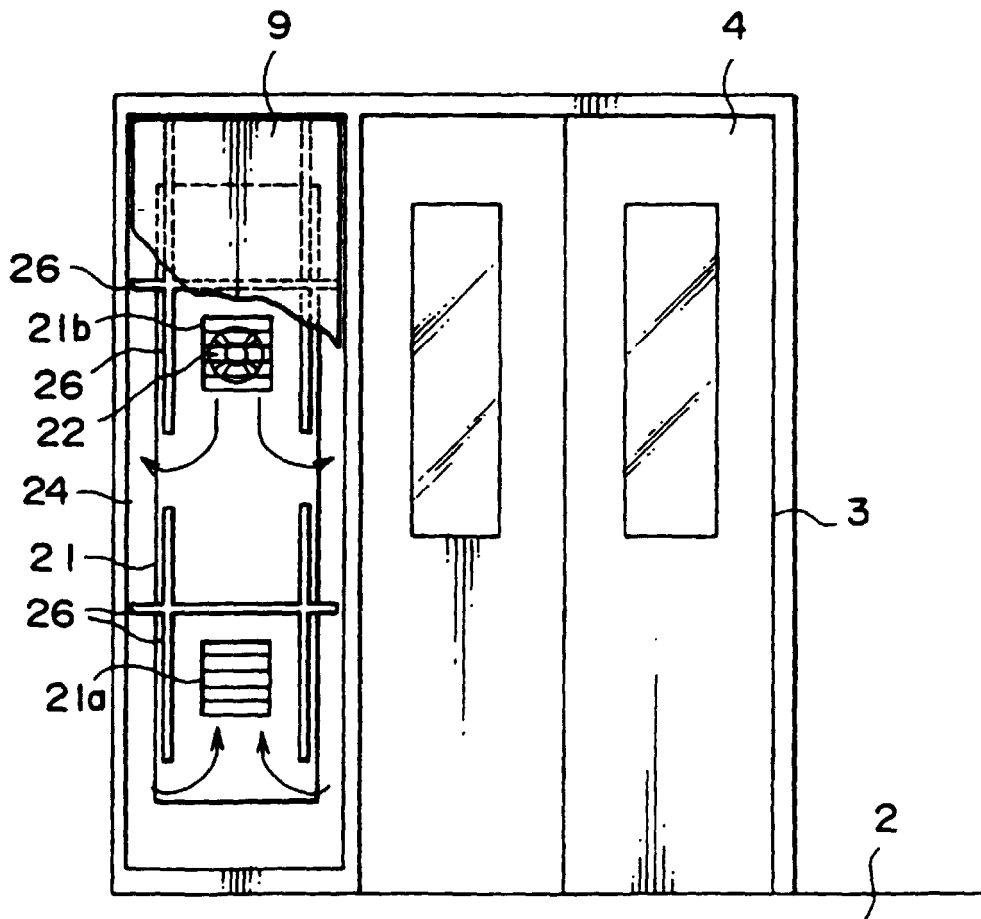


FIG. 5

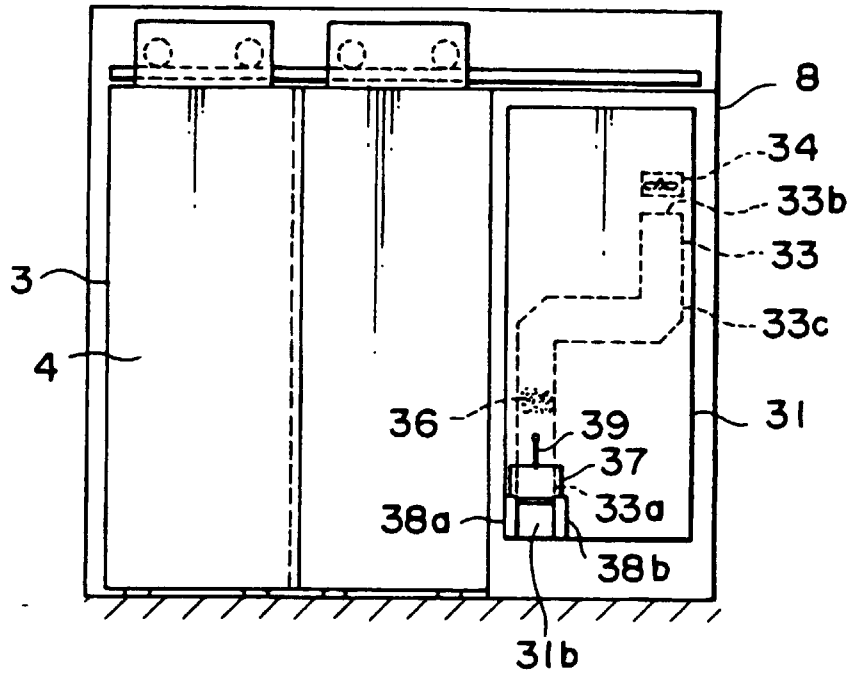


FIG. 6

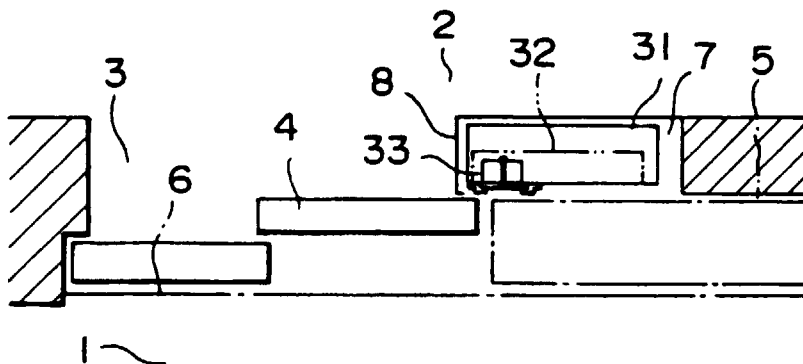


FIG. 7

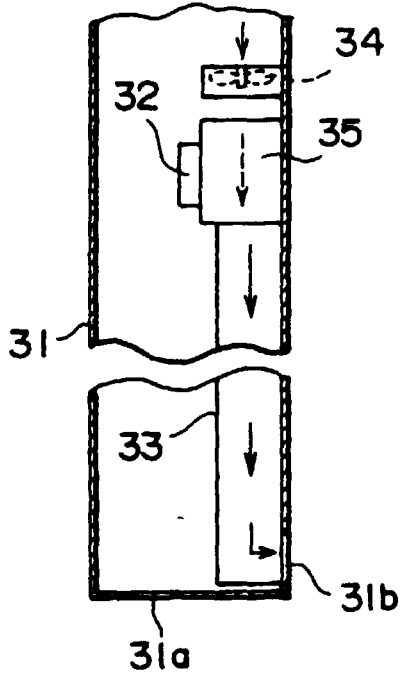


FIG. 8

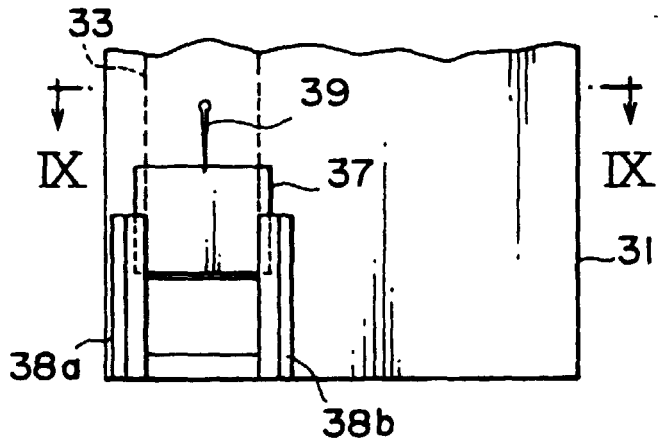


FIG. 9

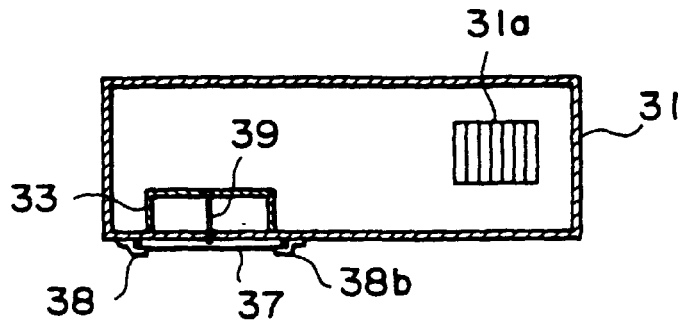


FIG. 10

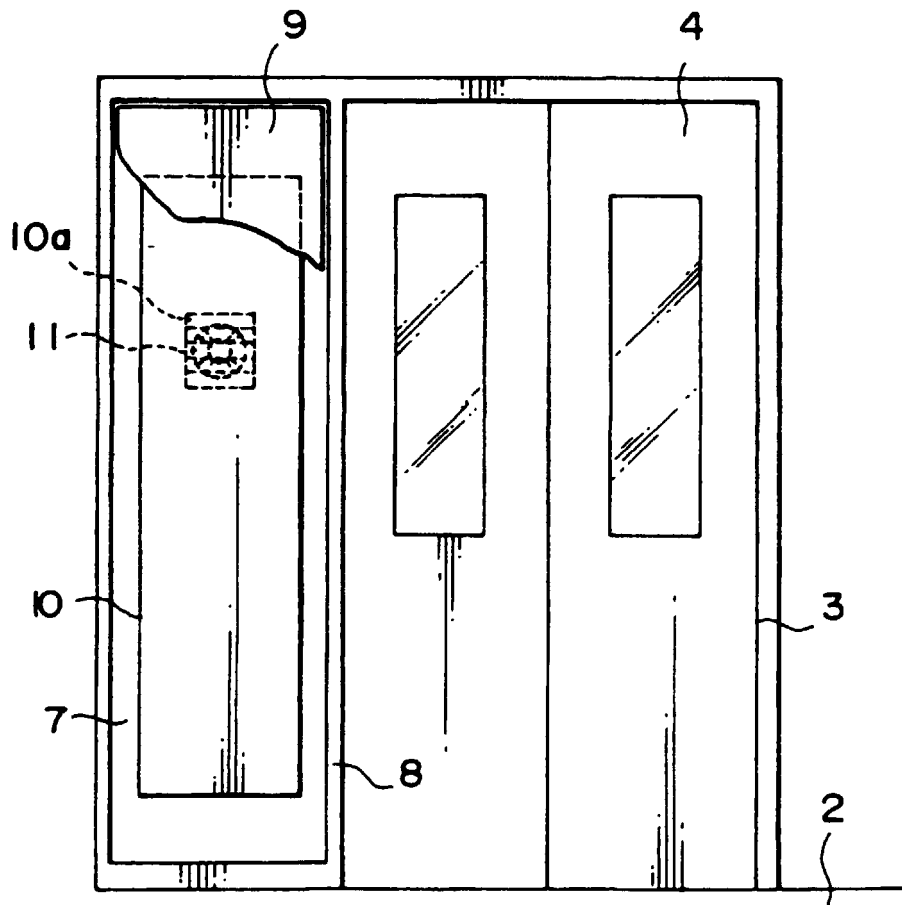


FIG. 11

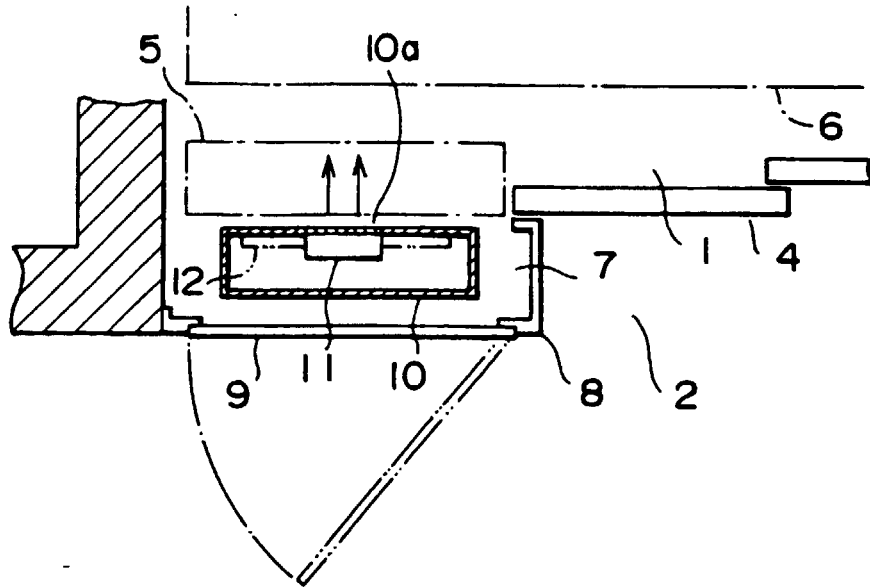
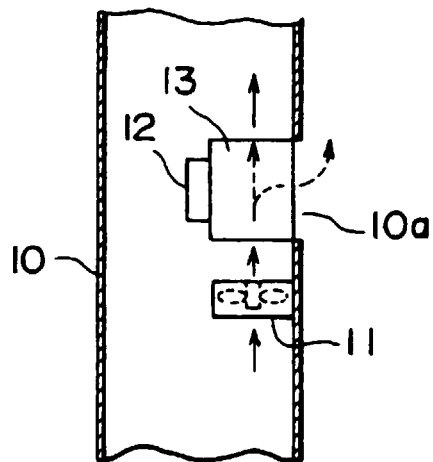


FIG. 12



INTERNATIONAL SEARCH REPORT

International application No. PCT/JP98/04984

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. ⁶ B66B1/34		
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. ⁶ B66B1/34		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1926-1999 Toroku Jitsuyo Shinan Koho 1994-1999 Kokai Jitsuyo Shinan Koho 1971-1999		
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, 08-40665, A (Kone Oy), 13 February, 1996 (13. 02. 96) & US, 574088, A & EP, 680921, A2	1-10
<input type="checkbox"/> Further documents are listed in the continuation of Box C.		<input type="checkbox"/> See patent family annex.
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Date of the actual completion of the international search 2 February, 1999 (02. 02. 99)	Date of mailing of the international search report 9 February, 1999 (09. 02. 99)	
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer	
Facsimile No.	Telephone No.	

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