

PASSENGER CONVEYOR

1 BACKGROUND OF THE INVENTION

This invention relates to a passenger conveyor such as an escalator or a motor-drive road, and more particularly, to a passenger conveyor which is equipped
5 with a safety device at an inlet portion for a moving handrail.

In general, a passenger conveyor is constructed such that a circulating moving handrail is guided along a peripheral edge of a balustrade in its
10 forward course while it is led into a lower part of the balustrade in its backward course. A safety device disclosed in Japanese Patent Unexamined Publication No. 51-42278, for example, is provided at an inlet for the moving handrail formed in the lower part of the
15 balustrade. In case that fingers of an infant or the like are slipped in a gap between the moving handrail and the inlet therefor, the operation of the passenger conveyor is stopped and the fingers thus slipped in are released.

20 Further, as disclosed in USP No. 3,970,187, a barrier member which is made of polystyrene, for example, and easily broken with a very small force, is provided at the inlet for the moving handrail such as to be spread between a platform floor and the moving
25 handrail. If fingers of a passenger are slipped in

1 between the moving handrail and the barrier member,
since the barrier member is broken easily, the passenger
can move back his or her fingers. In this way, the
fingers of the passenger can be prevented from being
5 drawn into the inlet for the moving handrail.

In the former conventional technique, since
the safety device is partly supported through a spring
so as to be partly sunk due to deformation of the
spring, there is a problem that, once the fingers of an
10 infant or the like are slipped in the gap between the
moving handrail and the safety device, the spring is
deformed easily so that the gap is further widened to
permit the fingers to enter therein easily. For this
reason, this technique is not applied to the actual
15 passenger conveyor under the existing circumstances.

In the latter conventional technique, since
the barrier member is placed on the platform floor,
there is a problem that the barrier member is easily
broken with a kick of the infant or with a light hit of
20 dusting things at the time of cleaning the floor.

An object of the present invention is to
provide a passenger conveyor which is capable of, when
fingers, foreign matters or the like are slipped into a
gap between an inlet of a safety device and a moving
25 handrail stopping the operation thereof at once so as to
release the fingers, foreign matters or the like
quickly.

Another object of the present invention is to provide a passenger conveyer which is capable of stopping the operation thereof before the fingers, foreign matters or the like are slipped in the gap between the inlet of the safety device and the moving handrail.

Still another object of the present invention is to provide a passenger conveyer which is capable of making the passenger perceive danger before the fingers, foreign matters or the like are slipped in the gap between the inlet of the safety device and the moving handrail.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a passenger conveyer comprising a movable body provided on an inlet portion through which a circulating moving handrail enters into an inside of a balustrade and means for stopping the passenger conveyer when said movable body is displaced in a direction of movement of said moving handrail from a regular position thereof, wherein said movable body is supported to be displaceable from said regular position in a direction opposite to the direction of movement of said moving handrail.

A subsidiary member which is able to make a gap or to be broken when an external force is applied thereto may be provided on the inlet portion for the moving handrail apart from the platform floor.

With the above construction, according to the present invention, in case that the fingers or the like

1 are caught in the gap between the movable body of the
safety device and the moving handrail so as to be
pressed hard, only by grasping the movable body and
pulling it back (in the direction opposite to the
5 direction of movement of the moving handrail), the
movable body is displaced in the direction of releasing
the pressure so that the fingers can be drawn out
easily. Further, since the subsidiary member provided
at the inlet portion for the moving handrail is broken
10 or serves to make a gap when it is applied with an
external force by the fingers which are about to enter
into the gap, the infant perceives danger and moves back
his or her fingers, thereby making it possible to
prevent the fingers from entering further.

