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(74) Agent: **KONE OYJ/PATENT DEPARTMENT**; P.O.
Box 677, FI-05801 Hyvinkää (FI).

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(71) Applicant (*for all designated States except US*): **KONE CORPORATION** [FI/FI]; Kartanontie 1, FI-003300 Helsinki (FI).

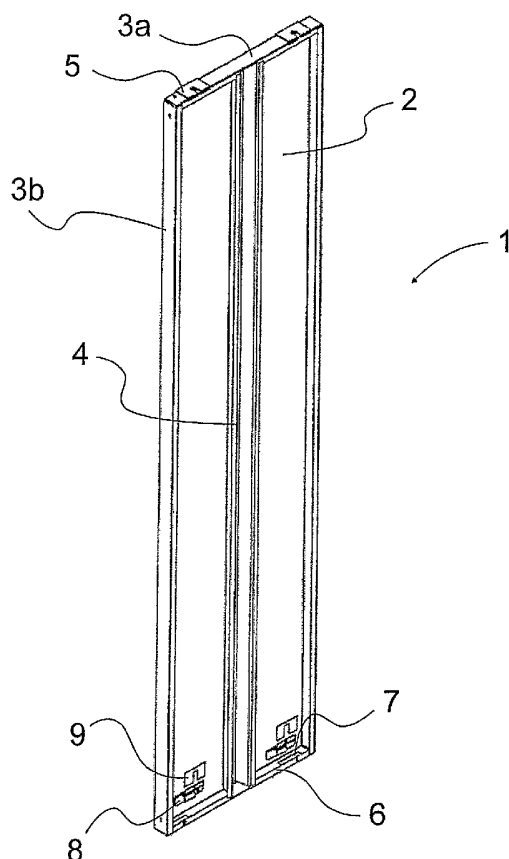
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(72) Inventor; and

(75) Inventor/Applicant (*for US only*): **NOVELLATI, Gianluca** [IT/IT]; Via P. Nenni 5, I-20090 Segrate (IT).

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(54) Title: ELEVATOR ARRANGEMENT



(57) Abstract: The invention relates to a door panel structure for an elevator or equivalent, said door panel structure comprising at least a door panel (1) bent from metal plate, including at least a front plate (2), an upper edge (3a), side edges (3b) and a lower edge (6). The door panel (1) is made from a single plate by bending the edges of the plate so as to form both the upper edge (3a), the side edges (3b) and the lower edge (6) and leaving in the middle a substantially even area to form the front plate (2).



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ELEVATOR ARRANGEMENT

The present invention relates to a door panel structure for an elevator or equivalent as defined in the preamble of
5 claim 1.

In prior-art elevator door panel solutions, the door panel generally consists of a number of separate parts which are fastened to each other during assembly of the door panel.
10 One prior-art door panel solution consists of two superimposed layers wherein a flat outer plate is glued by its inner surface to an inner plate having bent edges. A problem with prior-art door panel structures composed from several parts is their relatively complex structure, requiring as-
15 sembly in several stages of work and, among other things in conjunction with gluing, cleaning of the surfaces to be glued together plus drying time after the gluing. This is one of the reasons why prior-art door panels are slow to manufacture and, due to labor costs, expensive. Moreover,
20 door panels assembled from superimposed layers are relatively heavy and require good and stable fastening arrangements, which generally comprise many different adjustments. Therefore, installation of the door panels with all the adjustments takes plenty of time and is susceptible to vari-
25 ous adjustment errors and is thus also an expensive process.

The object of the present invention is to overcome the above-mentioned drawbacks and to create a door panel structure for an elevator that is economical in cost and easy to
30 manufacture and that can be installed easily and with few adjustments and fulfills the standards imposed on elevator doors and that is especially suited for use in elevators but also for other public uses. The door panel structure of the invention is characterized by what is disclosed in the char-
35 acterization part of claim 1. Other embodiments of the invention are characterized by what is disclosed in the other claims.

Inventive embodiments are also presented in the description part and drawings of the present application. The inventive content disclosed in the application can also be defined in other ways than is done in the claims below. The inventive content may also consist of several separate inventions, especially if the invention is considered in the light of explicit or implicit sub-tasks or in respect of advantages or sets of advantages achieved. In this case, some of the attributes contained in the claims below may be superfluous from the point of view of separate inventive concepts. Similarly, various details described in connection with each embodiment example of the invention can also be used in other embodiment examples.

