

Safety brake for an escalator or for a travelator

Description

The invention relates to a safety brake for an escalator or for a moving walkway.

Safety brakes are used in emergency situations when due to technical problems or misbehaviour of persons the step belt of the escalator or the plate belt of the moving walkway has to be rapidly stopped. Such safety brakes have been known for a long time. For example, a safety brake is disclosed in GB 2 207 718 A, the locking member or pawl of which is mounted to be pivotable about a pivot axis. The locking member is held by an actuating element in a release setting. As soon as the actuating element is activated, this pivots the locking member about the pivot axis into a locking setting so that the locking member engages in a moved part of the escalator or the moving walkway and blocks this. The moved part in which the locking member engages is usually a wheel rotatable about an axis of rotation. This can be, for example, a deflecting wheel of the step belt or a transmission wheel of a drive train connecting a drive motor with the step belt to be driven.

In addition, safety brakes according to category for escalators and moving walkways are disclosed in CN 202138945 U and CN 102372224 A. In both specifications the locking member in the locking setting bears against an abutment which is arranged in stationary position at the support structure or framework of the escalator or moving walkway and supports the major part of the forces which arise in the case of locking. As a result, the actuating element and the pivot axle of the locking member are relieved of load to a substantial extent. The moved part in which the locking member is to engage has for this purpose a suitable profile with projections and gaps in which the locking member in the locking setting engages. A projection created by the gaps thus stands against the locking member, whereby the moved part is blocked.

The safety brakes described in the preceding can be produced economically and in simple manner, are activated only very rarely and usually function faultlessly. If, however, during pivotation the locking member coincidentally impinges on a projection and wedges with that the locking member acts, in correspondence with its geometric arrangement with respect to the projection and the axis of rotation of the moved part, like a crowbar and due to the lever action can deform or even destroy the moved part, the mounting locations

thereof or parts of the safety brake. These parts necessarily have to be replaced after the event and before a next safety braking action is triggered.

An escalator with a return running block is disclosed in JP 2012 012187 A. This return running block comprises a ratchet wheel and a restraining pawl. If the step belt due to a technical problem runs back, the restraining pawl can be pivoted about a pivot axis, in which case a tooth of the ratchet wheel moves into engagement with the pawl and stops the ratchet wheel and thus the step belt of the escalator. In order that there is no overloading of the moved components during this abrupt stopping, the restraining pawl has at its engagement side a damping element in the form of a helical compression spring. This construction has the disadvantage that the compressed damping element after stopping of the ratchet wheel extends again and rotates the ratchet wheel back through a small angle of rotation in the opposite direction. The step belt is thus also rotated back and this change in running direction can lead to serious accidents. In addition, the damping element itself represents a significant source of risk, since this can, in the case of highly dynamic loading at the instant of engagement with the tooth, bend out and break, which can lead to serious accidents, since in this case the step belt is not stopped.

The object of the present invention is therefore to create a safety brake of the aforesaid kind which ensures use secure against destruction.

This object is fulfilled by a safety brake of an escalator or a moving walkway having at least one locking member. The locking member can be pivoted between a release setting and a locking setting about a pivot axle, wherein the locking member in the locking setting engages in at least one moved part of the escalator or the moving walkway and blocks this or prevents further movement. In other words, the locking member is arranged in such a way as to adopt a release setting or a locking setting by means of a pivot movement, in which case the locking member in the locking setting engages in at least one moved part of the escalator or the moving walkway and blocks this. In addition, the safety brake comprises a linear guide by which the locking member is linearly guided relative to the pivot axle between a first and a second position. The linear guide is mounted by the pivot axle on a stationary part of the escalator or the moving walkway. The linear guide together with the locking member can thereby be pivoted or swivelled into place between the release setting and the locking setting.

The locking member mechanically positively engages in the moved part so that it can block this. Correspondingly, the moved part has profiles suitable for standing against the locking member when these impinge on the locking member. These profiles are usually projections and gaps which move with the moved part in a defined space. The defined space is, as it were, an envelope volume in which the projections move. As long as the locking member is held in the release setting it is disposed completely outside this defined space. If through pivotation of the linear guide about the pivot axle the locking member, which is linearly guided by the linear guide and pivots therewith, penetrates into the region of a gap in this defined space the locking member due to the further rotation of the moved part necessarily impinges on a projection and blocks or stops the moved part instantly.

