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(54) **ENDLESS CHAIN FOR A HANDRAIL OF A MOVING WALK, HANDRAIL AND MOVING WALK**

(57) The invention relates to a chain (22) for a handrail (16) of a moving walk (10), wherein the chain (22) comprises multiple chain segments (22a) connected to each other along a moving direction (100) of the handrail (16), wherein each chain segment (22a) has an undercarriage (22b) and a hand rest element (22c) attached

to the undercarriage (22b), and wherein the undercarriage (22b) of each of the chain segments (22a) is swivel-mounted to the respective undercarriages (22b) of the neighboring chain segments (22a). The invention further relates to a handrail (16) and a moving walk (10).

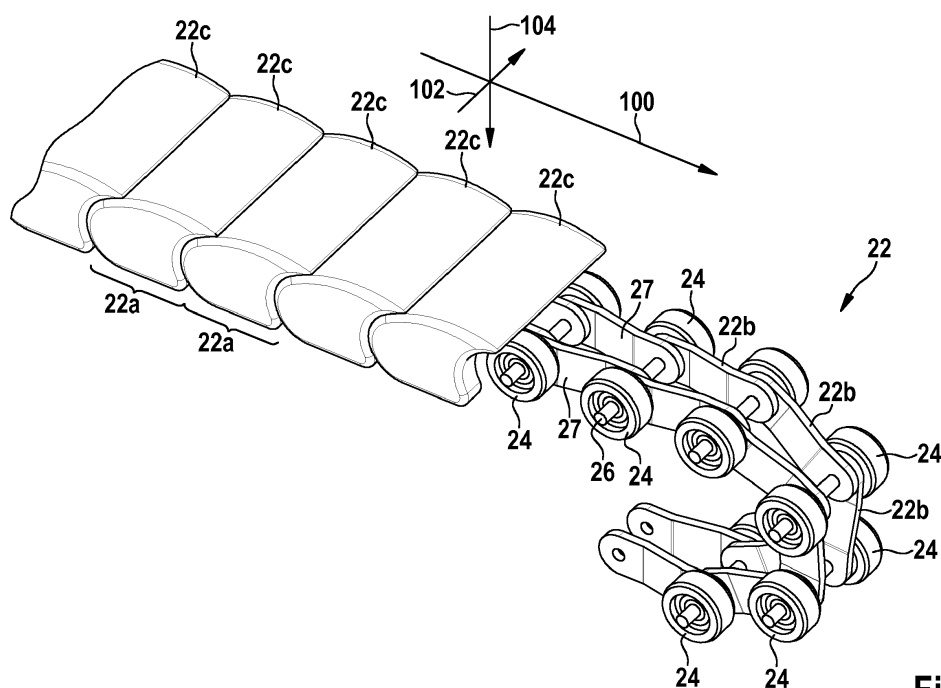


Fig. 2A

Description

Field of the invention

[0001] The present invention essentially relates to an endless chain for a handrail of a moving walk, a handrail and a moving walk. Therefore, the invention is related to the technical field of transportation systems, especially to moving walks and escalators and in particular to acceleration moving walks.

Background of the Invention

[0002] Typical moving walks, such as horizontal moving walks and/or ascending moving walks and/or escalators comprise at least one, more commonly two, parallel handrails, which extend in the longitudinal or moving direction of the moving walk and confine the moving walk laterally and allow passengers to hold on for support. Moving walks moving with a constant speed typically comprise one or more handrails, and comprise moving passenger support components such as a belt, which move essentially with the same speed, i.e. a possible relative speed and or speed mismatch between the moving walk and the moving support components of the handrails is minimized.

[0003] Furthermore, acceleration moving walks are known, which allow a higher travelling or moving speed in a middle section of the moving walk, while moving at a more moderate speed at the entrance and the exit of the moving walk. Hereby, entering and exiting the moving walk is facilitated, since the relative speed of the moving walk and the floor adjacent to the moving walk is reduced at the entrance and the exit of the moving walk, while a middle section of the moving walk may travel at a higher speed.

[0004] Due to different sections of an acceleration moving walk moving at different velocities, acceleration moving walks suffer from the disadvantage that the moving speed of the moving walk and of the moving support components of its handrails may not be sufficiently matched at every position along the moving direction. In order to reduce this mismatch, typically several handrails are provided adjacent to one another along the moving direction of the moving walk, wherein the handrails at the entrance and the exit sections are configured to move at a slower speed than the handrails in a middle section, in which, as mentioned, the moving walk also travels at a higher speed.

[0005] The handrails typically comprise, as moving support components, endless belts provided between two end sections, which require deflecting about deflection pulleys, sprockets or turnaround guides at both ends of the handrail. Therefore, gaps between adjacent handrails occur, where a passenger may be required to move his hand from one handrail to another handrail. In order to prevent passengers from catching their hands in-between two longitudinally adjacent handrails, the gap is

typically covered by a cover member. However, since no handrail is available in this section and thus a relative speed between the walkway and the balustrade can be very high, problems occur.

[0006] The invention therefore seeks to provide a handrail for a moving walk minimizing the sections between longitudinally adjacent handrails in which no moving handrail is available for passengers to hold on to.

[0007] This problem is solved by an endless chain, a handrail and a moving walk comprising the features of the respective independent claims. Preferred embodiments are the subject-matter of the dependent claims and the following description.

15 Disclosure of the invention

[0008] In one aspect the invention relates to an endless chain for a handrail of a moving walk, wherein the chain comprises multiple chain segments connected to one another, wherein each chain segment comprises an undercarriage and a hand rest element attached to the undercarriage, and wherein the undercarriage of each of the chain segments is swivel-mounted (i.e. articulatedly connected) to respective undercarriages of the adjacent or neighbouring chain segments.

[0009] In another aspect the invention relates to a handrail for a moving walk, the handrail comprising an endless chain according to the invention, a support element for slidably supporting the chain along the handrail and at least one turnaround guide or sprocket for deflecting the chain at an end of the handrail.

[0010] In another aspect the invention relates to a moving walk comprising at least one endless chain or handrail according to the invention.

[0011] In another aspect the invention relates to a moving walk comprising at least two handrails according to the invention, wherein the at least two handrails are arranged along the moving direction of the moving walk in single line configuration, or, in other words, longitudinally adjacent to each other, wherein a transition gap between the at least two handrails extends along the moving direction of the moving walk over a distance in a range from 1 mm to 100 mm, especially 30 to 60 mm.

