

CONVEYOR

FIELD OF THE INVENTION

The present invention relates to a method as defined
5 in the preamble of claim 1. Furthermore, the invention
concerns a travelator as defined in the preamble of
claim 14.

BACKGROUND OF THE INVENTION

10 As for prior art, reference is made to Japanese speci-
fication JP 2003-20281A, which discloses a travelator
for passenger transport. The travelator comprises a
number of successive conveyors so arranged that they
form an acceleration section, a constant-speed section
15 and a deceleration section. The acceleration section
consists of a number of successive belt conveyors
which move at even speeds stepwise increasing in the
transport direction to accelerate the speed of trans-
port of the passenger from a substantially slow ini-
20 tial speed to a higher transport speed. The constant-
speed section comprises a conveyor/conveyors for
transporting passengers at a constant transport speed.
The deceleration section is implemented in a manner
corresponding to the acceleration section but in a
25 functionally reverse order by arranging successive
conveyors moving at even speeds stepwise decreasing in
the transport direction for slowing down the speed of
transport of passengers from the constant transport
speed to a slower final speed.

30 Travelators are typically used at airports, where
travelators are provided between terminals and parking
areas and between different terminals, at subway and
railway stations and in department stores. In these
35 applications, the transport distances are typically a
few hundred meters. Transport speed is typically about

0.6 m/s and maximum speed about 0.8 m/s. The speed is restricted by the hazard associated with the act of stepping onto or off a moving conveyor. With these low speeds it is not reasonable to make very long travelators (>200 m) because the travel time becomes inconveniently long. Traveling from end to end of a 500 m long travelator at a speed of 0.8 m/s takes 10 minutes. However, there are situations (e.g. between terminals at airports) where it is necessary to travel through distances of 200 ... 1000 m or even more, where a travelator would be an advantageous solution if it had a sufficient speed. At present, these needs are usually fulfilled by using bus or subway lines or by walking.

Ideas regarding a high-speed travelator have been put forward, but as far as we know such a conveyor, which could be used in urban centers as a form of transport competing with subway transport, has so far never been implemented in practice anywhere. This type of travelator would be longer than earlier types, with a possible total transport distance of the order of up to about 2000 m. In the case of travelators of this length, it is also necessary to use a relatively high constant transport speed, e.g. of the order of 5 m/s. An appropriate initial/final speed corresponds roughly to the typical human walking speed.

Accelerating the travelator from a low initial speed to a high constant transport speed requires a relatively long acceleration section, and decelerating from that speed correspondingly requires a long deceleration section. If the acceleration takes place at even intervals from one constant speed step to another over the entire length of the acceleration and deceleration section e.g. in the manner described in JP 2003-20281A, this involves a problem regarding passen-

ger comfort and human adaptability to the stepwise changing speed. In practice, the passenger moves forward on the travelator while standing on his/her feet. The person's body and feet form a flexible system which wobbles back and forth during the stepwise speed changes. When the passenger is subjected to such wobbling in a temporally continuously accelerating/decelerating tempo, which is what happens in the case of the prior-art construction of the acceleration/deceleration section of a travelator, passenger comfort suffers because the passenger is not allowed enough time to adapt to the speed changes. The passenger may even sway out of balance, which leads to hazardous situations.

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Due to the above-mentioned problems, so far prior-art solutions have not aimed at reaching a very high traveling speed.

20 Specification EP 0 803 464 (CNIM) discloses a travelator which has acceleration/deceleration sections implemented using adjacent rotating shafts provided with interleaved discs and a rubber belt forming a constant-speed section. Disposed between the acceleration
25 section and the constant-speed section is a fixed plate covered with rotating balls. A product by CNIM (Constructions Industrielles de la Mediterranee - CNIM, France), a high-speed travelator, has been installed at Montparnasse station in Paris. The operation and construction of the CNIM travelator is described
30 at Internet address www.ratpinfo.net/testeur.php. The length of the travelator is 185 m. The initial speed is 0.75 m/s ... 0.8 m/s. In the constant-speed section the transport
35 speed is 2.5 ... 3 m/s. The acceleration and deceleration sections have a length of only a few meters and

the maximum acceleration/deceleration within them is about 0.9 m/s^2 .

