

"Tread Element for Moving Pavement or Escalator"

The invention relates to a tread element for a moving pavement or escalator, the tread element having a tread plate to receive the person to be transported, the tread plate having secured to it a nosing near at least one of its longitudinal edges.

Tread elements can of course have external nosings and mouldings or the like; unfortunately, securing them by means of a few screws to the tread element is inadequate in the long term for the rough operating conditions to which they are subject, and breakages of nosings or the jamming of noses between relatively moving parts of a moving pavement or an escalator cause unwanted disturbances in operation.

It is known to use so-called compact step elements - i.e., unitary die cast step elements made of an aluminium alloy. These are stronger and lighter than composite step elements but have the disadvantage of requiring replacement of the entire step element in the event of damage to the ribbing on the outside edges of the tread surface, a relatively elaborate and expensive operation.

What is desired is a tread element which is free from these disadvantages and which enables the nosing or the like to be secured over the entire length of at least one of its longitudinal edges.

The present invention provides a unitary die cast tread element for a moving pavement or escalator, the tread element having a tread plate to receive the person to be transported, the tread plate having secured to its top surface a nosing along at least one of its longitudinal edges, in which the nosing engages below a part and/or embraces the outside edge of the tread plate along at least the outside one of the two longitudinal edges of the nosing and is rigidly secured to the top surface of the tread plate between the two longitudinal edges of the nosing by additional securing means.

Conveniently, for an even stronger connection between the nosing and the tread element, the tread plate has the nosing on at least one of its said edges and the nosing engages along both its longitudinal edges below a part of the tread plate.

Advantageously in this case, the nosing engages along its inside longitudinal edge in at least one recess therein.

Conveniently, the outside longitudinal edge of the nosing engages below the outside of the tread plate.

It is advantageous, more particularly on the front longitudinal edge of a tread element, if the nosing engages at an angle around the longitudinal edge of the tread plate and engages along each of its two longitudinal edges in a recess in the tread element.

Conveniently, to ensure that more particularly nosings or the like secured laterally and at the rear to the tread plate do not drop off in the event of accidental release of their additional securing means while the element is in use, the lateral gap between, on the one hand, the nosing and, on the other hand, a component immediately adjacent the same, disposed at the same height as or projecting beyond the nosing and movable relatively to the tread plate which has the nosing is less than the mobility of the nosing perpendicularly to its length in the operative zone of the two zones where the nosing engages below the tread plate.

Conveniently too, for an optimal connection between the nosing or the like and the tread element, the interengaging parts of the nosing and tread plate form two longitudinal guides which extend along the two longitudinal edges of the nosing and which permit longitudinal movement thereof relatively to the tread plate but not movement transversely of nosing length.

Advantageously, to ensure that in the event of the additional securing means being lost a nosing or the like disposed laterally on the tread plate cannot accidentally drop off, the nosing extending along the tread element front wall extends over the entire width of the tread plate and therefore prevents the two lateral nosings from projecting out in their guides beyond the front wall.

Conveniently, at least one of the two lateral nosings extends to the tread element front wall and has an abutment which co-operates with the tread plate and which permits introduction of the nosing from the tread plate side opposite the front wall into its associated longitudinal guide but prevents movement of the nosing in such guide beyond the front wall.

Claims 10 to 17 set out other advantageous further developments of the tread element according to the invention.

The tread element may have a warning strip extending along one side of the tread plate, the warning strip being a differently coloured nosing which is

inserted in the tread plate, is at a distance from its outside edge, forms part of the tread plate tread surface and is rigidly attached to the tread plate by additional securing means.

Claims 19 to 21 set out convenient further developments of this subject of the invention.