[0012] The moving walk preferably extends in a plane, which may extend horizontally, i.e. perpendicular to the Earth's gravitational force and/or may be arranged ascending and/or declining in a slope. Alternatively the moving walk may be configured as an escalator.

[0013] The support element preferably is a rigid element, which provides a preferably flat support surface for supporting the endless chain such that the chain may be moved over the support element. In particular, the support element is preferably configured to allow the undercarriages of the chain segments to slide and/or roll in the moving direction over the support element. "Supporting" preferably means that the chain may be held in its vertical and/or horizontal position and may be stabilized by the Earth's gravitational force on top of the support

element, wherein the chain may be slid in moving direction of the moving walk over the support element of the handrail. For instance, the support element may comprise a profile, such as an aluminum profile, or consist of such.

[0014] As mentioned, the chain is provided in a closed or endless form, i.e. that its beginning and end are attached to each other or that the chain does not have a beginning and an end. Thus, by means of at least one sprocket or turnaround guide, preferably two sprockets or turnaround guides, wherein preferably at least one of the sprockets or turnaround guides may be driven, for example by an electric motor, the chain may be conveyed in an endless-movement over the supporting element in the longitudinal direction or moving direction of the moving walk while moving against, i.e. antiparallel, to the moving direction preferably below the supporting element.

[0015] Two handrails being longitudinally adjacent to one another other means, as mentioned, that the two handrails are preferably arranged in single line configuration along the moving direction of the moving walk. Thus, when moving along the moving walk, a passenger may first reach a first handrail and then a second handrail of the two longitudinally adjacent handrails. Preferably, the two adjacent handrails do not overlap each other in the moving direction, i.e. in longitudinal direction, and/or perpendicular thereto, i.e. they are not shifted and/or displaced relative to each other perpendicular to the moving direction and/or longitudinal direction, albeit such an overlap or displacement may be provided in some embodiments of the invention. The end of a handrail comprises a turnaround section, in which the chain is deflected by at least one sprocket or turnaround guide to be conveyed back against the moving direction of the moving walk.

[0016] The transition gap between each of the at least two handrails, as mentioned above, relates to a section between two adjacent turnaround sections of two longitudinally adjacent handrails, in which one handrail ends and the adjacent handrail starts. In the transition gap, there is no handrail available for a passenger to hold on. In particular, the transition gap may relate to a section along the moving direction, in which the chains of the respective handrails are deflected by a respective turnaround guide and thus do not move parallel to the moving direction but at least partially perpendicular to the moving direction, such as in a vertical direction, and/or antiparallel to the moving direction. In particular, the transition gap relates to a section, in which the chain of the handrail may not be comfortably used by a passenger, since the direction, in which the chain moves, significantly deviates from the horizontal moving direction of the moving walk. For instance, the position along the moving direction, at which the moving direction of the belt deviates by more than 10°, or 20° or 30° or 40° from the moving direction of the moving walk due to the deflection of the chain by a turnaround guide may be set as the beginning of the

transition gap. In an equivalent manner, the position, at which the moving direction of the chain of the following handrail deviates by less than 10°, or 20° or 30° or 40° from the moving direction of the moving walk due to the deflection of the chain by a turnaround guide may be set as the end of the transition gap.

[0017] The transition gap is preferably at least partially covered, for instance by means of a cover element. Covering the transition gap at least partly serves to prevent objects and/or passengers' hands getting caught in-between the two adjacent turnaround guides or chains.

[0018] The invention offers the advantage that by using an endless chain having the features of claim 1 for a handrail allows achieving a small radius of curvature of the handrail, in particular significantly smaller than when using a conventional belt for a handrail as known in prior art. The minimum radius of curvature of the chain may be adjusted according to the actual needs by choosing a suitable length of the chain segments. In principle, the shorter the length of the chain segments, the smaller the minimum radius of curvature achievable by the chain and the smaller the radius of curvature, the shorter the transition gap can be. For instance, a radius of curvature as small as about 50 mm may be achievable by means of the claimed invention. As a consequence thereof, small turnaround guides or sprockets (as compared to pulleys conventionally used for this purpose) may be used for deflecting the chain and running in a handrail and, thus, the transition gap between two longitudinally adjacent handrails can be significantly reduced. Due to the small possible minimum radius of curvature of the chain, for instance a turnaround guide having a diameter of only around 45 mm may be used for deflecting the chain, which is significantly less than the diameter of pulleys used in conventional handrails using belts requiring a much larger minimum radius of curvature.

[0019] Therefore, the invention offers in particular a technical advantage for handrails of acceleration moving walks, in which it is often desired to arrange several handrails longitudinally adjacent to one another, i.e. longitudinally adjacent in the moving direction of the moving walk. Due to the small radius of curvature achievable according to the claimed invention, the transition gap between two adjacent handrails being arranged longitudinally adjacent to each other, can be significantly reduced as compared to conventional handrails of acceleration moving walks. Thus, the invention allows increasing the safety of moving walks, in particular of acceleration moving walks, and especially of handrails for (acceleration) moving walks, because the sections along the moving direction, in which no moving handrail is provided is reduced. Therefore, passengers travelling on the moving walk will face only negligible transition gaps between longitudinally adjacent handrails and therefore do not face any problems to hold on. Accordingly, the safety and comfort of the handrail and of the moving walk is greatly increased as compared to conventional moving walks having longitudinally adjacent handrails.

[0020] Preferably, the hand rest element has an upper surface, which is adapted to be comfortable for a passenger to rest his hand on the hand rest element. For instance, the shape of the hand rest element may be adapted to a palm of an average adult person. Preferably, the hand rest element may be made of a material that feels comfortable for a passenger when resting his hand on the hand rest element.

[0021] Preferably, the hand rest element of each chain segment is rigidly fixed to the undercarriage of the respective chain segment. More preferably, the hand rest element forms an integral unit with the undercarriage. For example, the hand rest element may be molded around and/or on top of the undercarriage. Alternatively or additionally, the hand rest element may be fixed to the under carriage by at least one screw and/or at least one nail and/or at least one rivet and/or by an adhesive and/or a snap-lock mechanism. Preferably the undercarriage is at least partially made of metal, for example of steel. Preferably, the hand rest element of each chain segment is at least partially made of a plastics material and/or of a rubber material, such as polyurethane.