15

The door panel structure of the invention for an elevator or equivalent comprises at least a door panel that has been bent from metal plate and includes at least a front plate, an upper edge, side edges and a lower edge. According to the invention, the door panel is made from a single plate by bending the edges of the plate so as to form both the upper edge, the side edges and the lower edge and leaving a substantially even area in the middle to form the front plate.

25

In an embodiment of the invention, the front plate, the upper edge, the side edges and the lower edge are of substantially equal thickness in respect of material thickness.

30

In an embodiment of the invention, the upper edge of the door panel is provided with reinforcing plates to reinforce the fixing point of the door panel.

35 In an embodiment of the invention, the reinforcing plates are placed immediately above and below the upper edge.

In an embodiment of the invention, vertical and horizontal adjustments of the door panel have been arranged to be carried out using thin adjusting shims.

5

In an embodiment of the invention, the door panel has a substantially vertical reinforcing strip at the middle.

The advantages of the door panel structure of the invention include a simple door structure that, due to its simplicity, allows low production costs. In a preferred case, the door panel can even be produced by a single machine. An additional advantage is a substantially light door panel structure that requires but few adjustments and that can be easily and quickly installed in place. A further advantage is a material saving as it is not necessary to glue to the door panel a separate outer or inner plate of a width substantially equal to the door panel.

20 In the following, the invention will be described in detail with reference to an embodiment example and the attached drawings, wherein

Fig. 1 presents an oblique top view of a door panel structure according to the invention

Fig. 2 presents a partially sectioned front view of a elevator door structure assembled from door panels according to the invention,

Fig. 3 presents a cross-sectional top view of the door panel structure of the invention, and

Fig. 4 presents a detail illustrating the fastening of the door panel of the invention to a carriage on a suspension rail.

35 The door panel structure 1 presented in Fig. 1 comprises at least a door panel front plate 2 having upper, side and

lower edges 3a, 3b and 6 bent inwards to reinforce the door panel. In the door panel of the invention, the whole door panel 1 has been bent e.g. in a single operation from one and the same metal plate, and thus both the front plate 2 and the upper and side edges 3a and 3b have substantially equal thickness. A door panel exceeding a certain width is reinforced in the middle by a reinforcing strip 4 extending through the whole height of the door panel and bent into a special cross-sectional form, which strip is glued to the inner surface of the front plate 2 of the door panel using e.g. glue or double-sided tape. Narrow door panels are usually not provided with a reinforcing strip.

Placed at each end of the inwards bent upper edge 3a of the door panel, near the inwards bent side edges 3b of the door panel, are two reinforcing plates 5 at the same position one over the other so that the upper reinforcing plate 5 is at the upper surface of the upper edge 3a and the lower reinforcing plate 5 is at the lower surface of the upper edge 3a. With this arrangement, sufficiently strong fixing points of the door panel are obtained. Height adjustment of the door panel can be accomplished using thin shims at the fixing points.

Correspondingly, the inwards bent lower edge 6 has been bent double so that the lower edge 6 forms a hollow box reinforcing the lower part of the door panel. The lower edge 6, too, can be made in the same operation with the upper and side edges 3a and 3b, and the thickness of the box formed by the lower edge 6 is substantially equal to the thickness of the wall of the front plate 2 and the upper and side edges 3a and 3b. Provided at each end of the lower edge 6 is an opening 7, through which the sliding guide of the door panel can be inserted to its fixing point 8, which is also provided with a reinforcing area 9. The sliding guide is secured by means of fastening screws. Horizontal adjustment of the

sliding guides, and at the same time horizontal adjustment of the door panel, can be accomplished using thin shims provided at the fastening and reinforcing points 8 and 9.

5 Fig. 2 presents an elevator door structure provided with door panels 1 according to the invention in simplified front view and partially sectioned in the lower part. The door structure presented in this example is a typical two-leaf middle-opening door type with door panels 1 bent from metal
10 plate, each panel being suspended by its upper edge on a carriage 15 on a suspension bar 10 above the door panels in a conventional manner and supported by its lower edge on a guide bar 11 in the threshold by means of a sliding guide 12.

15 Fig. 3 presents the door panel of Fig. 1 in cross-sectional top view. In addition to the door panel structure described in Fig. 1, Fig. 3 shows in more detail that the side edges 3b of the door panel are additionally provided with a substantially rectangular reinforcing bend 13b towards the
20 middle part of the door panel. The reinforcing bend 13b can be made by the same machine and in the same operation as the side edges 3b.