5 The use of this travelator involves risks and many passengers have stumbled and fallen on the travelator. Due to the short acceleration/deceleration section, the large change in acceleration and deceleration unpleasant to people. Moreover, women's stiletto shoes are not compatible with the rotating shafts. In addition,
10 tion, the fixed plate between the acceleration/deceleration section and the constant-speed section is dangerous because one may easily trip over it.

Specification EP 1 253 101 (Thyssen) discloses a
15 high-speed travelator based on telescopic pallets, which is reported to be able to move at a speed of 2.0 m/s . The technical solution used here is probably safer than the travelator according to EP 0 803 464, but it is also very complicated as it has several
20 parts sliding one over the other.

In both travelator solutions referred to have a relatively high acceleration/deceleration in the acceleration/deceleration section and a low maximum speed in
25 the constant-speed section.

OBJECT OF THE INVENTION

The object of the present invention is to overcome the above-mentioned drawbacks.

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A specific object of the invention is to disclose a method and a travelator such that the passengers using it find traveling on the travelator a pleasant, comfortable and safe experience.

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A further object of the invention is to disclose a method and a travelator in which acceleration from a

low initial speed to a desired high constant speed and corresponding deceleration takes place in a manner that the passenger is well able to adapt to without finding the acceleration and deceleration stage an uncomfortable experience.

An additional object is to disclose a travelator in which the length of the acceleration and deceleration sections is in no way limited and can be designed to a desired length.

BRIEF DESCRIPTION OF THE INVENTION

The method of the invention is mainly characterized by what is disclosed in claim 1. Further, the travelator of the invention is characterized by what is disclosed in claim 14. Inventive embodiments are also presented in the description part of the present application and in the drawings. The inventive content disclosed in the application can also be defined in other ways than is done in the claims below. The inventive content may also consist of several separate inventions, especially if the invention is considered in the light of expressions or implicit sub-tasks or in respect of advantages or sets of advantages achieved. In this case, some of the attributes contained in the claims below may be superfluous from the point of view of separate inventive concepts. The features and details of different embodiments and forms of application of the invention may be applied in connection with other embodiments or forms of application within the scope of the basic inventive concept and/or inventive content.

The method for transporting passengers on a travelator comprises an acceleration stage in which the speed of transport of passengers is accelerated via stepwise increasing successive even speeds from a substantially slow initial speed to a heightened transport speed, a

constant-speed stage in which passengers are transported at a constant speed, and a deceleration stage in which the speed of transport of passengers is decelerated via stepwise decreasing successive even speeds to a substantially slow final speed. According to the invention, transport speed is changed during the acceleration and/or deceleration stage in a stepwise manner such that the average acceleration experienced by the passengers is constant substantially throughout the entire acceleration/deceleration stage.

Correspondingly, the travelator comprises a number of successive conveyors arranged to form an acceleration section, which contains successive conveyors having even speeds stepwise increasing in the transport direction for accelerating the passenger transport speed from a substantially slow initial speed to a heightened transport speed; a constant-speed section containing a conveyor/conveyors for transporting the passengers at a constant speed; and a deceleration section containing successive conveyors having even speeds stepwise decreasing in the transport direction for decelerating the passenger transport speed from the constant transport speed to a decelerated final speed. According to the invention, the speeds of the conveyors in the acceleration section and/or deceleration section are so adapted that the average acceleration experienced by the passengers over the entire length of the acceleration/deceleration section is constant.

In an embodiment of the method, the change of transport speed is kept constant in each step of speed change during the acceleration and/or deceleration stage.

In an embodiment of the method, the acceleration stage comprises acceleration portions, and constant-speed portions of different lengths alternating with the acceleration portions.

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In an embodiment of the method, the acceleration portions and constant-speed portions have been fitted to alternate in such manner that the transport distance in the constant-speed portions is the longer the higher is the transport speed.

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In an embodiment of the method, the length of the transport distances in the constant-speed portions alternating with the acceleration portions is varied as a square of the transport speed.

