

(19) **DANMARK**

(10) **DK/EP 2800833 T3**



(12)

Oversættelse af
europæisk patentskrift

Patent- og
Varemærkestyrelsen

-
- (51) Int.Cl.: **E 01 B 1/00 (2006.01)** **E 01 B 3/28 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2016-10-24**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2016-07-20**
- (86) Europæisk ansøgning nr.: **12773337.6**
- (86) Europæisk indleveringsdag: **2012-10-19**
- (87) Den europæiske ansøgnings publiceringsdag: **2014-11-12**
- (86) International ansøgning nr.: **EP2012070732**
- (87) Internationalt publikationsnr.: **WO2013102504**
- (30) Prioritet: **2012-01-03 DE 102012000028**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
- (73) Patenthaver: **RAIL.ONE GmbH, Ingolstädter Strasse 51, 92318 Neumarkt, Tyskland**
- (72) Opfinder: **SÄCKLER, Robert, Finkenweg 16, 93138 Lappersdorf, Tyskland**
ROSSMANN, Hans-Christian, Kissingenstr. 37, 13189 Berlin, Tyskland
SPITZNER, Gundolf, Sauerbruchstrasse 7, 92331 Parsberg, Tyskland
- (74) Fuldmægtig i Danmark: **PATRADE A/S, Fredens Torv 3A, 8000 Århus C, Danmark**
- (54) Benævnelse: **Fast kørebane**
- (56) Fremdragne publikationer:
WO-A2-2010/035958
DE-A1-102006 055 307
DE-U1- 29 611 823

The invention relates to a non-ballasted track, with a track panel supported on a base course having concrete sleepers and rails and anchor blocks for anchoring the concrete sleepers on the base course.

- 5 Such non-ballasted tracks are provided by the applicant company for some time under the name GETRAC (registered trademark). Therefore, it relates to a non-ballasted track with ballast less railway superstructure, in which the base course is normally made of asphalt. This non-ballasted track is characterized by a direct support of the track panel on the asphalt. The anchoring of the concrete sleepers
- 10 on the asphalt layer takes place by means of the anchor blocks. During the installation, the sleepers are laid over the asphalt layer and permanently attached elastically to the anchor block made of high strength concrete. The anchor block is designed such that it can transfer the track forces occurring in the longitudinal and transverse directions to the asphalt layer. The asphalt layer is built similar to that in
- 15 the road construction, the anchoring takes place in several layers by an automatically controlled heavy-duty paver. The bituminous base course is introduced on a ballast course or a hydraulically bound base course.

- A sleeper with anchor block and a method for making a non-ballasted track with
- 20 such a sleeper is known from the document DE 102 30 740 A1. The anchor block serves as the connecting member between the sleeper and the base course, for this purpose, the concrete sleeper has a recess on the underside thereof, in which the anchor block is inserted up to about half the height thereof. The lower half of the anchor block is inserted in an opening in the base course and moulded with a
- 25 filler material.

- A wide-sleeper for a non-ballasted track is known from the document EP 1 288 371 A2, which is provided for non-ballasted tracks under the name GETRAC A3. The concrete sleepers have a central region with reduced width; it relates to
- 30 concrete sleepers which are disposed at only a small distance with respect to each other. The cylindrical anchor block is placed on the one side in a recess under the wide sleeper and on the other side, in an opening of the base course and

moulded. The recess in the asphalt base course is rectangular and laterally juts out of the central region of the sleeper with reduced width, in order to facilitate a subsequent filling with the filler material.

- 5 DE 10 2006 055 307 A1 discloses a generic non-ballasted track according to the preamble of claim 1.

Although such non-ballasted tracks in which the sleepers are fixed with anchor blocks, are normally proved themselves very effective, the installation cost is
10 perceived to be high, because initially the recess in the base course must be made precisely. Subsequently, the sleeper along with the anchor block is placed in or above the recess and the anchor block is moulded.

