

"A Balustrade for a passenger conveyer"

The present invention relates to balustrades for passenger conveyers such as escalators, electric-
5 powered roads and the like and, more particularly, to a balustrade for a passenger conveyer which comprises a fixing instrument arranged within a main deck for fixedly mounting the main deck to a balustrade panel.

10 In a general or usual balustrade for a passenger conveyer, as disclosed in Japanese Utility Model Application Laid-Open No. 57-188773, a plurality of fixing instruments each composed of a pair of fixing members is arranged within a main deck supporting a
15 handrail, and each pair of fixing members cooperate with each other to clamp therebetween an upper end of an upright balustrade panel to thereby fixedly mount the main deck to the balustrade panel.

It will be understood from the foregoing that
20 in order to fixedly mount the main deck to the balustrade panel, it is necessary to clamp the balustrade panel by each pair of fixing members. By this reason, a worker fastens each pair of fixing members to each other by means of a bolt and a nut at a
25 job site where the passenger conveyer is installed.

Fastening portions by means of the respective pairs of bolts and nuts are located outwardly of the balustrade. The reason for this is to prevent projections interfering with passengers from being formed inwardly of the balustrade. Accordingly, it is required for the worker to carry out the fastening operation of the bolts and nuts with his body leaning outwardly of the passenger conveyer. Thus, there arises such a problem that fixing operation of the main deck to the balustrade panel is troublesome.

It is an object of the invention to provide a balustrade for a passenger conveyer, in which it is possible to easily carry out fixing operation of a main deck to a balustrade panel.

It is another object of the invention to provide a balustrade for a passenger conveyer, in which if an illuminating lamp is arranged within a main deck, it is possible to restrain a rise in temperature within the main deck due to heat generation of the lamp.

It is still another object of the invention to provide a balustrade for a passenger conveyer, in which if an illuminating lamp is arranged within a main deck, it is possible to easily lay electric wires for the lamp.

For the above purposes, according to the invention, there is provided a balustrade for a

passenger conveyor including a main deck formed of a steel sheet bent to have a downward opening; at least one fixing instrument provided inside the opening of the main deck; a vertically upright balustrade panel, the main deck being
5 mounted on an upper end of the balustrade panel with the fixing instrument interposed therebetween; and a guide frame provided on the main deck for slidingly guiding a handrail, wherein said fixing instrument has a fitting groove in a lower portion thereof, which is formed to open
10 downward, and a fixing section on an upper portion thereof, said balustrade panel being fitted at the upper end thereof in said fitting groove into fixing engagement therewith, and said main deck is attached onto said fixing section.

The present invention will now be described in greater detail by way of examples with reference to the accompanying drawings, wherein:-

Fig. 1 is a side elevational view of an
5 embodiment of a balustrade for a passenger conveyer according to the invention;

Fig. 2 is an enlarged cross-sectional view taken along line II - II in Fig. 1;

10 Fig. 3 is an enlarged cross-sectional view taken along line III - III in Fig. 1;

Fig. 4 is an enlarged cross-sectional view taken along line IV - IV in Fig. 1;

Fig. 5 is an exploded perspective view showing the operation of fixedly mounting a main deck to a
15 balustrade panel;

Fig. 6 is a fragmental cross-sectional view of another embodiment of the invention; and

5

Fig. 7 is a view similar to Fig. 6, but showing still another embodiment of the invention.

5 An embodiment of the invention will be described below with reference to Figs. 1 through 5 which illustrate a balustrade for an escalator. The escalator comprises a plurality of steps 1 connected to each other to form an endless step structure driven to
10 travel. A pair of handrails 2 are arranged respectively on opposite sides of the endless step structure and extend along the traveling direction thereof. The handrails 2 are driven to travel in synchronism with the endless step structure. A pair of balustrades 3 are
15 provided for guiding the respective handrails 2. Each of the balustrades 3 includes a balustrade panel 4 formed of transparent reinforced glass. The balustrade panel 4 is arranged vertically and has a lower portion thereof supported by a fixed member. A plurality of
20 fixing instruments 5 are fixedly mounted to an upper end of the balustrade panel 4. A main deck 8 and a guide frame 9 are mounted to the fixing instruments 5. A guide 10 is fixedly secured to the guide frame 9 and is in sliding contact with an inner peripheral surface of
25 the handrail 2.