[0022] Preferably the undercarriage of each chain segment has a length along the moving direction of 5 to 20 cm, especially 5 to 10 cm or 10 to 15 cm. This provides a chain offering a small minimum radius of curvature and/or to adjust to the trajectory of the handrail. In principle, the shorter the length of the chain segments, the smaller is the minimum radius of curvature which is achievable by the chain.

[0023] Preferably each of the undercarriages comprises at least one transportation element, wherein the chain is adapted such that each undercarriage is in physical contact with a support element of the handrail via the at least one transportation element, wherein transportation elements of adjacent undercarriages are articulatedly connected to one another by means of connection members. Undercarriages and transportation elements provided in this way allow reducing friction between the chain and the support element when the chain is conveyed and/or moved in the moving direction of the handrail and thus reduced the required motor power and energy consumption for operating the handrail. For instance the undercarriages and/or the support elements may be at least partially coated with a low-friction material at the areas being in contact with the support element and the chain segment, respectively, when the hand rail is operated. For instance, the transportation element may comprise a sliding shoe and/or a runner.

[0024] Preferably the at least one transportation element comprises at least one roller or wheel, wherein rollers or wheels of adjacent segments are articulatedly connected to one another by means of the connection members.

[0025] The chain segment is preferably adapted such that the at least one wheel runs on the support element in the moving direction of the handrail when the handrail is moving. More preferably the transportation element

comprises at least two wheels, which most preferably are arranged such that their axes are perpendicular to the moving direction. Most preferably, the at least two wheels are provided at least partially overlapping in a horizontal direction perpendicular to the moving direction. Having at least two wheels allows stabilizing the chain segment and, thus, the chain in a horizontal direction perpendicular to the moving direction.

[0026] Preferably the hand rest element of each of the chain segments at least partially overlaps along the moving direction of the handrail with a hand rest element of an adjacent chain segment. In other words, the hand rest elements of adjacent chain segments preferably intertwine with each other. More preferably, the hand rest elements are shaped such that when intertwined with each other the hand rest elements do not block and/or hinder each other when the chain is bending and/or deflected in a direction perpendicular to the moving direction. Especially, the hand rest elements are adapted to form a closed structure along the moving direction of the hand rail leaving no gaps in-between. For example, the hand rest elements are intertwined with each other in such a way that no gap is opened between the hand rests elements even when the chain is being bent with the minimum radius of curvature in a turnaround section. This allows preventing hands and/or fingers of passengers getting caught between the hand rest elements and, thus, preventing passengers from getting injured when using the handrail. The hand rest elements may for example have a C-shape and, thus, the hand rest element may be arranged in a "CCC" manner along the chain.

[0027] Preferably the turnaround guide has a diameter in a range of 20 to 120 mm, especially 20 to 60 mm or 60 to 120 mm. This allows achieving a small radius of curvature and/or to minimize the length and/or size of the transition gap between to longitudinally adjacent handrails.

[0028] Preferably the handrail is adapted such that at any time the turnaround guide is in direct physical contact with 4 to 10, especially 4 to 6 or 6 to 8 chain segments. Being in direct physical mechanical contact means that the respective chain segments are directly in touch with the turnaround guide via their undercarriage. This allows achieving a small minimum radius of curvature. For allowing deflecting the chain by 180° by means of 10 or fewer chain segments, the chain segments and in particular the undercarriages of the chain segments attached to each other may be required to be articulated or swiveling within a certain angular range. The larger the angular range in which the chain segments are articulated or swiveling with respect to each other, the smaller the number of chain segments may be, which is required for deflecting the chain by 180°.

[0029] Preferably the chain is adapted such that a trajectory of the chain at at least one end or turnaround section of the handrail is configured as a non-polygonal curve. This offers the advantage that the movement of the chain along the trajectory at the respective end of the

handrail may be optimized so as to have almost or even completely equal speed when entering and exiting the deflection trajectory. This in turn allows reducing and/or minimizing the strain to which the chain is exposed at the ends of the rail, i.e. in turnaround sections of the chain. Furthermore, the risk of the chain getting stuck when being deflected at the ends of the handrail is reduced. The non-polygonal best satisfying the criteria for a homogeneous velocity throughout the deflection can preferably be optimized by mathematical means, such as by a numerical optimization. Hence, the trajectory of the chain at the end of the handrail may be set to deviate from a circular shape.

[0030] Preferably the moving walk is an accelerating moving walk and/or wherein the at least two longitudinally adjacent handrails are configured to move at different constant speeds with respect to each other, wherein the different constant speeds are preferably at least partially matched to the speed of the moving walk at the position of the respective handrail along the moving direction of the moving walk. This allows providing handrails to an accelerating moving walk having suitably matched velocities of the walkway of the moving walk and the handrail at any position along the moving direction. Hence, the safety and comfort for passengers travelling the moving walk can be increased.

[0031] Further advantages and embodiments of the invention will become apparent from the description and the appended figures.

[0032] It should be noted that the previously mentioned features and the features to be further described in the following are usable not only in the respectively indicated combination, but also in further combinations or taken alone, without departing from the scope of the present invention.

[0033] In the drawings:

Figure 1 shows in a schematic perspective view a section of a moving walk according to a preferred embodiment.

Figures 2A and 2B depict a section of a chain according to a preferred embodiment in a perspective view and in a cross sectional view.

Figures 3A and 3B show a transition gap between two handrails according to a preferred embodiment in schematic perspective views.

Detailed description of the Figures

[0034] Figure 1 shows in a schematic perspective view a section of a moving walk 10 according to a preferred embodiment of the invention. The moving walk 10 comprises a walkway 12, on which the passengers can stand and/or walk to travel into the moving direction 100. The walkway 12 itself is driven and moves with respect to the surrounding of the moving walk 10 in moving direction

100. Furthermore, the moving walk 10 comprises a balustrade 14, which limits the walkway 12 in one direction laterally. The balustrade 14 comprises several balustrade panels 18 forming a wall separating the walkway 12 from its surroundings. In addition, the moving walk 10 comprises a number of longitudinally adjacent handrails 16, which are arranged on top of the balustrade panels 18 and form part of the balustrade 16.

