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- **SUZUKI, Toshiya, c/o Mitsubishi Denki K.K.  
Tokyo 100-8310 (JP)**
- **HANAJIMA, Mabito, c/o Mitsubishi Denki K.K.  
Tokyo 100-8310 (JP)**
- **KANAMORI, Osamu, c/o Mitsubishi Denki K.K.  
Tokyo 100-8310 (JP)**

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

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

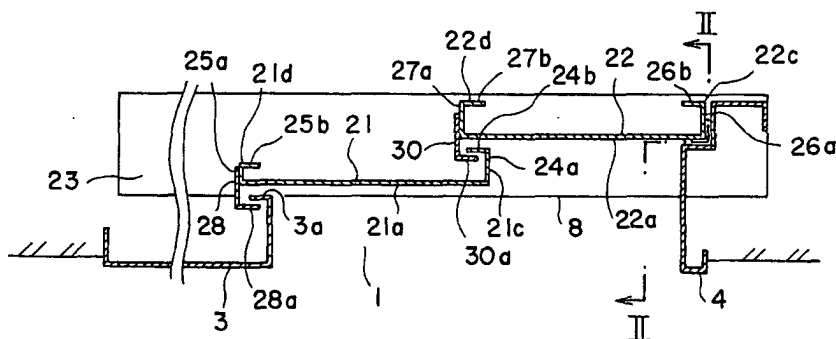
(72) Inventors:  
• **NISHIMURA, Nobuhiro, c/o Mitsubishi Denki K.K.  
Tokyo 100-8310 (JP)**

(54) **DOOR OF ELEVATOR**

(57) An elevator door apparatus has lower speed and higher speed doors whose closing end portions, opening end portions, and upper end portions are folded to the same side. A lower-speed-side-end-portion fire prevention member is mounted to a lower-speed-opening-side end surface, a higher-speed-side-end-portion

fire prevention member is mounted to a higher-speed-opening-side end surface by a plurality of screws. A lower-speed-side-upper-portion fire prevention member is mounted to a lower-speed-side upper end surface, and a higher-speed-side-upper-portion fire prevention member is mounted to a higher-speed-side upper end surface by a plurality of screws.

**FIG. 1**



## Description

### TECHNICAL FIELD

**[0001]** This invention relates to an elevator door apparatus having a fire prevention structure.

### BACKGROUND ART

**[0002]** Fig. 5 is a front view showing an example of a conventional elevator landing door apparatus, Fig. 6 is a sectional view taken along line VI-VI of Fig. 5, Fig. 7 is a sectional view taken along line VII-VII of Fig. 6, and Fig. 8 is a perspective view of a main portion of a lower speed door shown in Fig. 1.

**[0003]** In the drawings, a landing entrance 1 is formed by a jamb 2 constituting a framework. The jamb 2 has a first vertical frame 3, a second vertical frame 4 opposed to the first vertical frame 3, and an upper frame 5 arranged between the upper ends of the first and second vertical frames 3 and 4. The landing entrance 1 is opened and closed by a lower speed door 6 and a higher speed door 7.

**[0004]** The lower speed door 6 is reciprocated in the width direction (i.e., to the right and left as seen in Fig. 5) of the entrance 1. The higher speed door 7 is reciprocated at a higher speed than and parallel to the lower speed door 6 such that when the entrance is opened, it reaches the opened-door position substantially at the same time as the lower speed door 6, and that when the entrance is closed, it reaches the closed-door position substantially at the same time as the lower speed door 6.

**[0005]** At the bottom of the lower speed door 6 and the higher speed door 7, there is provided a landing sill 8 for guiding the movement of the lower end portions of the lower speed door 6 and the higher speed door 7.

**[0006]** The lower speed door 6 has a lower-speed-side plate portion 6a, a lower-speed-closing-side end portion 6b constituting a forward end at the time of a door closing operation, and a lower-speed-opening-side end portion 6c constituting a forward end at the time of a door opening operation. The higher speed door 7 has a higher-speed-side plate portion 7a, a higher-speed-closing-side end portion 7b constituting a forward end at the time of a door closing operation, and a higher-speed-opening-side end portion 7c constituting a forward end at the time of a door opening operation.

**[0007]** The first vertical frame 3 is equipped with a vertical-frame-side opposing portion 3a opposed to the lower-speed-side plate portion 6a and extending continuously in the height direction. The upper frame 5 is equipped with first and second upper-frame-side opposing portions 5a and 5b respectively opposed to the lower-speed-side and higher-speed-side plate portions 6a and 7a at the time of a door closing operation.

**[0008]** The lower-speed-opening-side end portion 6c is folded into an L-shape so that the vertical-frame-side opposing portion 3a may be situated between it and the

front surface of the lower-speed-side plate portion 6a at the time of a door closing operation. The lower-speed-closing-side end portion 6b is also folded into an L-shape that is reverse to the lower-speed-opening-side end portion 6c so that it may be opposed to the back surface of the lower-speed-side plate portion 6a.

**[0009]** Similarly, the higher-speed-opening-side end portion 7c is folded into an L-shape so that the lower-speed-closing-side end portion 6b may be situated between it and the front surface of the higher-speed-side plate portion 6a and the higher-speed-closing-side end portion 7b is folded in a direction reverse to the higher-speed-opening-side end portion 7c so that it may be opposed to the back surface of the higher-speed-side plate portion 7a.

**[0010]** Fixed to the front surface of the upper end portion of the lower-speed-side plate portion 6a by welding is a lower-speed-side-upper-portion fire prevention member 9 with a Z-shaped section arranged such that the first upper-frame-side opposing portion 5a is situated between it and the lower-speed-side plate portion 6a at the time of a door closing operation.

