

Device for connecting panels of an elevator car

The invention relates to a device for connecting panels of an elevator car, wherein the panels are connectable
5 together at their end sides by means of at least one connecting element.

The patent EP 0 997 424 B1 discloses a system for connecting wall panels of an elevator car. A connecting
10 apparatus arranged on a first wall panel consists of a holding element and of a clamping element. Provided on a second wall panel is a locking opening which has two circular regions with larger diameters and, between the circular regions, a rectangular region having a smaller
15 width than the larger diameter. The holding element is firmly connected to the first wall panel by means of a riveted connection, wherein a rivet head of the cylindrical holding element presses against the first wall panel. The cylindrical clamping element comprises
20 the cylindrical holding element and is slidable in the direction of the rivet axis, wherein both the first wall panel and a shoulder of the holding element limit the sliding travel. Provided between the shoulder and the clamping element is a spring element which presses
25 the clamping element against the first wall panel. The second wall panel is fitted over the clamping element at a circular region of the locking opening and is moved as far as the first wall panel and then moved further along the first wall panel until the
30 rectangular region of the locking opening presses the clamping element, at the conical end of the clamping element, against the shoulder of the holding element counter to the spring force of the spring element.

35 Fastening the holding element to the wall panel by means of a riveted connection is complicated. In order to produce the riveted connection, a special riveting tool and a minimum width of the panel end side are necessary.

The invention, as characterized in claim 1, achieves the object of creating a connecting device by means of which two wall panels are easily connectable.

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Advantageous developments of the invention are specified in the dependent claims.

The advantages achieved by the invention are essentially considered to be that two wall panels of an elevator car are connectable without tools. Provided at the end side of each wall panel is a locking opening in the form of a vertically extending slot which has a narrowed region at one end. In the case of the first wall panel, the slot is narrower or narrowed at the lower end, and in the case of the second wall panel, the slot is narrower or narrowed at the upper end. A connecting element is introducible into the slot in the first wall panel and is movable downwardly into the narrowed region along the slot. In the narrowed region of the slot, the first wall panel extends into a narrowed region of the connecting element, wherein a first spring of the connecting element presses against the first wall panel and connects the connecting element releasably to the first wall panel. The second wall panel is fitted over the connecting element at its slot and is moved downwardly along the connecting element. The narrowed region of the slot in the second wall panel extends into the narrowed region of the connecting element and as far as the first spring of the first connecting element. A second spring of the connecting element presses against the second wall panel and connects the latter to the connecting element and the first wall panel.

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Wall panels having variations in sheet thickness that are caused by manufacturing tolerances are connectable by way of the abovementioned connecting element. The

first and second springs compensate the variations and ensure a firm connection between the wall panels. If a wall panel having a larger sheet thickness is used, the metal sheet will be made thinner in the narrowed region of the slot, for example by stamping, in order that the wall panels fit into the narrowed region and under the springs of the connecting element.

By way of the two springs of the connecting element, a good clamping action is achieved between the wall panels and between the first wall panel and the connecting element and the second wall panel and the connecting element. Furthermore, precise positioning of the second wall panel with respect to the first wall panel is possible by way of the connecting element. The position of the connecting element in the vertical direction is predetermined by the lower end of the narrowed region of the slot in the first wall panel. When the connecting element is introduced into the narrowed region, the connecting element is present at the lower end of the narrowed region and is thus positioned precisely on the first wall panel. The position of the second wall panel in the vertical direction is predetermined by the upper end of the connecting element. When the narrowed panel region is introduced into the narrowed region of the connecting element, the second wall panel is present at the upper end of the connecting element and is thus positioned precisely with respect to the connecting element. However, the second wall panel is still movable counter to its sliding direction for fine positioning.

One connection or a plurality of connections are provided between the panels over the height of the wall panel. The connecting elements are mounted manually on the first wall panel by being introduced into the slots. Then, the second wall panel is fitted over the connecting elements at its slots and is moved

downwardly until it butts against the connecting elements and the multiple connection at the longitudinal sides of the two wall panels is complete. An entire grid of slots can also be provided on the longitudinal sides of the two wall panels, but only
5 some of them can be equipped with connecting elements, depending on requirements.

