

SPECIFICATION



TITLE OF THE INVENTION

ELEVATOR APPARATUS

5 BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention relates to an elevator apparatus, especially an elevator having an unlocking mechanism for opening a double-leaf door provided at a side of an entrance and exit at an elevator stop from a side of the door.

Description of the Related Art:

As described by Japanese Patent Laid-Open No.263370/1994, an unlocking mechanism of a conventional elevator apparatus to which an unlocking mechanism is provided to open its double-leaf door at a side of an entrance and exit of an elevator stop from a side of the door, includes hooks, each one of the hooks being releasably engaged with a latch provided at a fixed member, and a movable part whose moving direction is guided by a fixed guidance member provided at the vicinity of the hooks, wherein the movable part is constructed so that the hooks are released from the latch by operating the movable part from the side of the elevator stop.

However, it became clear that vibration by the opening or closing of the door is transferred to the movable part, and noises are generated due to the knocking between the movable



part and such a member provided at the vicinity of the movable part as the fixed guidance member when the door at the elevator stop is opened or closed, linking to the opening or closing of a door provided at a side of a cage by releasing
5 the hooks from the latch, since, in the unlocking mechanism of the above-mentioned elevator apparatus, the movable part is only slidably provided at the fixed guidance member..

SUMMARY OF THE INVENTION

10 Objects of the Invention:

The object of the present invention is to offer an elevator apparatus having an unlocking mechanism by which noises are not generated in the opening or closing of the door.

15 Methods Solving the Problems:

In order to attain the above-mentioned object, the present invention provides an elevator apparatus having a double-leaf door located at a side of an entrance and exit of an elevator stop, a hook provided at each leaf of the double-
20 leaf door, a latch releasably engaged with the each hook provided at a fixed member, and an unlocking mechanism including a movable part for unlocking an engagement of the latch and each hook by operating said movable part from a side of said elevator stop, the elevator apparatus comprising:
25 means for releasably fastening the movable part at a position where the movable part positions by its weight, in a non-



operation state of the unlocking mechanism.

And, such physical force, mechanism or material as magnetic force, elastic material, a hydraulic machine, electrical equipment and so forth can be applied to said fastening means.

Since, as mentioned above, an elevator apparatus of the present invention has the means for releasably fastening the movable part in the non-operation state of the unlocking mechanism, the both hooks can be released from the latch by operating the hooks from the side of an elevator stop, and noises are not generated due to the knocking between the movable part and such a member provided at the vicinity of the movable part as the fixed guidance member since the movable part is fasten to a fixed member at its vicinity by the fastening means and does not vibrate even if vibration of the door is caused when the door is opened or closed.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 is a front view showing a main part of an elevator apparatus of an embodiment of the present invention.

Fig.2 is an enlarged cross-sectional view along a A-A line of the elevator apparatus shown by Fig.1.

Fig.3 is an enlarged view of an unlocking mechanism of the elevator apparatus shown by Fig.1.

Fig.4 is a front view showing a main part of an elevator apparatus of another embodiment of the present



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invention.

Fig.5 is a front view showing a main part of an elevator apparatus of further another embodiment of the present invention.

5 Fig.6 is a front view showing a main part of an elevator apparatus of further another embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

10 Hereinafter, embodiments of the present invention is explained by referring to drawings.

Fig.1 is a front view showing a main part of an elevator apparatus of an embodiment of the present invention, and Fig.2 is a cross-sectional view along a line A-A.

15 Leaves 1A and 1B of a door each of which are opened in the right and left directions at the center, respectively, have hangers 2A and 2B at their upper parts, to each of which each of rollers 3A and 3B is rotatably and pivotally connected. And, the rollers 3A and 3B are rotatably provided
20 on a rail 4 horizontally fixed to a hanger case 5. By the above-mentioned structure, the door leaves 1A and 1B at the side of an elevator stop are horizontally movable, and opened or closed by a door opening mechanism (not shown by a figure) provided at the side of a cage, together with a door of the
25 cage. The hanger case 5 for supporting the rail 4 is fixed to a building wall 6. And, hooks 9A and 9B are rotatably

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connected to the hangers 2A and 2B via axes 7A and 7B, respectively. Then, at the positions opposite to the hooks 9A and 9B, upward latching parts 10A and 10B with which the downward hooks 9A and 9B are engaged, are fixed to the hanger case 5, and the latching parts compose a latch 10. Usually, in the closing state of a door, the hooks 9A and 9B are engaged with the latching parts 10A and 10B, and the latching state of the hooks is held by push springs 11A and 11B pushing the hooks 9A and 9B in the latching direction. Then, the locking mechanism is composed of the hooks 9A and 9B, the latch 10 and the push springs 11A and 11B.