**[0011]** Similarly, fixed to the front surface of the upper end portion of the higher-speed-side plate portion 7a by welding is a higher-speed-side-upper-portion fire prevention member 10 with a Z-shaped section arranged such that the second upper-frame-side opposing portion 5b is situated between it and the higher-speed-side plate portion 7a at the time of a door closing operation.

**[0012]** An upper reinforcing member 11 is fixed to the back surface of the upper end portion of the lower-speed-side plate portion 6a by welding. A similar upper reinforcing member 11 is also fixed to the back surface of the upper end portion of the higher-speed-side plate portion 7a by welding. In the upper end portion of the lower-speed-closing-side end portion 6b, there is provided a cutout 6d for avoiding interference with the higher-speed-side-upper-portion fire prevention member 10.

**[0013]** A hanger case 12 is fixed to the upper frame 5. A suspension mechanism and a driving mechanism for the lower speed door 6 and the higher speed door 7 are not shown and a description thereof will be omitted.

**[0014]** In this landing door apparatus, the lower-speed-opening-side end portion 6c is opposed to the vertical-frame-side opposing portion 3a, the higher-speed-opening-side end portion 7c is opposed to the lower-speed-closing-side end portion 6b, the lower-speed-side-upper-portion fire prevention member 9 is opposed to the first upper-frame-side opposing portion 5a, and the higher-speed-side-upper-portion fire prevention member 10 is opposed to the second upper-frame-side opposing portion 5b, thus forming a so-called rabbet structure. Due to this structure, the gaps around the lower speed door 6 and the higher speed door 7 are closed to thereby obtain the requisite fire prevention performance.

**[0015]** When warpage is generated in the lower-

speed-side plate portion 6a and the higher-speed-side plate portion 7a by a fire, the lower-speed-opening-side end portion 6c engages with the vertical-frame-side opposing portion 3a, the higher-speed-opening-side end portion 7c engages with the lower-speed-closing-side end portion 6b, the lower-speed-side-upper-portion fire prevention member 9 engages with the first upper-frame-side opposing portion 5a, and the higher-speed-side-upper-portion fire prevention member 10 engages with the second upper-frame-side opposing portion 5b, whereby preventing detachment of the lower speed door 6 and the higher speed door 7.

**[0016]** In the conventional landing door apparatus described above, it is necessary to attach the upper reinforcing members 11 to the lower speed door 6 and the higher speed door 7 in order to secure a sufficient degree of strength. However, to avoid impairing the design and the fire prevention performance, it is necessary to fix the reinforcing members by welding, not by screws, adhesive or the like. Accordingly, the welding operation requires time and labor, and the removal of welding distortion also requires time and labor.

**[0017]** Further, when stainless steel is used for an artistically designed surface, it is necessary to wrap a design film of stainless steel around the door surface after welding, resulting in a complicated structure and an increase in weight.

**[0018]** Further, since it is difficult to adjust the gap dimension between the lower-speed-opening-side end portion 6c and the vertical-frame-side opposing portion 3a and the gap dimension between the higher-speed-opening-side end portion 7c and the lower-speed-closing-side end portion 6b, it is necessary to prepare and install the lower speed door 6 and the higher speed door 7 with high precision. Further, since the lower-speed-side- and higher-speed-side-upper-portion fire prevention members 9 and 10 are fixed to the upper portions of the artistically designed surfaces of the lower-speed-side and higher-speed-side plate portions 6a and 7a, it is impossible to perform fore-and-aft gap adjustment.

**[0019]** A fire prevention structure for the above conventional door apparatus is described, for example, in the European Uniform Code EN81.

#### DISCLOSURE OF THE INVENTION

**[0020]** This invention has been made with a view toward solving the above problems. It is an object of this invention to provide an elevator door apparatus which can secure a sufficient degree of strength without having to weld reinforcing members to thereby facilitating production, and on which gap dimension adjustment can be easily conducted.

**[0021]** An elevator door apparatus according to the present invention comprises: a lower speed door which has a lower-speed-side plate portion, a lower-speed-side upper end portion, a lower-speed-closing-side end portion constituting a forward end at the time of a door

closing operation, and a lower-speed-opening-side end portion constituting a forward end at the time of a door opening operation, and which is reciprocated in the width direction of an entrance; a higher speed door which has a higher-speed-side plate portion, a higher-speed-side upper end portion, a higher-speed-closing-side end portion constituting a forward end at the time of a door closing operation, and a higher-speed-opening-side end portion constituting a forward end at the time of a door opening operation, which is reciprocated in parallel with and faster than the lower speed door, and which is placed in layers with the lower speed door and accommodated in a door pocket at the time of door opening; and a framework which has a first vertical frame equipped with a vertical-frame-side opposing portion opposed to the lower-speed-side plate portion, a second vertical frame opposed to the first vertical frame, and an upper frame equipped with first and second upper-frame-side opposing portions respectively opposed to the lower-speed-side and higher-speed-side plate portions at the time of door closing and arranged between the upper end portions of the first and second vertical frames, and which forms an entrance, wherein: the lower-speed-closing-side end portion has a lower speed closing side end surface extending perpendicularly with respect to the lower-speed-side plate portion, and a lower-speed-closing-side folded portion extending perpendicularly from the lower speed closing side end surface and opposed to the back surface of the lower-speed-side plate portion and to the front surface of the higher-speed-side plate portion; the lower-speed-opening-side end portion has a lower-speed-opening-side end surface extending perpendicularly with respect to the lower-speed-side plate portion and shorter than the lower speed closing side end surface, and a lower-speed-opening-side folded portion extending perpendicularly from the lower-speed-opening-side end surface and opposed to the back surface of the lower-speed-side plate portion; the higher-speed-closing-side end portion has a higher speed closing side end surface extending perpendicularly with respect to the higher-speed-side plate portion, and a higher-speed-closing-side folded portion extending perpendicularly from the higher speed closing side end surface and opposed to the back surface of the higher-speed-side plate portion; the higher-speed-opening-side end portion has a higher-speed-opening-side end surface extending perpendicularly with respect to the higher-speed-side plate portion, and a higher-speed-opening-side folded portion extending perpendicularly from the higher-speed-opening-side end surface and opposed to the back surface of the higher-speed-side plate portion; a lower-speed-side-end-portion fire prevention member with an L-shaped section having a lower-speed-side opposing surface arranged such that the vertical-frame-side opposing portion is situated between it and the lower-speed-side plate portion at the time of door closing, is mounted to the lower-speed-opening-side end surface by a plurality of