Therefore, the object underlying the invention is to specify a non-ballasted track in
15 which the production cost is reduced.

For achieving this object, in a non-ballasted track mentioned at the beginning it is provided in accordance with the invention that the anchor block is configured as trapezoid and fixed on a flat surface of the base course by means of an asphalt
20 adhesive or by means of a concrete adhesive.

The invention is based on the knowledge that the installation of a non-ballasted track can be simplified, in which anchor blocks are mounted on the concrete sleepers laterally. In this way, the expensive mounting of the anchor blocks under
25 the sleeper is avoided, wherein the anchor block is disposed partially in a recess under the sleeper and partially in an opening of the base course.

It is also within the scope of the invention that the anchor block is trapezoid, that means configured as spatially trapezoid. Preferably, it relates to a symmetrical
30 trapezoid that can also be inserted rotated by 180°. In order to further simplify the non-ballasted track in accordance with the invention, it can be provided that the anchor block is fixed on a flat surface of the base course. Accordingly, the

expensive making of an opening in the base course, which had to be carried out with higher accuracy until now, is avoided. Instead of this, the required fixing of the sleeper on the base course is achieved merely by the positive locking between the anchor block and the sleeper, wherein the anchor block is fastened on the flat
5 surface of the base course.

The anchor block can be fixed by an asphalt adhesive or a concrete adhesive.

It is preferred in the non-ballasted track in accordance with the invention that the
10 region with reduced width tapers in the direction of the underside of the concrete sleeper. Therefore, the cross-section of the region with reduced width is least on the underside of the concrete sleeper and increases in the direction of the upper side of the concrete sleeper. This tapered form facilitates the positively locked arrangement of an anchor block, in order to fasten the sleeper on the base course
15 by means of the anchor block.

It is also within the scope of the invention that the concrete sleeper is configured as mono block concrete sleeper in pre stressed concrete. Therefore, the concrete sleeper is configured as integral pre cast concrete part with pre stressed
20 reinforcement, which can be positioned in this condition on the base course.

The inventive non-ballasted track is in particular suitable for track panels which are formed as asphalt layer or concrete layer.

25 An improvement of the invention provides that an intermediate layer is disposed on the contact surfaces between the anchor blocks and the region with reduced width of the concrete sleeper in the non-ballasted track in accordance with the invention. Preferably, the intermediate layer is made of an elastomer, a film or a different flexible material, by which the stress risers are reduced. In this way, it is
30 prevented that the stress risers lead to spalling on the concrete sleeper.

In special cases, a bolting of the anchor block with the base course can be provided in the non-ballasted track, for this purpose, a dowel can be inserted in the base course in which an anchor bolt pushed through the anchor block is screwed.

- 5 Preferably, the anchor block is retained between two adjacent concrete sleepers in a positively locked manner.

For the non-ballasted track in accordance with the beginning, practically any sleeper can be used, as long as the sleeper has a central constriction.

10

The invention will be explained in the following by means of exemplary embodiments with reference to the drawings. The drawings are schematic representations and show:

- 15 Fig. 1 shows a perspective view of a non-ballasted track in accordance with the invention;

Fig. 2 shows a section through the non-ballasted track in a longitudinal direction shown in Fig. 1;

20

Fig. 3 shows an enlarged view of the anchor block shown in Fig. 2;

Fig. 4 shows a side view of an anchor block;

- 25 Fig. 5 shows the anchor block shown in Fig. 4 rotated by 90°;

Fig. 6 shows a view of the anchor block of Fig. 4 from above;

Fig. 7 shows a perspective view of the anchor block of Fig. 4;

30

Fig. 8 shows a section through a non-ballasted track in accordance with the invention with the anchor block shown in Fig. 4;

Fig. 9 shows a view of the non-ballasted track of Fig. 8 in a longitudinal direction;
and

