United States Patent

Kito

[15] **3,670,862**

[45] **June 20, 1972**

[54] SAFETY DEVICES FOR ENTRANCE AND EXIT FOR MOVING HANDRAIL

[72] Inventor: **Katsumi Kito**, Inazawa, Japan

[73] Assignee: **Mitsubishi Denki Kabushiki Kaisha**, Tokyo, Japan

[22] Filed: **Oct. 8, 1970**

[21] Appl. No.: **79,199**

[52] **U.S. Cl.** **198/16**

[51] **Int. Cl.** **B66b 9/12**

[58] **Field of Search** 198/16

[56] **References Cited**

UNITED STATES PATENTS

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Primary Examiner—Richard E. Aegerter

Attorney—Robert E. Burns and Emmanuel J. Lobato

[57] **ABSTRACT**

At either of entrance and exit for a moving handrail a front guard of soft, high flexible material and a rear guard of relatively hard material are tandem disposed to encircle the handrail to form a closed space between both guards communicating with the exterior through narrow clearances formed between the guards and the handrail.

3 Claims, 6 Drawing Figures

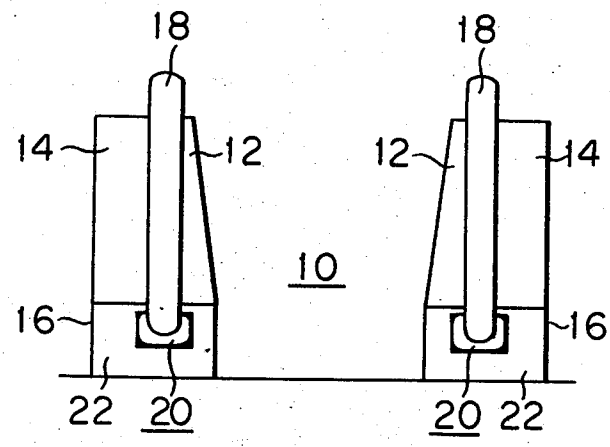


FIG. 1

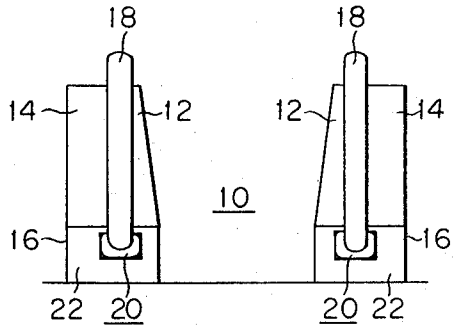


FIG. 2

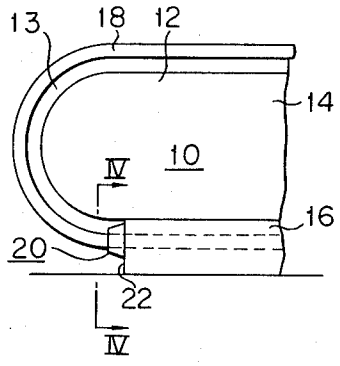


FIG. 3
PRIOR ART

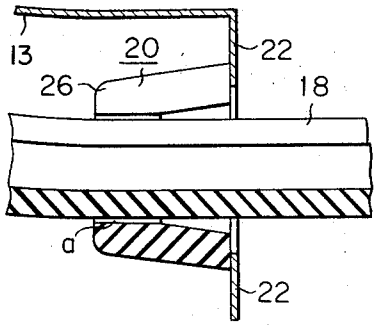


FIG. 4

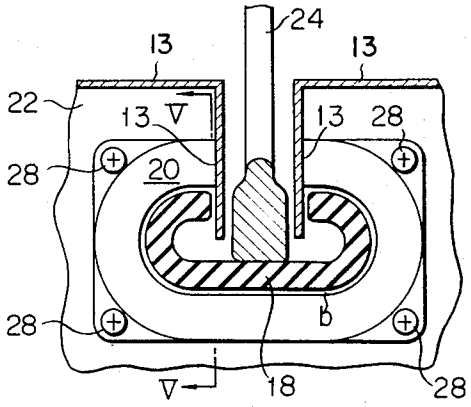


FIG. 5

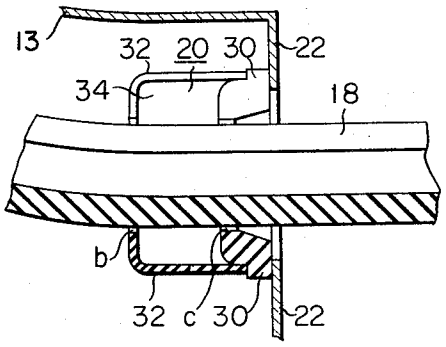
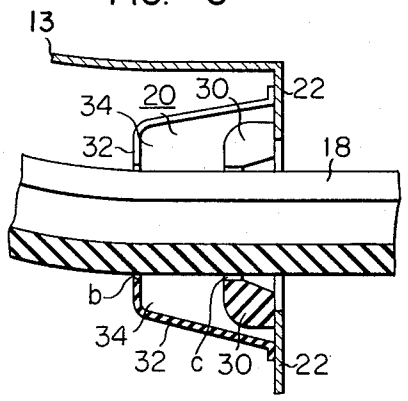


FIG. 6



SAFETY DEVICES FOR ENTRANCE AND EXIT FOR MOVING HANDRAIL

BACKGROUND OF THE INVENTION

This invention relates to improvements in a guard member for an endless belt type moving handrail disposed adjacent a platform for a moving staircase or moving walkway.