screws; and a higher-speed-side-end-portion fire prevention member with an L-shaped section having a higher-speed-side opposing surface arranged such that the lower-speed-closing-side folded portion is situated between it and the higher-speed-side plate portion at the time of door closing, is mounted to the higher-speed-opening-side end surface by a plurality of screws.

#### BRIEF DESCRIPTION OF THE DRAWINGS

##### [0022]

Fig. 1 is a sectional view of an elevator landing door apparatus according to one example of an embodiment of this invention;

Fig. 2 is a sectional view taken along the line II-II of Fig. 1;

Fig. 3 is an exploded perspective view showing a main portion of a lower speed door of Fig. 1;

Fig. 4 is a development view showing a main portion of the lower speed door of Fig. 3;

Fig. 5 is a front view showing an example of a conventional elevator landing door apparatus;

Fig. 6 is a sectional view taken along the line VI-VI of Fig. 5;

Fig. 7 is a sectional view taken along the line VII-VII of Fig. 6; and

Fig. 8 is a perspective view showing a main portion of the lower speed door of Fig. 1.

#### BEST MODE FOR CARRYING OUT THE INVENTION

[0023] A preferred embodiment of this invention will now be described with reference to the drawings.

[0024] Fig. 1 is a sectional view of an elevator landing door apparatus according to an embodiment of this invention; Fig. 2 is a sectional view taken along the line II-II of Fig. 1; Fig. 3 is an exploded perspective view showing a main portion of the lower speed door of Fig. 1; and Fig. 4 is a development view showing a main portion of the lower speed door of Fig. 3.

[0025] In the drawings, a landing entrance 1 is formed by a jamb 2 constituting a framework. The jamb 2 has a first vertical frame 3, a second vertical frame 4 opposed to the first vertical frame 3, and an upper frame 5 arranged between the upper ends of the first and second vertical frames 3 and 4. The landing entrance 1 is opened and closed by a lower speed door 21 and a higher speed door 22.

[0026] The lower speed door 21 is reciprocated in the width direction (i.e., to the right and left as seen in Fig. 1) of the entrance 1. The higher speed door 22 is reciprocated at a higher speed than and parallel to the lower speed door 21 such that when the entrance is opened, it reaches the opened-door position substantially at the same time as the lower speed door 21, and that when the entrance is closed, it reaches the closed-door position substantially at the same time as the lower speed

door 21. When the entrance is opened, the higher speed door 22 overlaps the back side of the lower speed door 21 and is accommodated in a door pocket 23.

[0027] At the bottom of the lower speed door 21 and the higher speed door 22, there is provided a landing sill 8 for guiding the movement of the lower end portions of the lower speed door 21 and the higher speed door 22.

[0028] The lower speed door 21 has a lower-speed-side plate portion 21a, a lower-speed-side upper end portion 21b, a lower-speed-closing-side end portion 21c constituting a forward end at the time of a door closing operation, and a lower-speed-opening-side end portion 21d constituting a forward end at the time of a door opening operation. The higher speed door 22 has a higher-speed-side plate portion 22a, a higher-speed-side upper end portion (not shown), a higher-speed-closing-side end portion 22c constituting a forward end at the time of a door closing operation, and a higher-speed-opening-side end portion 22d constituting a forward end at the time of a door opening operation.

[0029] The first vertical frame 3 is equipped with a vertical-frame-side opposing portion 3a opposed to the lower-speed-side plate portion 21a and extending continuously in the height direction. The upper frame 5 is equipped with first and second upper-frame-side opposing portions 5a and 5b respectively opposed to the lower-speed-side and higher-speed-side plate portions 21a and 22a at the time of a door closing operation.

[0030] The lower-speed-closing-side end portion 21c has a lower-speed-closing-side end surface 24a extending at right angles with respect to the lower-speed-side plate portion 21a, and a lower-speed-closing-side folded portion 24b extending perpendicularly from the lower-speed-closing-side end surface 24a and opposed to the back surface of the lower-speed-side plate portion 21a and the front surface of the higher-speed-side plate portion 22a.

[0031] The lower-speed-opening-side end portion 21d has a lower-speed-opening-side end surface 25a extending at right angles with respect to the lower-speed-side plate portion 21a, and a lower-speed-opening-side folded portion 25b extending perpendicularly from the lower-speed-opening-side end surface 25a and opposed to the back surface of the lower-speed-side plate portion 21a. Further, the dimension of the lower-speed-opening-side end surface 25a as measured in the direction perpendicular to the opening/closing direction of the lower speed door 21 (the vertical direction in Fig. 1) is smaller than that of the lower-speed-closing-side end surface 24a.

[0032] The higher-speed-closing-side end portion 22c has a higher-speed-closing-side end surface 26a extending at right angles with respect to the higher-speed-side plate portion 22a, and a higher-speed-closing-side folded portion 26b extending perpendicularly from the higher-speed-closing-side end surface 26a and opposed to the back surface of the higher-speed-side plate portion 22a.