5 Fig. 10 shows a section of the non-ballasted track of Fig. 8 in a view from above.

The non-ballasted track 1 shown in Fig. 1 is essentially made of concrete sleepers 2, which are configured as mono block sleeper in pre stressed concrete and disposed at a small distance from each other. Each concrete sleeper 2 supports a pair of rails, rails 3 are fastened on the upper side of the concrete sleepers 2 by means of rail fasteners 4. The concrete sleepers 2 and the rails 3 together form a track panel which is supported on a base course 5. The base course 5 represented in the exemplary embodiment is configured as asphalt base course; however other embodiments are also possible, in which the base course is configured as concrete base course.

It can be seen in Fig. 1 that each concrete sleeper has a region 6 with reduced width disposed between the rail supports, which tapers downwards, that means tapers towards the underside of the concrete sleeper 2.

20

An anchor block 7, which is made of a special concrete and configured as trapezoid, is disposed in the region 6 with reduced width of the concrete sleeper 2 and is fixed on the base course 5 by means of an asphalt adhesive. Accordingly, another anchor block is located on the opposite side of the concrete sleeper 2, which is not visible in Fig. 1. The anchor block 7 has side surfaces tapering downwards, which are exactly matched with the side surfaces of the region 6 with reduced width of the concrete sleeper 2. That means, the sloping edges of the anchor blocks 7 and of the region 6 with reduced width have the same angle of inclination. Accordingly, a positive locking is present between the anchor block 7 and the region 6 with reduced width of the concrete sleeper, which enables transfer of forces. Therefore, the forces occurring during the operation can be transferred from the rails 3 to the base course 5 via the concrete sleepers 2 and

30

the anchor blocks 7. It is not necessarily that each concrete sleeper 2 is laterally retained by two anchor blocks 7; normally it is sufficient if, e.g. each second, third or fourth concrete sleeper is laterally fixed by two anchor blocks.

- 5 While making the non-ballasted track 1, the track panel made of the concrete sleepers 2 and the rails 3 is placed on the base course 5; after the alignment, the selected concrete sleepers 2 are fixed by anchor blocks 7, which are disposed in pairs on either side of the concrete sleepers 2 in the region 6 with reduced width. Since the contour of the anchor blocks 7 exactly corresponds to the contour of the
- 10 concrete sleepers 2 in this region, a positively locked connection forms between the concrete sleeper 2 and anchor block 7.

Fig. 2 shows a section through the non-ballasted track 1. It can be seen there that both the anchor blocks disposed laterally to the concrete sleeper 2 have a cross-section reducing in the direction of the base course 5, a movement of the concrete

15 sleeper 2 is prevented by the positive locking. Therefore, the concrete sleeper 2 is retained between the anchor blocks 7 in a positively locked manner.

Fig. 3 is a sectioned view and shows the anchor block 7 in an enlarged view. It can be seen there that the anchor block 7 is fixed on the base course 5 by means of

20 asphalt adhesive 8. An intermediate layer 9 is disposed in the contact surfaces between the anchor block 7 and the region 6 with reduced width of the concrete sleeper 2, which layer is made of an elastomer and reduces stress risers. In this way, spalling of the concrete sleeper 2 is avoided.

25

Figures 4 to 7 show a second exemplary embodiment of an anchor block 10, which tapers upwards different from the anchor block 7 shown in the first exemplary embodiment. It can be seen in Figures 4 and 5 that the anchor block 10 has a trapezoid cross-section, wherein the cross-section area tapers from the

30 underside towards the upper side. In the Figures 6 and 7, it is shown that the anchor block 10 is confined by six lateral surfaces, which form the upper side 11 of

the anchor block 10 by four surfaces, which have a low inclination, the inclination is about 1 % in the exemplary embodiment represented.

5 The inclination of the vertical surfaces in the exemplary embodiments represented is 10:1. In the installed condition, the anchor block 10 is surrounded by an elastomer (not shown).

