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Description

Moving walkways and escalators are known which not only extend over straight distances, but also travel around curves in a horizontal plane. It is also possible that moving walkways are arranged not only in horizontal planes, but also in rising or falling planes, possibly also with curved transitions between the rising or falling planes and horizontal planes. In the case of escalators there is also a transition between a rising or falling transport plane and a horizontal transport plane. When “transport plane” is referred to herein, horizontal planes as well as rising or falling planes and their transitions to horizontal planes are to be understood. When “moving walkway” is referred to herein, the same applies to escalators, as long as they have a bend or curvature in any section of their transport path, which also includes a horizontal component.

JP 2002 306597 A, DE 196 11 655 A and DE 650 233 C disclose handrails which are guided on the guide about their longitudinal axis along an arcuate section of the guide. US 3,048,256 discloses the rotation of a handrail through 90° about its longitudinal axis in areas in which it is not guided on the guide.

It is problematic in the case of moving walkways that the handrail generally has a substantially higher stiffness in a plane parallel to the transport plane than in the vertical plane, since handrails at the end of the balustrade are normally deflected downwards in an arcuate manner, and thus are easily bent in this plane, whereas they may not be, or only with difficulty, bent in a plane parallel to the transport plane due to their geometric shape and their construction. It is therefore the object of the invention to provide a balustrade with a handrail for a moving walkway, which is guided in a plane parallel to the transport plane and follows the path of the moving walkway or the escalator around an arcuate section.

This object is achieved in a balustrade of the type mentioned in the introduction, wherein the handrail is guided along an arcuate section of the guide and rotated through an angle of 90° about its longitudinal axis on the guide.

Since the handrail is rotated about its longitudinal axis when the balustrade is guided to follow the moving walkway in a plane parallel to the transport plane, its stiffness in the plane parallel to the transport plane is less than if it were not rotated about its longitudinal axis, so that the handrail may more easily follow the arcuate section of the guide, or no complicated measures need to be implemented in order to reduce the stiffness of the handrail in the plane parallel to the transport plane to such an extent that the handrail may be guided around the arcuate section of the guide.

The handrail is bent through an angle of rotation of 90° in the arcuate section of the guide in the same plane as this is usually performed at the end of the balustrade, when a handrail is guided downwards in an arcuate manner, so that a conventional handrail may be used.

Preferably, according to the invention, when the handrail is attached to a straight section of the guide on the top side of the balustrade, and on an arcuate portion of the guide on the side of the balustrade to which the arcuate portion of the guide is bent. In this case, the handrail is arranged in a curve of the moving walkway on the outer side, i.e. on the side facing away from the center of curvature of the balustrade.

Alternatively, according to the invention, it is also possible for the handrail to be guided on a straight section of the guide on the top side of the balustrade and on an arcuate section of the guide on the side of the balustrade to which the arcuate section of the guide is bent to the guide. The handrail is thus arranged in a curve of the moving walkway on the inner side, i.e. on the side facing the center of curvature of the balustrade.

According to the invention, however, it is also possible for the handrail to be guided on a straight section of the guide on the top side of the balustrade and on arcuate sections of the guide, which are bent on opposite sides, on corresponding opposite sides on the guide. The handrail is thus arranged, as required, once on the inside and once on the outside or the top side of the balustrade.

According to the invention, as is known from the prior art, the handrail may be guided downwards in an arcuate manner at the end of a balustrade on the top side of the balustrade. However, as described above, it may also be bent through 180° at the end of a balustrade in a plane parallel to the transport plane and, for example, guided to a moving walkway running in the opposite direction.

Further features and advantages of the invention will be apparent from the following description of preferred embodiments of the invention with reference to the attached drawings.

Fig. 1 shows a moving walkway with a balustrade according to the invention in a first embodiment,

Fig. 2 shows a moving walkway with a balustrade according to the invention in a second embodiment,

Fig. 3 shows a handrail in a first position,

Fig. 4 shows a handrail of a second position, and

Fig. 5 shows a handrail in the third position.