If now, as explained further above, the locking member in an intermediate position between the release setting and the locking setting impinges directly on a projection it stands against this and starting from the first position is pushed back along the linear guide to the second position until this impinged projection can move past the locking member. The linear guide and the locking member obviously pivot further during this pushing back until an abutment is encountered. The locking member is pushed back by suitable means from the second position back into the first position and thus reaches the final locking setting. The moved part further moves or rotates until a projection following the impinged projection impinges on the locking member and is stopped by this.

In order to relieve the pivot axle of load the locking member has an abutment surface which in the locking setting is supported at the previously mentioned abutment, which is arranged at the stationary part. This abutment is arranged as close as possible to the moved part so that the bending moments which arise on impinging of the projection on the locking member are as small as possible.

In order to bring the locking member back again into the first position after pushing back from the second position a resilient element can be arranged between the pivot axle and the locking member. The resilient element positions the locking member relative to the pivot axle in the first position. As soon as the locking member is pushed from the first position in the direction of the second position the resilient element is stressed. This can be, for example, a spring element, a gas cylinder, a piece of elastomeric material or the like.

In order to accommodate and/or guide the resilient element and/or to protect it from damage the locking member can have a passage, a recess or a cavity in which the resilient element is arranged. The resilient element can obviously also be arranged at the outer side of the locking member if this appears expedient.

The linear guide can also be formed by a passage, for example a slot, arranged in the locking member. The linear guide can, moreover, open into the passage in which the resilient element is arranged.

The linear guide can obviously also be arranged at an outer side of the locking member, for example in tubular form, wherein the locking member in the case of collision with a projection is pushed into the interior space of the linear guide created by the tubular form.

An actuating element, which pivots the locking member about the pivot axle from the release setting to the locking setting, is provided for actuation of the safety brake. A spring-loaded electromagnet, a pneumatic cylinder, a hydraulic cylinder, an electric motor, a servomotor or a setting motor, for example, can be used as actuating elements. Use is preferably made of a spring-loaded electromagnet, the armature of which in the case of power interruption drops out and pivots the locking member by the spring force of the spring-loaded electromagnet into the locking setting or swivels it into the defined space.

The actuating element is incorporated in an electrical safety circuit which stands under voltage and comprises switching elements installed at safety-relevant locations of the escalator or the moving walkway such as, for example, in emergency stop buttons, in comb-plate or handrail-entry safety switches, and the like. As soon as the safety circuit is interrupted and the actuating element of the safety brake pivots the locking member a control of the escalator or the moving walkway detects this interruption and switches off the current feed of the drive motor. In order to ensure switching-off of the drive motor even more rapidly a switch can be provided which is actuatable by the locking member and interrupts a current line of the drive unit of the escalator or the moving walkway.

As already mentioned several times, at least one safety brake can be used in an escalator or in a moving walkway. The escalator or the moving walkway comprises, as stationary part, a support structure or framework with a first deflecting region and a second deflecting region. Belonging to the moved part are a first deflecting wheel pair rotatably mounted in

the first deflecting region, a second deflecting wheel pair rotatably mounted in the second deflecting region and an endless step belt or plate belt, which is arranged between the two deflecting regions and is deflected by the deflecting wheel pairs. A deflecting curve having no moved parts can also be present in place of the first deflecting wheel pair. The safety brake is preferably fastened to the support structure in stationary position in one of the deflecting regions so that the locking member in the locking setting can engage at least in a deflecting wheel pair associated with the safety brake and can block this.

The two deflecting wheels of a deflecting wheel pair are preferably fixedly connected together by means of an axle or shaft. A collar with projections can be laterally arranged at one of the two deflecting wheels, in which case the locking member in the locking setting stands in the path of at least one of these projections. The projections can be blocks, teeth, pins or the like arranged at the collar. By virtue of the latter arrangement of the projections the pivot axle of the locking member can be arranged orthogonally to an axis of rotation of the deflecting wheel pair. This has the advantage that the entire safety brake can be accommodated in intermediate spaces, which are present in any case, of the support structure and a very direct force introduction of the braking forces into the support structure can be achieved.