**[0033]** The higher-speed-opening-side end portion 22d has a higher-speed-opening-side end surface 27a extending at right angles with respect to the higher-speed-side plate portion 22a, and a higher-speed-opening-side folded portion 27b extending perpendicularly from the higher-speed-opening-side end surface 27a and opposed to the back surface of the higher-speed-side plate portion 22a.

**[0034]** A lower-speed-side-end-portion fire prevention member 28 with an L-shaped section is attached to the lower-speed-opening-side end surface 25a by a plurality of screws 29. The lower-speed-side-end-portion fire prevention member 28 has a lower-speed-side opposing surface 28a arranged such that the vertical-frame-side opposing portion 3a is situated between it and the lower-speed-side plate portion 21a at the time of a door closing operation.

**[0035]** The lower-speed-opening-side end surface 25a is equipped with a plurality of screw holes 25c to be threadedly engaged with screws 29. The lower-speed-side-end-portion fire prevention member 28 is provided with a plurality of elongated holes 28b through which the screws 29 are passed. The elongated holes 28b extend thin and narrow in the thickness direction of the lower speed door 21 (the vertical direction in Fig. 1). Due to this construction, the gap between the lower-speed-side-end-portion fire prevention member 28 and the vertical-frame-side opposing portion 3a can be adjusted.

**[0036]** A higher-speed-side-end-portion fire prevention member 30 with an L-shaped section is attached to the higher-speed-opening-side end surface 27a by a plurality of screws (not shown). The higher-speed-side-end-portion fire prevention member 30 has a higher-speed-side opposing surface 30a arranged such that the lower-speed-closing-side folded portion 24b is situated between it and the higher-speed-side plate portion 22a at the time of a door closing operation.

**[0037]** As in the case of the lower speed side, the gap between the higher-speed-side-end-portion fire prevention member 30 and the lower-speed-closing-side folded portion 24b can be adjusted.

**[0038]** The lower-speed-side upper end portion 21b has a lower-speed-side upper end surface 31a extending at right angles with respect to the lower-speed-side plate portion 21a, and a lower-speed-side upper end folded portion 31b extending perpendicularly from the lower-speed-side upper end surface 31a and opposed to the back surface of the lower-speed-side plate portion 21a.

**[0039]** The higher-speed-side upper end portion has a higher-speed-side upper end surface (not shown) extending at right angles with respect to the higher-speed-side plate portion 22a, and a higher-speed-side upper end folded portion extending perpendicularly from the higher-speed-side upper end surface and opposed to the back surface of the higher-speed-side plate portion 22a.

**[0040]** Attached to the lower-speed-side upper end

surface 31a is a lower-speed-side-upper-portion fire prevention member 32 with an L-shaped section having a first upper opposing surface 32a and arranged such that the first upper-frame-side opposing portion 5a is situated between it and the lower-speed-side plate portion 21a at the time of a door closing operation.

**[0041]** Through-holes 32b are provided in the vicinity of the central portion and the end portions with respect to the longitudinal direction of the lower-speed-side-upper-portion fire prevention member 32. Further, a pair of nuts 33 communicating with the through-holes 32b in the vicinity of the end portions are fixed to the lower-speed-side-upper-portion fire prevention member 32.

**[0042]** A screw hole 31c is provided in the central portion with respect to the longitudinal direction of the lower-speed-side upper end surface 31a. A pair of elongated holes 31d are provided in the vicinity of the end portions with respect to the longitudinal direction of the lower-speed-side upper end surface 31a.

**[0043]** A screw 34 is passed through the through-hole 32b and threadedly engaged with the screw hole 31c. Screws 35 are passed through the elongated holes 31d and the through-holes 32b and threadedly engaged with the nuts 33. By loosening the screws 35, the lower-speed-side-upper-portion fire prevention member 32 becomes rotatable around the screw 34, and the mounting position of the lower-speed-side-upper-portion fire prevention member 32 with respect to the lower-speed-side upper end surface 31a can be adjusted from below the lower-speed-side upper end surface 31a.

**[0044]** When screws for a hex wrench are used as the screws 35, the screws 35 situated on the inner side of the lower-speed-side upper end portion 21b can be easily turned.

**[0045]** Mounted to the higher-speed-side upper end surface by means of a plurality of screws (not shown) is a higher-speed-side-upper-portion fire prevention member 36 with an L-shaped section having a second upper opposing surface 36a and arranged such that the second upper-frame-side opposing portion 5b is situated between it and the higher-speed-side plate portion 22a at the time of a door closing operation. The mounting structure for the higher-speed-side-upper-portion fire prevention member 36 is the same as that for the lower-speed-side-upper-portion fire prevention member 32, and the mounting position of the higher-speed-side-upper-portion fire prevention member 36 with respect to the higher-speed-side upper end surface can be adjusted from below the higher-speed-side upper end surface.

**[0046]** At the upper end of the lower-speed-closing-side end surface 24a and of the lower-speed-closing-side folded portion 24b, there is provided a cutout 24c for avoiding interference with the higher-speed-side-upper-portion fire prevention member 36.

**[0047]** Mounted to the lower speed door 21 is a lower-speed-side reinforcing member 37 connected by screws to the lower-speed-closing-side folded portion 24b and to the lower-speed-side upper end folded portion 31b.

Mounted to the higher speed door 22 is a higher-speed-side reinforcing member (not shown) connected by screws to the higher-speed-closing-side folded portion 26b and to the higher-speed-side upper end folded portion.

**[0048]** A hanger case 12 is fixed to the upper frame 5. The suspension mechanism and the driving mechanism for the lower speed door 21 and the higher speed door 22 are not shown and a description thereof is omitted.