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In an embodiment of the method, the deceleration stage comprises deceleration portions, and constant-speed portions of different lengths alternating with the deceleration portions.

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In an embodiment of the method, the deceleration portions and constant-speed portions have been fitted to alternate in such manner that the transport distance in the constant-speed portions is the longer the higher is the transport speed.

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In an embodiment of the method, the length of the transport distances in the constant-speed portions alternating with the deceleration portions is varied as a square of the transport speed.

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In an embodiment of the method, the initial speed and the final speed are of the order of about 0.5 - 0.7 m/s.

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In an embodiment of the method, the transport speed in the constant-speed stage is about 2.5 - 7 m/s, suitably about 3 - 6 m/s and preferably about 5 m/s.

- 5 In an embodiment of the method, the stepwise change of transport speed in the acceleration stage is so adapted that the average acceleration experienced by the passengers is of the order of about 0.3 m/s^2 .
- 10 In an embodiment of the method, the stepwise change of transport speed in the deceleration stage is so adapted that the average deceleration experienced by the passengers is of the order of about 0.3 m/s^2 .
- 15 In an embodiment of the method, the speed difference between successive even speeds in the acceleration stage and/or deceleration stage is of the order of about 0.5 m/s.
- 20 In an embodiment of the travelator, the transport distances of the conveyors in the acceleration section and/or deceleration section are of a substantially equal length and the speed difference in each speed change step is constant.
- 25 In an embodiment of the travelator, the acceleration section contains acceleration portions where successive conveyors have a speed difference between them and constant-speed portions where successive conveyors
- 30 have the same transport speeds.
- In an embodiment of the travelator, the acceleration portions and constant-speed portions have been fitted to alternate in such manner that the transport distance in the constant-speed portions is the longer the
- 35 higher is the transport speed.

In an embodiment of the travelator, the deceleration section comprises deceleration portions where successive conveyors have a speed difference of a constant magnitude between them, and constant-speed portions
5 where successive conveyors have the same transport speeds.

In an embodiment of the travelator, the deceleration portions and constant-speed portions have been fitted
10 to alternate in such manner that the transport distance in the constant-speed portions is the longer the higher is the transport speed.

In an embodiment of the travelator, the length of the
15 transport distances in the acceleration section and/or deceleration section has been fitted to change as a square of the transport speed.

In an embodiment of the travelator, the point of speed
20 change between two successive conveyors is on a horizontal straight line perpendicular to the transport direction.

In an embodiment of the travelator, an individual conveyor comprises a first diverting element and a second
25 diverting element located at a distance from the first diverting element. Each diverting element comprises a number of first belt pulleys and a number of second belt pulleys. A transmission ratio exists between the
30 first and the second belt pulleys. The first and the second belt pulleys in each diverting element are arranged alternately in succession fixedly on the same shaft and rotating about a common axis of rotation. Further, the conveyor comprises a number of parallel
35 endless conveyor belts. Each conveyor belt is so guided that it runs over the first belt pulley of the first diverting element and over the second belt pul-

ley of the second diverting element. In adjacent successive conveyors, the second diverting element of the preceding conveyor as seen in the transport direction is the first diverting element of the next conveyor as
5 seen in the transport direction, and thus each diverting element forms a point of speed change between successive conveyors.

In an embodiment of the travelator, the transmission
10 ratio between the first belt pulley and the second belt pulley is determined by the ratio of the diameters of the belt pulleys.

In an embodiment of the travelator, the diameter of
15 the first belt pulley in the acceleration section is larger than the diameter of the second belt pulley.

In an embodiment of the travelator, the diameter of
20 the first belt pulley in the deceleration section is smaller than the diameter of the second belt pulley.

In an embodiment of the travelator, the endless conveyor belts are cogged belts. The first belt pulley and the second belt pulley are cogged belt pulleys
25 having different numbers of teeth, the transmission ratio between the first and the second belt pulleys being determined by the ratio of the numbers of teeth on the belt pulleys.

30 In an embodiment of the travelator, the transmission ratio between the first belt pulley and second belt pulley in the acceleration section is $1 < i \leq 1,1$.