When the locking member is pivoted and stands by its abutment surface against the stationary abutment a projection of the moved part, which is to be stopped, impinges on the locking member. In that case, the entire kinetic energy of the moved part would have to be abruptly nullified without further measures. This would have the consequence that the step belt or plate belt would stop abruptly and persons standing thereon could fall over and hurt themselves. In addition, the locking member would have to have enormous dimensions in order to be able to withstand the high impact force of the projection. In order to avoid all this the collar can be arranged to be rotatable relative to the deflecting wheel, in which case a slip clutch is arranged between the deflecting wheel and the collar. A resilient element can obviously also be arranged between the collar and the deflecting wheel instead of the slip clutch or in combination therewith.

The slip torque of the slip clutch is preferably settable by way of the pressing force of the friction partners thereof. As a result, after engagement of the locking member only the collar with the projections is abruptly stopped and the rest of the moved part can run on under defined braking until at standstill. The slip torque of the slip clutch can, for example,

be elastically set in accordance with a spring characteristic or in accordance with a progressive spring characteristic.

The safety brake of an escalator or a moving walkway is explained in more detail in the following by way of examples and with reference to the drawings, in which:

- Figure 1 shows, in side view in schematic illustration, an escalator with a support structure, in which guide rails and a circulating step belt are arranged between a first deflecting region and a second deflecting region;
- Figure 2 shows, in three-dimensional view, a first deflecting wheel pair, which is illustrated in Figure 1, of the first deflecting region with a part of the support structure and with a safety brake arranged at the support structure;
- Figure 3 shows a three-dimensional detail view of the deflecting wheel pair, which is illustrated in Figure 2, from the viewing direction A indicated in Figure 2;
- Figure 4 shows a detail view, from the viewing direction B indicated in Figure 3, of the deflecting wheel pair and the safety brake, wherein the locking member thereof is illustrated in the release setting;
- Figure 5 shows a detail view, from the viewing direction B indicated in Figure 3, of the deflecting wheel pair and the safety brake, wherein the locking member thereof is illustrated in a collision setting;
- Figure 6 shows a detail view, from the viewing direction B indicated in Figure 3, of the deflecting wheel pair and the safety brake, wherein the locking member thereof is illustrated in a locking setting; and
- Figure 7 shows, in three-dimensional view, a further form of embodiment of the safety brake.

Figure 1 shows an escalator 1 with a balustrade 2 carrying a handrail 7. In addition, the escalator 1 comprises a support structure 5, which is illustrated in outline and which carries the balustrades 2. The balustrades 2 comprise base plates 3, between which

laterally guided steps 4 are arranged to circulate. The escalator 1 connects a first storey E1 with a second storey E2. Guide rollers 8 of the steps 4 travel on guide rails 10, 11 or on guide rails 12, 13, which are connected with the support structure 5 of the escalator 1. Although Figure 1 shows an escalator 1 with steps, it is obvious that the present invention is also suitable for a moving walkway with a plate belt. The support structure 5 can be a framework, a girder, a foundation and the like.

The steps 4 are connected together to form a circulating step belt. The framework 5 has in the region of the first storey E1 a first deflecting region 15 and in the region of the second storey E2 a second deflecting region 16, in which the step belt is deflected between a forward run V and a return run R. On the basis of the indicated arrow direction of the forward run V and the return run R in the illustrated embodiment, users are conveyed from the second storey E2 to the first storey E1. Operation of the escalator in the opposite direction is obviously also possible. For deflecting of the step belt a first deflecting wheel pair 17 is rotatably arranged in the first deflecting region 15 and a second deflecting wheel pair 18 in the second deflecting region 16.

In the present embodiment the second deflecting wheel pair 18 is connected with a drive unit 6. The drive unit 6 can obviously also be arranged at another location of the escalator 1 or the moving walkway and drive the step belt or plate belt.

In addition, arranged in the second deflecting region 16 is a safety brake 20 which can act on the second deflecting wheel pair 18 and the construction and function of which is described in connection with the further Figures 2 to 6. Accordingly, Figures 1 to 6 have the same reference numerals for the same parts.

The safety brake 20 can act on a schematically illustrated switching element 50 which can interrupt the energy supply of the drive unit 6. In the case of an electric drive unit 6 this switching element 50 can be a motor circuitbreaker or a thyristor, which interrupts the current supply 51 of an electric motor of the drive unit 6.