[0035] In the section of the moving walk 10 depicted in Figure 1, two longitudinally adjacent handrails 16 are shown, wherein the two handrails 16 are separated by a transition gap 20. At one side of the transition gap 20 along the moving direction 100, the first of the two handrails 16 ends and at the other side of the transition gap the second of the two handrails 16 begins. Each of the handrails 16 comprises an endless chain 22 comprising multiple chain segments 22a, wherein the chain 22 is conveyed such as to move in moving direction 100 at essentially the same speed as the walkway 12. At the beginning and the end of the respective handrail 16, the chain 22 is deflected by a respective turnaround guide (not shown) to allow the chain 22 to be transported back against the moving direction 100 below the upper surface of the handrail 16, as shown in Figure 2B.

[0036] As can be seen in Figure 1, the transition gap 20 has a very limited extension in moving direction and therefore merely forms a small slit or gap between the two adjacent handrails 16. Therefore, the interruption, in which no moving handrail 16 is available for a passenger moving on the moving walk 10 along the moving direction 100, is minimal and, thus, negligible. Furthermore, the transition gap 20 is covered by a cover element 30 to prevent passengers from catching their hands in the transition gap between the two handrails 16 and/or to prevent objects from getting stuck between the two handrails 16.

[0037] The chain 22 of each of the handrails 16 is composed of multiple chain segments 22a, which are connected to each other in a swiveling or articulated manner such that the chain 22 may be deflected around the turnaround guides. The width, i.e. the extension of the chain 22 in horizontal direction 102 perpendicular to the moving direction 100 and perpendicular to the vertical direction 104 (parallel to the Earth's gravitational force) may be adapted to an average hand size of an adult passenger, for instance to 10 cm.

[0038] Figures 2A and 2B depict a section of chain 22 according to a preferred embodiment in a perspective view (Figure 2A) and in a cross sectional view (Figure 2B). The chain 22 is provided with multiple chain segments 22a, which each comprise an undercarriage 22b and a hand rest element 22c fixed to the undercarriage 22b. Preferably, the hand rest element 22c may be attached by a snap-lock mechanism to the undercarriage 22b. Most preferably, the hand rest element 22c is attached to the undercarriage 22b in such a way that the hand rest element 22c may be removed from the undercarriage 22b, for instance to replace a damaged and/or torn hand rest element 22c and/or undercarriage 22b. As

shown in the illustration in Figures 2A and 2B, the hand rest element 22c of each chain segment covers the underlying undercarriage 22b, and consequently the respective undercarriages 22b of the chain segments 22a, for which the hand rest element 22c is shown, is not visible. Preferably all chain segments 22a comprise an undercarriage 22b and a hand rest element 22c. More preferably, all chain segments 22a and/or undercarriages 22b and/or hand rest elements 22c are identical.

[0039] Moreover, the undercarriage 22b of each chain segment 22a comprises two transportation elements, which are provided as rollers or wheels 24 according to the depicted embodiment. The wheels 24 are in contact with a support element of the handrail and allow the respective chain segment to be transported over the support element in moving direction of the handrail. The wheels 24 are rotatable about an axis 26, such that the chain segments 22a may run on the wheels 26 when the chain is being conveyed along the moving direction 100. The wheels are fixed to each other and to the other components of the undercarriage by means of the axis 26. In addition to connecting the wheels 24 of a respective chain segment 22a with each other, the axis 26 also serves for mechanically connecting the undercarriages 22b of two adjacent chain segments 22a.

[0040] Axes 26 of adjacent undercarriages are connected by means of longitudinally extending connection members 27, so that at each of its ends, a connection member 27 is penetrated by one axis 26. Herein, the connection members are provided to be rotatable about each axis 26, so that by means of this construction the transportation elements, especially rollers or wheels, of adjacent chain segments, are articulatedly connected to one another.

[0041] As shown in Figure 2A and mentioned above, each axis 26 penetrates the connection members of two adjacent undercarriages and by doing so links the two undercarriages 22c to one another in an articulated manner. Alternatively or additionally, the transportation element(s) may be configured as sliding element(s) allowing the respective chain segment to slide on the support element.

[0042] Figure 2B further depicts a trajectory 200 along which the chain 22 is conveyed when operated in a handrail 16. Over almost the entire length of the handrail 16, the trajectory 200 may extend along a straight line extending parallel to the walkway of a moving walk 10. At the ends of the handrail 16, the chain 22 is deflected by means of a turnaround guide with a radius of curvature indicated as 300, to move backwards, against the moving direction 100 below the upper surface of the chain 22. For the deflection at the end of the handrails 16, different trajectories may be possible. For instance, the chain 22 may be deflected along an essentially circular trajectory 200a. Alternatively and advantageously, the chain 22 may be deflected along a trajectory 200b deviating from a circular trajectory and being for instance a non-polygonal trajectory. The latter may offer the advantage that

the velocity of the chain when entering and exiting the deflection trajectory 200b may be matched to ensure the strain on the chain 22 to be minimized

[0043] Figures 3A and 3B show a transition gap 20 between two handrails 16 according to a preferred embodiment of the invention in schematic perspective views. At the transition gap 20, one handrail 16 ends and the longitudinally adjacent handrail 16 begins. The transition gap 20 is covered by a cover element 30 to prevent the intrusion of objects and/or passengers' hands and/or fingers into the transition gap 20. Due to the small radius of curvature 300 with which the chains 22 are deflected, the length of the transition gap 20 is very small. Consequently, the transition gap 20 does not impair the comfort and/or safety of passengers travelling the moving walk 10.

[0044] As can be seen in particular in Figure 3A, the chain segments 22a and in particular the hand rest elements 22c are provided with a side wall 22d covering the side surfaces of the chain segments 22a, on which the hands of passengers typically rest, down until the side wall of the balustrade 14. This prevents passengers from intruding the space between the hand rest element 22c and the undercarriage 22b and/or the support element (not shown) of the hand rail 16 by which the chain 22 is supported. Furthermore, this facilitates the manufacturing of the handrail, since preferably no further safety arrangements need to be provided for preventing an intrusion of passengers' hands and/or fingers and/or for preventing the intrusion of objects underneath the hand rest elements 22c.