10 Figures 8, 9 and 10 show a non-ballasted track 12, made of concrete sleepers 2, rails 3 and rail fasteners 4, which respectively correspond to those of the first exemplary embodiment. An anchor block 10 is respectively disposed between two adjacent concrete sleepers 2, by which the concrete sleepers 2 are retained on a base course.

15 In addition, the non-ballasted track 12 essentially corresponds to the non-ballasted track 1 of the first exemplary embodiment, which is shown in Figures 1 to 3.

Patentkrav

1. Fast kørebane (1) med et sporpanel, der understøttes på et bærelag (5),
og som omfatter betonsveller (2) og skinner (3) samt forankringsblokke
5 (7, 10) til forankring af betonsvellerne (2) på bærelaget (5), hvorved be-
tonsvellerne (2) omfatter et centralt område (6) med reduceret bredde, og
som er placeret mellem skinneunderstøtninger, i hvilket område en foran-
kringsblok (7, 10), der er fastgjort på bærelaget (5), er anbragt på hver
side af betonsvellen (2), **kendetegnet ved**, at forankringsblokken (7, 10)
10 er udformet som trapezoide og fikseret på en flad overflade af bærelaget
(5) ved hjælp af en asfaltklæber (8) eller ved hjælp af en betonklæber.
2. Fast kørebane ifølge krav 1, **kendetegnet ved**, at området (6) med redu-
ceret bredde indsnævres i retning af betonsvellens (2) underside.
15
3. Fast kørebane ifølge krav 1 eller krav 2, **kendetegnet ved**, at betonsvel-
len (2) er udformet som monoblok-betonsvelle i forspændt beton.
4. Fast kørebane ifølge et hvilket som helst af de foregående krav, **kende-
20 tegnet ved**, at bærelaget (5) er udformet som asfaltbærelag eller beton-
bærelag.
5. Fast kørebane ifølge et hvilket som helst af de foregående krav, **kende-
25 tegnet ved**, at et mellemliggende lag (9), der fortrinsvis er fremstillet af
en elastomer, er anbragt på kontaktfladerne mellem forankringsblokken
(7, 10) og området (6) med reduceret bredde af betonsvellen (2).
6. Fast kørebane ifølge et hvilket som helst af de foregående krav, **kende-
30 tegnet ved**, at forankringsblokken (7, 10) formfølgende fastholdes mellem
to til hinanden grænsende betonsveller (2).