Fig. 1 shows a moving walkway 1 which, in a horizontal transport plane 2 in the illustrated embodiment, travels around several curves 3, 4, 5, 6 between which there are transport sections 7, 8, 9. The moving walkway 1 consists, as is known per se, of a multiplicity of approximately semicircular plates, which are connected to one another in such a way that they may travel around curves 3, 4, 5, 6 as well as along straight transport sections 7, 8, 9, 10.

A balustrade 11 with a handrail 12, which follows the path of the moving walkway 1, is arranged along the moving walkway 1, wherein persons who are being transported on the moving platform 1, may hold the handrail 12, which travels at the same speed as the moving walkway 1.

As may be seen in the exemplary embodiment of Fig. 3 to 5, the handrail 12 has a substantially C-shaped cross-section with a flat central web 13 and mutually curved leg ends 14. A rib 15, which extends in the longitudinal direction of the handrail 12 and is directed towards the interior of the C-shaped cross-section, is arranged on the central web 13. The handrail is guided in this exemplary embodiment on an approximately Y-shaped guide 16 with a groove 18 arranged between the legs 17, in which the rib 15 of the handrail 12 is guided. The legs 17 of the guide 16 are surrounded by the bent leg ends 14 of the handrail 12.

Fig. 4 shows that the guide 16 may be arranged on the top side of the balustrade 3, wherein the handrail 12 is arranged on the top side of the guide 16 and thus the balustrade 3. According to the invention, this position of the handrail 12 is preferably used for straight transport sections, for example the transport sections 7, 8, 9, 10 according to Fig. 1 and 2.

Since the handrail 12 may be bent only with difficulty or not at all in a plane 19, which is parallel to the transport plane 1, it would be difficult to travel around the curves 3, 4, 5 with the handrail 12. According to the invention, the handrail 12 is therefore rotated about its longitudinal axis, through 90° to the left in the exemplary embodiment according to Fig. 3, and through 90° to the right in the exemplary embodiment according to Fig. 5. In the position according to Fig. 3 and 5, the handrail 12 may be simply bent in the plane 19 so that it is also possible to follow the curves 3, 4, 5, 6 with the handrail 12.

The handrail 12 could assume, for example, the position according to Fig. 3 in the region of the curves 4 and 6 of Fig. 1, wherein the handrail is arranged, as it were, on the outside of the balustrade 11, i.e. the side facing away from the point of curvature of the curve 4, 6, and the position according to Fig. 5 in the region of the curves 3 and 5 of Fig. 1, wherein the handrail in the curve 5 is, as it were, on the inside of the balustrade 11, i.e. the side facing the center of curvature of the curve 5, and is again arranged on the outside of the balustrade in the curve 3. The handrail 12 is preferably arranged on at least one curve 3, 4, 5, 6 on an outer side because, for example, it may then be motor-driven very simply by means of a V-belt wheel.

In Fig. 2, the handrail 12 at the end of the balustrade 11 (in the region of the curves 4 and 6) is guided downwards in an arcuate manner on the guide 16 in the manner known per se from the prior art, so that it retains its position on the balustrade 11 as substantially shown in Fig. 4 when it comes from a straight transport path 7, 8, 9, 10, in which it preferably assumes the position shown in Fig. 4 as described above. Compared to the embodiment according to Fig. 1, the handrail 12 could then, for example, merely assume the positions according to Fig. 4 and 5, but not those according to Fig. 3.

If the moving walkway 1 not only runs in a horizontal plane 2 as shown in the embodiments illustrated in Fig. 1 and 2, but also transitions from a horizontal plane to an inclined plane and at least one curve is present in this transition region, then it is advantageous in this transition or curve region when the handrail 12 is not rotated through 90° about its longitudinal axis but through an angle smaller than 90° , and thus the middle region 13 of the handrail 12 is thus rotated by an angle between 0° and 90° , since the optimum bending plane of the handrail 12 may then be adapted to the curving course of the conveying path and thus of the guide 16.