15 BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a partly broken-away side view of
an embodiment of a passenger conveyor safety device
according to the present invention;

20 Figure 2 is a partly broken-away front view of
the embodiment shown in Figure 1;

Figure 3 is a partly broken-away side view of
an escalator to which the embodiment of the passenger
conveyor safety device shown in Figure 1 is attached;

25 Figure 4 is a partly broken-away perspective
view of the embodiment of the passenger conveyor safety
device shown in Figure 1;

1 Figure 5 is a perspective view showing support
bodies of the embodiment of the passenger conveyor
safety device of Figure 1;

 Figure 6 is a longitudinal sectional view of a
5 movable body taken along line VI - VI of Figure 2;

 Figure 7 is a longitudinal sectional view
showing the movement of the movable body;

 Figure 8 is a longitudinal sectional side view
of a modification of the movable body of the present
10 invention;

 Figure 9 is a partly broken-away side view of
an escalator to which another embodiment of a passenger
conveyor safety device according to the present
invention is attached;

15 Figure 10 is a partly broken-away perspective
view of the embodiment of the passenger conveyor safety
device shown in Figure 9;

 Figure 11 is a longitudinal sectional view
taken along line XI - XI of Figure 9 and showing
20 protective members on an enlarged scale;

 Figure 12 is a view similar to Figure 11 but
showing a modification of the protective members of the
present invention;

 Figure 13 is a view similar to Figure 11 but
25 showing another modification of the protective members
of the present invention;

 Figure 14 is a view similar to Figure 11 but
showing still another modification of the protective

1 members of the present invention;

Figure 15 is a partly broken-away side view of still another embodiment of the passenger conveyor safety device according to the present invention; and

5 Figure 16 is a side view of a different embodiment of the passenger conveyor safety device according to the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to Figs. 1 to 7, an embodiment of the present invention will be described hereinafter. As shown in Figures 3 and 4, a passenger conveyor such as an escalator comprises treadboards 1 connected endlessly so as to be rotated, platforms 2 provided at opposite end portions of the rotating treadboards 1, balustrades 3 installed upright on and along both sides of the rotating treadboards 1, moving handrails 4 each guided along a peripheral edge of the balustrade 3 so as to be moved synchronously with the treadboards 1, and a frame structure (not shown) built to support these members.

20 Each balustrade 3 comprises a balustrade panel 5 supported by the frame structure so as to be installed upright, a handrail frame 6 attached along the peripheral edge of the balustrade panel 5 for serving to guide the moving handrail 4, and an inside deck cover 7, 25 an outside deck cover 8 and a skirt guard 9 which serve to cover the portions where the balustrade panel 5 is supported by the frame structure.

1 The skirt guard 9 is provided with a safety
device 10 at an inlet portion for the moving handrail 4.
As shown in Figures 1, 2 and 5 to 6, the safety device
10 roughly comprises a fixed support body 13 disposed in
5 a space enclosed by the inside deck cover 7, the outside
deck cover 8 and the skirt guard 9, a movable support
body 14 a lower end of which is rotatably supported on
the fixed support body 13 through a shaft, a detector
switch 18 provided between the fixed support body 13 and
10 the movable support body 14, a first coil spring 20
provided between the fixed support body 13 and the
movable support body 14 so as to be located around the
detector switch 18, and a movable body 21 supported by
the movable support body 14. The fixed support body 13
15 is secured to a support member 11 supported by the frame
structure by means of fastening members 12 such as
bolts.

 The fixed support body 13 is formed by
stamping out a plate material such as a steel plate, for
20 example, into the shape of a letter T, the projecting
end portion of the T-shaped body serving as a switch
supporting portion 13A. The movable support body 14 is
formed in an upper part and on both sides thereof with
movable body supporting portions 15A and 15B for serving
25 to support the movable body 21, while the upper central
portion thereof is bent against the direction of
movement of the moving handrail 4 with the tip end
thereof raised so as to form a switch operating portion

1 16 serving to operate the detector switch 18. The
movable support body 14 is formed by a sheet material
such as a steel plate as well, with a notched portion
17A being formed in the lower central portion thereof so
5 as not to hinder the fixed support body 13 from being
secured to the support member 11 as well as with a
through hole 17B being formed in the horizontal portion
leading to the switch operating portion 16 so as to
allow the switch supporting portion 13A of the fixed
10 support body 13 to extend therethrough.