Figure 2 shows the second deflecting wheel pair 18, which is illustrated only schematically in Figure 1 and for the sake of better clarity only a small part of the support structure 5. The two deflecting wheels 41, 42 of the deflecting wheel pair 18 are connected with a shaft 43, which has bearing pins 58. The step belt or plate belt (not illustrated) is deflected by

way of the two deflecting wheels 41, 42. In addition, the torque of the drive unit (not illustrated) is transmitted through the recesses 45, which are formed at the circumference of the deflecting wheels 41, 42, to suitable projections of the step belt, for example chain axles, chain pins, pins, bolts, rollers and the like. The bearing pins 58 are rotatably mounted in bearing locations (not illustrated) of the support structure 5.

In addition, a gearwheel 44 which is connected by means of a duplex chain (not illustrated) with the drive unit 6 illustrated in Figure 1 is arranged on the shaft 43 laterally of one of the deflecting wheels 42. The gearwheel 44 and the mentioned duplex chain are obviously referred to only by way of example and it is open to the expert to provide a different transmission of torque from the drive unit 6 to the second deflecting wheel pair 18. The gearwheel 44 is illustrated broken away at one place so that the most important parts of the safety brake 20 arranged on the support structure 5 can be seen.

The safety brake 20 is operated by means of an actuating element 30. In the present example, the actuating element 30 is an electromagnet. The actuating element 30 acts by way of a pivot lever 31, which is visible only partly, on a locking member 21 so that this can be pivoted from a release setting into the illustrated locking setting.

Figure 3 shows a three-dimensional detail view of the deflecting wheel pair 18 from the viewing direction A indicated in Figure 2. For the sake of better clarity, the actuating element and the pivot lever, which acts on a pivot axle 22, are not illustrated. In addition, the locking member 21 is illustrated sectioned in a plane orthogonal to the pivot axle 22 so as to show the components arranged in the interior of the locking member 21.

The pivot axle 22 is pivotably mounted in a bearing arm 52, which is connected with the support structure 5 to be stationary with respect thereto. The locking member 21 has a linear guide 23, which is formed as a slot or elongate hole and which is arranged on the centre longitudinal axis 24 of the locking member 21 and extends in the longitudinal direction thereof. The slot 23 extends only over a specific part of the locking member 21 and thereby defines a first position 25 and a second position 26, which the locking member 21 can adopt with respect to the linear displaceability thereof relative to the pivot axle 22. The pivot axle 22 is guided through the slot 23. The slot 23 as well as the first position 25 and the second position 26 can be seen substantially better in Figures 4 to 6.

The locking member 21 is illustrated in the release setting and through pivotation about the pivot axle 22 can mechanically positively engage in the deflecting wheel pair 18 and block this. Correspondingly, the deflecting wheel pair 18 has profiles which are suitable for standing against the locking member 21 when this is in the locking position and the profiles impinge on the locking member 21.

In the present example these profiles are created by a collar 46 with projections 47, which collar is connected with the deflecting wheel pair 18 and the projections 47 of which collar move in company with the deflecting wheel pair 18 in a defined, annular space 48. As long as the locking member 21 is held in the release setting it is disposed completely outside this annular space 48. When through pivotation or swivelling in of the linear guide 23 about the pivot axle 22 the locking member 21, which is linearly guided by the linear guide 23 and pivots therewith, penetrates into this defined space 48 and adopts the locking setting a projection 47 of the rotating deflecting wheel 18 constrainedly impinges on the locking member 21 and blocks or stops the deflecting wheel pair 18 and thus also the step belt or plate belt.

If it is now the case that the locking member 21 impinges on a projection 47 in an intermediate position between the release setting and the locking setting it stands against this projection and, starting from the first position 25, is pushed back along the linear guide 23 to the second position 26 until this impinged projection 47 can move past the locking member 21. The linear guide 23 and the locking member 21 obviously pivot further during this pushing back, until the locking member 21 stands against an abutment 53, which is arranged in stationary position at the support structure 5. When the impinged projection 47 has further moved and a gap, which is present between the impinged projection 47 and the following projection 47, is disposed in the region of the pivoted locking member 21 the locking member 21 is pushed back by a resilient element 27 from the second position 26 again to the first position 25 and thereby attains the locking setting. The deflecting wheel pair 18 further moves or rotates until the projection 47 following the impinged projection 47 impinges on the locking member 21 and is stopped by this.

