

"Balustrade for passenger conveyor"

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This invention relates to passenger conveyors, such as moving stairways or escalators, moving passageways, 5 etc., and more particularly it is concerned with a balustrade for a passenger conveyor including a deck cover portion of improved construction.

Passenger conveyors have been popular and widely 10 in use as important transportation facilities to be used within buildings, sheds, etc. In recent years, multifarious needs have been created for this type of public conveyance with regard to a shortening of the time required for building them, improvements in their designs, etc.

15 Particularly in respect of the improvements in the design of a passenger conveyor, importance is placed on the balustrades thereof, and the tendency nowadays is that newly constructed passenger conveyors are provided with glass panels which are transparent and 20 presentable in appearance. Generally, a glass panel has an inner deck cover and an outer deck cover, which are formed of material different from glass, positioned in abutting relation to the lower portion of the glass panel. To avoid production of a gap between the lower end portion 25 of the glass panel and the inner and outer deck covers

at their abutting ends, packings of soft material are mounted between the glass panel and the deck covers at their abutting ends.

As subsequently to be described in detail,
5 however, a small gap tends to be formed between the glass panel and the packings covering the inner and outer deck covers on account of errors in fabrication or assembling, and such gap is inevitable if the present design is continued to be adopted.
10 Such gap not only mars the appearance of the passenger conveyer but also gives rise to problems with regard to the safety of the passengers. For example, children might have their fingers stuck in the gap. Moreover, the inner and outer deck
15 covers tend to have a difference in level between them and this has presented a rather ugly appearance.

This invention has as its object the provision of a balustrade for a passenger conveyer
20 which can be improvements on balustrades of the prior art, and which may be superior to balustrades of the prior art in appearance, safety of passengers and economy.

There is provided according to the invention
25 a balustrade wherein a packing mounted between the ^{transparent} ~~glass~~ panel and the inner and outer deck covers located on the inner and outer sides of the glass panel respectively is of unitary structure ~~formed of hard material~~ including a groove for receiving
30 a lower end portion of the ~~glass~~ panel and grooves for receiving end portions of the inner and outer deck covers respectively, and the unitary structure

is secured to the support bed at its side while holding the panel at its lower portion. The invention also relates to a passenger conveyor having at least one such balustrade.

5 Embodiments of the invention are described below by way of example with reference to the accompanying drawings, in which:-

Fig. 1 is a side view of a passenger conveyor to which the invention may be applied, showing an upper
10 landing portion thereof;

Fig. 2 is a sectional view taken along the line I-I in Fig. 1, showing the construction of a balustrade of the prior art;

15 Figs. 3, 4 and 5 are sectional views of essential portions of balustrades of the prior art in explanation of the defects thereof;

Fig. 6 is a sectional view similar to Fig. 2 but showing the balustrade construction according to an embodiment of the invention;

20 Fig. 7 is a sectional view showing the manner in which the balustrade construction shown in Fig. 6 is installed;

Fig. 8 is a sectional view of the balustrade construction according to another embodiment;

25 Fig. 9 is a side view of a packing; and

Fig. 10 is a side view of the packing shown in Fig. 9, showing the manner in which it is mounted.

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Referring to Fig. 1, a passenger conveyor comprises movable members and stationary members, the former comprising a plurality of steps 1 arranged like an endless belt for movement and a plurality of handrails 2 each located on either side of the steps 1, and the latter comprising ²balustrades 3 each supporting one of the handrails thereon, ^{and} a main body frame 4, etc. The passenger conveyor is supported by a building floor F.