Each of the fixing instruments 5 has an appearance of an inverted U-shape provided therein with an inverted U-shaped fitting groove 5G opening

downwardly. The inverted U-shaped fixing instrument 5 has a bottom whose outer surface portion is formed into a planar section serving as a fixing section 5F for the main deck 8. The fixing section 5F is formed therein with an inverted T-shaped engaging groove 5A whose lower end portion is enlarged in width. The fitting groove 5G in the fixing instrument 5 is fitted about the upper end of the balustrade panel 4 in such a manner that the fixing instrument 5 straddles the upper end of the balustrade panel 4. The fixing instrument 5 has a length 1 of 30 to 100 mm. The plurality of fixing instruments 5 are spaced from each other at intervals L of 300 to 500 mm longitudinally of the balustrade panel 4. Each fixing instrument 5 is fixedly bonded to the upper end of the balustrade panel 4 by means of an adhesive 6. Each of a plurality of bolts 7A has a head which is inserted into the engaging groove 5A in a corresponding one of the fixing instruments 5 fixedly mounted to the upper end of the balustrade panel 4. The head of the bolt 7A is square in shape as viewed in plan. When a nut 7B is threadedly engaged with the bolt 7A and is tightened subsequently to be described, the square head of the bolt 7A interferes with the engaging groove 5A to serve as a detent.

The main deck 8 is made of a sheet of stainless-steel, for example, which is so bent as to form an opening facing downwardly. The main deck 8 is arranged in back to back relation to the guide frame 9

formed into a U-shaped cross-section. The main deck 8 and the guide frame 9 may be joined beforehand to each other by fixing means such as welding, bonding, bolt fastening and the like, or may be maintained separated from each other. In either case, however, a plurality of through bores H are provided in the main deck 8 and the guide frame 9 at respective locations corresponding respectively to the bolts 7A. The bolts 7A pass respectively through the through bores H such that the forward ends of the respective bolts 7A project into the guide frame 9. The nuts 7B are threadedly engaged respectively with the forward ends of the respective bolts 7A and are tightened whereby the main deck 8 and the guide frame 9 are fixedly mounted to the fixing instruments 5.

The main deck 8 has incorporated therein first brackets 11A and second brackets 11B. Each of the first brackets 11A and a corresponding one of the second brackets 11B are fixedly mounted to the main deck 8 by means of a screw 12A and a nut 12B. The screw 12A extends through both the main deck 8 and the guide frame 9 at a location which does not overlap the through bore H for the bolt 7A. Each of a pair of sockets 13 for a rod-like fluorescent lamp 18 is mounted to a forward end of a corresponding one of the first brackets 11A. Each of the second brackets 11B has a forward end provided with a threaded bore S. Screws 14B are threadedly engaged respectively with the threaded

bores 5 in the forward ends of the respective second brackets 11B for mounting a lamp cover 14 to the second brackets 11B. Lead wires 15 extending from each of the sockets 13 are guided into the guide frame 9 through a wiring bore 16 which is formed through the main deck 8 and the guide frame 9 at a location which does not overlap the fixing instrument 5. The lead wires 15 as well as other electric wires 17 are laid within the guide frame 9. The lamp cover 14 has a side wall portion which is confronted with the balustrade panel 4 with a gap left therebetween.

An operational process of assembling the balustrade for the escalator constructed as above will next be described.

As shown in Fig. 5, the fixing instruments 5 are beforehand fixedly mounted, at a factory, to the upper end of the balustrade panel 4 at intervals L. The balustrade panel 4 having fixedly mounted thereto the fixing instruments 5 is carried into a job site of installation of the escalator. In addition, the main deck 8 and the guide frame 9 are also beforehand united to each other into an assembly by means of spot welding at the factory. Further, the first and second brackets 11A and 11B are also beforehand attached to the main deck 8 and the guide frame 9.

At the job site of installation, the balustrade panel 4 is vertically supported by an escalator body frame (not shown) and, subsequently, the

heads of the respective bolts 7A are first inserted respectively into the engaging grooves 5A in the respective fixing instruments 5 to erect the bolts 7A. The through bores H beforehand provided through both the
5 main deck 8 and the guide frame 9 are aligned respectively with the bolts 7A, and the assembly of the main deck 8 and the guide frame 9 is mounted on the fixing instruments 5 such that the forward ends of the respective bolts 7A extend respectively through the
10 through bores H into the guide frame 9. The nuts 7B are threadedly engaged respectively with the forward ends of the respective bolts 7A projecting into the guide frame 9 and are tightened to fasten the assembly of the main deck 8 and the guide frame 9 to the fixing instruments
15 5. Thus, the fixing instruments 5 and the assemblies each composed of the pair of brackets 11A and 11B are arranged alternately along the upper end of the balustrade panel 4 and in spaced relation to each other.