As already mentioned, the resilient element 27 positions the locking member 21 relative to the pivot axle 22 in the first position 25. As soon as the locking member 21 is pushed from the first position 25 in the direction of the second position 26 the resilient element 27, in the present embodiment a helical compression spring, is stressed. The resilient element

27 can, however, also be a gas cylinder, a hydraulic cylinder, a piece of elastomeric material or the like.

The resilient element 27 is arranged in the interior of the locking member 21 in a passage or in a bore, which is similarly arranged on the centre longitudinal axis 24 of the locking member 21, extends over the longitudinal direction of the locking member 21 and opens in the slot 23. In order that the helical compression spring 27 remains at its predetermined location and can be mounted in simple manner, a plunger-shaped element 29 is guided through the helical compression spring 27 and arranged in the passage. The plunger-shaped element 29 is in addition displaceably arranged in a transverse bore of the pivot axle 22. The torque of the pivot lever 31, which is recognisable in part in Figure 1, can thereby be transmitted to the locking member 21. In the present embodiment the plunger-shaped element 29 is a shank screw, wherein the shank thereof is concealed by the helical compression spring 27 and only the head thereof and the threaded end thereof screwed into the locking member 21 are visible in the region of the first position 25. The resilient element 27 or the helical compression spring bears at one end against the screw head of the plunger-shaped element 29 and at the other end against the pivot axle 22 and keeps, by the spring force thereof, the locking element 21 with respect to the pivot axle 22 in the first position 25.

In order to relieve the pivot axle 22 of load in the case of collision of the projection 47 with the locking member 21, the locking member 21 has an abutment surface which in the locking setting is supported at the stationary abutment 53. This abutment 53 is arranged as close as possible to the moved part or the collar 46, so that the bending moments, which arise when the projection 47 impinges on the locking member 21, are as small as possible.

When the locking member 21 is pivoted and a projection 47 of the deflecting wheel pair 18 to be stopped impinges on the locking member 21 the entire kinetic energy of the moved part would have to be abruptly nullified without further measures. This would have the consequence that the step belt or plate belt would abruptly stop. The persons standing thereon could fall over and in that case seriously hurt themselves. Moreover, the locking member 21 would have to have enormous dimensions in order to be able to withstand the high impact force of the projection 47. In order to avoid all this the collar 46 is arranged to be rotatable relative to the deflecting wheel pair 18. In addition, a slip clutch 49 is

arranged between the collar 46 and the deflecting wheel pair 18, wherein, of the slip clutch 49, in Figure 3 only a spring-loaded pressing ring is visible. The slip clutch 49 can have a slip lining, a brake lining, springs and the like. The collar 46 can also be a pinion or a disc.

The slip clutch 49 makes it possible, after engagement of the locking member 21 in the defined space 48, for only the collar 46 with the projections 47 to be abruptly stopped and the rest of the moved part, namely the first and second deflecting wheel pairs 17, 18 illustrated in Figure 1 as well as the step belt composed of steps 4, to be braked in defined manner and to be able to run down to standstill.

Figures 4 to 6 all show a detail view from the viewing direction B indicated in Figure 3, wherein Figures 4 to 6 show different operational states of the locking member 21 and thus of the safety brake. Since only the region of the locking member 21 and the co-operation thereof with the second deflecting wheel pair 18 are to be described in more detail, merely one half of the deflecting wheel pair 18 is illustrated. In addition, in Figures 4 to 6 the gearwheel 44 is illustrated in broken-away form so that the locking member 21 and the projections 47 of the collar 46 are visible. Moreover, the locking member 21 is illustrated in sectional form so that the function of the resilient element 27 can be seen.

Figure 4 shows the locking member 21 of the safety brake in the release setting. The resilient element 27 holds the locking member 21 in the first position 25, i.e. so that the locking member 21 in the first position 25 bears against the pivot axle 22. A projection 47 of the collar 46 is disposed in the region of the locking member 21 and can move past this unhindered in a predetermined direction D of rotation. It is apparent from Figure 1 that in the case of emergency the forward run V of the step belt or the plate belt has to be prevented from movement from the second storey E2 in the direction of the first storey E1. The predetermined direction D of rotation therefore corresponds with this direction of movement of the forward run V.