10 Referring to Fig. 2, the balustrades 3 of the prior art each comprise a plurality of balustrade components supported on a support bed 5 secured to the main body frame 4 and including a glass panel 6, packings 7, 8 and 9, an inner deck cover 10, an outer deck cover 11 and
15 an outer board 12. The glass panel 6 is held in place at its lower end portion which is in pressing engagement with a pressing plate 14 bolted to the support bed 5 as indicated at 13, and supports at its upper end the associated handrail 2 for movement. The balustrade 3
20 has arranged at its lower portion decorative members including the inner deck cover 10 located on the side of the glass panel 6 adjacent the steps 1, the outer deck cover 11 located on the side of the glass panel 6 adjacent the outer board 12, and a molding plate 15
25 connected to the outer deck cover 11 at one end and to the outer board 12 at the other end.

The inner deck cover 10 extends from a skirt guard 16 located on the side of the steps 1 in a manner

1 to enclose the same to the glass panel 6 and has at its
back an engaging portion 10a which receives therein an
engaging portion 14a of the pressing plate 14 for engage-
ment with each other to maintain strength for the inner
5 deck cover 10. Meanwhile the outer deck cover 11 and the
molding plate 15 are supported by a support member 17
connected to the support bed 5, and bolted thereto as
indicated at 18 and 19 respectively.

In the balustrade 3 constructed as aforesaid,
10 the decorative members, particularly the packings 8 and
9 and inner and outer deck covers 10 and 11 constituting
surface portions, are members having a direct bearing on
the decorative value of the passenger conveyor, and it is
of high importance whether the external appearance and
15 combination of the members are acceptable.

Particularly in the balustrade 3 of the aforesaid
construction, members formed of dissimilar materials
are in abutting engagement with each other in the vicinity
of the glass panel 6 and the appearance of these members
20 attract attention. Thus the presence of gaps or differ-
ences in level in this section of the passenger conveyor
or in the vicinity of the glass panel is frowned upon.
Balustrades of the prior art have had defects as presently
to be described which should be eliminated as soon as
25 possible.

The undesirable gaps which would be formed in
the vicinity of the glass panel 6 are designated by g_1
and g_2 in Figs. 3 and 4 respectively. The gap g_1 on the

(19)

- 6 -

1 outer side of the glass panel 6 would be formed when the
spacing W_1 between the glass panels 6 is too small as
compared with the spacing W between outer ends of the outer
deck covers 11 when the balustrades 3 are assembled. The
5 gap g_2 on the inner side of the glass panel 6 would be
formed when the assembling spacing W_2 for the inner deck
cover 10 is short of the predetermined value. The gaps
 g_1 and g_2 are formed on account of an accumulation of
errors committed during production of balustrade components
10 or a tiny error committed in assembling the components
which is inevitable. However, these gaps should be
eliminated once for all not only to make the external
appearance acceptable but also to provide for the safety
of the passengers (Childrens tend to have their fingers
15 stuck in the gaps.). Another defect of the balustrades
of the prior art which warrants immediate attention is
the presence of a difference δ in level shown in Fig. 5.
Generally the inner deck cover 10 and outer deck cover
11 are assembled with a predetermined curvature as shown
20 in Fig. 1 as designated by the character R. An error
that might be made in the heights of the support bed 5
and the pressing plate 14 shown in Fig. 2 would result
in the formation of the difference δ as shown in Fig. 5.
This is an unacceptable phenomenon.

25 The gaps g_1 and g_2 are structural defects
because errors committed with regard to the inner and
outer deck covers 10 and 11 manifest themselves as the
gaps on account of the fact that the packings 8 and 9

1 are bonded to or fitted in the inner and outer deck covers
10 and 11 respectively. Meanwhile the difference δ in
level is accounted for by the fact that the pressing
plate 14 serving as a reference for assembling the inner
5 deck cover 10 is formed with an opening for inserting
the bolt 13 (the opening having a larger diameter than
the bolt 13) and the bolt 13 might move vertically in
the opening, or by the fact that difficulties are faced
with in positioning the outer deck cover 11 because of
10 the presence of the glass panel 6 which stands in the way.