Between the switch supporting portion 13A and
the switch operating portion 16 formed in the above-
described manner is located the first coil spring 20,
and a movable contact 19 of the detector switch 19 is
15 disposed to face on the switch operating portion 16
leaving a little gap therebetween.

On the other hand, the movable body 21 is made
of a synthetic resin material which is softer than the
material of the fixed support body 13 and the movable
20 support body 14 and which is of the same group as the
material of the moving handrail 4. The movable body 21
has a through groove 22 (Figure 2) through which the
moving handrail 4 and the balustrade panel 3 are made to
pass and supported portions 23 (Figures 6, 7) by means
25 of which the movable body 21 is supported by the
supporting portions 15A and 15B. Gaps G_1 , G_2 and G_3
(Figure 2) formed between the through hole 22 and the
moving handrail 4 as well as the balustrade panel 3 are

1 made as small as possible in order to prevent fingers
and foreign matters from entering thereinto. Further;
the supported portions 23 are each formed with a
receiving hole 24 in which a guide pin 25 and a second
5 coil spring 26 to be described later are to be received
at right angles with respect to the movable support body
14. The receiving hole 24 is formed in the bottom
portion thereof adjacent to the movable support body 14
with a small hole 24H through which the guide pin 25 is
10 made to pass. The guide pin 25 is formed with a head
portion 25H at one end thereof and with a screw portion
25S at the other end thereof. The screw portion 25S is
passed through the small hole 24H and the movable body
supporting portion 15A, 15B so as to be fastened with a
15 nut 25N. The second coil spring 26 is disposed between
the head portion 25H of the guide pin 25 and the bottom
portion of the receiving hole 24, as a result of which
the movable body 21 is supported as being pressed
against the movable body supporting portions 15A, 15B.
20 However, the same function can be obtained even when the
guide pin 25 and the second coil spring 26 are disposed
inwardly (on the right, in the drawing) of the movable
support body 14 as shown in Figure 6. Incidentally,
reference numeral 27 of Figure 1 denotes a stopper which
25 serves to adjust the distance between the tip end of the
movable contact 19 of the detector switch 18 and the
operating portion 16, the stopper 27 being screwed into
the movable support body 14 with the tip end thereof

1 kept in contact with the fixed support body 13.
Further, reference numeral 21S of Figure 1 denotes a
partition member which serves to protect the detector
switch 18 from the foreign matter entered into the
5 movable body 21, the partition member 21S being formed
integrally with the movable body 21.

During an operation of the escalator equipped
with the safety device constructed as described
hereinbefore, in case that an infant playing around the
10 platform 2 puts his or her fingers into the gap G_1 under
the lower surface of the moving handrail 4 by accident,
the movable body 21 is displaced in the direction of
movement of the handrail around the lower end 14S of the
movable supporting body 14 as shown by the two-dot chain
15 line A of Figure 1. As a result, the movable body 21
causes the movable support body 14 to be displaced in
the same direction while compressing the first coil
spring 20 between the switch supporting portion 13A and
the switch operating portion 16, resulting in that the
20 movable contact 19 of the detector switch 18 is pushed
by the switch operating portion 16. In consequence,
the detector switch 18 is operated to send a detection
signal to a control unit provided separately, thereby
stopping the operation of the escalator. In this case,
25 although the movable body 21 is displaced around the
lower end 14S, an amount of displacement thereof is
very small. For this reason, the gap G_1 is sub-
stantially the same as that obtained when the movable

- 1 body 21 is in its regular position, thereby making it possible to prevent the fingers from further entering into the gap.