The present invention is explained in more detail by way of exemplary embodiments with reference to the
10 appended figures, in which:

Figure 1 shows an elevator car having wall panels,

15 Figure 2 shows two wall panels of the elevator car,

Figure 3 shows a horizontal section along the line B-B in figure 2,

20 Figure 4 shows a detail A from figure 2 of wall panels connected by means of a connecting element,

Figure 5 and figure 5a show a variant embodiment of a connecting element,

25 Figure 6 to figure 9 show mounting of the connecting element for connecting the wall panels,

Figure 10 shows details of the connection of wall
30 panels,

Figure 11 and figure 12 show a connection with a wall panel having an excess thickness.

35 Figure 1 shows an elevator car 1 consisting of a floor frame having a floor 3, of wall panels 5 forming walls 4, of a ceiling 6 and of a car entrance 7. Not

illustrated are the entrance doors and a supporting frame supporting the floor frame 2.

Figure 2 shows a first wall panel 5.1 and a second wall panel 5.2 of the elevator car 1. The first wall panel 5.1 has a first edgefold 5.11 which forms a first end side 5.12. The second wall panel 5.2 has a second edgefold 5.21 which forms a second end side 5.22. The wall panels 5.1, 5.2 are connected to the floor frame 2 at their narrow side SCH and are connected together at least once at the end sides 5.12, 5.22 along the panel height H. A detail designated A is explained in more detail in figures 3 to 5.

Figure 3 shows a horizontal section along the line B-B in figure 2. The first edgefold 5.11 of the first wall panel 5.1 forms the first end side 5.12 of the first wall panel 5.1. The second edgefold 5.21 of the second wall panel 5.2 forms the second end side 5.22 of the second wall panel 5.2. The first wall panel 5.1 is connected to the second wall panel 5.2 by means of a connecting element 8, wherein the first edgefold 5.11 and the second edgefold 5.21 rest against one another. The wall panels 5.1, 5.2 connected together at their end sides form a flat surface on a passenger side 9 of the elevator car 1, wherein the two edgefolds 5.11, 5.21 and the connecting element 8 are arranged on an outer side 10 of the elevator car 1.

The example shown in figure 3 of a connecting element 8 is formed in one piece and is produced for example from plastics material by means of an injection-molding process. Details of the one-piece connecting element 8 are illustrated in figure 5. The basic mode of operation of the connecting element 8 is explained in figure 4 and figure 6 to figure 9 by way of a multipiece connecting element 8.

Figure 4 shows the detail A from figure 2, wherein the multipiece connecting element 8 connecting the wall panels 5.1, 5.2 is sectioned in the vertical direction, wherein the connecting element 8 consists of a connecting body, a spring element and a screw. The connecting element 8 consists of a foot 8.1 and a top part 8.2. The foot 8.1 and top part 8.2 form a one-piece connecting body, wherein the foot 8.1 has a male form 8.11 directed toward the top part. A first spring element 8.3 and a second spring element 8.4 form a one-piece spring body 8.5 which is pressed centrally against the top part 8.2 by means of the male form 8.11 and by means of a screw 8.6. The spring body 8.5 is produced for example from a spring-steel sheet. The first spring element 8.3 is supported on the top part 8.2 and on the one side of the first edgefold 5.11. The foot 8.1 serves as a counter-bearing and is supported on the other side of the edgefold 5.11. The second spring element 8.4 is supported on the top part 8.2 and on the one side of the second edgefold 5.21. The other side of the second edgefold 5.21 presses against the one side of the first edgefold 5.11.

Figure 5 and figure 5a show a variant embodiment of a one-piece connecting element 8 for connecting the first wall panel 5.1 to the second wall panel 5.2. In contrast to the connecting element 8 in figure 4, the connecting element 8 in figures 5 and 5a is produced in one piece and is produced for example from plastics material by means of an injection-molding process. The one-piece connecting element 8 has a low weight and is producible cost-effectively as a mass-produced article. The first spring element 8.3 and the second spring element 8.4 form the spring body 8.5, which is part of the top part 8.2 and exerts the same function as the spring body 8.5 in figure 4.

Figures 6 to 9 show the mounting of the multipiece connecting element 8 for connecting the first wall panel 5.1 to the second wall panel 5.2. The mounting of the one-piece connecting element 8 is substantially identical to the mounting of the multipiece connecting element 8.