This invention has been developed for the
purpose of obviating the aforesaid defects of the prior
art and providing balustrade of ^{improved} ~~improved~~ construction
^{can be} which ~~is~~ good to look at, safe ^{in operation} ~~to ride on~~ and economical
15 to build.

An embodiment of the invention will now be
described by referring to Fig. 6 in which the glass panel
6 itself and the construction of the handrail 2 supported
thereon as well as the arrangement of the support bed 5
20 and molding plate 15 have no difference from the counter-
parts in the prior art. The invention is characterized
in that an inner deck cover 20 (corresponding to the inner
deck cover 10 of the prior art) and an outer deck cover
11 (corresponding to the outer deck cover 11 of the prior
25 art) are fitted at their ends on the glass panel 6 side
in a packing 21 of rigid or hard material formed as a
single entity. In this case, the packing 21 is formed
with a groove 21a for receiving the outer deck cover 11,

1 a groove 21b for receiving the glass panel 6 and a groove
21c for receiving the inner deck cover 20. Fig. 7 shows
the order in which the components of the balustrades 3
shown in Fig. 6 are assembled. The outer deck cover 11
5 that has been assembled is fitted in the groove 21a and
the packing 21 is secured at its lower end to the main
body frame 4 by screws 22 to bring the packing 21 to an
upright position. Then a pressing plate 23 is forced
against the packing 21 from the step 1 side after the
10 glass panel 6 is inserted in the groove 21b as indicated
by an arrow A, and the pressing plate 23 is connected to
the packing 21 by the bolts 13 (see an arrow B). Then
the deck cover 20 is inserted in the groove 21c as
indicated by an arrow C, to thereby complete assembling.
15 The packing 21 which is formed of rigid material, such
as hard plastics or aluminum alloy, has its surfaces 21d
and 21e beautifully finished for decorative purposes.
What is noteworthy in the aforesaid construction is that
the grooves 21a and 21c are at the same elevation or level
20 and the inner deck cover 20 is supported by the packing
21 itself. This naturally brings the inner deck cover
20 and the outer deck cover 11 to the same height and
production of the difference δ described by referring
to the prior art can be eliminated. Moreover, the inner
25 deck cover 20 and the outer deck cover 11 can be shifted
horizontally while their vertical positions are regulated
by the depths of the grooves 21c and 21a, so that produc-
tion of the gaps g_1 and g_2 described by referring to the

1 prior art can be eliminated. Also, the inner deck cover
20 does not require the arrangement of the prior art in
which it is secured in place by insertion of the engaging
portion 14a in the engaging portion 10a as shown in Fig.
5 2, and the inner deck cover 20 can be secured in place
merely by fitting same in the groove 21c in the packing
21. Thus the invention is conducive to a reduction in
cost.

It will be appreciated that the balustrades of
10 the improved construction according to the invention
can achieve the marked effects in avoiding production
of gaps or differences in level that may otherwise occur
in the vicinity of the glass panel 6 as is the case of
the prior art.

15 As aforesaid, the packing 21 ~~according to the~~
~~invention~~ is formed of rigid material and this produces
a difficulty in making the packing 21 conform to the
inner deck cover 20 and outer deck cover 11 at a curved
section (section Q in Fig. 1) having the curvature R.
20 In order to make the packing conform to the inner deck
cover and outer deck cover at the curved section, the
packing 21 ^{is subjected to a} ~~is~~ bending operation by heating ~~the same~~,
which raises problems with regard to how to minimize an
increase in cost and how to obtain necessary precision
25 finishes.