Patentkrav

1. Balustrade (11) til et rullende forto (1) eller en rulletrappe, idet der på balustraden (11) er anbragt et gelænder (12) og en føring (16) til gelænderet (12), hvorpå gelænderet (12) bevæges motorisk drevet langs sin længdeakse, idet gelænderet (12) føres på føringen (16)
- 5 drejet omkring sin længdeakse langs et buet afsnit af føringen (16), **kendetegnet ved, at** gelænderet (12) langs et buet afsnit af føringen (16) føres på føringen (16) med en vinkel på 90° drejet omkring sin længdeakse.
2. Balustrade ifølge krav 1, **kendetegnet ved, at** gelænderet (12) føres på føringen (16) på et
- 10 lige afsnit af føringen (16) på oversiden af balustraden (11) og et buet afsnit af føringen (16) på den side af balustraden (11), som det buede afsnit af føringen (16) krummer imod.
3. Balustrade ifølge krav 1, **kendetegnet ved, at** gelænderet (12) føres på føringen på et lige
- 15 afsnit af føringen på oversiden af balustraden (11) og på et buet afsnit af føringen (16) på den side af balustraden (11), som ligger over for den side, som det buede afsnit af føringen (16) krummer imod.
4. Balustrade ifølge krav 2 eller 3, **kendetegnet ved, at** gelænderet (12) føres på modstående
- 20 sider af føringen (16) på et lige afsnit af føringen (16) på oversiden af balustraden (11) og på buede afsnit af føringen (16), som krummer imod modstående sider.
5. Balustrade ifølge ét af kravene 1 til 4, **kendetegnet ved, at** gelænderet (12) for enden af
- 25 en balustrade (11) på oversiden af balustraden (11) føres cirkelformet nedad liggende på føringen (16).
6. Balustrade ifølge ét af kravene 1 til 5, **kendetegnet ved, at** gelænderet (12) har et C-
- formet tværsnit.
7. Balustrade ifølge krav 6, **kendetegnet ved, at** et mellemstykke (13) på det C-formede
- 30 tværsnit er lige.

8. Balustrade ifølge krav 5 eller 6, **kendetegnet ved, at** der på mellemstykket (13) på det C-formede tværsnit på indersiden er placeret et fremspring (15), som forløber i gelænderets (12) længderetning, hvilket fremspring føres i en not (18) på føringen (16).