When the operation of the escalator is stopped
5 by the above-described operation, if the fingers which have been caught in the gap are moved back, the movable body 21 is restored to its regular position. Further, by compressing the second coil springs 26 serving to press the movable body 21 against the movable body
10 supporting portions 15A, 15B, the movable body 21 is displaced in the direction opposite to the direction of movement of the moving handrail 4 as shown by the two-dot chain lines B and C of Figure 1 until the outer end portion of the movable body 21 is inclined downwards
15 (Figure 7). If the movable body 21 is displaced as shown by the two-dot chain line C of Figure 1 and as shown in Figure 7, the gap G_1 under the moving handrail 4 is widened as indicated by G_4 , thereby making it easy to draw out the fingers. Further, in case that there is
20 no composure to move back the fingers, if the movable body 21 is grasped and pulled in the direction opposite to the direction of movement of the moving handrail 4 by people therearound or a person in charge, it is displaced easily in the direction opposite to the
25 direction of movement of the handrail, thereby making it possible to draw out the fingers likewise.

As described above, even if the fingers are caught, it is possible not only to draw out the fingers

1 easily but also to keep the damage of the caught fingers
at a minimum because the moving handrail 4 and the
movable body 21 are made of the softer material than the
support bodies 13 and 14.

5 By the way, the gaps G_1 , G_2 and G_3 between the
through groove 22 and the moving handrail 4 as well as
the balustrade panel 3, particularly the gaps G_1 and G_2 ,
can be made substantially equal to each other if the
moving handrail 4 is designed to enter into the inlet
10 portion substantially horizontally, but, if inclinedly,
when the movable body 21 is pulled outwardly, the
movable body 21 is obstructed by the moving handrail 4
at once to hinder the further displacement, thereby
making it difficult to draw out the fingers. To cope
15 with this, the upper gap G_2 can be made larger than the
lower gap G_1 . Even if the upper gap G_2 is made larger,
since the inside deck cover 7 and the outside deck cover
8 are provided just thereabove as shown in Figures 3 and
4, there is little chance for the fingers and the
20 foreign matters to enter it.

Further, in the portion of the through groove
22 formed in the movable body 21 adjacent to the inlet
for the handrail, a projecting peripheral edge 21P is
formed as being projected toward the moving handrail 4
25 by a length L (Figure 1), thereby providing a safety
function of obstructing the fingers which are about to
enter the gap.

1 Moreover, for easy grasping, the movable body
21 may be formed with gripping portions 28A, 28B which
are projected in the direction opposite to the direction
of movement of the handrail as shown in Figure 8, or may
5 be formed with a concave portion.

 In the embodiment described hereinbefore, the
caught fingers or the like are drawn out by displacing
the movable body 21 in the direction opposite to the
direction of movement of the handrail after the
10 operation of the escalator is stopped. In addition,
although not illustrated, it is also possible that,
after the movable body 21 is displaced in the direction
of movement of the handrail with the fingers or the
foreign matters being caught until the operation of the
15 escalator is stopped, the movable body 21 is displaced
in the direction of widening the gap G_1 in that position
so as to allow the caught fingers or the like to be
drawn out.

 Besides, although the movable member 21 has
20 been described as being held in its regular position by
means of the first and second coil springs 20 and 26, it
may be held in its regular position by a single holding
member such as a single spring member, for example, so
as to be displaceable in both directions when applied
25 with a little force.

 Further, the fingers or the like are drawn out
due to displacement of the movable body 21 in the above-
described embodiment, but, by providing a projection

1 wall 29 projecting from a peripheral edge of the through
groove 22 of the movable body 21 in the direction of the
handrail as shown in Figure 8, it is possible to
perceive danger since the fingers or the like are
5 brought into contact with the projection wall 29 before
they are caught and, further, since this contact makes
it possible to displace the movable body 21, it is
possible to stop the operation of the escalator.

Next, another embodiment of the present
10 invention will be described with reference to Figures 9
to 11.

Since the same reference numerals as those of
the above embodiment denote the same members, the
explanation thereof will be omitted. In the present
15 embodiment, the movable body 21 made of an elastic
material such as rubber or synthetic resin is formed on
a front surface 21F thereof with a projection wall 30 in
the vicinity of the through groove 22, the projection
wall 30 extending along the moving handrail 4 while
20 being opposed to the moving handrail 4 with the gap G_1
between them. The projection wall 30 is formed by a
large number of cylindrical protective members 30R
arranged close to each other.