Subsequently, the lead wires 15 from each of
20 the sockets 13 retained on a corresponding one of the first brackets 11A are caused to pass through the wiring bore 16 as shown in Fig. 4, and are drawn into the guide frame 9. The rod-like fluorescent lamp 18 is mounted between the sockets 13. Then, the lamp cover 14 is
25 mounted to the second brackets 11B by the screws 14B, and the guide 10 is fixedly mounted to the guide frame 9 to permit the handrail 2 to be guided by the guide 10.

According to the embodiment of the invention,

the engaging groove 5A in each of the fixing instruments 5 enables a corresponding one of the bolts 7A to be mounted such that the bolt 7A extend vertically upwardly from the fixing section 5F of the fixing instrument 5.

- 5 The upstanding bolts 7A can be utilized to fixedly mount the main deck 8 to the fixing instrument 5. Thus, the worker can carry out the assembling operation in an upright posture. As a result, it is possible to easily carry out the assembling operation, even if the wall of
- 10 a building is located adjacent the balustrade of the escalator. Additionally, the operations such as wiring of the lead wires 15, mounting of the rod-like fluorescent lamp 18 and attachment of the lamp cover 14 are required to be carried out outwardly of the
- 15 balustrade of the escalator and, therefore, the operations are inferior in operability. However, such operations are not large-scale ones, unlike attachment of the main deck 8 and the like. Accordingly, it is possible to carry out such operations relatively easily
- 20 even if the worker leans outwardly of the balustrade. If the worker hates the operations with his body leaning outwardly of the balustrade, however, wiring of the lead wires 15, mounting of the rod-like fluorescent lamp 18 and attachment of the lamp cover 14 should beforehand be
- 25 carried out prior to attachment of the main deck 8 to the fixing instruments 5.

Further, according to the embodiment of the invention, the interior of the guide frame 9 can be utilized

11

to lay the requisite lead wires 15 and electric wires 17. This eliminates the need for provision of an especial wiring trough. That is, the main deck 8 is mounted to the balustrade panel 4 through the fixing instruments 5 which are fixedly mounted to the balustrade panel 4 in spaced relation to each other. Accordingly, a non-contact section h_1 shown in Figs. 3 and 4 is defined between the upper end of the balustrade panel 4 and the main deck 8 and between each pair of adjacent fixing instruments 5. The non-contact section h_1 is utilized to provide the wiring bore 16 in the main deck 8 and the guide frame 9. This makes it possible to lay the wires 15 and 17 within the guide frame 9. As a result, no such problems arise as hanging-down of the lead wires 15 and electric wires 17 and the like, and no especial wiring trough is required for preventing the lead wires 15 and electric wires 17 from hanging down.

Moreover, according to the embodiment of the invention, recirculation of cooling air makes it possible to restrain a rise in temperature due to heat generation of the rod-like fluorescent lamp 18. Heat is generated by turning-on of the rod-like fluorescent lamp 18, and a rise in temperature is remarkable, in particular, at the sections adjacent the sockets 13. As described previously, however, since each of the non-contact sections h_1 is utilized to mount a corresponding one of the sockets 13, a non-contact section of the size of h_2 still remains at the non-contact section h_1 , even

if the thicknesses of the respective brackets 11A and 11B are taken away from the non-contact section h_1 .

Thus, air can freely communicate with the interior of the main deck 8 through the non-contact section h_1 or

5 the non-contact section h_2 . Moreover, since the lamp cover 14 and the main deck 8 are maintained out of contact with the balustrade panel 4, air can freely flow as indicated by the broken lines in Fig. 3 so that heat can sufficiently be radiated. As a result, such
10 inconveniences can be eliminated as heat damage and the like of the lamp cover 14 due to a rise in temperature within the main deck 8.

By the way, the arrangement of the above-described embodiment is such that the engaging grooves
15 5A are formed respectively in the upper surfaces of the respective fixing instruments 5, and the main deck 8 and the guide frame 9 are both fastened to the fixing instruments 5 by the nuts 7B and the bolts 7A fitted respectively into the engaging grooves 5A. This manner
20 requires the operation of fitting the bolts 7A into the respective engaging grooves 5A at the job site of installation. In view of such inconvenience, as shown in Fig. 6, the fixing instruments 5 may be used in which a bolt 19 is beforehand implanted in the upper surface
25 of each of the fixing instruments 5 in united relation thereto. In this case, the bolts 19 are caused to pass respectively through the through bores H in the main deck 8 and the guide frame 9 at the job site of

installation, and nuts 20 are threadedly engaged
respectively with the bolts 19 and are tightened.
Moreover, as shown in Fig. 7, each of threaded bores 21
may be provided which extends from the upper surface of
5 a corresponding one of the fixing instruments 5 toward
the bottom of the inverted U-shaped fitting groove 5G
therein. In this case, tightening bolts 22 passing
respectively through the through bores H in the main
deck 8 and the guide frame 9 are threadedly engaged
10 respectively with the threaded bores 21 and are
tightened.