In an embodiment of the travelator, the transmission
35 ratio between the first belt pulley and the second belt pulley in the deceleration section is $1 > i \geq 0,9$.

In an embodiment of the travelator, the initial speed and the final speed of the travelator are of the order of about 0.5 - 0.7 m/s.

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In an embodiment of the travelator, the transport speed in the constant-speed section of the travelator is of the order of about 2.5 - 7 m/s, suitably about 3 - 6 m/s and preferably about 5 m/s.

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In an embodiment of the travelator, the stepwise change of transport speed in the acceleration stage has been so adapted that the average acceleration experienced by the passengers is of the order of about 15 0.3 m/s².

In an embodiment of the travelator, the stepwise change of transport speed in the deceleration stage has been so adapted that the average deceleration experienced by the passengers is of the order of about 20 0.3 m/s².

In an embodiment of the travelator, the speed difference between successive conveyors is of the order of 25 0.5 m/s.

It is preferable to keep the transport surface of the travelator unbroken or at least such that the passenger will find it to be continuous, instead of effecting the passenger acceleration or deceleration in the conveyor solution by using successive sub-conveyors separated from each other, which would necessarily leave a gap between the slower and the faster sub-conveyor. An advantageous solution like this can be 30 achieved e.g. by using a structure common to successive sub-conveyors which connects them to each other and on which the motion of one sub-conveyor and that 35

of the next sub-conveyor are present simultaneously. Such a common structure may consist of a diverting element, such as a roller or equivalent, which is common to the successive sub-conveyors. By using a common
5 diverting element, the speed change between successive sub-conveyors can be adapted without separating the sub-conveyors from each other.

LIST OF FIGURES

10 In the following, the invention will be described in detail with reference to embodiment examples and the attached drawings, wherein

Fig. 1 presents a diagrammatic side view of an embodi-
15 ment of the travelator of the invention,

Fig. 2 presents a diagrammatic side view of a part of the beginning of the acceleration section of the travelator, corresponding to the beginning of range A in
20 Fig. 7,

Fig. 3 presents the travelator shown in the figure as seen from direction III-III in Fig. 2,

25 Fig. 4 presents a mathematically generated diagram representing transport speed as a function of distance in the acceleration section of the travelator in an embodiment of the travelator of the invention according to an embodiment of the method of the invention
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Fig. 5 presents a diagrammatic side view of a part of range E of the acceleration section of the travelator in Fig. 4,

35 Fig. 6 presents a diagrammatic side view of a part of range G of the acceleration section of the travelator in Fig. 4,

Fig. 7 presents section VII-VII taken from Fig. 3.

DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 presents a travelator for passenger transport, comprising a large number of successive conveyors 1. The conveyors are so arranged that, in the transport direction, they form an acceleration section 2, a constant-speed section 3 and a deceleration section 4. In the acceleration section 2, successive conveyors 1 have even speeds increasing stepwise in the transport direction, whereby the passenger transport speed is accelerated from a substantially slow initial speed to a heightened transport speed. The constant-speed section 3 contains conveyors for transporting the passenger at a constant transport speed. The deceleration section 4 contains successive conveyors 1 having even speeds decreasing stepwise in the transport direction for decelerating the passenger transport speed from the constant transport speed to a slow final speed. The initial speed and final speed of the travelator are of the order of about 0.5 - 0.7 m/s. The transport speed in the constant-speed section is of the order of about 2.5 - 7 m/s, suitably about 3 - 6 m/s and preferably about 5 m/s.

In the acceleration and deceleration sections, the stepwise change of the transport speed is so adapted that the average acceleration experienced by the passengers is constant substantially throughout the entire acceleration/deceleration stage. The average acceleration/deceleration is preferably of the order of about 0.3 m/s^2 . The speed difference between successive conveyors is preferably of the order of 0.5 m/s.

Figures 2 and 3 show the structure of the conveyors 1. The transport distances s of individual conveyors 1 are substantially of equal length. The speed differ-

ence between the conveyors 1 in each speed change step is constant, i.e. $v_1 - v_0 = v_2 - v_1 = v_3 - v_2$ and so on. The conveyors 1 are belt conveyors implemented using a number of adjacent narrow endless conveyor belts
5 10.