Figure 6 shows the first wall panel 5.1 with a first slot 11 on the first edgefold 5.11. The first slot 11 has a wide region 11.1 and a narrow or a narrowed region 11.2. The narrow slot 11.2 is directed downwardly. The foot 8.1 of the connecting element 8 is less wide than the wide region 11.1 of the first slot 11 and wider than the narrow region 11.2 of the first slot 11. A first arrow P1 symbolizes the movement of the mounting, without tools, of the connecting element 8 on the first edgefold 5.11 of the first wall panel 5.1. During mounting, the connecting element 8 is handled only manually, with the top part 8.2 of the connecting element 8 serving as a mounting grip which is grasped for example by means of thumb and forefinger. The foot 8.1 of the connecting element 8 is introduced into the wide region 11.1 of the slot as far as a narrowed region 8.7 of the top part 8.2 by way of a horizontal movement. Subsequently, the connecting element 8 is introduced into the narrow region 11.2 of the first slot 11 at the narrowed region 8.7 of the top part 8.2 by means of a vertical downward movement, wherein the foot 8.1 slides along a rear side 5.13 of the first edgefold 5.11 and the first spring element 8.3 presses against a front side 5.14 of the first edgefold 5.11 on both sides of the first slot 11. The introduction of the connecting element 8 is continued until the narrowed region 8.7 of the top part 8.2 is present at a first stop 8.12 at the end of the narrow region 11.2 of the first slot 11 on the first edgefold 5.11.

Figure 7 shows how the second edgefold 5.21 of the second wall panel 5.2 is fitted over the connecting element 8. Provided on the second edgefold 5.21 of the second wall panel 5.2 is a second slot 12 having a wide region 12.1 and a narrow or a narrowed region 12.2, wherein the narrow region 12.2 of the second slot 12 is directed upwardly. A second arrow P2 symbolizes the movement for fitting the second edgefold 5.12 over the connecting element 8.

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Figure 8 shows the second edgefold 5.21 fitted over the connecting element 8. The first edgefold 5.11 and the second edgefold 5.21 are now located close together. A third arrow P3 symbolizes the movement for connecting the second edgefold 5.21 to the connecting element 8. During the vertical movement P3, the narrow region 12.2 of the second slot 12 slides over the narrowed region 8.7 of the top part 8.2 until the upper end of the narrow region 12.2 of the second slot 12 is present at a second stop 8.13 of the narrowed region 8.7 of the connecting element 8. In this position, the narrow region 12.2 of the second slot 12 extends as far as in front of the first spring element 8.3, as is shown in figures 4 and 5. The second spring element 8.4 is supported on the top part 8.2 and on the one side of the second edgefold 5.21. The other side of the second edgefold 5.21 presses against the one side of the first edgefold 5.11.

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Figure 9 shows the finished connection between the first edgefold 5.11 and the second edgefold 5.21. The connecting element 8 is neither visible nor accessible from the passenger side 9. There is no risk of injury to the passengers of the car on account of the connecting element. The hidden arrangement of the connecting element 8 provides no motive for vandalism.

Figure 10 shows how the first slot 11 and the second slot 12 lie above one another in the finished connection according to figure 9. For the purposes of clearer illustration, the slots 11, 12 are illustrated in a manner pushed-apart along the lines L1, L2. Furthermore, figure 10 shows a first supporting surface A1 or a first contact zone of the first spring element 8.3 on the first edgefold 5.11 and a second supporting surface A2 or a second contact zone of the second spring element 8.4 on the second edgefold 5.21. The first spring element 8.3 extends through the wide region 12.1 of the second slot 12 and presses against the first edgefold 5.11 at the first supporting surface A1. The second spring element 8.4 presses against the second edgefold 5.21 at the second supporting surface A2.

In figure 10, the first slot 11 and the second slot 12 are dimensioned. The dimensions can change depending on loading and sheet thickness of the wall panels 5.1, 5.2. In one exemplary embodiment, the following dimensions are provided: $l_{11} = 40 \text{ mm}$, $l_{12} = 25 \text{ mm}$, $b_{11} = 8 \text{ mm}$, $b_{12} = 5 \text{ mm}$, $l_{21} = 40 \text{ mm}$, $l_{22} = 15 \text{ mm}$, $b_{21} = 8 \text{ mm}$, $b_{22} = 5 \text{ mm}$. The top part 8.2 of the connecting element 8 is a few tenths of a mm narrower than b_{11} and b_{21} . The narrowed region 8.7 of the connecting element 8 is a few tenths of a mm narrower than b_{12} and b_{22} . The narrowed region 8.7 extends from the first stop 8.12 to the second stop 8.13 and corresponds approximately to l_{12} .