The invention will be described herein after with reference to the drawings, wherein:

Figure 1 is a perspective view of a part of an escalator having tread elements in accordance with the invention;

Figure 2 is a section on the line II-II of Figure 1;

Figure 3 is a section on the line III-III of Figure 1;

Figure 4 is a section IV-IV of Figure 1;

Figure 5 is a plan view of a part of the tread plate of the escalator step shown in Figure 1;

Figure 6 is a section on the line VI-VI of Figure 5;



Figure 7 is a perspective view of a part of a second exemplary embodiment of an escalator having tread elements in accordance with the invention;

Figure 8 is a section on the line VIII-VIII of Figure 7;

Figure 9 is a section on the line IX-IX of Figure 7;

Figure 10 is a section on the line X-X of Figure 7;

Figure 11 is a section on the line XI-XI of Figure 7;

Figure 12 is a section on the line XII-XII of Figure 7;
and

Figure 13 is a section on the line XIII-XIII of Figure 7.

As can be seen from Figure 1, a tread element or escalator step 1 of the escalator shown has a tread plate 2 adapted to receive the person to be transported. The tread plate 2 has nosings or edge strips or the like 3,4,5 introduced into it and secured to it.



As can be seen from Figures 2 and 4, the relatively heavily exposed nosings 3,5 each engage along both their longitudinal edges 3a,3b or 5a,5b over their entire length below respective parts 6,7 or 8,9 of the step 1 and are thus secured along their two outside edges 3a,3b or 5a,5b over their entire length to the step 1. Also, screws 10 are provided which rigidly secure the nosings 3,5 to the tread plate 2 between their two longitudinal edges 3a,3b and 5a,5b respectively retained by the tread plate 2.

As Figure 2 shows, the front nosings 3 are formed such that they embrace angularly the front longitudinal edge of the tread plate 2 or step 1 - and engage along both their longitudinal edges 3a,3b in respective recesses formed below respective projections 6,7 of the step 1. Also, the two longitudinal edges 3a,3b of the angular cross-section nosings 3 project at least substantially perpendicularly to the tread plate 2 and the front wall 11 and engage in corresponding grooves in the step 1. The nosing 3 is therefore prevented from moving in the direction A or B perpendicular to its correspondingly devised longitudinal edge 3a and 3b and parallel to the tread plate 2 and front wall 11 respectively.

The nosing 3 has on its outside ribs 14 of the same pitch as the ribs of the tread plate 2 and front wall 11.

As can be gathered from Figure 4, the lateral nosings or edgings or the like 5 engage, along their longitudinal edge 5a directed towards the interior of the tread plate 2, in a recess with which the tread plate 2 is formed below a projection 8 and are thus secured over the whole length of the edge 5a to the step 1.

Along their longitudinal edge 5b which extends along the outside edge 9 of the tread plate 2, the nosings 5 extend below the outside edge of the tread plate 2 and are therefore secured along the entire length of their second longitudinal edge 5b to the step 1.

Those parts of the nosing 5 which engage below the projection 8 and the outside edge 9 are of a length such that their engagement length a and b respectively is greater than the lateral gaps g between the nosing 5 and the fixedly disposed side curtaining 20 (see also Figure 1), so that even should the additional securing elements 10 drop out, the nosing 5 would not drop out as well.

As can be gathered from Figure 3, the rear nosing or edging 4 engages, along its longitudinal edge 4b extending along the outside edge 15 of the tread plate

2, below the outside edge thereof and is therefore secured over the whole length of the edge 4b to the tread plate 2.

Along its second longitudinal edge 4a the rear nosing or edging or the like 4 is rigidly secured to the tread plate 2 by the screws 10.

Also, the longitudinal edge 4a of the nosing 4 projects substantially perpendicularly to the tread plate 2 and engages below the tread plate. The resulting catch rib 16 engages in a corresponding inclined groove 17 in the step 1 so that the nosing 4 is prevented from a movement C perpendicular to its correspondingly devised longitudinal edge 4a and parallel to the tread plate 2 or in any other direction extending in the plane of Figure 4, over its whole length; consequently, the nosing 4 can be introduced into its two lateral longitudinal guides only lengthwise of itself.

