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Handrail-drive for an escalator or a moving walk

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(56) Related Art
US 4895240 A
US 6450317 B1
US 6685004 B

Abstract

In this handrail-drive a drive-wheel chain-wheel (4.9) is connected by means of an axle (4.16) to a drive-wheel (4.15) which carries a drive-wheel tire (4.1), the axle (4.16) being held rotatably by bearings (4.17). The drive-wheel tire (4.1) which is filled with a gas, for example compressed air, is pulled over a dismountable wheel-rim (4.18) which is arranged on the axle (4.16). The drive-wheel tire (4.1) adapts to the shape of the handrail. Due to the springing properties or air-cushion properties of the drive-wheel tire (4.1) and the greater contact surface which results therefrom, the handrail is deformed only slightly or insignificantly.

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Fig. 2

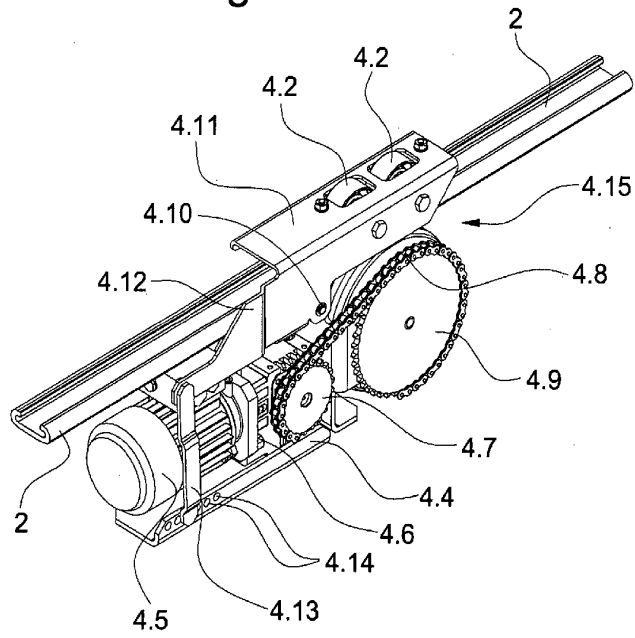
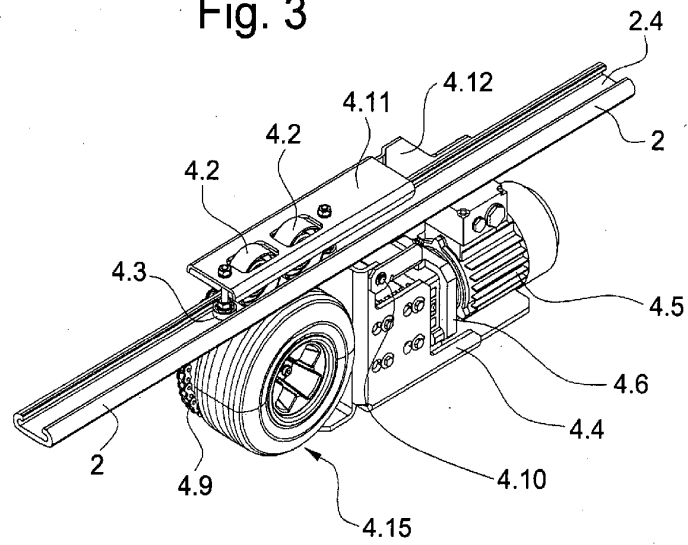


Fig. 3



HANDRAIL-DRIVE FOR AN ESCALATOR OR A MOVING WALK**1. FIELD OF THE INVENTION**

The invention relates to an escalator or a moving walk that includes a
5 truss, a step-band with steps or a pallet-band with pallets for the transportation of
persons and/or objects, and, on each side of the step- or pallet-band, a
balustrade which is held by a balustrade base and has a handrail, the handrail
being driven by a handrail-drive.

2. BACKGROUND TO THE INVENTION

10 From patent document EP 640 553 A2 is known a linear handrail-drive for
an escalator. Two drive-wheels with frictional engagement on the inside of the
handrail move the handrail, there being provided on the outside of the handrail for
each drive-wheel a follower-wheel which presses the handrail against the
drive-wheel.

15 A disadvantage of the known device is that the follower-wheel must exert a
high pressing force so that no slip can occur between the handrail and the
drive-wheel. The high flexing work shortens the service life of the drive-wheels
and of the follower-wheels.