Each conveyor 1 comprises a first diverting element 5 and a second diverting element 6, which is located at a distance from the first diverting element 5. Each
10 diverting element 5, 6 comprises a number of first belt pulleys 7 and a number of second belt pulleys 8.

As is also shown in Fig. 7, the first and second belt pulleys 7 and 8 in each diverting element 5, 6 are
15 placed alternately in succession fixedly on the same shaft and they can thus rotate about a common axis of rotation 9 at the same speed.

A transmission ratio exists between the first belt pulleys 7 and the second belt pulleys 8. In the acceleration section 2, the transmission ratio i between
20 the first belt pulley 7 and the second belt pulley 8 is preferably $1 < i \leq 1,1$. In the deceleration section, the transmission ratio between the first belt pulley 7 and the second belt pulley 8 is $1 > i \geq 0,9$.
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In the example in Fig. 2, the transmission ratio in the acceleration section has been formed by using a first belt pulley 7 having a diameter D_1 somewhat larger than the diameter D_2 of the second belt pulley.
30 Correspondingly, in the deceleration section 4 the first belt pulley has a diameter D_1 smaller than the diameter D_2 of the second belt pulley.

35 In Fig. 2, the difference between the diameters D_1 , D_2 is somewhat exaggerated for better visual perception. In practice, if a first belt pulley 7 having a diame-

ter D1 of e.g. 10 cm is selected, then the second belt pulley 8 must have a diameter D2 only about 2 - 3 mm smaller if the speed difference between successive conveyors 1 is desired to be about 0.5 m/s. Each one of the parallel endless conveyor belts 10 is passed over the first belt pulley 7 of the first diverting element 5 and over the second belt pulley 8 of the second diverting element 6 as illustrated in Fig. 2 and 3. In adjacent successive conveyors 1, the second diverting element 6 of the preceding conveyor in the transport direction is the first diverting element 5 of the next conveyor in the transport direction. The point of speed change between successive conveyors 1 is on each diverting element 5, 6 on a horizontal line L perpendicularly transverse to the transport direction.

The endless conveyor belts 10 may be flat belts, V-belts or cogged belts. They are preferably also used as power transmitting elements, in which case no external transmission is needed. The conveyors 1 can be driven by motors M (see Fig. 1) placed e.g. at 50-meter distances, from which the power is transmitted to each conveyor 1 by the conveyor belts 10 themselves. This provides the advantage of simple construction as driving power needs to be supplied to the diverting elements 5, 6 only here and there. The advantages of cogged belts over triangular or flat belts are smaller losses and a more reliable drive. When the conveyor belts 10 used are cogged belts, correspondingly the first belt pulley 7 and the second belt pulley 8 are cogged belt pulleys having different numbers Z1, Z2 of teeth, so the transmission ratio between the first and the second belt pulleys is determined by the ratio Z1/Z2 of the numbers of teeth on the belt pulleys.

Fig. 4 represents the change of transport speed over the entire distance of the acceleration section 1 in an example situation where the acceleration section/stage has been implemented using conveyors 1 in such manner that the speeds of the conveyors 1 in the acceleration section 2 are so adapted that the average acceleration experienced by the passengers is constant substantially over the entire length of the acceleration section. To achieve this, the acceleration section 2 contains acceleration portions a, where successive conveyors 1 have a speed difference between them, and additionally constant-speed portions b, where successive conveyors 1 have the same transport speeds. The acceleration portions a and the constant-speed portions b have been fitted to alternate in such manner that the transport distance in the constant-speed portions b is the longer the higher is the transport speed. The graph shows this clearly as increased step lengths starting from range D towards higher speeds. The length of the transport distances in the constant-speed portions a has been fitted to change as a square of the transport speed.