**[0049]** In this landing door apparatus, the lower-speed-side opposing surface 28a of the lower-speed-side-end-portion fire prevention member 28 is opposed to the vertical-frame-side opposing portion 3a, and the higher-speed-side opposing surface 30a of the higher-speed-side-end-portion fire prevention member 30 is opposed to the lower-speed-closing-side folded portion 24b, the first upper opposing surface 32a of the lower-speed-side-upper-portion fire prevention member 32 is opposed to the first upper-frame-side opposing portion 5a, and the second upper opposing surface 36a of the higher-speed-side-upper-portion fire prevention member 36 is opposed to the second upper-frame-side opposing portion 5b, thus forming a so-called rabbet structure. Due to this structure, the gaps around the lower speed door 21 and the higher speed door 22 are closed to achieve the requisite fire prevention performance.

**[0050]** If warpage is generated in the lower-speed-side plate portion 21a and the higher-speed-side plate portion 22a as a result of a fire, the lower-speed-side opposing surface 28a engages with the vertical-frame-side opposing portion 3a, the higher-speed-side opposing surface 30a engages with the lower-speed-closing-side folded portion 24b, the first upper opposing surface 32a engages with the first upper-frame-side opposing portion 5a, and the second upper opposing surface 36a engages with the second upper-frame-side opposing portion 5b, whereby detachment of the lower speed door 21 and the higher speed door 22 is prevented.

**[0051]** Further, the lower speed door 21 and the higher speed door 22 are of a so-called box bending structure, in which the lower-speed-side upper end portion 21b, the lower-speed-closing-side end portion 21c, the lower-speed-opening-side end portion 21d, the higher-speed-side upper end portion, the higher-speed-closing-side end portion 22c, and the higher-speed-opening-side end portion 22d are all folded to the same side. Thus, it is only necessary to fasten a small reinforcing member 37 to a corner portion by a screw, and it is possible to secure a sufficient degree of strength without welding a large reinforcing member, thereby facilitating production and achieving a reduction in cost.

**[0052]** Furthermore, since welding is not adopted, no welding distortion is involved, so that it is possible to assemble the apparatus with high accuracy. This makes it possible to achieve a satisfactory artistic design characteristic even if the coating film for the painting is thin. Further, it is possible to shorten the requisite time for

gap adjustment at the time of installment.

**[0053]** Further, even if stainless steel is used, the apparatus can be produced using the same structure, making it possible to obtain a light-weight door at low cost.

**[0054]** Further, the fire prevention members 28, 30, 32, and 36 are members separate from the lower speed door 21 and the higher speed door 22, and their mounting positions with respect to the lower speed door 21 and the higher speed door 22 can be adjusted, so that the adjustment of the gap dimension can be easily conducted.

**[0055]** Furthermore, the dimension of the lower-speed-opening-side end surface 25a as measured in the direction perpendicular to the opening/closing direction of the lower speed door 21 is shorter than that of the lower-speed-closing-side end surface 24a, so that it is possible to avoid interference between the higher-speed-side-upper-portion fire prevention member 36 and the lower speed door 21.

**[0056]** While the above example is applied to a two-door-side-opening type apparatus, the present invention is also applicable to an apparatus using three or more doors. Further, this invention is applicable to a center-opening type door apparatus as long as it accommodates a plurality of doors in layers in a door pocket on either side.

**[0057]** Further, while in the above embodiment this invention is applied to a landing door apparatus, this invention is also applicable to a car door apparatus.

## Claims

1. An elevator door apparatus comprising:

a lower speed door which has a lower-speed-side plate portion, a lower-speed-side upper end portion, a lower-speed-closing-side end portion constituting a forward end at the time of a door closing operation, and a lower-speed-opening-side end portion constituting a forward end at the time of a door opening operation, and which is reciprocated in the width direction of an entrance;

a higher speed door which has a higher-speed-side plate portion, a higher-speed-side upper end portion, a higher-speed-closing-side end portion constituting a forward end at the time of a door closing operation, and a higher-speed-opening-side end portion constituting a forward end at the time of a door opening operation, which is reciprocated in parallel with and faster than the lower speed door, and which is placed in layers with the lower speed door and accommodated in a door pocket at the time of door opening; and

a framework which has a first vertical frame

equipped with a vertical-frame-side opposing portion opposed to the lower-speed-side plate portion, a second vertical frame opposed to the first vertical frame, and an upper frame equipped with first and second upper-frame-side opposing portions respectively opposed to the lower-speed-side and higher-speed-side plate portions at the time of door closing and arranged between the upper end portions of the first and second vertical frames, and which forms an entrance, the elevator apparatus being **characterized in that**:

the lower-speed-closing-side end portion has a lower speed closing side end surface extending perpendicularly with respect to the lower-speed-side plate portion, and a lower-speed-closing-side folded portion extending perpendicularly from the lower speed closing side end surface and opposed to the back surface of the lower-speed-side plate portion and to the front surface of the higher-speed-side plate portion;

the lower-speed-opening-side end portion has a lower-speed-opening-side end surface extending perpendicularly with respect to the lower-speed-side plate portion and shorter than the lower speed closing side end surface, and a lower-speed-opening-side folded portion extending perpendicularly from the lower-speed-opening-side end surface and opposed to the back surface of the lower-speed-side plate portion;

the higher-speed-closing-side end portion has a higher speed closing side end surface extending perpendicularly with respect to the higher-speed-side plate portion, and a higher-speed-closing-side folded portion extending perpendicularly from the higher speed closing side end surface and opposed to the back surface of the higher-speed-side plate portion;

the higher-speed-opening-side end portion has a higher-speed-opening-side end surface extending perpendicularly with respect to the higher-speed-side plate portion, and a higher-speed-opening-side folded portion extending perpendicularly from the higher-speed-opening-side end surface and opposed to the back surface of the higher-speed-side plate portion;

a lower-speed-side-end-portion fire prevention member with an L-shaped section having a lower-speed-side opposing surface arranged such that the vertical-frame-side opposing portion is situated between

it and the lower-speed-side plate portion at the time of door closing, is mounted to the lower-speed-opening-side end surface by a plurality of screws; and

a higher-speed-side-end-portion fire prevention member with an L-shaped section having a higher-speed-side opposing surface arranged such that the lower-speed-closing-side folded portion is situated between it and the higher-speed-side plate portion at the time of door closing, is mounted to the higher-speed-opening-side end surface by a plurality of screws.