To reduce the cost of nosing production and to reduce to a minimum the effect of pitch errors of the ribs on the nosings and to reduce very considerably the effect of expansion errors, the nosings are, conveniently, and as shown in Figure 5, sub-divided over their length into a number of segments 3', 3'' and 3''', the various segments 3', 3'', 3''' being formed for lateral centering, in the

manner visible in Figure 6, with a recess 18 which is in their underside and in which a centering projection 19 of the step 1 engages centeringly. Of course this kind of centering is possible only in the case of such nosings or the like as do not have to be introduced lengthwise in lateral guides.

Since this kind of anchorage of the nosings 3,4,5 to the step 1 cause for a relatively complicated anchorage zone therein, this construction is particularly suitable for compact tread elements produced as an aluminium alloy die casting, where anchorage facilities of this kind can be provided relatively simply.

Of course, securing elements other than the screws 10 can be used, such as plastics anchorage pins which are formed on the nosings or the like and which, after their introduction into correspondingly pre-shaped bores in the tread element, are deformed at the end projecting from the bore by heat and, therefore, anchored.

The tread plate 2 can of course have in its external zones coloured markings to indicate to the person on the escalator that he should it at all possible keep away from these outer zones of the tread plate.

Unfortunately, these coloured markings have the

disadvantage that they very quickly cease to be striking because the colour coating wears.

To obviate this and to enable the tread plate outer zones to be produced as a unitary die casting with the remainder of the tread element, the warning strip takes the form, as can be gathered more particularly from Figure 7, of edge strips 3', 4', 5' inserted in the tread plate 2 and disposed at a distance from its outside wall. The latter nosings form a part of the tread plate tread surface and have the same width pitch as the latter and amplify its ribs continuously to form ribs extending over the entire tread surface. The nosings 3', 4', 5' used for this purpose can be made, for example, of yellow plastics or of a yellow anodized aluminium alloy; in the latter event the nosings can be produced, for example, by drawing or continuous casting.

The edgings 3', 4', 5' are secured, as can be gathered from Figures 8 to 13, by each engaging along one longitudinal edge, e.g. 4b, below a projecting part of the tread plate 2, so as to be satisfactorily secured thereto over their whole length. To ensure that the nosings 3', 4', 5' cannot shift laterally, opposite longitudinal edges, e.g. 4a, engage each with an abutment 21 formed in the tread plate 2. The foot of the nosings or edgings or the like thus

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engaging in a recess in the plate 2 is so devised that the various nosings can be removed from the tread element if they are first tilted around their longitudinal edge 3b,4b,5b disposed below the respective projection 23 of the tread plate 2.

After the nosings 3',4',5' have been introduced into the tread plate 2, the nosings are rigidly secured thereto by means of additional securing means 10, such as screws.

To ensure that in the event of any screws 10 dropping out the nosings 3',4',5' cannot drop out, the latter are interlaced by means of overlapping projections 24. However, to enable any of the four nosings to be introduced or removed, the nosing 4' is, as shown in Figure 13, movable lengthwise by an amount d greater than the overlap e of its projection 24 over the contiguous nosing 5'.

To removing the nosings thus secured from the plate 2, all the screws 10 are first removed, whereafter the rear nosing 4' is disengaged against the force of a compression spring 22 from the nosing 5' it overlaps, whereafter the nosing 5', then the front nosing 3', then the second nosing 5' and finally the rear nosing 4' can be removed from the tread plate 2. Also, the

nosings 3', 4', 5' can be secured by their overlapping arrangement without this additional securing.

Claims:

1. A unitary die cast tread element for a moving pavement or escalator, the tread element having a tread plate to receive the person to be transported, the tread plate having secured to its top surface a nosing along at least one of its longitudinal edges, in which the nosing engages below a part and/or embraces the outside edge of the tread plate along at least the outside one of the two longitudinal edges of the nosing and is rigidly secured to the top surface of the tread plate between the two longitudinal edges of the nosing by additional securing means.
2. A tread element as claimed in claim 1, in which the tread plate has a nosing on at least one of its outside edges and the nosing engages along both its longitudinal edges below a part of the tread plate.
3. A tread element as claimed in claim 1 or 2, in which the nosing engages along its inside longitudinal edge in at least one recess of the tread plate.
4. A tread element as claimed in claim 2 or claims 3 when dependent on claim 2, in which the outside longitudinal edge of the nosing engages below the outside edge of the tread plate.