In the example in Fig. 4, the distance between the axes 9 of rotation of the diverting elements 5, 6 arranged at even distances is 0.125 m. The total length of the acceleration section is 43,125 m. The initial speed is 0.65 m/s, in other words, the conveyor 1 in section A in Fig. 4 rotates at this speed. A constant average acceleration of 0.3 m/s^2 has been achieved by the following means.

In range A (corresponding to a transport distance of 0 - 5 m), successive conveyors 1 have been arranged as illustrated in Fig. 2 and 3, i.e. so that a speed change occurs at each diverting element. In each diverting element, the number Z1 of teeth on the first

belt pulley is 100 and the number Z2 of teeth on the second belt pulley is 98.

Arranged by turns in range B (transport distance 5.125 m - 6.500 m) are diverting elements in which one diverting element has a first belt pulley with 100 teeth Z1 and a second belt pulley with 99 teeth Z2 while the other diverting element has a first belt pulley with 100 teeth Z1 and a second belt pulley with 98 teeth Z2.

In each diverting element in range C (transport distance 6.625 m - 9.000 m), the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 on the second belt pulley is 99.

The conveyors in range D (transport distance 9.125 m - 17.500 m) are so arranged that it contains alternately diverting elements in which the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 of the second belt pulley is 99 while in the other diverting element the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 on the second belt pulley is 100, in other words, every second diverting element has a transmission ratio differing from 1, which results in a speed change. Thus, each acceleration portion a is followed by a constant-speed portion b of the same length.

The conveyors in range E (transport distance 17.625 m - 24.250 m) (see also Fig. 5) have been so arranged that in one diverting element the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 on the second belt pulley is 99 while in the next two other diverting elements the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 on the second belt pulley is 100, in other

words, only every third diverting element has a transmission ratio differing from 1, which causes a speed change. Therefore, as can be seen from Fig. 5, repeatedly in range E each acceleration portion a is always followed by a constant-speed portion b of a length twice that of the acceleration portion a.

The conveyors in range F (transport distance 24.375 m - 31.750 m) have been so arranged that in one diverting element the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 on the second belt pulley is 99 while in the next three diverting elements the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 on the second belt pulley is 100, in other words, only every fourth diverting element has a transmission ratio differing from 1, causing a speed change. Repeatedly in range F each acceleration portion a is thus always followed by a constant-speed portion b of a length three times that of the acceleration portion a.

The conveyors in range G (transport distance 31.875 m - 38.625 m) have been so arranged that in one diverting element the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 on the second belt pulley is 99 while in the next four other diverting elements the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 on the second belt pulley is 100, in other words, only every fifth diverting element has a transmission ratio differing from 1, causing a speed change. Thus, as can be seen from Fig. 6, repeatedly in range G each acceleration portion a is always followed by a constant-speed portion b of a length four times that of the acceleration portion a.

Finally, the conveyors in range H (transport distance 38.750 m - 42.125 m) have been so arranged that in one diverting element the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 on the second belt pulley is 99 while in the next five other diverting elements the number of teeth Z1 on the first belt pulley is 100 and the number of teeth Z2 on the second belt pulley is 100, in other words, only every sixth diverting element has a transmission ratio differing from 1, causing a speed change. Thus, as can be seen from Fig. 6, repeatedly in range H each acceleration portion a is always followed by a constant-speed portion b of a length five times that of the acceleration portion a.

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Although the above description covers the arrangement in the acceleration section, it is obvious that the deceleration section can be implemented in a completely corresponding manner by arranging the conveyor arrangement in a mirror image-like fashion relative to the arrangement used in the acceleration section.

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The invention is not limited to the embodiment examples described above; instead, many variations are possible within the scope of the inventive concept defined in the claims.