2. An elevator door apparatus according to claim 1, **characterized in that**:

the lower-speed-side upper end portion has a lower-speed-side upper end surface extending perpendicularly with respect to the lower-speed-side plate portion and a lower-speed-side upper end folded portion extending perpendicularly from the lower-speed-side upper end surface and opposed to the back surface of the lower-speed-side plate portion;

the higher-speed-side upper end portion has a higher-speed-side upper end surface extending perpendicularly with respect to the higher-speed-side plate portion and a higher-speed-side upper end folded portion extending perpendicularly from the higher-speed-side upper end surface and opposed to the back surface of the higher-speed-side plate portion;

a lower-speed-side-upper-portion fire prevention member with an L-shaped section having a first upper opposing surface arranged such that the first upper-frame-side opposing portion is situated between it and the lower-speed-side plate portion at the time of door closing, is mounted to the lower-speed-side upper end surface by a plurality of screws; and

a higher-speed-side-upper-portion fire prevention member with an L-shaped section having a second upper opposing surface arranged such that the second upper-frame-side opposing portion is situated between it and the higher-speed-side plate portion at the time of door closing, is mounted to the higher-speed-side upper end surface by a plurality of screws.

3. An elevator door apparatus according to Claim 2, **characterized in that** a lower-speed-side reinforcing member joined and fastened to the lower-speed-closing-side folded portion and to the lower-speed-side upper end folded portion, is mounted to the lower speed door.

4. An elevator door apparatus according to Claim 2,

**characterized in that** a higher-speed-side reinforcing member joined and fastened to the higher-speed-closing-side folded portion and to the higher-speed-side upper end folded portion, is mounted to the higher speed door.

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5. An elevator door apparatus according to Claim 1, **characterized in that** the gap between the lower-speed-side-end-portion fire prevention member and the vertical-frame-side opposing portion can be adjusted.

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6. An elevator door apparatus according to Claim 1, **characterized in that** the gap between the higher-speed-side-end-portion fire prevention member and the lower-speed-closing-side folded portion can be adjusted.

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7. An elevator door apparatus according to Claim 2, **characterized in that** the mounting position of the lower-speed-side-upper-portion fire prevention member with respect to the lower-speed-side upper end surface can be adjusted from below the lower-speed-side upper end surface.

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8. An elevator door apparatus according to Claim 2, **characterized in that** the mounting position of the higher-speed-side-upper-portion fire prevention member with respect to the higher-speed-side upper end surface can be adjusted from below the higher-speed-side upper end surface.