FIG. 1

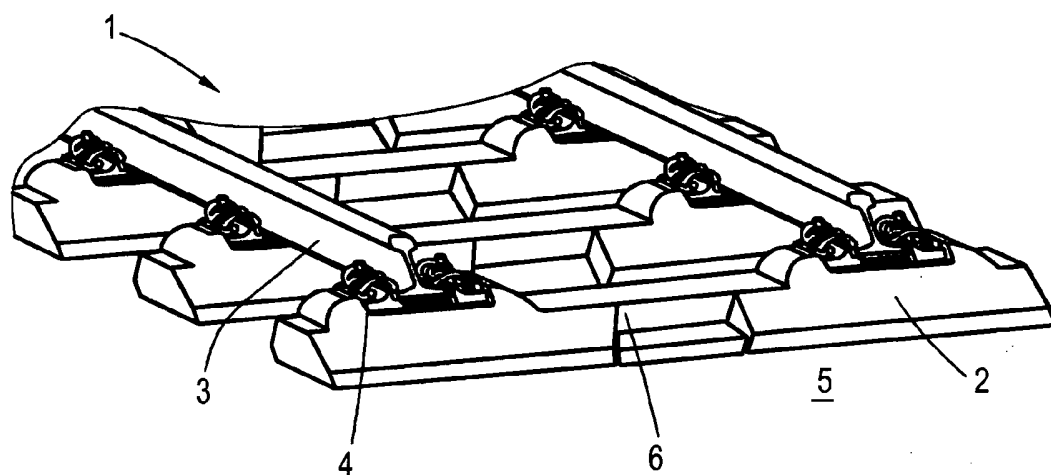


FIG. 2

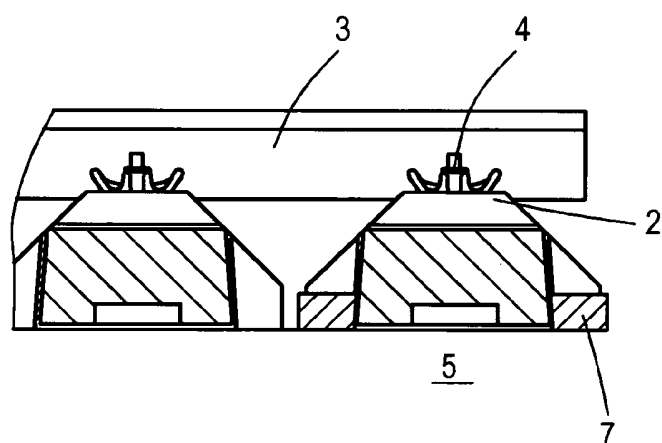


FIG. 3

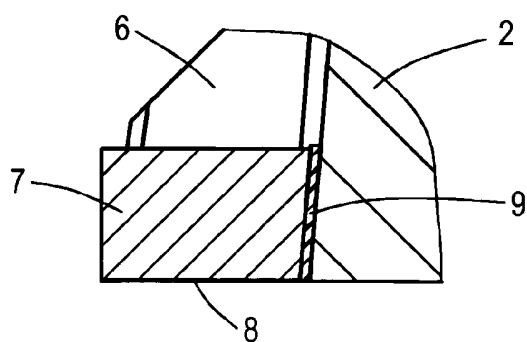


FIG. 4

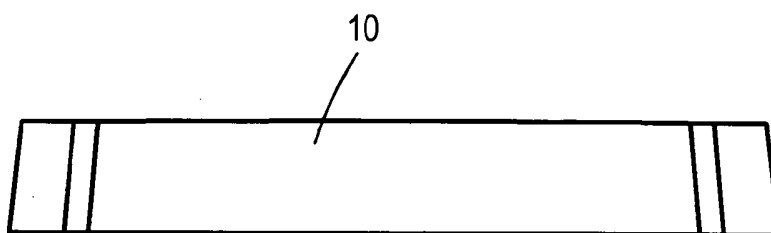


FIG. 5