In moving staircases and passageways, the balustrade on each side thereof is provided on each end face of the lower portion thereof adjacent the platform for the staircase or passageway with an opening through which the endless belt type moving handrail enters into or emerges from the lower balustrade portion. Then the guard member is disposed at each of the entrance and exit for the handrail to enclose it with a narrow clearance formed therebetween. Such guard members have been previously formed of relatively hard material, such as rubber or a plastic having a rubber shore durometer hardness of about 90, into a single element.

The entrance and exit for the moving handrail on the lower balustrade portion stimulates interest for curious children. Particularly, accidents have frequently occurred that a child thrusts his or her fingers into the clearance formed between the moving handrail and the guard member until the fingers may be caught in the clearance. Once the fingers have been caught in the clearance the child can not pull them out from the clearance with his or her own force because the guard member has been heretofore formed of a relatively hard material as above described and the handrail is moving toward the interior of the associated machinery room. This has been apt to cause a serious trouble. In addition foreign matter might be often caught in such a clearance resulting in the handrail being scratched.

SUMMARY OF THE INVENTION

According to the principles of the invention, there is provided a safety device for either of an entrance and an exit through which a handrail of endless belt type is moved, comprising a first guard member disposed at each of the entrance and the exit to encircle the adjacent portion of the handrail, a second hollow guard member of highly flexible material disposed on that side of the first guard member remote from each of the entrance and the exit to encircle the adjacent portion of the handrail and an enclosed space formed between the first and second guard members.

Accordingly, it is an object of the invention to improve the safety of an entrance and an exit for a moving handrail of endless belt type particularly suitable for use in a moving staircase or passageway.

BRIEF DESCRIPTION OF THE DRAWING

For a better understanding of the nature and the object of the invention, reference should be had to the following detailed description and drawings in which:

FIG. 1 is a diagrammatic front view of a typical moving passageway with which the invention is concerned;

FIG. 2 is a side view of the moving passageway shown in FIG. 1;

FIG. 3 is a fragmental elevational view, partly in section of the guard member as shown in FIGS. 1 and 2 constructed in accordance with the principles of the prior art;

FIG. 4 is a fragmental sectional view taken along the line IV—IV of FIG. 2 and showing a safety device constructed in accordance with the invention with parts illustrated in elevation;

FIG. 5 is a fragmental sectional view taken along the line V—V of FIG. 4; and

FIG. 6 is a view similar to FIG. 5 but illustrating a modification of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing and FIGS. 1 and 2 in particular, a typical moving passageway of the conventional design

generally designated by the reference numeral **10** comprises a pair of balustrades **12** on both sides thereof each including upper and lower portions **14** and **16** respectively. The upper balustrade portion **14** is encompassed by a guide plate for guiding a moving handrail **18** of endless belt type therealong while the lower balustrade portion **16** supports the upper portion **14**. The handrail **18** enters into or emerges from the lower balustrade portion **16** through a safety device generally designated by the reference numeral **20** mounted on an end plate **22** on the end face of the lower balustrade portion **16** located adjacent a platform for the moving passageway. The safety device **20** covers an opening formed on the end plate **22** so as to permit the handrail **18** to enter into or emerge from the lower balustrade portion **16** but prevents the ingress of foreign matters into the machinery housing. The handrail **18** is driven by driving wheels **24** (one of which is illustrated in FIG. **4**) at the same speed as that of the moving passageway.

In FIG. **3**, there is illustrated in enlarged scale a safety device constructed in accordance with the principles of the prior art. The arrangement illustrated comprises a single guard member **26** made of any suitable, relatively hard material such as rubber or plastic having a rubber shore durometer hardness of about 90 and handrail **18** traveling past the guard member **26**. The guard member **26** is fixedly attached to the end plate **22** by any suitable fastening means for example screws (not shown in FIG. **3**) to cover the opening for the handrail **18** on the end plate **22** while forming a narrow clearance *a* between the guard member **26** and the adjacent portion of the handrail **18** for the purpose of smoothly moving the handrail past the guard member **26**.

As previously described, the environs of the guard member **26** stimulates interest for curious children. Particularly, accidents have frequently occurred that a child thrusts his or her fingers into the narrow clearance *a* until the fingers may be caught in the clearance. Once the fingers have been caught in the clearance, the child can not pull them out from the clearance with his or her own force. This has been apt to cause serious trouble. Also foreign matter might be often caught in the clearance resulting in the handrail being scratched.