In light of the above drawbacks it would be desirable to create a
20 handrail-drive which drives the handrail with less friction.

3. SUMMARY OF THE INVENTION

In accordance with the present invention there is provided an escalator or
moving walk, including

- a truss;

25 - a step- or walk-band with step or band elements for the transportation of
persons and/or objects;

- a balustrade base;

- a balustrade on each side of the step- or walk-band held by the balustrade base;

- a handrail mounted on at least one of the balustrades; and

30 - a handrail-drive for driving the handrail which includes (i) a single axle-driven
drive wheel for engaging and driving the handrail on an outside of the handrail
and (ii) press-on roller means engaging the handrail on an inside of the handrail
at a location substantially aligned with a location where engagement of the drive

wheel with the handrail takes place. The press-on rollers are arranged such as to press the handrail against the drive-wheel.

In preferred embodiments of the handrail-drive according to the invention, it is possible to adjust and where desired reduce the pressure exerted by the drive-wheel and follower press-on rollers or wheels onto the handrail. In providing for a greater contact surface between the drive-wheel and the handrail, more power can be transmitted to the handrail through frictional arrangement.

In an advantageous embodiment, the drive wheel has an inflatable (or other type) of tire. The spring properties of the drive-wheel tire and the greater contact surface which results therefrom ensure that the handrail is deformed only slightly or insignificantly. A further advantage is that the service life of the drive-wheels, the follower-wheels, and the handrail is increased.

In a preferred embodiment of the handrail-drive, dust and/or particles of dirt are prevented from being pressed into the casing of the handrail and/or into the outside of the handrail. The formation of grooves, cracks, or pressure points in the handrail can thus be avoided. Roller damage due to flexing work is reduced or eliminated because the flexing work is largely absorbed by the filling material, for example, compressed air or inert gases, of the drive-wheel tire.

Further aspects and preferred features of the present invention are explained in more detail below with reference to the attached figures in which are illustrated a number of embodiments of the present invention.

4. BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a side view of an escalator with a handrail-drive embodiment of the invention;

FIG. 1a shows a cross-section elevation view of the escalator of fig. 1;

FIG. 1b shows a cross-section elevation view of a portion of the left-hand side of the escalator base illustrated in fig. 1a;

FIG. 2 is a perspective representation of the handrail-drive according to the invention seen from the drive side;

FIG. 3 is a perspective representation of the handrail-drive according to the invention seen from the drive-wheel side;

FIG. 4 shows a cross-section elevation view through the axis of the drive-wheel seen in fig. 3; and

FIG. 5 is a perspective representation of a second embodiment of a handrail-drive according to the invention.

5. DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

The present invention finds embodiments in escalators such as found eg. in shopping centres, multi-storey buildings, etc. However, the handrail-drives devised using the principles underlying the invention can also be used on moving walks having a plurality of sequentially connected plates (or pallets) in a common plane. In the rest of the following description only the term "escalator" will be used, but the statements made also apply analogously for a moving walk.

FIG. 1 shows a side view of an escalator 1 which connects a first landing E1 with a second landing E2. The escalator 1 has a step-band consisting of steps. A handrail 2 with a riding-side 2.1 and a return-side 2.2 is arranged on a balustrade 3 which is held at the lower end by means of a balustrade base 3.1. A handrail-drive 4 arranged on truss 5 drives the handrail 2. The balustrade base 3.1 is equally supported by the a truss 5 of the escalator 1. Arranged at both the upper and the lower end-area of the escalator 1 is a combplate, which ensures safe transition from the stationary section to the moving step-band and from the moving step-band to the stationary section of the escalator 1.

FIG. 1a shows a cross-section and FIG. 1b shows a detail of the escalator 1 with the handrail-drive 4 arranged in the balustrade base 3.1 which drives the handrail 2 on the return-side 2.2. Reference number 6 designates step-rollers of the step-band riding-side and reference number 7 designates step-rollers of the step-band return-side, the step-rollers 6 being guided by guides 6.1 and the step-rollers 7 by means of guides 7.1. A drive-wheel tire 4.1 of the handrail-drive 4 is frictionally engaged with the outside 2.3 (i.e. the handrail-casing) of the handrail 2. Press-on rollers 4.2 press the handrail 2 on its inside 2.4 (i.e. the gliding surface) against the drive-wheel tire 4.1, there being provided for each press-on roller 4.2 a handrail guide 4.3 which guides the handrail 2 on the edge 2.5, i.e. the handrail lip.