[0045] Due to the small transitional gap, the sections of the moving walk 10 can be significantly reduced as compared to conventional moving walks, in which no moving handrail 16 is provided along the moving direction of the moving walk 10. Consequently, the handrails 16 according to the invention can advantageously be used for acceleration moving walks 10, in which several longitudinally adjacent handrails 16 travelling at different constant speeds are provided in order to efficiently reduce a mismatch of velocities between the acceleration walkway and the handrails 16.

[0046] Figure 3B shows the chains 22 of the handrails 16 of Figure 3A in a perspective view, in which, for clarification purposes, other components have been omitted. Also the hand rest elements 22c of the chain segments 22a are illustrated in a transparent manner to provide a view on the underlying undercarriages 22b. As can be seen in Figure 3B, the hand rest elements 22c follow the trajectory of the chain determined by the undercarriages 22b, wherein the undercarriages 22b are moving by means of the wheels 26 over the support element 28.

[0047] The hand rest elements 22c have a C-shaped cross section when cut in a plane parallel to the moving direction 100 and the vertical direction 104. The concavely curved back of the hand rest element 22c is inserted in the convex open front part of the C-shape of the fol-

lowing or preceding, i.e. neighbouring, hand rest element 22c. Thus, even when the chain 22 is deflected at the end of the handrail 16, the hand rest elements 22c are able to follow the movement of their undercarriage 22c and stay in close contact with the neighboring hand rest elements 22c. Therefore, even when the chain 22 is deflected, no gap opens between two adjacent chain segments 22a.

Reference signs

[0048]

10	moving walk
12	walkway
14	balustrade
16	handrail
18	balustrade panel
20	transition gap
22	chain
22a	chain segment
22b	undercarriage
22c	hand rest element
22d	sidewall of a hand rest element
24	wheel
26	axis (of the wheel and/or undercarriage)
27	connection element
28	support element
30	cover element

Claims

1. Endless chain (22) configured and adapted for use as a handrail (16) of a moving walk (10), wherein the chain (22) comprises multiple chain segments (22a) connected to one another, wherein each chain segment (22a) comprises an undercarriage (22b) and a hand rest element (22c) attached to the undercarriage (22b), and wherein the undercarriage (22b) of each of the chain segments (22a) is swivel-mounted to the respective undercarriages (22b) of the neighbouring chain segments (22a).

2. Chain (22) according to claim 1, wherein the undercarriage (22b) of each chain segment (22a) has a length in a range of 5-20 cm, preferably 5-10 cm or 10-15 cm

3. Chain (22) according to claim 1 or 2, wherein each of the undercarriages (22b) comprises at least one transportation element (26), wherein the chain (22) is adapted such that each undercarriage (22b) is in mechanical contact with a support element (28) of the handrail (16) by means of the at least one transportation element (26), and transportation elements (26) of adjacent undercarriages are articulatedly connected to one another by means of connection members (27).

4. Chain (22) according to claim 3, wherein the at least one transportation element comprises at least one roller or wheel (26), and wherein rollers or wheels of adjacent chain segments are articulatedly connected to one another by means of the connection members (27)

5. Chain (22) according to any one of the preceding claims, wherein the hand rest element (22c) of each of the chain segments (22a) at least partially overlaps in moving direction (100) of the handrail (16) a hand rest element (22c) of an adjacent chain segment (22a).

6. Chain (22) according to any one of the preceding claims, wherein the hand rest element (22c) of each chain segment (22a) is rigidly fixed to the undercarriage (22b) of the respective chain segment (22a).

7. Chain (22) according to any one of the preceding claims, wherein the undercarriage (22b) is at least partially made of metal and/or wherein the hand rest element (22c) of each chain segment (22a) is at least partially made of a plastics material.

8. Handrail (16) for a moving walk (10), the handrail (16) comprising:

- a an endless chain (22) according to any one of the preceding claims;
- a support element (28) for supporting the chain ; and
- at least one turnaround guide or sprocket for driving and/or deflecting the chain at an end of the handrail (10).

9. Handrail (16) according to claim 8, wherein the turnaround guide or sprocket has a diameter in a range of 20 to 120 mm, preferably 20-60 or 60-120 mm.

10. Handrail (16) according to claim 8 or 9, wherein the handrail (16) is adapted such that at any time the

turnaround guide or sprocket is in direct mechanical contact with 4-10, especially 4-6 or 6-8 chain segments.