As shown in Fig.2, at the building wall 6, an entrance and exit of an elevator is constructed, leading to an elevating space. And, a peripheral part of the entrance and exit is rimmed by a three-way frame composed of a pair of vertical frames 13V and a horizontal frame 13H, and a door sill (not shown by the figure) arranged between the bottom parts of the vertical frames 13V. At the entrance and exit part, such the leaves 1A and 1B of a door at the side of an elevator stop as mentioned above are arranged so that the leaves wall up the entrance and exit space in the door closing state.

The locked state of the door by the above-mentioned locking mechanism is unlocked by giving the torque in the releasing direction to the hooks 9A and 9B in operations for opening of the door at the side of a cage together with the



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door leaves 1A and 1B at the side of an elevator stop with a door opening mechanism for opening and closing the door at the side of the cage. The above-mentioned locking mechanism has such a structure that the locked state of the leaves 1A and 1B of the double-leaf door at the side of an elevator stop can be also released by inserting a key 15 through a penetrating hole 14, formed at the horizontal frame 13H as shown in Figs.1 and 2, of the unlocking mechanism, from the side of an elevator stop and by giving the torque in the releasing direction to the hooks 9A and 9B. In the following, the unlocking mechanism is explained.

As shown by Fig.3 which is an enlarged view of the main part of the composition shown by Fig.1, the unlocking mechanism is composed of a horizontal movable part 20A provided at the position to which the key 15 is inserted through the penetrating hole 14 as occasions need, a vertical part 20B provided at the horizontal movable part 20A in a body, guiding means, fixed to the hanger case 5, for guiding the vertical motion of the vertical part 20B, and push pedestals 12A and 12B, provided under the hooks 9A and 9B, for giving the torque in the releasing direction to the hooks 9A and 9B with the horizontal movable part 20A. The movable part 20 is composed of the horizontal movable part 20A and the vertical part 20B, and the horizontal movable part 20A is embarked on fixed plates 19A and 19B fixed to the hanger case at the vicinity of the plates so as to be arranged at the

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place where the horizontal movable part can be driven by the inserted key. Then, magnets 16A and 16B of a sheet type is fixed to either the bottom face of the horizontal movable part 20A or the top face of the fixed plates 19A and 19B. In the embodiment, the magnets 16A and 16B are fixed to the top face of the fixed plates 19A and 19B. And, the vertical part 20B has an engagement part 21 over the guiding means 18. The engagement part 21 strikes the top of the guiding means when the vertical part 20B moves downward by its weight, and the further downward movement of the vertical part 20B is stopped. A magnet of a sheet type 17 is fixed to either the bottom face of the engagement part 21C or the top face of the guiding means 18. In the embodiment, the magnet 17 is fixed to the top face of the guiding means 18. Further, the horizontal movable part 20A has its length of extending over the push pedestals 12A and 12B, and the locked state of the latch 10 shown by Fig.1 is released by the torque to the hooks 9A and 9B given by the upward motion of the horizontal movable part 20A via the push pedestals 12A and 12B, as shown by the chain double-dashed lines in Figs.1 and 3.

Therefore, in the non-operation state of the unlocking mechanism, that is, in the operation state of the locking mechanism wherein the movable part 20 positions on the top face of the fixed plates by its weight, the magnets 16A and 16B suck and fasten the horizontal movable part 20A, and the magnet 17 fastens the engagement part 20C. Then, noises are



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not generated due to the knocking between the movable part and such a member provided at the vicinity of the movable part as the fixed plates 19A and 19B or the guiding means 18 since the fastened state of the movable part 20 is kept as shown by the figure and it does not vibrate even if vibration of the door is caused when the elevator stops at the elevator stop and its door is opened or closed. Although the arrangement of the magnets 16A and 16B is implemented between the horizontal movable part 20A and the fixed plates 19A and 19B, and the arrangement of the magnet 17 between the engagement part 20C and the guiding means 18, in the embodiment, even one of the above-mentioned two magnet arrangements is available and such fastening means is applicable to another unlocking mechanism of a different composition.

Fig.4 is a front view showing an unlocking mechanism of an elevator apparatus of another embodiment of the present invention.

Similarly as the embodiment shown by Fig.3, the unlocking mechanism is composed of the movable part 20 constructed by a horizontal movable part 20A provided at the position to which the key is inserted through the penetrating hole as occasions need and the vertical part 20B provided at the horizontal movable part 20A in a body, guiding means, fixed to the hanger case 5, for guiding the vertical motion of the vertical part 20B, and the push pedestals not shown in the figure, provided under the hooks 9A and 9B, for giving the

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torque in the releasing direction to the hooks 9A and 9B with the horizontal movable part 20A. Pulling springs 21A and 21B are provided between the horizontal movable part 20A and the fixed plates 19A and 19B so that the movable part 20 is fastened at the position where it moves downward and positions by its weight, and pulling springs 22A and 22B are provided between the engagement part 20C and the guiding means 18 so that the movable part 20 is fastened at the position where it moves downward and positions by its weight.