The invention contemplates eliminating these disadvantages.

Referring now to FIGS. **4** and **5** wherein like reference numerals designate the components corresponding or similar to those shown in FIG. **3**, there is illustrated an embodiment of the invention. In the arrangement illustrated, the endless belt type moving handrail **18** of substantially C-Shaped cross section is moved along a pair of spaced opposite guide plates **13**, by driving wheels such as shown by the reference numeral **24** in FIG. **4**. The safety device **20** of substantially C-Shaped cross section is fixed to the end plate **22** of the lower balustrade portion **16** (not shown in FIGS. **4** and **5**) by fastening screws **28** to closely encircle the adjacent portion of the moving handrail **18** and also to cover an opening on the end plate **22** providing an entrance or an exit for the handrail.

As best shown in FIG. **5**, the safety device **20** includes a first guard member **30** of substantially C-Shaped cross section fixed to the end plate **22** to encircle the adjacent portion of the moving handrail **18** with a narrow clearance *c* formed therebetween while the opposite ends of the "C" abut against the opposite guide plates **13**. The first guard member **30** serves also to cover the opening on the end plate **22** through which the handrail **18** is moved. It will be understood that the guard member **30** is similar in material and configuration to the guard member **26** as shown in FIG. **3** excepting that the former is smaller in height than the latter and has an annular shouldered portion. Then a second guard member **32** in the form of a cup having a substantially C-Shaped cross section is disposed on the front side of the first guard member **30** remote from the end plate **22** by having the mouth of the cup fixed, by any suitable fastening means such as adhesive, to an annular shoulder disposed on the outer periphery of the first guard member **30**. The second guard member **32** is provided on the bottom face with an opening including one portion similar in

shape to the handrail and slightly greater in dimension than the cross section of the handrail and the other portion continuous to the gap formed of the opposite ends of the "C." The handrail **18** extends through the one portion of the opening just described on the second guard member **32** to form a narrow clearance *b* therebetween while the opposite legs of the guide plates **13** are forced into the gap between the opposite ends of the "C" with the result that the moving handrail **18** is encircled by the second guard member **32**. Further both guard members **30** and **32** form a closed space **34** therebetween communicating with the exterior thereof through the narrow clearance *b* and *C*.

The second guard member **32** is formed of any suitable material relatively low in rigidity and relatively high in flexibility for example rubber or a plastic. The material for the second guard member **32** has preferably a rubber shore durometer hardness of from about 50 to 70.

FIG. **6** wherein like reference numerals designate the components corresponding to those shown in FIGS. **4** and **5** illustrates a modification of the invention. The arrangement is identical to that shown in FIGS. **4** and **5** except for the second guard member being fixed directly, by any suitable fastening means such as screws or adhesive (not shown), to the end plate **22** around the first guard member **30**.

The invention has several advantages. For example, in the case a child has thrusted his or her fingers or the like into the clearance *b* on the second or front guard member **32**, the child can easily pull them out from the clearance because the second guard member **32** is formed of a soft, highly flexible material. Also if the fingers have been deeply thrusted in the second guard member **32**, the space **34** prevents the fingers from reaching the clearance *c* on the hard guard member **30**. Therefore the invention prevents the occurrence of any serious accidents. With any foregion matter passed through the front clearance *b*, it falls upon the bottom of the space **34** and is prevented from being caught in the rear clearance *c*. Thus each foreign matter is prevented from scratching the handrail.

It is to be understood that instead of the moving passageway, the invention is equally applicable to moving staircases and other similar apparatus.

While the invention has been illustrated and discribed in conjunction with a few preferred embodiments thereof it is to be understood that various changes in the details of construction and the arrangement and combination of part may be resorted to without departing from the spirit and scope of the invention.

What is claimed is:

1. In a moving handrail assembly including a handrail, a balustrade having an end plate at a front side lower portion thereof, said end plate having an opening therein through which said handrail passes, and guide means for said handrail, an improvement comprising a C-shaped first guard member disposed on an outer face of said end plate adjacent said opening to partially encircle said handrail, said guide means being disposed between the terminal ends of said C-shaped first guard member, a C-shaped second guard member fixed to said assembly to partially encircle said handrail and being formed of a flexible material, said second guard member extending outwardly past an outer face of said first guard member and in a spaced relation with respect to said handrail, wherein the outer extremity of said second guard member defines a C-shaped flange extending toward said handrail, said second guard member providing a cavity internally thereof and extending between said flange and said first guard member, whereby said cavity provides a safety zone preventing foreign objects from reaching said first guard member.

2. A safety device as claimed in claim **1.**, wherein said second guard member is fixed to said first guard member.

3. A safety device as claimed in claim **1.**, wherein said second guard member is fixed to said end plate.

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