With the construction described above, even if
25 an infant tries to make his or her fingers slip along
the outer periphery of the moving handrail 4 during the
operation of the escalator, the fingers can be hindered
from slipping due to the provision of the large number

1 of protective members 30R. Further, even if the fingers
slip into the gap G_1 between the cylindrical members 30R
and the moving handrail 4, it is possible to press the
movable body 21 through the protective members 30R to
5 displace the movable support body 14 supporting the
movable body 21 so that the detector switch 18 (Figures
1 and 5) can be operated to thereby stop the operation
of the escalator. In addition, since the large number
of protective members 30R are made of the elastic
10 material, even if the fingers slip into the gap G_1 , the
pressure exerted by the slipped fingers causes the
protective members 30R adjacent to each other to move in
the directions of arrows S_1 and S_2 , respectively, so as
to widen the gap G_5 between them, or if a passenger
15 tries to move back the fingers slipped into the gap G_1
away from the moving handrail 4, the adjacent protective
members 30R are moved in the directions of arrows S_1 and
 S_2 , respectively, so as to widen the gap G_5 between
them, with the result that the fingers can be drawn out
20 easily before they are pressed hard.

By the way, in the embodiment described
hereinbefore, since the projection wall 30 is formed by
arranging the large number of cylindrical protective
members 30R side by side, the moving handrail 4 can be
25 seen through the gap G_5 between each pair of adjacent
protective members 30R. For this reason, there is a
possibility that the infants try to put in the foreign
matters through the gap G_5 . To cope with this, as shown

1 in Figure 12, it is considered to use protective members
31 each having a main body portion 31A serving to give
the stiffness, a notched groove 31B formed in one half
thereof over the entire length, and a projection piece
5 31C formed on the other half thereof over the entire
length, these protective members 31 being arranged
around the through groove 22 with the notched grooves
31B and the projection pieces 31C overlapped each other.
Other constructions, functions and effects are the same
10 as those of the embodiment shown in Figure 11. Due to
the provision of such protective members 31, it becomes
impossible to see the moving handrail 4 from the
outside. In consequence, the infants have no chance to
take an interest in the movement of the moving handrail
15 4, thereby bringing about a good result.

Figure 13 and 14 illustrate other modifica-
tions of the protective member. In the modification of
Figure 13, protective members 32 each having a trapezoid
form cross-section are arranged side by side such as to
20 be inverted every other member, while in the modifica-
tion of Figure 14, protective members 33 each having a
parallelogram form cross-section are arranged side by
side such as to be overlapped between each pair of
adjacent members. According to these modifications as
25 well, the same functions and effects as those of the
embodiment of Figure 10 can be obtained.

As described hereinbefore, according to
another embodiment (Figures 9 to 14) of the present

1 invention, even if the foreign matters such as the
fingers are slipped in the gap between the protective
members and the moving handrail, they can be drawn out
quickly without being pressed hard, thereby making it
5 possible to improve the security of the escalator.

Incidentally, the protective members have been
described as being formed integrally with the movable
body 21 in the above-described embodiment, but, the
protective members and the movable body may be formed
10 separately. Further, it is also possible to control the
operation of the passenger conveyor by interlocking a
detector switch which serves to detect the displacement
of the protective members.

Next, description will be given of different
15 embodiments shown in Figures 15 and 16.

The different embodiments shown in Figures 15
and 16 are intended to make a person perceive danger or
to stop the escalator before the fingers or the like are
caught in.