11. Handrail (16) according to any one of the claims 8 to 10, wherein the chain (22) is adapted such that a trajectory (200) of the chain (22) at at least one end of the handrail (16) is configured as a non-polygonal curve (200b).
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12. Moving walk (10) comprising at least one chain according to any one of claims 1 to 7 or a handrail (16) according to any one of the claims 8 to 11.
13. Moving walk (10) comprising at least two handrails (16) according to any one of the claims 8 to 11, wherein the at least two handrails (16) are arranged along the moving direction (100) of the moving walk in single line configuration, wherein a transition gap (20) between the at least two handrails (16) extends along the moving direction (100) of the moving walk over a range from 1 mm to 100 mm, preferably 30 mm to 60 mm.
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14. Moving walk (10) according to claim 13, wherein the moving walk is an accelerating moving walk and/or wherein the at least two handrails (16) are configured to move at different constant speeds with respect to each other, wherein the different constant speeds are preferably at least partially matched to the speed of the moving walk (10) at the position of the respective handrail (16) along the moving direction (100) of the moving walk (10).
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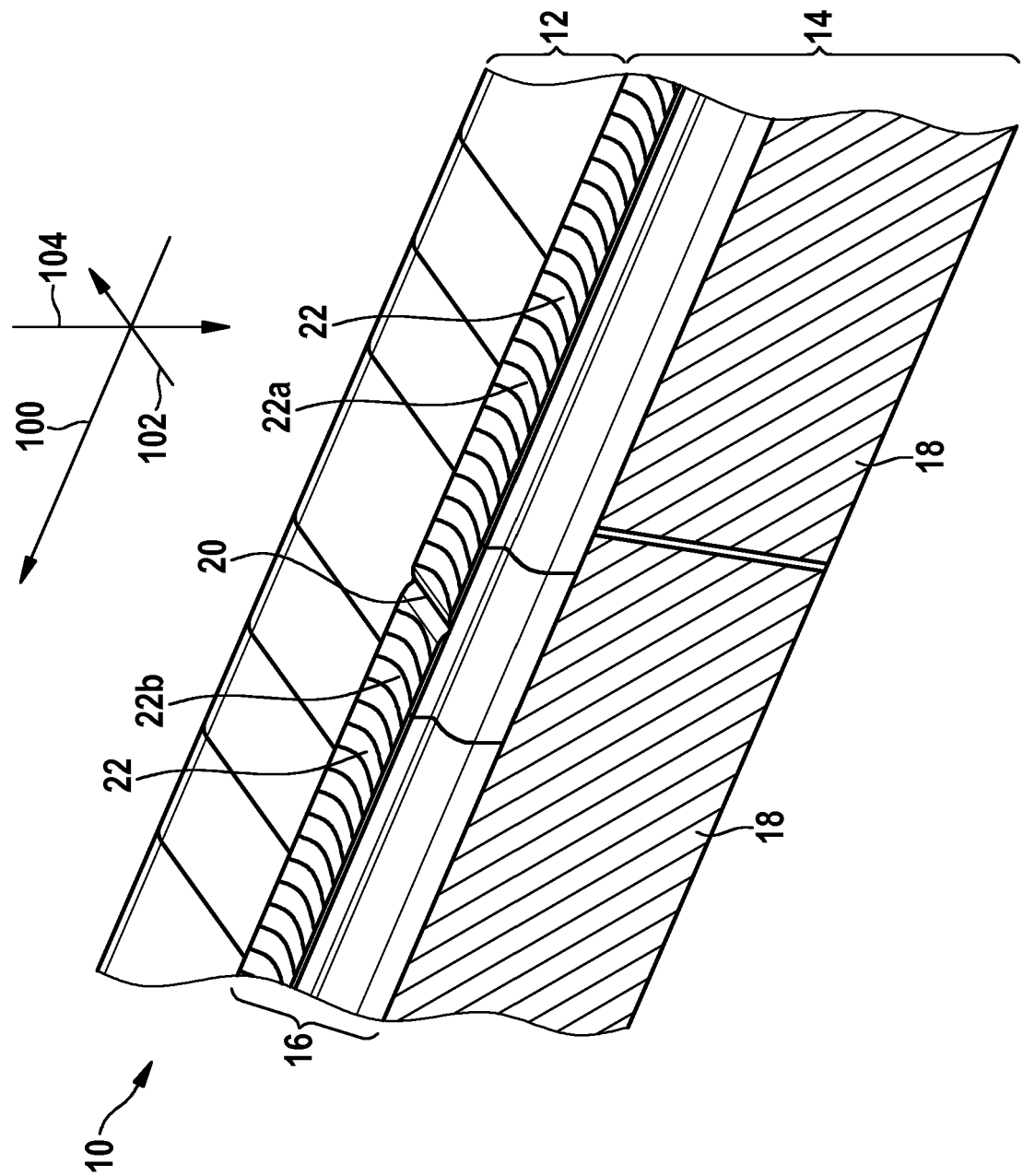