Figure 5 shows the locking member 21 in pivoted or swivelled-in position, wherein it bears against the abutment 53. At the trigger instant of pivotation a projection 47 was by chance located in the region of the locking member 21. This impinged on this projection 47 and would jam with it if, as not illustrated, the locking member 21 were to be linearly displaceable relative to the pivot axle 22. The locking member 21 is prevented by the projection 47 from penetration into the defined space 48 and as a consequence of the

collision with the impinged projection 47 has been pushed back by this into the second position 26. This means that through the pushing-back of the locking member 21 the relative position of the pivot axle 22 starting from the first position 25 changes towards the second position 26. As a result, the projection 47 can, notwithstanding the pivoted locking member 21, move past this.

The slot 23, which serves as a linear guide and enables linear displacement of the locking member 21 relative to the pivot axle 22, can be seen particularly clearly in Figure 5. Equally the plunger-shaped element 29, which was pushed through the bore of the pivot axle 22, can be seen. The resilient element 27 is stressed by the plunger-shaped element 29 and the locking element 21 being pushed back. As soon as the projection 47 has moved past the locking member 21 and frees this the locking member 21 is displaced by the stressed resilient element 27 from the second position 26 to the first position 25 so that the locking member 21 penetrates into the defined space 48.

Figure 6 shows the locking member 21 in pivoted position and after it could penetrate into the defined space 48. The locking member 21 has now reached the locking setting and is supported by the abutment 53. A projection 47 of the collar 46 stands against the locking member 21 and is mechanically positively blocked by this in the direction D of rotation. The locking member 21 thus prevents the projection 21 and thereby the deflecting wheel pair 18 from further rotational movement in the rotational direction D.

Figure 7 shows a further embodiment of a safety brake 120 in three-dimensional view. Of the escalator or moving walkway, only the abutment 53 is illustrated. The safety brake 120 comprises a locking member 121 which is guided in a tube 123, which serves as linear guide, to be linearly displaceable. The tube 123 has, for example, a square tube cross-section. Other tube cross-sectional shapes are obviously also possible. Arranged at the tube 123 is a pivot axle 122, the bearing points of which for pivotable mounting are formed at a support structure (not illustrated) of an escalator or a moving walkway. In order to pivot the locking member 121, an eye 134, which is connected by means of a linkage 131 with a pneumatic cylinder serving as actuating element 130, is arranged at the tube 123.

The tube 123 also has a slot 136, through which a transverse pin 132 fixedly connected with the locking member 121 projects. The locking member 121 can thus be moved or linearly displaced, limited by the length of the slot 136, between a first position 125 and a

second position 126. The tube 123 additionally has a strap 133. Arranged between this and the transverse pin 132 is, as resilient element 127, a tension spring which positions the locking element 121 in the illustrated, first position 125.

Moreover, a switching cam 135, which in the illustrated locking setting actuates a switching element 50, is formed at the tube 123. This switching element 50 interrupts the energy feed 51 to the drive unit 1 as explained further above in the description of Figure 1.

Although the invention has been described by the illustration of specific embodiments on the basis of an escalator, it is obvious that this can also be used in a moving walkway and numerous further variants of embodiment can be created with knowledge of the present invention. For example, it is apparent from Figures 1 to 7 that the safety brake 20, 120 can be blocked only in one rotational direction D of the deflecting wheel pair 17, 18. However, it is open to the expert to arrange a second safety brake 20, 120 in mirror symmetry with respect to the illustrated safety brake 20, 120 so that the deflecting wheel pair 17, 18 can also be stopped in the rotational direction opposite to the rotational direction D. Moreover, the two deflecting wheel pairs 17, 18 can also be each equipped with one safety brake or two safety brakes 20, 120. However, a deflecting curve can also be arranged in the first deflecting region in place of the first deflecting wheel pair 17.

The safety brake 20, 120 is light, simple in construction and economic. Manipulation is very simple and few steps are needed in order to mount and demount the safety brake 20, 120. Moreover, the safety brake 20, 120 can be very rapidly reset after use. In addition, the safety brake 20, 120 can be used several times per day. Beyond that, the shutdown time of the escalator or the moving walkway is substantially shortened and the operator obtains significant added value or a considerable amount of additional use.

