



Description

Equipment for fine-positioning at least one deck of a multi-deck cage for a lift

- 5 The invention relates to equipment for fine-positioning at least one deck of a multi-deck cage for a lift, wherein at least one deck positions its deck sill of the deck floor on the storey level.

10 A lift with a double-deck cage of a lift has become known from the specification WO 98/09906 in which the upper deck can be matched to the upper edge of the storey to be served. The upper deck consists of a fixed platform and a vertically displaceable platform. Actuators supported on the fixed platform move the displaceable platform up and down until the upper platform is disposed flush with the upper edge of the storey to be served, wherein positioning sensors control the movement of the platform.

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A disadvantage of the known equipment resides in the fact that the movable platform driven at four corners can tilt. An offset can thereby arise between the platform and the storey, which represents a significant risk of accident for boarding and alighting lift passengers.

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The invention will create a remedy here. The invention, as characterised in claim 1, meets the object of avoiding the disadvantages of the known equipment and of creating a multi-deck cage with at least one deck which can be matched to the storey in terms of level and which allows a safe boarding and alighting for the lift passengers.

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The advantages achieved by the invention are substantially to be seen in that with the multi-deck cage according to the invention the performance capability of the multi-deck lift can be improved because the fine-positioning of the deck or decks can be undertaken in a shorter time. Moreover, the construction according to the invention is mechanically more robust, which in turn has a positive effect on the reliability of the multi-deck cage in lift operation. Of further advantage is the fact that the floor, as a ramp, is moved, which can be performed by a smaller drive.

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The present invention will be explained in more detail on the basis of the accompanying figures, in which:

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Fig. 1 shows a multi-deck cage consisting of a lower deck with a ramp drive and consisting of an upper deck,

Fig. 2 shows a section, along the line A-A of Fig. 1, of the multi-deck cage in the lift shaft,

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Fig. 3 shows a detail B and a detail C of a deck floor, which is constructed as a ramp, of a cage deck,

Fig. 4 shows the ramp in lowered setting for fine-positioning of the deck,

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Fig. 5 shows the ramp in raised setting for fine-positioning of the deck,

Fig. 6 shows a variant of embodiment of the deck sill movable with the ramp,

15 Fig. 7 shows the ramp with the deck sill according to Fig. 6 in lowered setting for fine-positioning of the deck and

Fig. 8 shows the ramp with the deck sill according to Fig. 6 in raised setting for fine-positioning of the deck.

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Figures 1 and 2 show a multi-deck cage 2 which is movable in a lift shaft 1 and consists of a lower deck 3 and an upper deck 4. The deck door 5, which is constructed as a telescopic door and has several door leaves 6, is shown at the lower deck. The upper deck door is denoted by 5.1. The door leaves 6 are suspended and guided at the top at a door guide 7, wherein a door drive 8 moves the door leaves 6. The lift shaft 1 is formed from shaft walls, wherein a respective opening, which serves for access to the multi-deck cage 2, is provided for each storey. In Fig. 2 there is shown an uneven-numbered storey 10 and an even numbered storey 11. The opening in the shaft wall is closed by a storey door 12 and by a storey door 13, respectively. The storey door 12 is guided by a door guide arranged in a cross member 14 and moved by means of the lower storey door 5.

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The lower deck 3 is provided with a ramp drive 15 which is arranged below the deck 3 at a support construction 16. The support construction 16 is fixedly connected with a support frame 17 of the deck 3. The ramp drive 15 consists of a drive unit 18, which can be, for example, a hydraulic drive or a pneumatic drive, and of actuators 19, which can be, for example, hydraulic cylinders or pneumatic cylinders, wherein the cylinders are connected

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with the drive unit 18 by way of lines 20. The deck floor 21, which is constructed as a ramp, of the lower deck 3 can be raised or lowered by the actuators 19. Specific features with respect thereto are shown in the details B and C of Fig. 2. Spindle drives acting as actuators 19 can also be provided as the ramp drive 15. Instead of the lower deck 3, the upper deck 4 can be equipped with a ramp drive 15 and a ramp or both decks 3, 4 can be equipped with a ramp drive 15 and a ramp.

Compensation for the height deviations within the storeys 11, 12 are provided by the floor 21, which is constructed as a ramp, of the decks 3, 4, wherein one deck 3 or 4 is levelled to be flush with the storey and the other deck 3 or 4 adjusts the storey level by means of the removable ramp. Which deck 3 or 4 adjust the storey level is dependent on whether the respective deck 3 or 4 serves only uneven-numbered storeys or also even-numbered storeys.