5. A tread element as claimed in claim 2, in which the nosing embraces angularly the longitudinal outside edge of the tread plate and engages along each of its two longitudinal edges in a recess in the tread element.

6. A tread element as claimed claim 2, in which a lateral gap between the nosing embracing the outside longitudinal edge of the tread plate and a component immediately adjacent to the nosing, disposed at the same height as or projecting beyond it and movable relatively to the tread plate which has the nosing, is less than the engagement length of the parts of the nosing engaging below the tread plate in a direction perpendicularly to the length of the nosing.

7. A tread element as claimed in claim 2, in which the interengaging parts of the nosing and tread plate form two longitudinal guides which extend along the two longitudinal edges of the nosing and which permit longitudinal movement of the nosing relatively to the tread plate but not movement transversely to the nosing length.

8. A tread element as claimed in claim 7, in which the nosing extending along the tread element front wall, extends over the entire width of the tread plate and



prevents two lateral nosings from moving out in their guides beyond the front wall.

9. A tread element as claimed in claim 7, in which at least one of two lateral nosings extends to the tread element front wall and abuts in its final position against an abutment which is part of the tread plate and which abutment is formed in a manner such that it permits introduction of the nosing from the tread plate side opposite the front wall into its associated longitudinal guide but prevents movement of the nosing in such guide beyond the front wall.

10. A tread element as claimed in claim 1, in which for lateral centering the nosing has on its underside a centering which co-operates with the tread plate.

11. A tread element as claimed in claim 1 or 2, in which at least one longitudinal edge of the nosing projects substantially perpendicularly to the tread plate plane or front wall plane and so engages in a corresponding groove in the tread element that the nosing is inhibited from movement perpendicularly to its corresponding longitudinal edge and parallel to the tread plate plane or front wall plane.



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12. A tread element as claimed in any of claims 1 to 11, in which the nosing is sub-divided in its longitudinal direction into a number of separate portions.

13. A tread element as claimed in any of claims 1 to 12, in which the tread plate including one recess for the nosings and the parts below which the nosings engage, is a die-casting.

14. A tread element as claimed in any of claims 1 to 13, in which the nosings or nosing portions are made of coloured plastics or a colour-anodised aluminium alloy.

15. A tread element as claimed in any of claims 1 to 14, in which the nosing has the same rib pitch as the tread plate.

16. A tread element as claimed in claims 5 and 15, in which the ribs embrace angularly the outside of the nosing.

17. A tread element as claimed in claim 7, in which the nosings are provided along all four outside edges of the tread plate and engage at their ends in the adjacent nosings, so that mobility of the nosings along their longitudinal guides is inhibited.



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18. A tread element according to claim 1, having at least one warning strip extending along an outside of the tread plate, in which the warning strip is a differently coloured nosing which is inserted in the tread plate, is at a distance from the outside edge thereof, and forms part of the tread plate tread surface.

19. A tread element as claimed in claim 18, in which the nosings extending along all the outside edges of the tread surface are provided, which engage along one longitudinal edge below a part of the tread plate and by way of their opposite longitudinal edge co-operate with at least one lateral abutment for lateral retention; the nosings are interlaced with one another; and at least one of the nosings is movable lengthwise out of engagement with its overlapping adjacent nosing.

20. A tread element as claimed in claim 19, including spring means which retain the movable nosing in resilient engagement with the overlapping adjacent nosing.

21. A tread element as claimed in any of claims 18 to 20, in which the nosings are made of a colour-anodized aluminium alloy or of coloured plastics.



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22. A tread element substantially as described herewin
with reference to, and as shown in, Figures 1 to 6 or
Figures 7 to 13 of the accompanying drawings.