25 Correspondingly, Fig. 4 shows in more detail how the door panel of the invention is reinforced in the area where the door panel 1 is connected to a carriage 15 on a suspension bar 10. Fig. 4 shows the upper part of the door panel in cross-sectional side view. At the upper edge of the door
30 panel there is yet another substantially rectangular reinforcing bend 13a, which have been bent downwards. This reinforcing bend 13a, too, can be made with the same machine and in the same operation as the upper edge 3a and the side edges 3b.

35 Each fixing point at the upper edge 3a of the door panel is

reinforced with an upper and a lower reinforcing plate 5, which are so placed that the upper edge 3a of the door panel remains between the reinforcing plates 5. The reinforcing plates 5, provided with a slot-like elongated opening, are pressed against the upper edge 3a of the door panel by means of nuts and a fastening bolt 14, said fastening bolt being also used to secure the door panel 1 to the carriage 15 on the suspension bar 10. Height adjustment of the door panel is implemented using thin shims 16.

10

It is obvious to the person skilled in the art that the invention is not limited to the embodiments described above, in which the invention has been described by way of example, but that many different variations and different embodiments of the invention are possible within the scope of the inventive concept defined in the claims presented below. Thus, the door designs may differ from the above description. For example, the number of door leaves may also be only one or more than two.

20

It is additionally obvious that the bends at the edges of the door panel may differ from those described above. Likewise, the door panel fastening solution including the reinforcements may be different from that described above, and the mounting of the sliding guide may also differ from the above description.

25

CLAIMS

1. A door panel structure for an elevator or equivalent, said door panel structure comprising at least a door panel
5 (1) bent from metal plate, including at least a front plate (2), an upper edge (3a), side edges (3b) and a lower edge (6), **characterized** in that the door panel (1) is made from a single plate by bending the edges of the plate so as to form both the upper edge (3a), the side edges (3b) and the
10 lower edge (6) and leaving in the middle a substantially even area forming the front plate (2).
2. A door panel structure according to claim 1, **characterized** in that the front plate (2), the upper edge (3a), the
15 side edges (3b) and the lower edge (6) are of substantially equal thickness in respect of material thickness.
3. A door panel structure according to claim 1 or 2, **characterized** in that the upper edge (3a) of the door panel (1)
20 is provided with reinforcing plates (5) to reinforce the fixing point of the door panel.
4. A door panel structure according to claim 3, **characterized** in that the reinforcing plates (5) are placed immedi-
25 ately above and below the upper edge (3a).
5. A door panel structure according to any one of the preceding claims, **characterized** in that vertical and horizontal adjustments of the door panel have been arranged to be
30 carried out using thin adjusting shims (16).
6. A door panel structure according to any one of the preceding claims, **characterized** in that the door panel has a substantially vertical reinforcing strip (4) at the middle.

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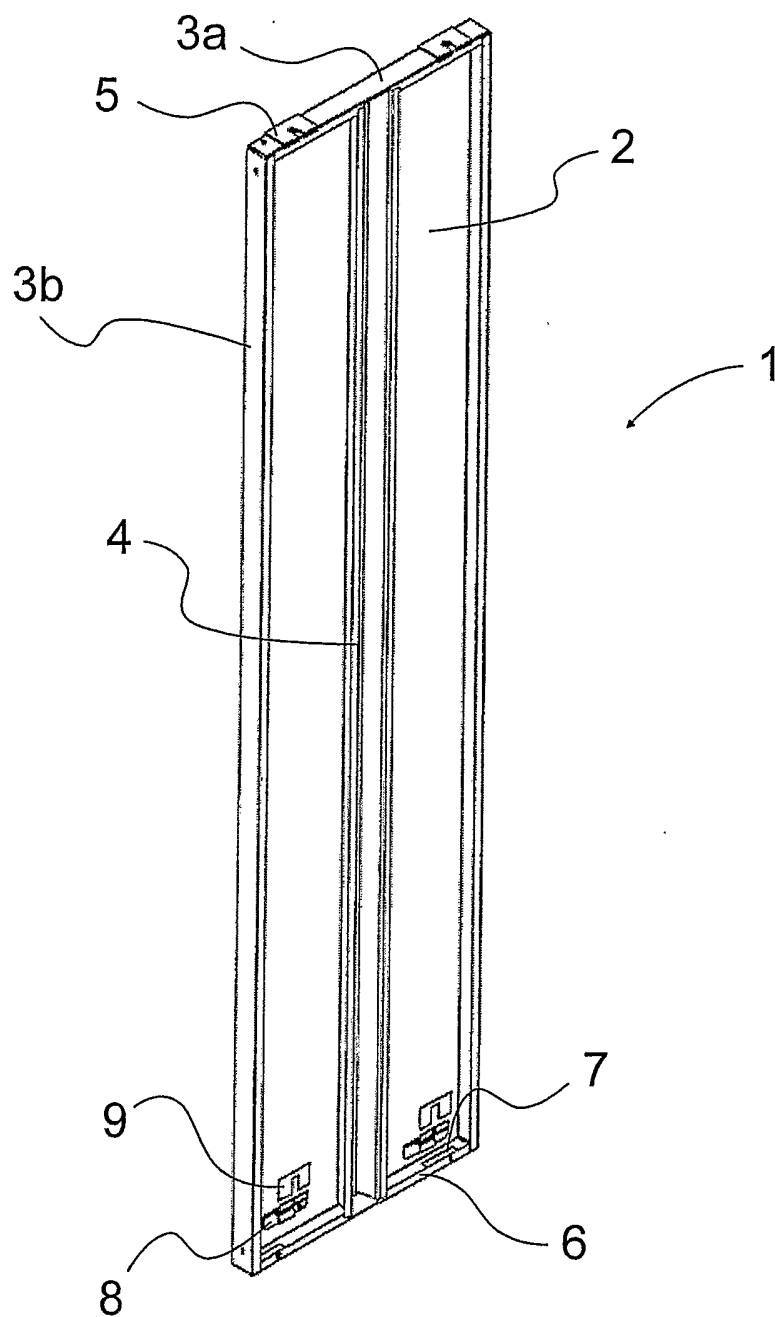