FIG. 2 shows the handrail-drive 4 from the drive side and FIG. 3 shows the handrail-drive 4 from the drive-wheel side. Arranged on a support 4.4 which is connected to the truss 5 is an electric motor 4.5 and a gearbox 4.6, a gearbox chain-wheel 4.7 being connected by means of a chain 4.8 to a drive-wheel chain-

wheel 4.9. Instead of the chain-wheel and chain, a belt (toothed belt, V-belt) and belt-wheels can also be used. The drive-wheel chain-wheel 4.9 can also be driven by the step-band drive which imparts motion to the steps. Arranged on the support 4.4 is an axle 4.10, on which a rocker 4.11 with an arm 4.12 is pivoted.

5 The rocker 4.11 serves as support for the press-on rollers 4.2 and as support for the handrail guides 4.3. A bracket 4.13 connects the arm 4.12 with the support 4.4, the bracket 4.13 engaging in one of the drilled holes 4.14 arranged in the support 4.4. Depending on the choice of drilled hole, the press-on rollers 4.2 are pressed more or less against the inside of the handrail 2.

10 As shown in FIG. 4, the drive-wheel chain-wheel 4.9 is connected by an axle 4.16 to a drive-wheel 4.15 which carries the drive-wheel tire 4.1, the axle 4.16 being held rotatably by a bearing 4.17. The drive-wheel tire 4.1 which is filled with a gas, for example compressed air, is pulled over a dismountable wheel-rim 4.18 which is arranged on the axle 4.16. As shown in FIG. 1b and FIG. 4, thanks
15 to its spring properties and/or air-cushion properties, the drive-wheel tire 4.1 adapts to the form of the handrail 2. A solid tire as drive-wheel tire 4.1 is also conceivable.

FIG. 5 shows an exemplary embodiment of the handrail-drive 4. Provided as drive for the drive-wheel 4.15 instead of the electric motor 4.5 and gearbox
20 4.6, is a step sprocket 8, the step sprocket 8 being arranged on the axle 4.16 and engaged with the step-chain 9. The step-chain 9 driven by the step-chain drive comprises chain-links 9.1, step-rollers 6 and step-axles 9.2 on which the escalator steps are arranged.

Advantageous in this variant are the simple construction and simple
25 installation. Electric motor 4.5, gearbox 4.6, chain-wheels 4.7, 4.9, and chain 4.8 are dispensed with. Moreover, synchronization is assured by the step-chain 9 which moves the handrail 2 along with it at the same speed.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An escalator or moving walk, including
 - a truss;
 - a step- or walk-band with step or band elements for the transportation of
- 5 persons and/or objects;
 - a balustrade base;
 - a balustrade on each side of the step-or walk-band held by the balustrade base;
 - a handrail mounted on at least one of the balustrades; and
 - a handrail-drive for driving the handrail which includes (i) a single axle-driven
- 10 drive wheel for engaging and driving the handrail on an outside of the handrail and (ii) press-on roller means engaging the handrail on an inside of the handrail at a location substantially aligned with a location where engagement of the drive wheel with the handrail takes place.
2. The escalator or moving walk according to claim 1, wherein the drive-
 - 15 wheel has a drive-wheel tire with a peripheral surface arranged to adapt to the form of the handrail outside.
3. The escalator or moving walk according to claim 2, wherein the drive-wheel tire is arranged on a wheel-rim which is connected to a driving axle.
4. The escalator or moving walk according to claim 2 or 3, wherein the drive-
 - 20 wheel includes means for driving the drive wheel by one of a motor, a step chain-wheel, and a step chain-wheel drive.
5. The escalator or moving walk according to any one of claims 1 to 4, wherein the press-on roller means is arranged on a rocker and such that, a pressing force of the press-on roller means onto the handrail is adjustable by a
 - 25 setting of the rocker.
6. An escalator or moving walk handrail drive substantially as hereinbefore described with reference to the accompanying figures 1a to 5.