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CLAIMS

1. A method for transporting passengers on a travelator comprising successive conveyors, said method comprising
- 5 - an acceleration stage, in which the speed of transport of passengers is accelerated via stepwise increasing successive even speeds from a substantially slow initial speed to a heightened transport speed,
- 10 - a constant-speed stage, in which passengers are transported at a constant speed, and
- a deceleration stage, in which the speed of transport of passengers is decelerated via stepwise decreasing successive even speeds to a substantially
- 15 slow final speed, in which method the transport speed is changed during the acceleration and/or deceleration stage in a stepwise manner such that the average acceleration experienced by the passengers is constant substantially throughout the entire acceleration/
- 20 deceleration stage, characterized in that, during the acceleration stage and/or deceleration stage, the transport speed is changed using in adjacent successive conveyors a diverting element common to these conveyors, at which diverting element the speeds of
- 25 these adjacent successive conveyors are different in the transport direction..
2. A method according to claim 1, characterized in that, during the acceleration and/or deceleration
- 30 stage, the change of transport speed is kept constant in each step of speed change.
3. A method according to claim 1 or 2, characterized in that the acceleration stage comprises acceleration
- 35 portions, and constant-speed portions of different lengths alternating with the acceleration portions.

4. A method according to claim 3, characterized in that the acceleration portions and constant-speed portions have been fitted to alternate in such manner that the transport distance in the constant-speed portions is the longer the higher is the transport speed.

5. A method according to claim 4, characterized in that the length of the transport distances in the constant-speed portions alternating with the acceleration portions is varied as a square of the transport speed.

6. A method according to any one of claims 1 - 5, characterized in that the deceleration stage comprises deceleration portions, and constant-speed portions of different lengths alternating with the deceleration portions.

7. A method according to claim 6, characterized in that the deceleration portions and constant-speed portions have been fitted to alternate in such manner that the transport distance in the constant-speed portions is the longer the higher is the transport speed.

8. A method according to claim 7, characterized in that the length of the transport distances in the constant-speed portions alternating with the deceleration portions is varied as a square of the transport speed.

9. A method according to any one of claims 1 - 8, characterized in that the initial speed and the final speed are of the order of about 0.5 - 0.7 m/s.

10. A method according to any one of claims 1 - 9, characterized in that the transport speed in the constant-speed stage is about 2.5 - 7 m/s, suitably about 3 - 6 m/s and preferably about 5 m/s.

11. A method according to any one of claims 1 - 10, characterized in that the stepwise change of transport speed in the acceleration stage is so adapted that the average acceleration experienced by the passengers is of the order of about 0.3 m/s^2 .
12. A method according to any one of claims 1 - 11, characterized in that the stepwise change of transport speed in the deceleration stage is so adapted that the average deceleration experienced by the passengers is of the order of about 0.3 m/s^2 .
13. A method according to any one of claims 1 - 12, characterized in that the speed difference between successive even speeds in the acceleration stage and/or deceleration stage is of the order of about 0.5 m/s .
14. A travelator for passenger transport, comprising a number of successive conveyors (1) arranged to form
- an acceleration section (2), which contains successive conveyors having even speeds stepwise increasing in the transport direction for accelerating the passenger transport speed from a substantially slow initial speed to a heightened transport speed,
 - a constant-speed section (3) containing a conveyor/conveyors for transporting the passengers at a constant speed, and
 - a deceleration section (4) containing successive conveyors having even speeds stepwise decreasing in the transport direction for decelerating the passenger transport speed from the constant transport speed to a decelerated final speed,
- in which travelator the speeds of the conveyors in the acceleration section (2) and/or deceleration section (3) have been so adapted that the average acceleration experienced by the passengers over the entire length

of the acceleration/deceleration section is constant, characterized in that adjacent successive conveyors in the acceleration/deceleration section have at the speed change point a diverting element common to these
5 conveyors, at which diverting element the speeds of these adjacent successive conveyors are different in the transport direction.

15. A travelator according to claim 14, characterized
10 in that the transport distances of the conveyors (1) in the acceleration section and/or deceleration section are of a substantially equal length and the speed difference in each speed change step is constant.

15 16. A travelator according to claim 14 or 15, characterized in that the acceleration section (2) contains acceleration portions where successive conveyors (1) have a speed difference between them, and constant-speed portions where successive conveyors have the
20 same transport speeds.

17. A travelator according to claim 16, characterized in that the acceleration portions and constant-speed portions have been fitted to alternate in such manner
25 that the transport distance in the constant-speed portions is the longer the higher is the transport speed.