Fig. 1

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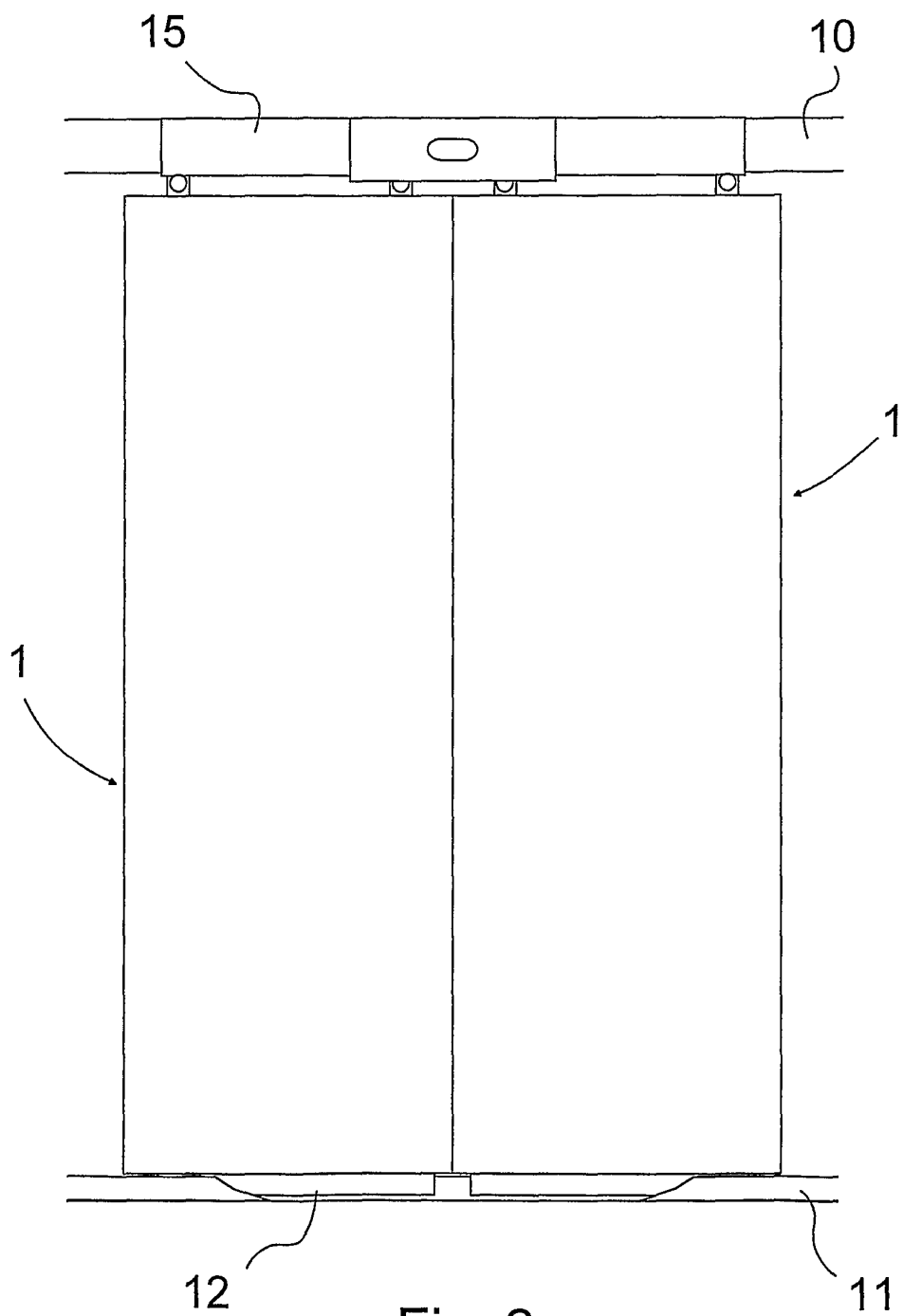