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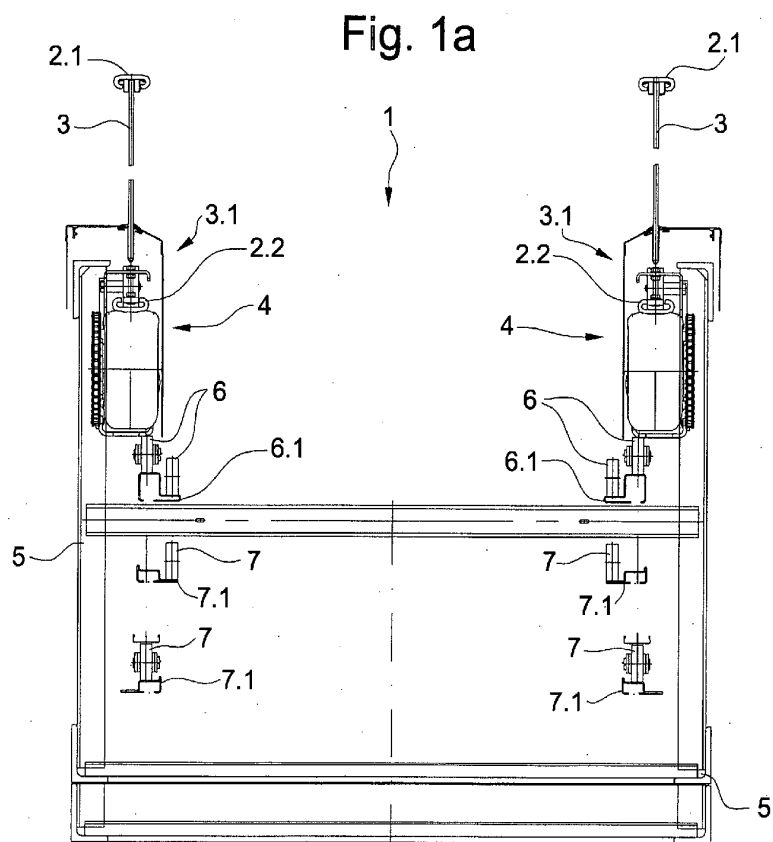
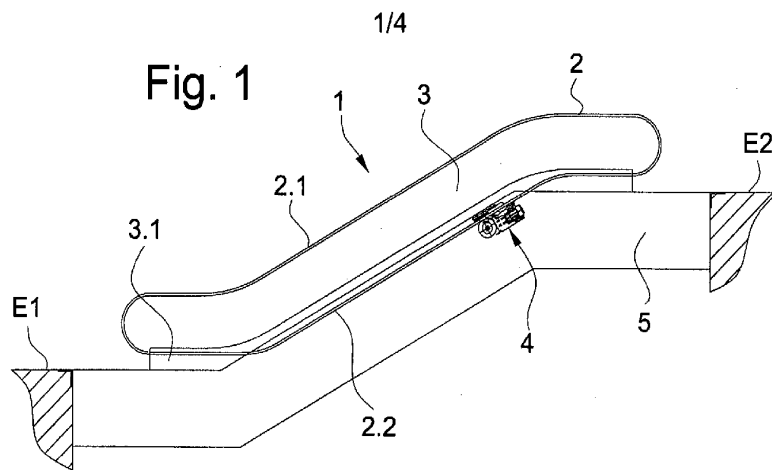