18. A travelator according to any one of claims 14 - 17, characterized in that the deceleration section (4)
30 comprises deceleration portions where successive conveyors (1) have a speed difference of a constant magnitude between them, and constant-speed portions where successive conveyors have the same transport speeds.

35 19. A travelator according to claim 18, characterized in that the deceleration portions and constant-speed portions have been fitted to alternate in such manner

that the transport distance in the constant-speed portions is the longer the higher is the transport speed.

20. A travelator according to any one of claims 17 -
5 19, **characterized** in that the length of the transport distances in the acceleration section (2) and/or deceleration section (4) has been fitted to change as a square of the transport speed.

10 21. A travelator according to any one of claims 14 - 20, **characterized** in that the point of speed change between two successive conveyors (1) is on a horizontal straight line perpendicular to the transport direction.

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22. A travelator according to any one of claims 14 - 21, **characterized** in that the conveyor (1) comprises:

- a first diverting element (5) and a second diverting element (6) located at a distance from the
20 first diverting element, each one of said diverting elements (5, 6) comprising a number of first belt pulleys (7) and a number of second belt pulleys (8), with a transmission ratio existing between said first and second belt pulleys, and which first and second belt
25 pulleys in each diverting element have been arranged alternately in succession fixedly on the same shaft and rotatable about a common axis (9) of rotation, and
- a number of parallel endless conveyor belts (10), each one of which conveyor belts runs over the
30 first belt pulley (7) of the first diverting element (5) and over the second belt pulley (8) of the second diverting element (6);

and that, in adjacent successive conveyors, the second diverting element of the preceding conveyor
35 in the transport direction is the first diverting element of the next conveyor in the transport direction,

and thus each diverting element forms a point of speed change between successive conveyors.

23. A travelator according to claim 22, characterized
5 in that the transmission ratio between the first belt pulley (7) and the second belt pulley (8) is determined by the ratio $(D1/D2)$ of the diameters of the belt pulleys.
- 10 24. A travelator according to claim 23, characterized in that, in the acceleration section (2), the diameter $(D1)$ of the first belt pulley (7) is larger than the diameter $(D2)$ of the second belt pulley (8).
- 15 25. A travelator according to claim 23 or 24, characterized in that, in the deceleration section (4), the diameter $(D1)$ of the first belt pulley is smaller than the diameter $(D2)$ of the second belt pulley.
- 20 26. A travelator according to claim 22, characterized in that the endless conveyor belts (10) are cogged belts; that the first belt pulley (7) and the second belt pulley (8) are cogged belt pulleys having different numbers of teeth $(Z1, Z2)$, the transmission ratio
25 between the first and the second belt pulleys being determined by the ratio $(Z1/Z2)$ of the numbers of teeth on the belt pulleys.
27. A travelator according to any one of claims 14 -
30 26, characterized in that the transmission ratio between the first belt pulley (7) and second belt pulley (8) in the acceleration section is $1 < i \leq 1,1$.
28. A travelator according to any one of claims 14 -
35 27, characterized in that the transmission ratio between the first belt pulley (7) and the second belt pulley (8) in the deceleration section is $1 > i \geq 0,9$.

29. A travelator according to any one of claims 14 -
28, **characterized** in that the initial speed and the
final speed of the travelator are of the order of
5 about 0.5 - 0.7 m/s.

30. A travelator according to any one of claims 14 -
29, **characterized** in that the transport speed in the
constant-speed section of the travelator is of the or-
10 der of about 2.5 - 7 m/s, suitably about 3 - 6 m/s and
preferably about 5 m/s.

31. A travelator according to any one of claims 14 -
30, **characterized** in that the stepwise change of
15 transport speed in the acceleration stage has been so
adapted that the average acceleration experienced by
the passengers is of the order of about 0.3 m/s².

32. A travelator according to any one of claims 14 -
20 31, **characterized** in that the stepwise change of
transport speed in the deceleration stage has been so
adapted that the average deceleration experienced by
the passengers is of the order of about 0.3 m/s².

25 33. A travelator according to any one of claims 14 -
32, **characterized** in that the speed difference between
successive conveyors (1) is of the order of 0.5 m/s.