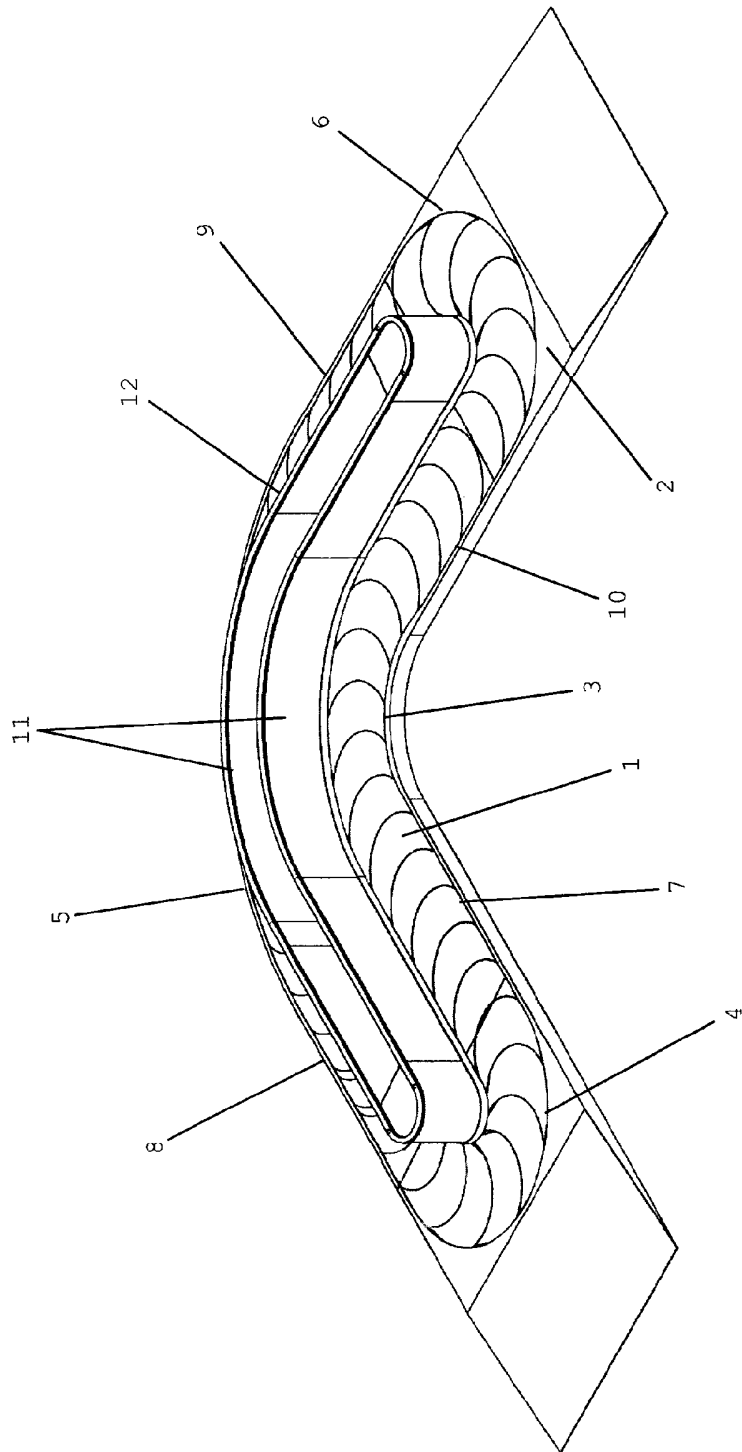


Fig. 1

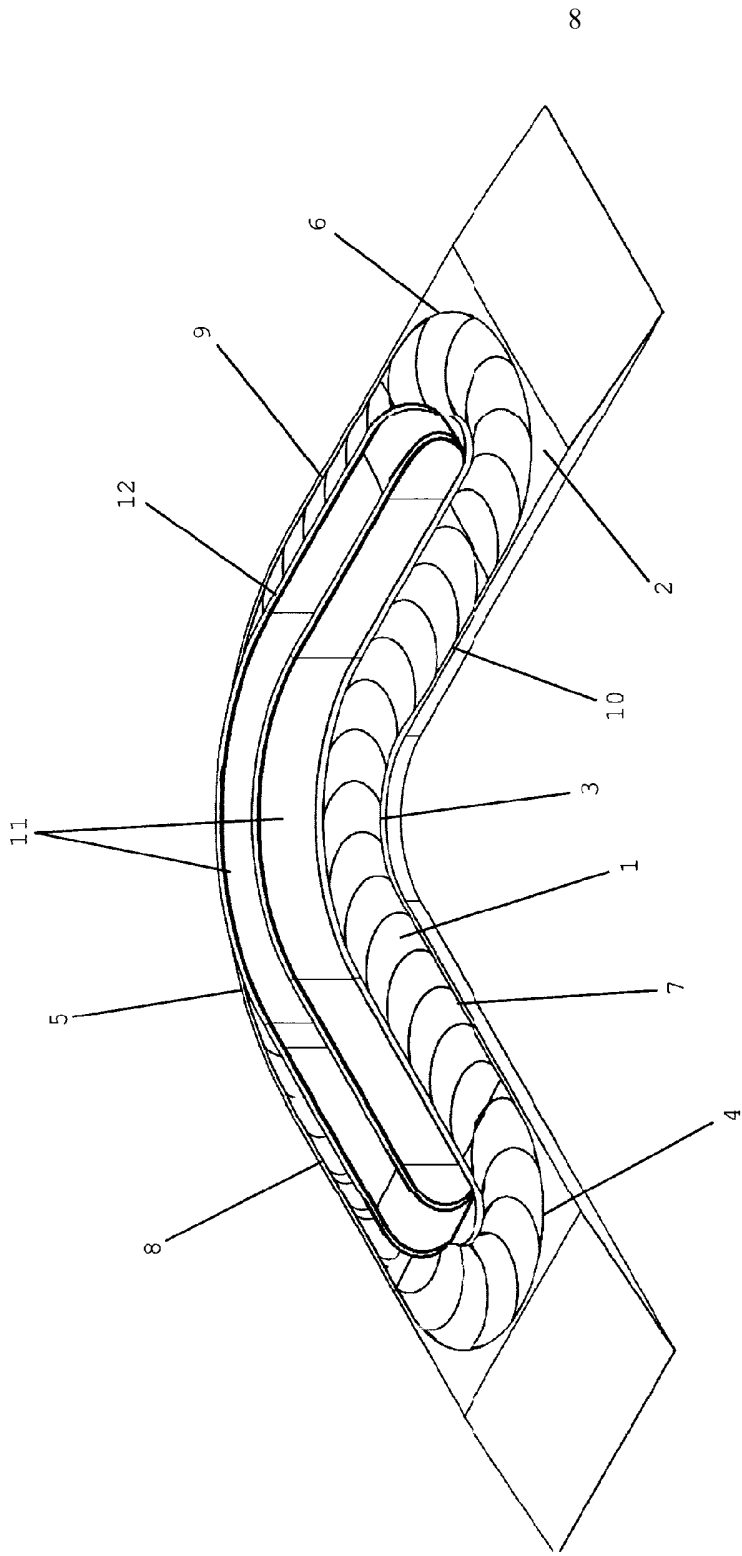


Fig. 2