Fig. 2

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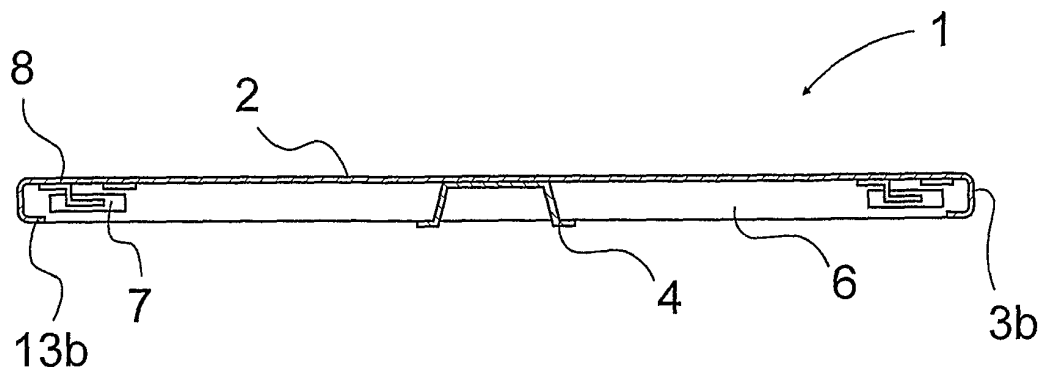


Fig. 3

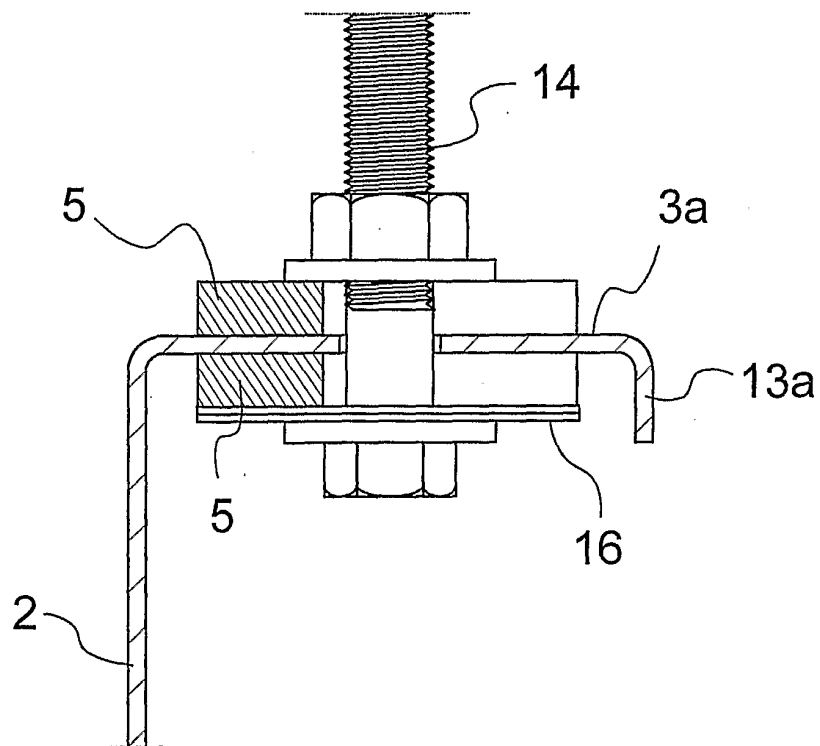


Fig. 4