The spring body 8.5 is designed for a particular material thickness of the wall panels 5.1, 5.2. A particular spring body 8.5 is suitable for wall panels 5.1, 5.2 having a particular sheet thickness, for example 1.25 mm. A sheet thickness which is too small or a sheet thickness which is too large subjects the spring elements 8.3, 8.4 to too little or too much

loading. Figures 11 and 12 show how a wall panel having too large a wall thickness is connectable. The second wall panel 5.2 has for example a wall thickness which is too large by the thickness D1. In order that the second spring element 8.4 works correctly in spite of the too large wall thickness of the second edgefold 5.21, the second edgefold 5.21 is made thinner by the thickness D1 around the narrow region 12.2 of the second slot 12, for example by stamping, forging or milling, and then has a thickness of D2. The processed edgefold region is designated UB. Figure 12 shows the thicknesses D1, D2 and is a section along the line C-C in figure 11.

15 The connection explained above for wall panels can also be used for ceiling panels or floor panels of the elevator car.

Patent claims

1. A device for connecting panels (5.1, 5.2) of an elevator car (1), wherein the panels (5.1, 5.2) are connectable together at their end sides by means of at least one connecting element (8), characterized in that at least a first slot (11) is provided on a first panel (5.1) and at least a second slot (12) is provided on a second panel (5.2), and the connecting element (8) is insertable into the first slot (11) without tools and the second panel (5.2) is fittable over the connecting element (8) at the second slot (12), wherein a first spring element (8.3) of a spring body (8.5) of the connecting element (8) presses against the first panel (5.1) and a second spring element (8.4) of the spring body (8.5) of the connecting element (8) presses against the second panel (5.2).

2. The device as claimed in claim 1, characterized in that the first panel (5.1) has at its end side a first edgefold (5.11) on which the first slot (11) is arranged with a wide region (11.1) and a narrow region (11.2), and in that the second panel (5.2) has at its end side a second edgefold (5.21) on which the second slot (12) is arranged with a wide region (12.1) and a narrow region (12.2).

3. The device as claimed in claim 2, characterized in that the wide region (11.1, 12.1) is wider than the connecting element (8), and in that the connecting element (8) has a narrowed region (8.7) at which the connecting element (8) is introducible into the narrow region (11.2, 12.2) of the slot (11, 12).

4. The device as claimed in either of claims 2 and 3, characterized in that the first spring element (8.3) of the spring body (8.5) is wider than the narrow region (11.2) of the first slot (11) and the second spring

element (8.4) is narrower than the narrow region (12.2) of the second slot (12).

5 5. The device as claimed in one of the preceding claims, characterized in that the connecting element (8) has a top part (8.2) which acts as a mounting grip for introducing the connecting element (8) into the first slot (11).

10 6. The device as claimed in claim 2, characterized in that the second edgefold (5.21) has a reduced thickness (D2) in the vicinity (UB) of the narrow region (12.2) of the second slot (12).

15 7. A method having the following steps for connecting panels (5) of an elevator car (1), wherein a first panel (5.1) has at least a first slot (11) and a second panel (5.2) has at least a second slot (5.2):

20 a) inserting a connecting element (8) into the first slot (11), wherein a first spring element (8.3) of the connecting element (8) presses against a first edgefold (5.11) of the first panel (5.1), and

25 b) fitting a second edgefold (5.21) of the second panel (5.2) over the connecting element (8) at the second slot (12), wherein a second spring element (8.4) of the connecting element (8) presses against the second edgefold (5.21).

30 8. The method as claimed in claim 7, wherein the connecting element (8) is introduced into a narrow region (11.1) of the first slot (11) at a narrowed region (8.7), and wherein the second edgefold (5.21) is introduced into the narrowed region (8.7) of the connecting element (8) at a narrow region (12.1) of the
35 second slot (12).