As described, the invention can be used equally on escalators or travelling stairways and moving walkways or moving sidewalks.

Patent claims

1. Safety brake (20, 120) of an escalator (1) or a moving walkway, which safety brake (20, 120) includes at least one locking member (21, 121), which is arranged so as to adopt a release setting or a locking setting by means of a pivot movement about a pivot axle (22, 122), wherein the locking member (21, 121) in the locking setting engages in at least one moved part (4, 6, 17, 18) of the escalator (1) or the moving walkway and blocks this, characterised in that the safety brake (20, 120) comprises a linear guide (23, 123) by which the locking member (21, 121) is linearly guided relative to the pivot axle (22, 122) between a first position (25, 125) and a second position (26, 126) and the linear guide (23, 123) is mounted on a stationary part (5, 52) of the escalator (1) or the moving walkway by the pivot axle (22, 122).
2. Safety brake (20, 120) according to claim 1, wherein the locking member (21, 121) has an abutment surface which in the locking setting is supported at an abutment (53) which is arranged at the stationary part (5).
3. Safety brake (20, 120) according to claim 1 or 2, wherein a resilient element (27, 127), which positions the locking member (21, 121) relative to the pivot axle (22, 122) in the first position (25, 125), is arranged between the pivot axle (22, 122) and the locking member (21, 121).
4. Safety brake (20, 120) according to claim 3, wherein the locking member (21, 121) has a passage in which the resilient element (27) is arranged.
5. Safety brake (20, 120) according to claim 3, wherein the resilient element (127) is arranged at the outer side of the locking member (21, 121).
6. Safety brake (20, 120) according to any one of claims 1 to 5, wherein the locking member (21, 121) has a slot (23) serving as the linear guide (23).
7. Safety brake (20, 120) according to any one of claims 1 to 5, wherein the linear guide (123) is arranged at an outer side of the locking member (21, 121).
8. Safety brake (20, 120) according to any one of claims 1 to 7, wherein this

comprises an actuating element (30, 130) which pivots the locking member (21, 121) about the pivot axle (22, 122) from the release setting to the locking setting.

9. Safety brake (20, 120) according to claim 8, wherein the actuating element (30, 130) is a spring-loaded electromagnet (30), a pneumatic cylinder (130), a hydraulic cylinder (130), an electric motor, a setting motor, a step motor or a servomotor.

10. Safety brake (20, 120) according to any one of claims 1 to 9, wherein a switch (50), which interrupts a current line (51) of a drive unit (6) of the escalator (1) or the moving walkway, is actuable by the locking member (21, 121).

11. Escalator (1) or moving walking with at least one safety brake (20, 120) according to any one of claims 1 to 10 and further comprising, as stationary part, a support structure (5) with a first deflecting region (15) and a second deflecting region (16), a second deflecting wheel pair (18), as moved part, rotatably mounted in the second deflecting region (16), insofar as present a first deflecting wheel pair (17) rotatably mounted in the first deflecting region, and an endless step belt or plate belt, which is arranged between the two deflecting regions (15, 16) and which is deflected by deflecting wheels (41, 42) of the deflecting wheel pair (17, 18), characterised in that the locking member (21, 121) in the locking setting blocks the deflecting wheel pair (18) associated with the safety brake (20, 120).

12. Escalator (1) or moving walkway according to claim 11, wherein a collar (46) with projections (47) is arranged laterally at the deflecting wheel (42) of a deflecting wheel pair (17, 18) and the locking member (21, 121) in the locking setting stands in the way of at least one of these projections.

13. Escalator (1) or moving walking walkway according to claim 12, wherein the pivot axle (22, 122) of the locking member (21, 121) is arranged orthogonally to an axis of rotation of the deflecting wheel pair (17, 18).

14. Escalator (1) or moving walking walkway according to claim 12 or 13, wherein the collar (46) is arranged to be rotatable relative to the deflecting wheel (42) and a slip clutch (49) is present between the deflecting wheel (42) and the collar (46).

15. Escalator (1) or moving walking walkway according to claim 14, wherein the slip torque of the slip clutch (49) is settable.

16. Escalator (1) or moving walking walkway according to claim 15, wherein the slip torque of the slip clutch (49) is settable elastically according to a spring characteristic or settable elastically according to a progressive spring characteristic.