Fig. 1

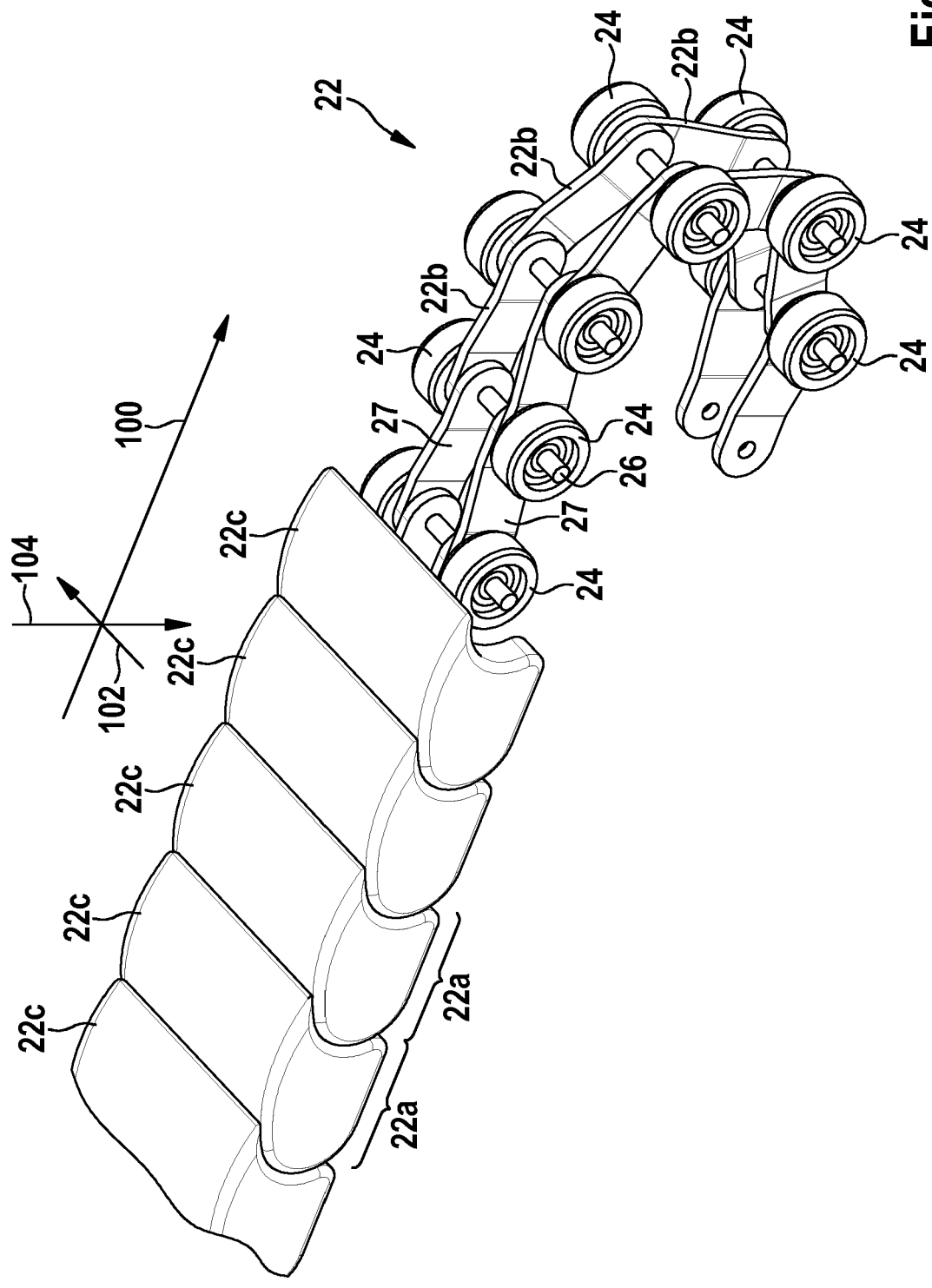


Fig. 2A

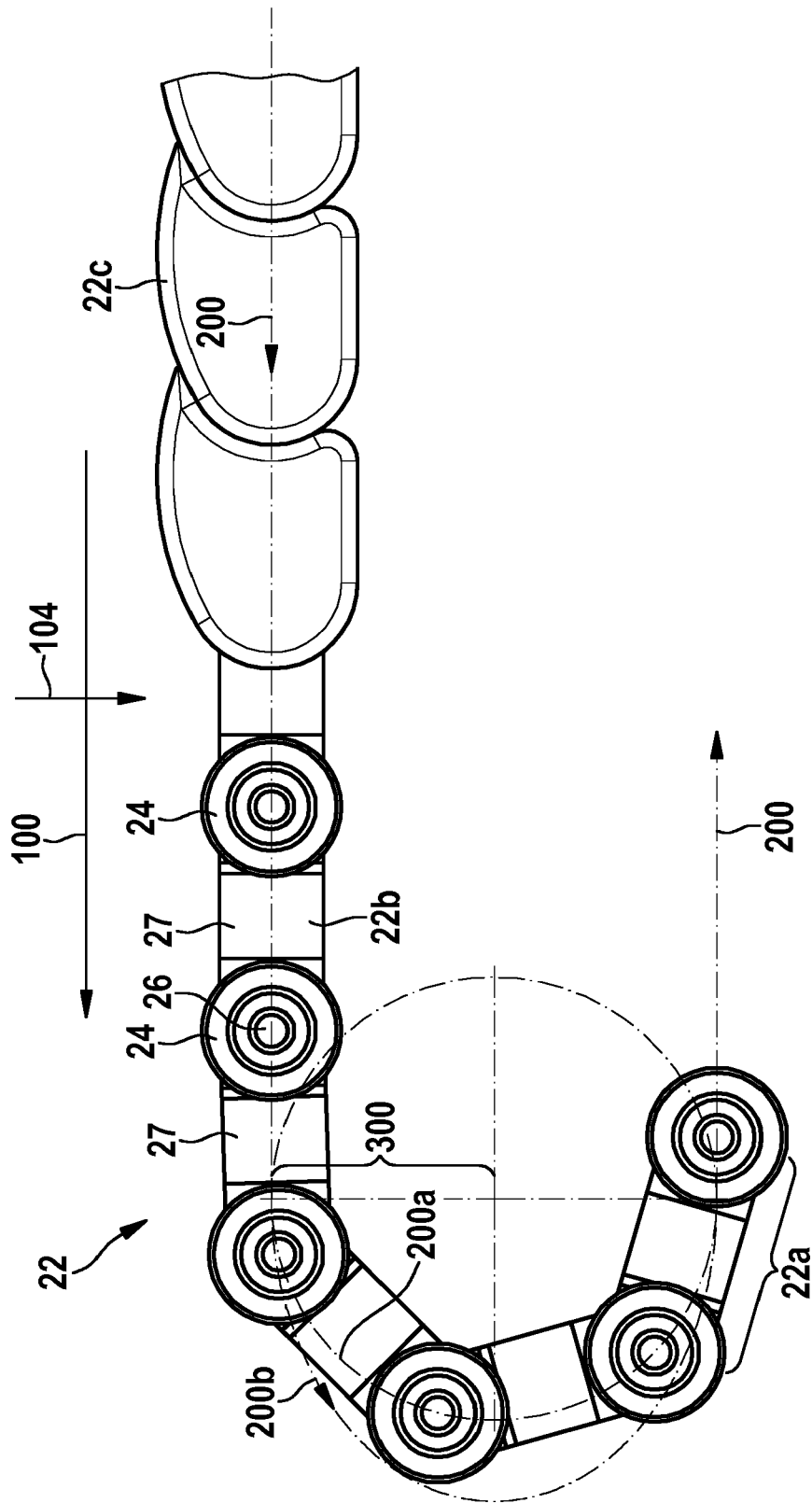


Fig. 2B

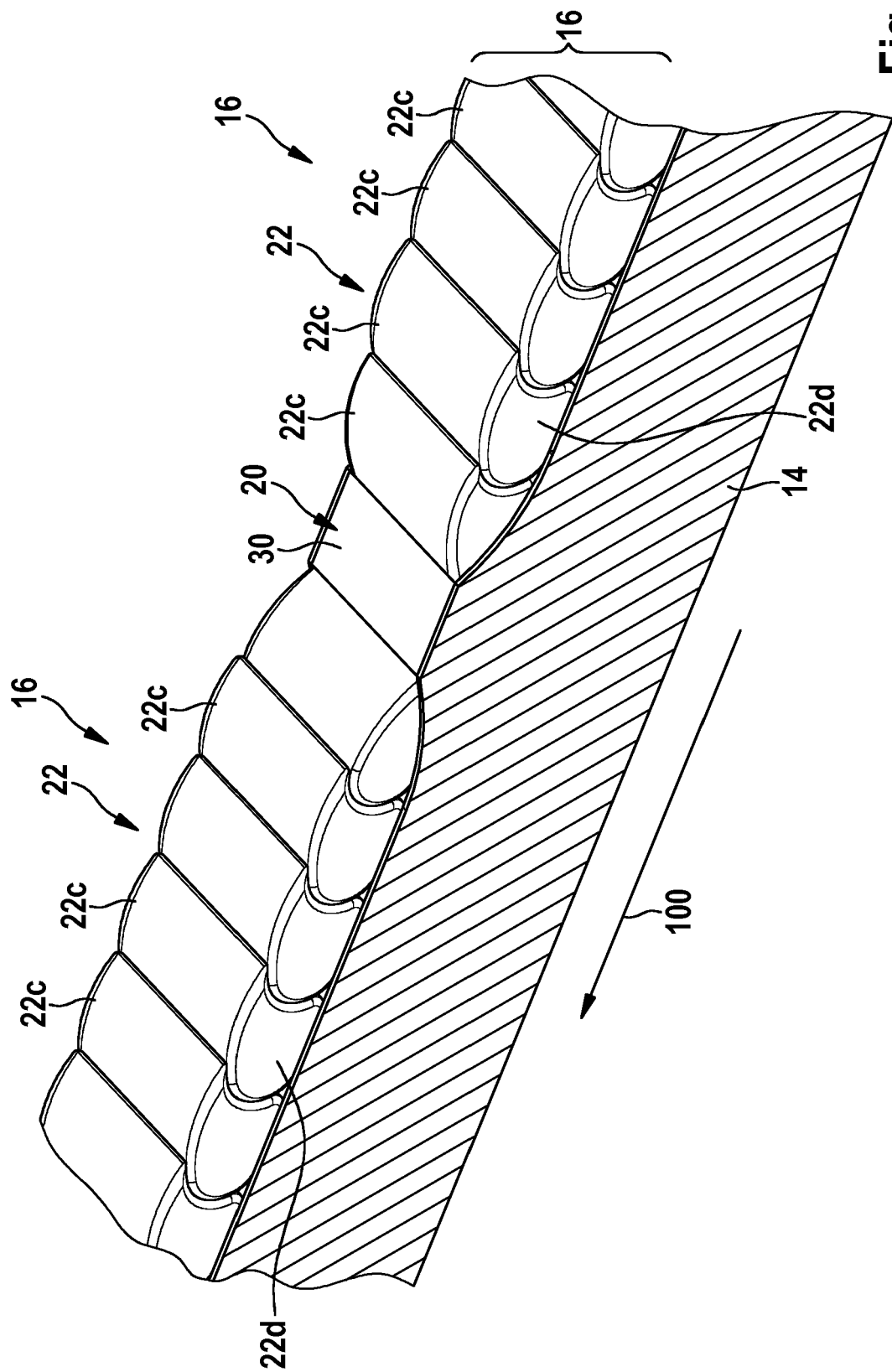


Fig. 3A

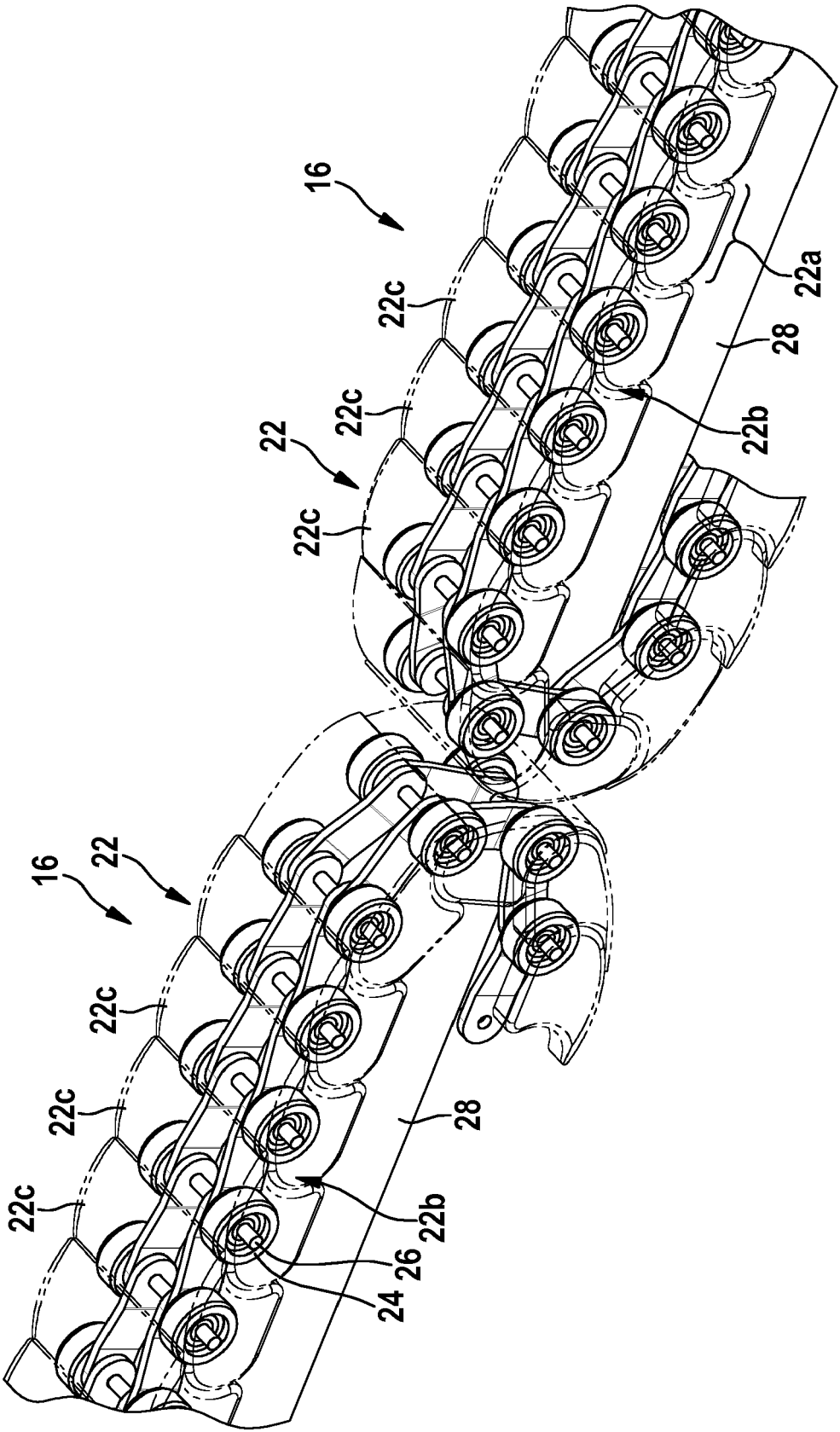


Fig. 3B



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Place of search The Hague		Date of completion of the search 7 March 2019	Examiner Szován, Levente
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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