The structure shown in Figs 8 to 10 obviates
these problems. ⁱⁿ ~~in~~ this structure, a packing 31 arranged
in the curved section Q (see Fig. 1) of the passenger

1 conveyor is formed with a plurality of cuts 31f of a width w (approximately, 2 to 5 mm) arranged with a relatively small spacing interval. The packing 31 is secured, by screws 32 fitted at their heads in a groove

5 31g formed in a lower portion of the packing 31 in the curved section Q of the passenger conveyor, to support pieces 33 located on the support bed 5 with a suitable spacing interval. The groove 31g does not exist in sections of the passenger conveyor where the packing 31 is located

10 in a substantially horizontal position ~~(as indicated at R in Fig. 10)~~ as shown in Fig. 10, and exists only in the curved section Q. Thus the cuts 31f formed in the packing 31 are closed as indicated by P in Fig. 10 at the time the outer deck cover 11 is fitted in the groove

15 31a, so that the packing 31 conforms to the outer deck cover 11 in curvature and is secured by the screws 32 while in this condition. In this way, the packing 31 is maintained at the desired curvature for a prolonged period of time.

20 Meanwhile the inner deck cover 20 is fitted in a groove 31c formed in the packing 31. In this case, since the packing 31 is formed of rigid material, any deviation of the curvature of the inner deck cover 20 from that of the outer deck cover 11 can be corrected by

25 the groove 31c of the packing 31. Thus the inner deck cover 20 and the outer deck cover 11 which are important elements for maintaining the decorative value of the passenger conveyor at a high level can be kept at the

1 same height. The glass panel 6 is fitted in a groove 31b
in the packing 31.

By virtue of the aforesaid features, the packing
31 can be made to conform to the outer deck cover 11 in
5 curvature R, and fixing in place of the packing 31 can
be achieved positively by the combination of the groove
31g and the screws 32. In addition, the inner deck cover
20 and the outer deck cover 11 can have their heights
brought to the same level, thereby contributing to
10 maintenance of the decorative value of the passenger
conveyor at a high level and elimination of high cost and
unacceptable appearance.

The description has been made solely by referring
to the convex curved portion of the passenger conveyor.
15 However, the structure shown in Figs 8 to 10 can have
application to a concave curved section located in the
vicinity of a lower boarding area of the passenger
conveyor. In this case, the portions indicated at P
in Fig. 10 open to achieve the same effects as achieved
20 by the convex curved portion.

From the foregoing description, it will be
appreciated that the invention enables assembling of the
packings to be accomplished with increased efficiency
and allows the safety of the passengers to be increased
25 while enabling the decorative level of the decorative
members of the passenger conveyor to be raised.

CLAIMS:

1. A balustrade for a passenger conveyor comprising:
a ^{transparent} ~~glass~~ panel located beneath a handrail arranged
in endless form for movement;

an inner deck cover and an outer deck cover
5 located inside and outside a lower portion of said ~~glass~~-
panel respectively;

a packing mounted between said ~~glass~~ panel and
said inner and outer deck covers; and

a support bed for supporting said ~~glass~~ panel;
10 said packing being of unitary structure ~~formed~~
~~of hard material~~ and including a groove for receiving a
lower end portion of the ~~glass~~ panel and grooves formed
in an upper portion of said packing at both sides of the
latter for receiving end portions of the inner and outer
15 deck covers respectively, said packing being secured at the
side thereof to the support bed while holding the lower
portion of the ~~glass~~ panel.

2. A balustrade for a passenger conveyor as claimed
in claim 1, wherein said packing of ~~the~~ unitary structure
20 is formed with a plurality of elongated cuts to enable
the packing to bend at a curved section of said balustrade.

3. A balustrade for a passenger conveyor as claimed
^{or claim 2}
in claim 1, wherein said packing is screwed at a lower
end thereof to a main body frame or a support member.

25 4. A balustrade for a passenger conveyor as claimed
in claim 3, wherein said packing is formed at the lower
end thereof with a groove for receiving screws.



-13-

5. A balustrade according to any one of the preceding claims wherein the panel is made of glass.

6. A balustrade for a passenger conveyor substantially as herein described with reference

5 to and as shown in Figs. 6 and 7 or Figs. 8 to 10 of the accompanying drawings.

7. A passenger conveyor having at least one balustrade according to any one of the preceding claims.