As explained above, the fastening means is composed of the magnets 16A, 16B and 17 in the former embodiment, and it is composed of the pulling springs 21A, 21B, 22A and 22B in the latter embodiment. And, the structure except the fastening means, the unlocking mechanism and its operations are the same in the both embodiments. Then, the both embodiment have almost the same effects.

Fig.5 is a front view showing an unlocking mechanism of an elevator apparatus of further another embodiment of the present invention, and the parts equivalent to the ones shown by Fig.4 are labeled with the same signs. Then, detailed explanation of such parts is omitted.

In the embodiment, spring pedestals 25A and 25B fixed to the hanger case 5 are provided at the place apart by the predetermined distance upward from the horizontal movable part 20A, and pushing springs 23A and 23B are provided between the spring pedestals 25A and 25B and the horizontal movable part



20A, respectively, so that the movable part 20 is fastened at the position where it moves downward and positions by its weight. Further, spring pedestals 26A and 26B fixed to the hanger case 5 are provided at the place apart by the
5 predetermined distance upward from the engagement part 20c, and pushing springs 24A and 24B are provided between the spring pedestals 26A and 26B and the engagement part 20A, respectively, so that the movable part 20 is fastened at the position where it moves downward and positions by its weight.
10 Then, also the present embodiment has almost the same effects as the previous embodiments.

Fig.6 is a front view showing an unlocking mechanism of an elevator apparatus of further another embodiment of the present invention, and the parts equivalent to the ones shown
15 by Fig.4 are labeled with the same signs. Then, detailed explanation of such parts is omitted.

The present embodiment is different from the previous embodiment in the point that the fastening means is constructed by using electromagnets in the present embodiment.
20 That is, electromagnets 27A and 27B are fixed on the top face, opposite to the bottom face of the horizontal movable part 20A, of the fixed plates 19A and 19B. Then, also the present embodiment has almost the same effects as the previous embodiments.

25 And, such a mechanism as a hydraulic damper, a motor driven fastener and so forth can be also applied to said



fastening means.

As explained above, by the elevator apparatus of the present invention, the vibration of the movable part and noises caused by the vibration in a conventional elevator apparatus, when its door is opened or closed, can be prevented since the unlocking mechanism is provided in the elevator apparatus, the unlocking mechanism having the movable part for releasing the locking mechanism locking the double-leaf door at the side of an elevator stop from the side of an elevator stop, and the fastening means for releasably fastening the movable part of the unlocking mechanism is provided so that the movable part is fastened at the position where it moves downward and positions by its weight.





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WHAT IS CLAIMED IS:

1. An elevator apparatus having a double-leaf door located at a side of an entrance and exit of an elevator stop, a hook provided at each leaf of said double-leaf door, a latch
5 releasably engaged with said each hook provided at a fixed member, and an unlocking mechanism including a movable part for unlocking an engagement of said latch and said each hook by operating said movable part from a side of said elevator stop, characterized in that:
10 said elevator apparatus comprises means for releasably fastening said movable part at a position where said movable part positions by its weight, in a non-operation state of said unlocking mechanism.
- 15 2. An elevator apparatus according to claim 1, wherein magnetic force is applied to said fastening means.
3. An elevator apparatus according to claim 2, wherein
20 said fastening means is a magnet provided at said movable part to fasten said movable part to a member fixed at a vicinity of said movable part.
4. An elevator apparatus according to claim 2, wherein
25 said fastening means is an electromagnet provided at said movable part to fasten said movable part to a member fixed at a vicinity of said movable part.

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5. An elevator apparatus according to claim 1, wherein elastic material is applied to said fastening means.

6. An elevator apparatus according to claim 5, wherein
5 said fastening means is a spring provided at said movable part to fasten said movable part to a member fixed at a vicinity of said movable part.

7. An elevator apparatus according to claim 1, wherein
10 a hydraulic machine is applied to said fastening means.

8. An elevator apparatus according to claim 7, wherein
said fastening means is a hydraulic damper provided at said movable part to fasten said movable part to a member fixed at
15 a vicinity of said movable part.

9. An elevator apparatus according to claim 1, wherein electrical equipment is applied to said fastening means.

20 10. An elevator apparatus according to claim 9, wherein said fastening means is a motor driven fastener provided at said movable part to fasten said movable part to a member fixed at a vicinity of said movable part.

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