FIG. 6

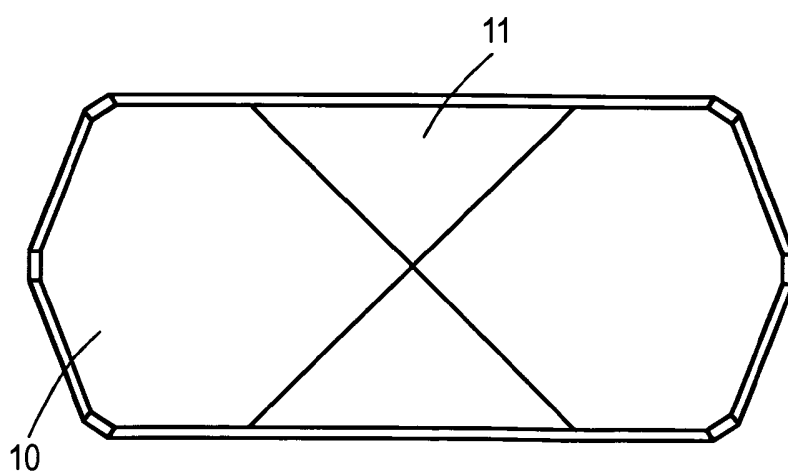


FIG. 7

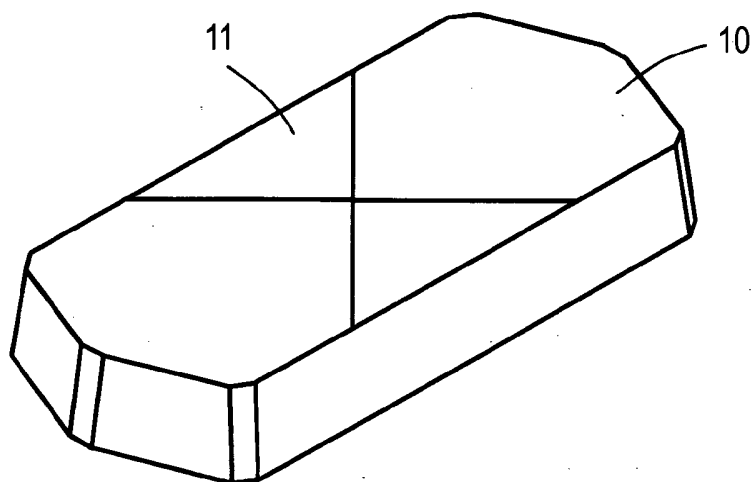


FIG. 8

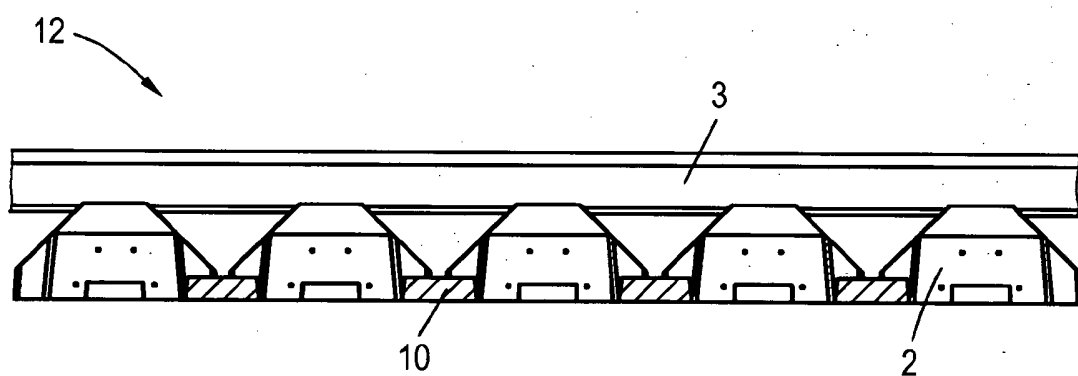


FIG. 9

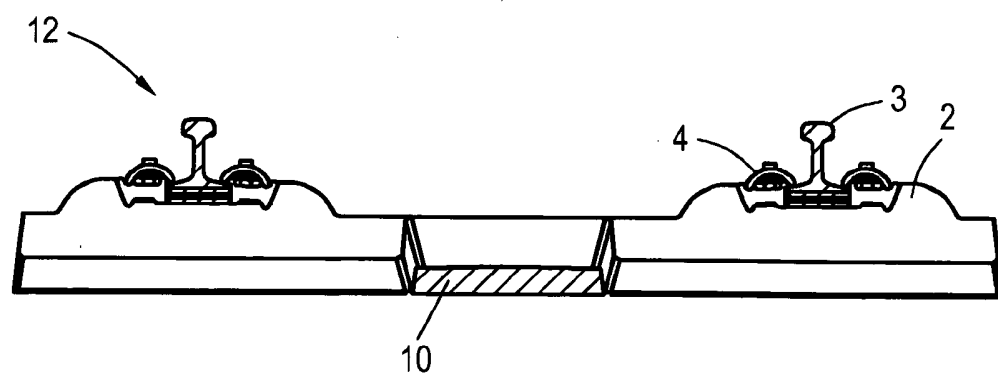


FIG. 10