20 First, in the embodiment shown in Figure 15, a
subsidiary member is provided in front of the movable
body 21 of the aforesaid embodiment shown in Figures 1
to 7. This subsidiary member is a structure body 34
which is made of a foamed plastic material, for example,
25 so as to be broken when a little force or a force
corresponding to about 3 kg/cm², for example, is applied
thereto with naked hands, and it is disposed such as to
surround the moving handrail 4. Since the structure

1 body 34 is supported directly or indirectly by the
handrail frame 6, it is designed to be capable of being
attached and detached easily so that it can be exchanged
for a new one without difficulty when broken. With the
5 above construction, if an infant continues to grasp the
moving handrail 4 until his or her fingers reach the
structure body 34, the structure body 34 made of the
foamed plastic material will be easily broken with an
external force. At that time, if the structure body 34
10 causes the movable body 21 to be displaced in the
direction of movement of the handrail, the detector
switch is operated to stop the operation of the
escalator. Even in case that the operation of the
escalator is not stopped, breakage of the structure body
15 34 makes the infant move back his or her hands by a
reflex action, thereby preventing a serious accident.
If the fingers are slipped into the gap between the
moving handrail 4 and the structure body 34
unfortunately, a force is exerted on the structure body
20 34 by the slipped fingers in the direction of widening
the gap. This force serves to displace the structure
body 34 made of the foamed plastic material toward the
movable body 21 so that not only the movable body 21 is
displaced but also the structure body 34 is broken
25 easily. As a result, it is possible not only to stop
the operation of the escalator but also to make the
infant move back his or her fingers without difficulty.
For this reason, the frequency of occurrence of the

1 accident that the fingers are even drawn into the inside
of the movable body 21 can be reduced. In this case, if
the relation between the breaking strength W of the
structure body 34 and the displacement force F of the
5 movable body 21 is determined as being $W < F$, it is
possible that the structure body 34 is made to be broken
before the movable body 21 is displaced and, thereafter,
the movable body 21 is displaced. On the other hand, if
 $W > F$, it is possible to make the structure body 34 to be
10 broken after or simultaneously with the displacement of
the structure body 34 together with the movable body 21.
The relation between the breaking strength W of the
structure body 34 and the displacement force F of the
movable body 21 can be selected arbitrarily.

15 Next, in the embodiment shown in Figure 16, a
structure body 35, which is made of a fragile material
such as a foamed plastic like the subsidiary member of
Figure 15, is directly supported by a fitting seat 21H
formed on the movable body 21 around the portion thereof
20 serving as an inlet for the moving handrail. The
relation between the breaking strength W of the
structure body 35 and the displacement force F of the
movable body 21 in the same as that of the embodiment of
Figure 15. Further, effects of this embodiment are
25 substantially the same as those of the embodiment of
Figure 15.

Incidentally, in the embodiments of Figures 15
and 16, a detector serving to detect the breakage of the

1 structure body 34, 35 and the movable body 21 may be
provided, by means of which the operation of the
escalator is made to stop and, in addition, the stop of
operation and the outbreak of an accident are informed
5 to those around the escalator and the manager room.
Further, it is also possible to inform the stop of
operation and the outbreak of an accident by
constructing the structure body 34, 35 and the movable
body 21 such as to be deformed with a little force
10 instead of being broken.

In addition, since the structure body 34, 35
is designed to be provided on the movable body 21 only
in the vicinity of the inlet portion for the moving
handrail, there is no possibility that the structure
15 body 34, 35 is broken with a passenger's kick in
ordinary circumstances or with a hit of dusting things
at the time of cleaning the floor.

By the way, the foregoing description has been
made on the escalator, but, it goes without saying that
20 the present invention is applicable to the motor-drive
road as well, the balustrades of which are almost the
same as the escalator in construction.

According to the present invention, it is
possible to obtain a passenger conveyor of high security
25 which is capable of not only releasing the foreign
matters such as the fingers quickly when they are
slipped into the gap between the safety device provided
at the inlet portion for the moving handrail and the

- 1 moving handrail, but also stopping the operation of the passenger conveyor as well as making the passenger perceive danger before the fingers are slipped in.