Fig. 3

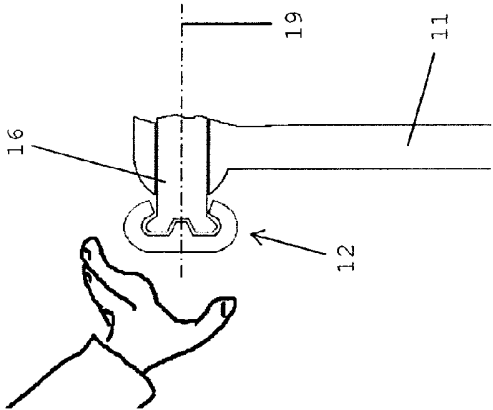


Fig. 4

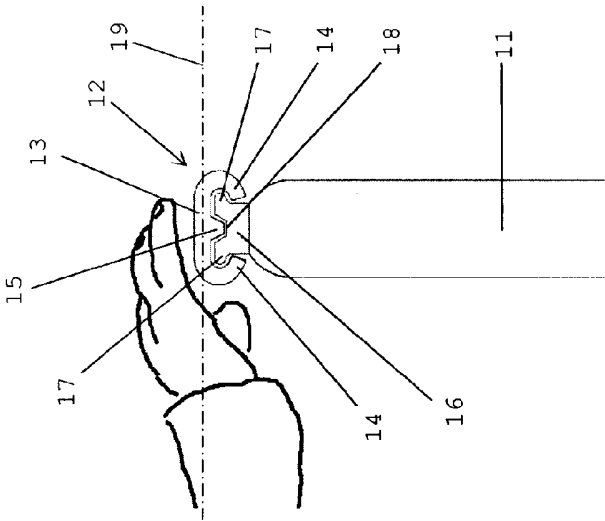


Fig. 5