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FIG. 2

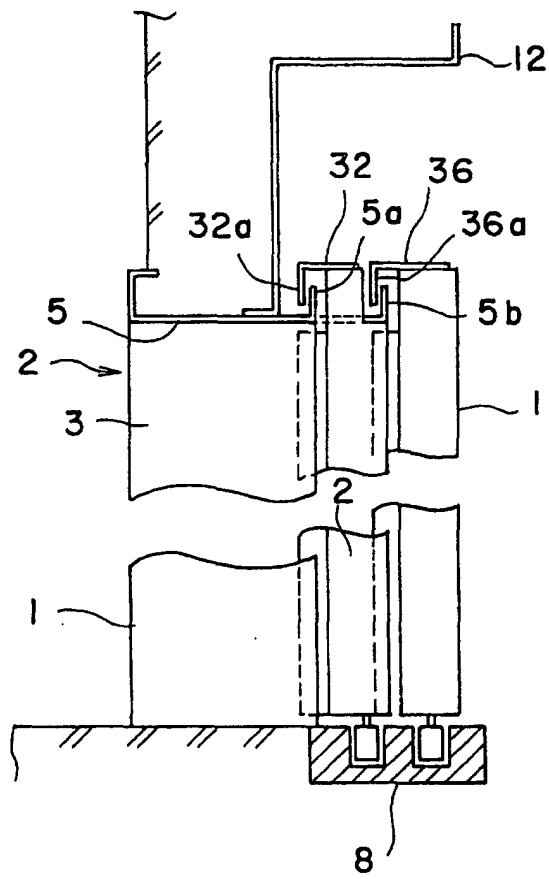


FIG. 3

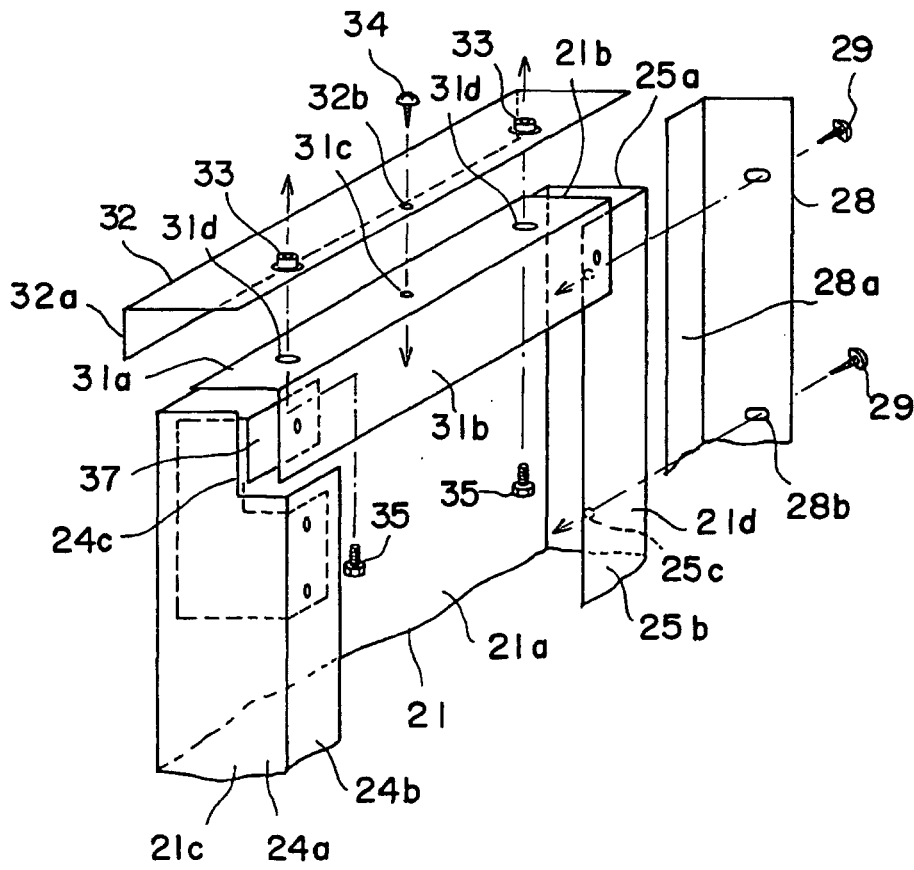


FIG. 4

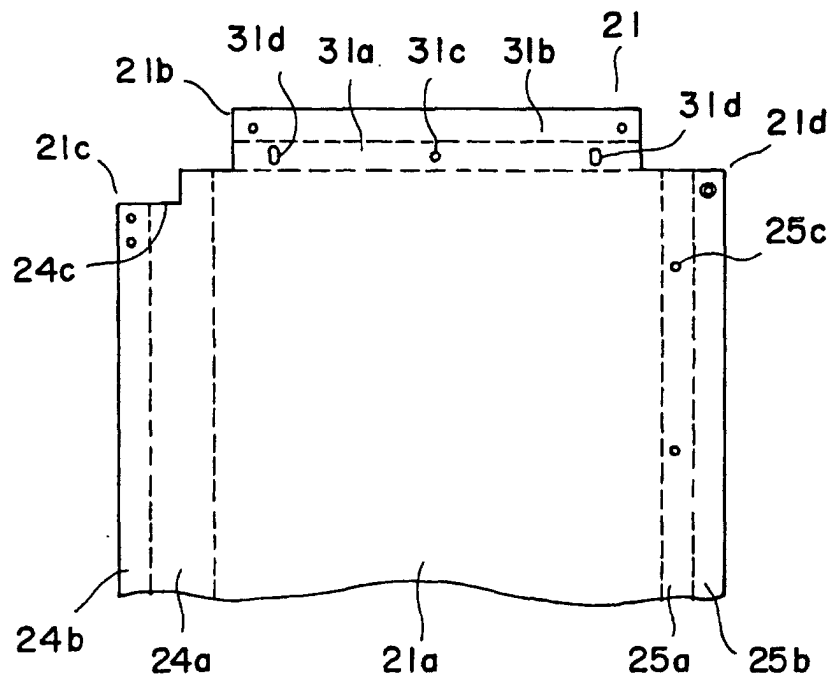


FIG. 5

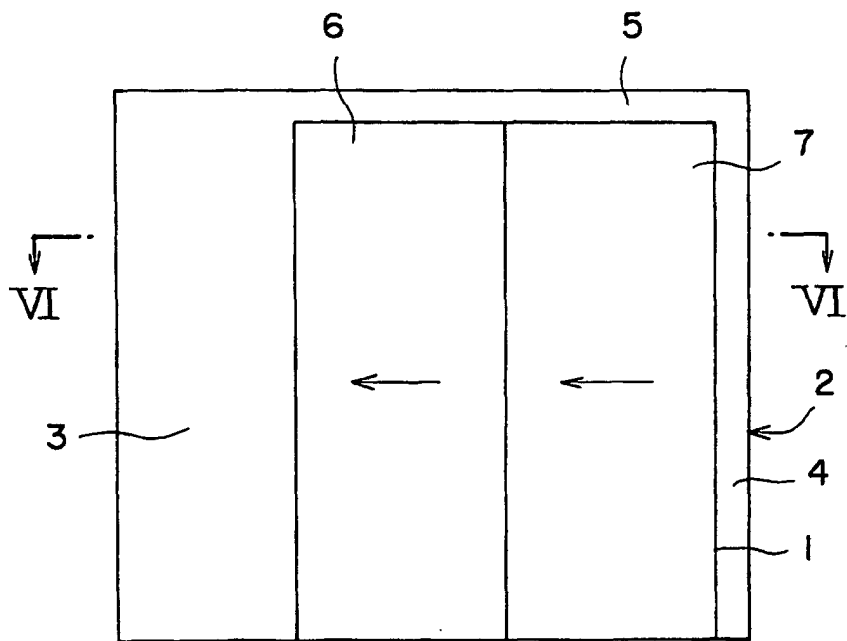


FIG. 6

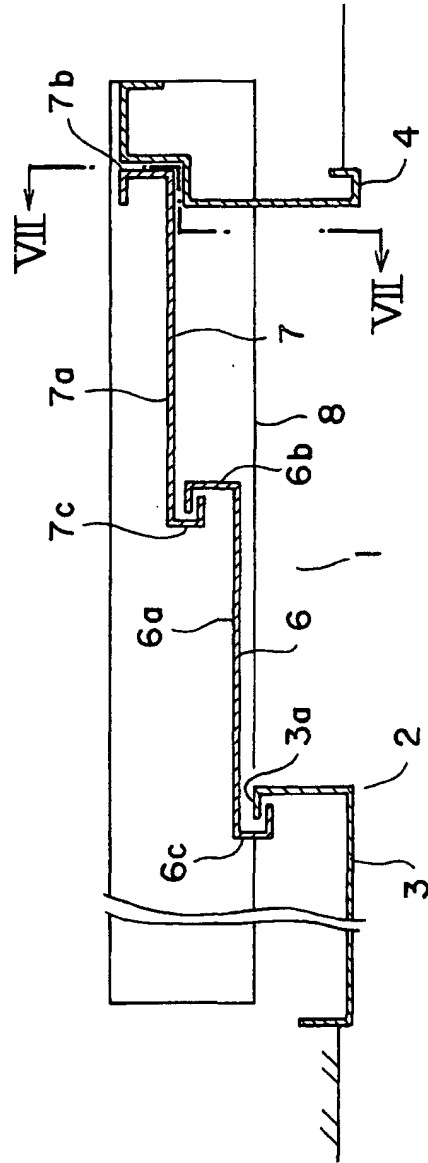


FIG. 7

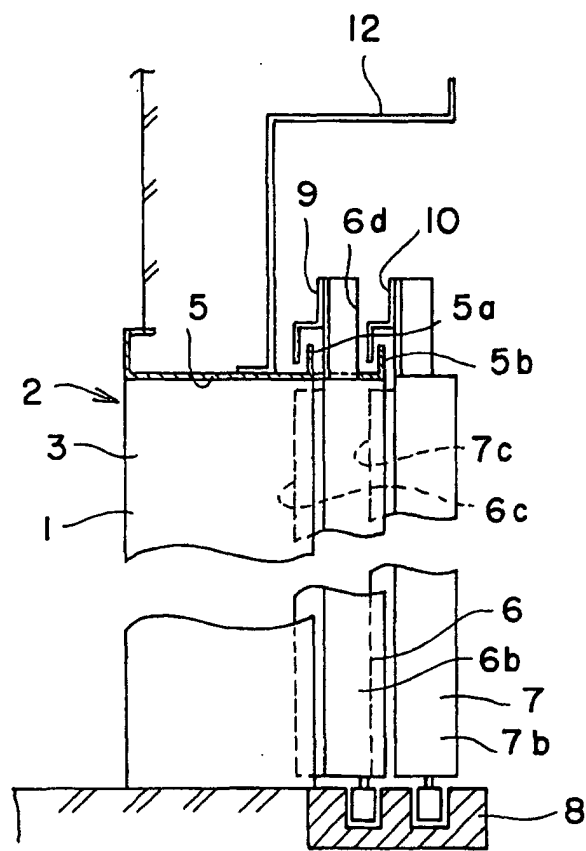
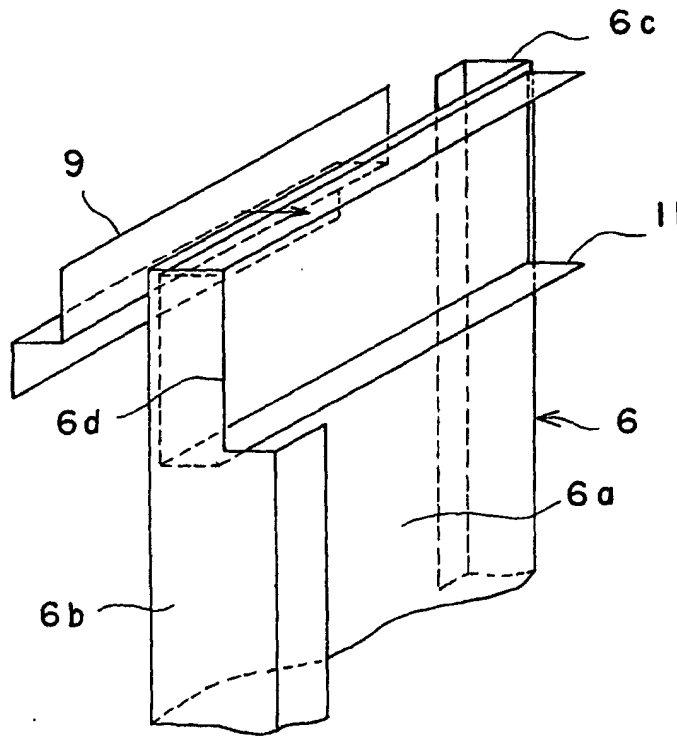


FIG. 8



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP01/07386

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl <sup>7</sup> B66B13/30		
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 <sup>7</sup> B66B13/30-B66B13/30		
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.
Y	JP 8-165081 A (Mitsubishi Electric Corp.), 25 June, 1996 (25.06.96), (Family: none)	1-8
Y	JP 2001-199660 A (Mitsubishi Electric Corp.), 24 July, 2001 (24.07.01), (Family: none)	1-8
Y	JP 9-156857 A (Mitsubishi Electric Corp.), 17 June, 1997 (17.06.97), (Family: none)	1-8
Y	CD-ROM of the specification and drawings annexed to the request of Japanese Utility Model Application No. 97515/1991 (Laid-open No. 44974/1993) (Toshiba Corp.), 15 June, 1993 (15.06.93), (Family: none)	3-4
<input type="checkbox"/> Further documents are listed in the continuation of Box C.		<input type="checkbox"/> See patent family annex.
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"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search 23 May, 2002 (23.05.02)	Date of mailing of the international search report 11 June, 2002 (11.06.02)	
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer	
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