CLAIMS:

1. A passenger conveyor comprising:
 a movable body provided on an inlet portion
5 through which a circulating moving handrail enters into
 an inside of a balustrade; and
 means for stopping the passenger conveyor when
 said movable body is displaced in a direction of movement
 of said moving handrail from a regular position thereof,
10 wherein said movable body is supported to be
 displaceable from said regular position in a direction
 opposite to the direction of movement of said moving
 handrail.
- 15 2. A passenger conveyor according to claim 1,
 wherein a holder body is provided to hold said movable
 body in said regular position in a steady state.
- 20 3. A passenger conveyor according to claim 1 or 2,
 wherein said movable body is formed with a holding
 portion which serves as a grip for an operator.
- 25 4. A passenger conveyor according to claim 1 or 2,
 wherein said movable body is formed, at a portion thereof
 opposed to said moving handrail, with a projecting
 peripheral edge which projects in the direction opposite
 to the direction of movement of the moving handrail.



5. A passenger conveyor according to claim 1 or 2, wherein said movable body is supported through a support body in such a manner that said movable body is displaced in the direction of movement of said moving handrail together with said support body while it is displaced in the direction opposite to the direction of movement of the moving handrail leaving said support body behind.
6. A passenger conveyor according to claim 1 or 2, wherein said movable body is supported through a support member so as to be supported elastically with respect to said support member.
7. A passenger conveyor according to claim 6, wherein the elastic support is provided by an elastic body which includes a first elastic member and a second elastic member so that said movable body is displaced in the direction of movement of said moving handrail together with said support body while deforming said first elastic member, while it is displaced in the direction opposite to the direction of movement of the moving handrail leaving said support body behind while deforming said second elastic member.
8. A passenger conveyor according to claim 1, wherein said movable body is supported through a support body and is displaced in the direction opposite the direction of movement of the moving handrail with respect



to said support body while being displaceable in a vertical direction.

9. A passenger conveyor according to claim 1,
5 wherein said movable body comprises a plurality of protective members projecting in the direction opposite to the direction of movement of said moving handrail and said plurality of protective members are arranged so as to surround an outer periphery of said moving handrail.

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10. A passenger conveyor according to claim 9, wherein said plurality of protective members are made of an elastic material.

15 11. A passenger conveyor according to claim 9 or claim 10, wherein said plurality of protective members are arranged to be opposed to the outer periphery of said moving handrail while being overlapped each other.

20 12. A passenger conveyor according to claim 9, 10 or 11, wherein said plurality of protective members are each formed by a bar member or a plate member.

13. A passenger conveyor according to claim 1,
25 wherein a structure body which is suitable to be broken when an external force is applied thereto is attached to a side of said movable body opposite to the direction of movement of said moving handrail so as to surround a



* C L M S *

periphery of said moving handrail.

14. A passenger conveyor according to claim 1,
wherein a structure body which is suitable to be broken
5 when an external force is applied thereto is attached to
a member for serving to support said moving handrail
provided at outside of said movable body, said member
being provided so as to surround a periphery of said
moving handrail.

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15. A passenger conveyor according to claim 1,
wherein said movable body is supported through a support
body including a first support body serving to support
said movable body and a second support body serving to
15 support said first support body for free displacement in
the direction of movement of said moving handrail, and a
detector for detecting a displacement of said movable
body in the direction of movement of said moving handrail
from its regular position so as to issue a stop command
20 to stop operation of said passenger conveyor is disposed
between said first and second support bodies, and said
second support body is formed with a restriction member
which serves to restrict the displacement of said first
support body in the direction opposite to the direction
25 of movement of said moving handrail, and a first elastic
member which serves to return said first support body
displaced in the direction of movement of said moving
handrail to its regular position is provided, and a



second elastic member which serves to press said movable body against said first support body is provided.

16. A passenger conveyor having a moving handrail
5 safety device substantially as herein described with reference to Figs. 1 to 7 of the accompanying drawings or modified as shown in Fig. 8, Figs. 9 to 11 or any one of Figs. 12 to 16.
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