It has been described in the above embodiments .
that each of the fixing instruments 5 is fixedly mounted
to the balustrade panel 4 by means of the adhesive 6.
15 It is to be understood, however, that only the adhesive
6 may be interposed between the fixing instrument 5 and
the balustrade panel 4, or a fibrous substrate
impregnated with the adhesive 6 may be interposed
between the fixing instrument 5 and the balustrade panel
20 4.

As described above, in the balustrade for the
passenger conveyer in which the main deck supporting the
handrail is fixedly mounted to the end of the balustrade
panel, the improvement according to the invention makes
25 it possible for the worker to fixedly mount the main
deck to the end of the balustrade panel in an upright
posture. In addition, if the illuminating lamp is
arranged within the main deck, it is possible to

restrain a rise in temperature within the main deck due to heat generation of the illuminating lamp. Moreover, the wires for the illuminating lamp can easily be laid without provision of a trough exclusive for the wires.



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CLAIMS:-

1. A balustrade for a passenger conveyor including:
a main deck formed of a steel sheet bent to have a downward
opening; at least one fixing instrument provided inside the
5 opening of the main deck; a vertically upright balustrade
panel, the main deck being mounted on an upper end of the
balustrade panel with the fixing instrument interposed
therebetween; and a guide frame provided on the main deck
for slidably guiding a handrail, wherein said fixing
10 instrument has a fitting groove in a lower portion thereof,
which is formed to open downward, and a fixing section on
an upper portion thereof, said balustrade panel being
fitted at the upper end thereof in said fitting groove into
fixing engagement therewith, and said main deck is attached
15 onto said fixing section.

2. A balustrade for a passenger conveyor according
to claim 1, wherein that are provided a plurality of fixing
instruments which are arranged in spaced relation to each
other longitudinally of said balustrade panel.

20 3. A balustrade for a passenger conveyor according
to claim 2, wherein said fixing instruments are spaced from
each other at intervals longer than a length of each of
said fixing instruments.

4. A balustrade for a passenger conveyor including:
25 a main deck formed of a steel sheet bent to have a downward



16

opening; a plurality of fixing instruments provided inside the opening of the main deck; a vertically upright balustrade panel, the main deck being mounted on an upper end of the balustrade panel with the fixing instruments interposed therebetween; and a guide frame provided on the main deck for slidably guiding a handrail, wherein each of the plurality of fixing instruments has a fitting groove in a lower portion thereof, which is formed to open downward, and a fixing section on an upper portion thereof, and wherein the plurality of fixing instruments are respectively fixed onto the upper end of said balustrade panel by means of said fitting grooves at intervals in the longitudinal direction of said balustrade panel, said main deck being attached onto said fixing sections of said fixing instruments thus fixed, and sockets for holding illumination lamps being respectively supported on corresponding portions of said main deck between adjacent fixing instruments.

5. A balustrade for a passenger conveyor including:

a main deck formed of a steel sheet bent to have a downward opening; a plurality of fixing instruments provided inside the opening of the main deck; a vertically upright balustrade panel, the main deck being mounted on an upper end of the balustrade panel with the fixing instrument interposed therebetween; and a guide frame provided on the main deck for slidably guiding a handrail, wherein each of the plurality of fixing instruments has a fitting groove in



17

a lower portion thereof, which is formed to open downward, and a fixing section on an upper portion thereof, and wherein the plurality of fixing instruments are respectively fixed onto the upper end of said balustrade panel by means of said fitting grooves at intervals in the longitudinal direction of said balustrade panel, said main deck being attached onto said fixing sections of said fixing instruments thus fixed, brackets for holding sockets and lamp covers of illumination lamps being respectively mounted on corresponding portions of said main deck between adjacent fixing instruments, wiring bores being respectively provided in corresponding portions of said main deck between adjacent fixing instruments to lead from said main deck to the inside of said guide rail, and lead wires for said sockets extending through the respective wiring bores to pass through the inside of said guide rail.

6. A balustrade for a passenger conveyor according to claim 5 wherein said fitting groove in each of said fixing instruments and the upper end of said balustrade panel are fixed to each other by means of an adhesive.

7. A balustrade for a passenger conveyor constructed substantially as herein described with reference to and as illustrated in the accompanying drawings.