Fig. 3 shows the details B and C of Fig. 2. The deck floor 21 serving as a ramp is rotatably mounted at one end by means of a rotary axle 22, wherein the rotary axle 22 is connected at both ends with the support frame 17. At the other end there is arranged, at the deck floor 21, a deck sill 23 which serves for the lower guidance of the deck door 5. The deck sill 23 consists of a first half 23.1 and a second half 23.2, which are connected by means of screws 24, wherein the halves 23.1, 23.2 form a V-shaped slot 25 into which the deck door 5 extends and in which the deck door 5 is guided. The V-shaped slot 25 serves as compensation during raising and lowering of the deck floor 21, wherein a guidance of the deck door 5 free of jamming is ensured in every position of the deck floor 21. A sensor 26, which locates a mark 28 arranged below a storey sill 27, is arranged below the first half 23.1 of the deck sill 23. The sensor 26 and mark 28 can also be integrated in the sills 23, 27.

Fig. 3 shows the deck floor 21 in the horizontal position 29. Fig. 4 shows the deck floor 21 deflected downwardly by the maximum distance d_u from the horizontal position 29. The lower end of the door leaf 6 extends less deeply into the V-shaped slot 25 approximately by the distance d_u . Fig. 5 shows the deck floor 21 deflected upwardly by the maximum distance d_o from the horizontal position 29. The lower end of the door leaf 6 extends more deeply into the V-shaped slot 25 approximately by the distance d_o . The maximum distances d_o , d_u can amount to a few centimetres.

The lift control recognises the travel direction of the multi-deck cage 2. If the sensor 26, up to stopping of the multi-deck cage 2 at a storey, has travelled past the mark 28 of the storey sill 27, the ramp drive is activated against the travel direction of the multi-deck cage 2 ahead of the storey stop until the sensor 26 and the mark 28 are disposed at the same level. If the sensor 26 up to stopping of the multi-deck cage 2 at the storey has not recognised the mark 28 of the storey sill 27, the ramp drive is activated in the travel direction of the multi-deck cage 2 ahead of the storey stop until the sensor 26 and the mark 28 are disposed at the same level.

- 10 A further variant relates to pre-adjustment of the storey floor. The exact position of the storey sill can be learnt in a learning travel, for example by means of the shaft data system. The deck floor can be adjusted by this data already during the journey to the storey to which movement is to take place. A precondition is, however, equipment (travel transmitter, travel regulator) for detecting and controlling the travel of the deck floor relative to the support frame of the multi-deck cage.

- Figures 6 to 8 show a further variant of embodiment of the deck sill 23. A sliding guide shoe 30 is connected with the deck sill 23 and guides the door leaf 6 in vertical direction. The sliding guide shoe 30 has a circular degree of freedom and can compensate, by its cylindrical foot, for the movement of the deck sill 23 relative to the door leaf 6. Fig. 6 shows the deck floor 21 in the horizontal position 29. Fig. 7 shows the deck floor 21 deflected downwardly by the maximum distance d_u from the horizontal position 29. The lower end of the door leaf 6 extends less deeply into the sliding guide shoe 30 by approximately the distance d_u . Fig. 8 shows the deck floor 21 deflected upwardly by the maximum distance d_o from the horizontal position 29. The lower end of the door leaf 6 extends more deeply into the sliding guide shoe 30 approximately by the distance d_o .

- Figures 1 to 8 show a ramp for fine-positioning of the deck of a multi-deck cage, wherein the ramp is formed by the entire deck floor 21. In a further variant of embodiment the ramp can be formed from a part of the deck floor, for example the sill region of the deck floor.

Patent Claims:

1. Equipment for fine-positioning at least one deck of a multi-deck cage for a lift, wherein at least one deck positions its deck sill of the deck floor on the storey level,
5 characterised in that the deck floor (21) is, as a ramp, able to be matched at the sill side to the storey level.
2. Equipment according to claim 1, characterised in that the deck floor (21) is pivotable by means of a ramp drive (15) about a rotary axle 22.
- 10 3. Equipment according to claim 2, characterised in that the rotary axle 22 is disposed opposite the deck sill (23), wherein actuators (19) of the ramp drive (15) position the deck floor (21) towards the deck sill (23).
- 15 4. Equipment according to claim 2 or 3, characterised in that the deck sill (23) has a V-shaped slot (25), wherein the V-shaped slot (25) serves as a guide of a deck door (5) and as compensation in raising and lowering the deck sill (23).
- 20 5. Equipment according to claim 2 or 3, characterised in that the deck sill (23) comprises a sliding guide shoe (30) with a circular degree of freedom, wherein the sliding guide shoe (30) compensates for the movement of the deck sill (23) relative to the deck door (5) by its cylindrical foot.
- 25 6. Equipment according to one of the preceding claims, characterised in that a sensor (26) is arranged at the deck side and a mark (28) is arranged at the storey side, wherein the ramp drive (15) moves the ramp up and down until the sensor (26) locates the mark (28).
- 30 7. Equipment according to one of claims 1 to 5, characterised in that a device for detection and control of the travel of the ramp relative to the support frame of the multi-deck cage is provided, wherein the fine-positioning of the deck floor (21) is carried out already during travel of the multi-deck cage (2) on the basis of storey distances known beforehand.