Fig. 1b

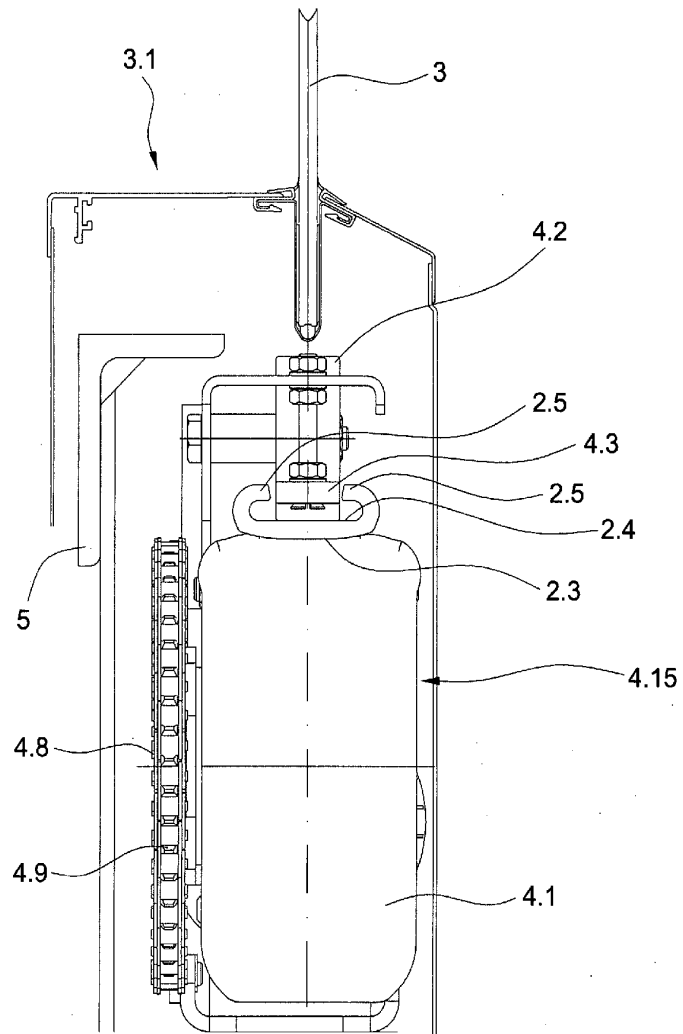


Fig. 2

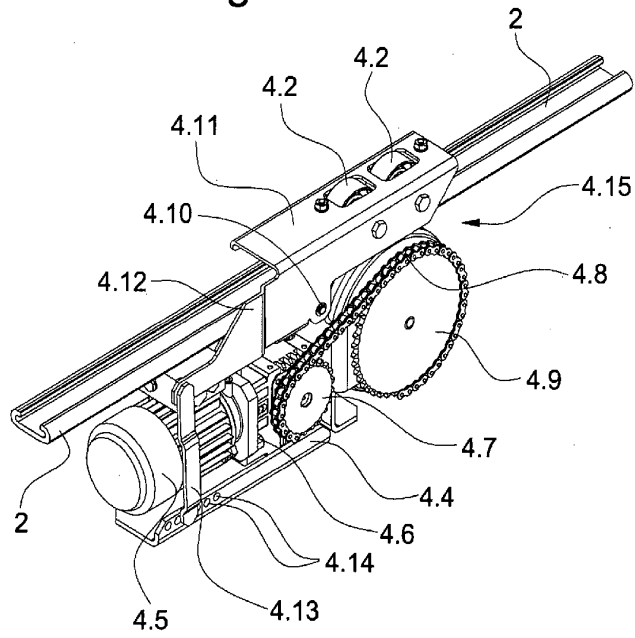
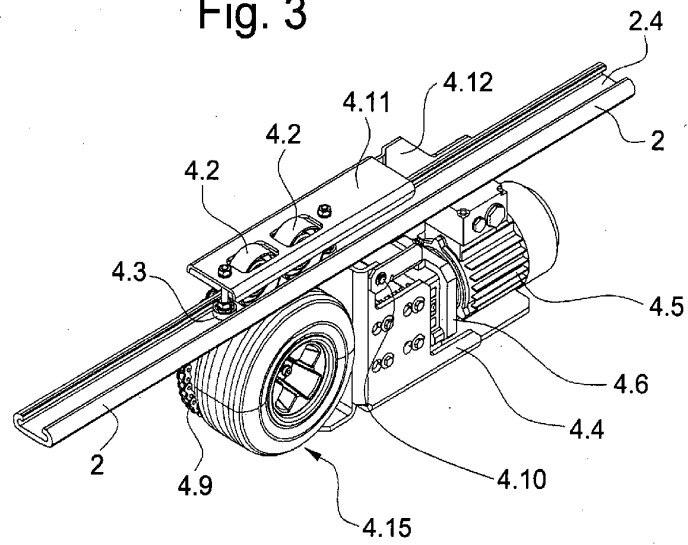


Fig. 3



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Fig. 4

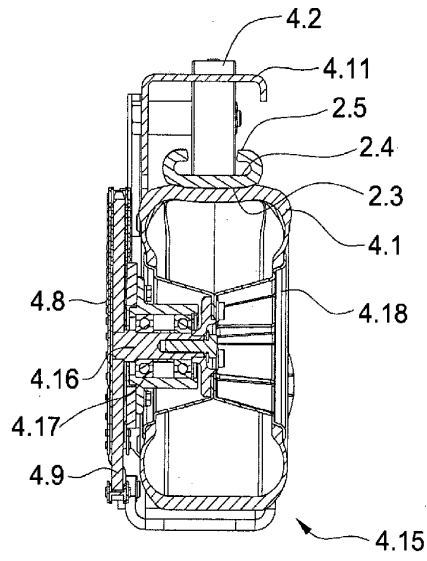


Fig. 5

