Method for Converting a Ballasted Track into a Slab Track

The invention relates to a method for converting a ballasted track into a slab track.

The increasing travelling speeds of trains call for slab tracks, which are capable of taking up the arising loads better than ballasted tracks. The reference WO00/61866 describes a method for renewing a railway line where the existing superstructure that is associated with the track is removed and the track is laid on the substructure. After optionally embedding a substructure for the new railway line, at least one support layer for a solid railway is embedded and subsequently the existing track is retreated. A solid railway, more particularly one with a track which is mounted on a concrete or asphalt support layer or with a track with sleepers which are cast into a concrete layer, is produced by building a new track and adjusting and fastening the new track.

The increasing traffic density on the railway networks calls for ever shorter interruptions for track maintenance and renewal. The aforementioned method is not suitable for a conversion of short track sections with short operation interruptions.

On the background of this prior art, embodiments~~it is the object~~ of the invention ~~to~~ suggest a method for converting a ballasted track into a slab track that is implementable on short track sections and therefore in relatively short periods such that the track is operable between these periods.

~~According to the invention, this object is achieved by the measures indicated in the characterizing part of claim 1.~~

According to an aspect, there is provided a method for converting a ballasted track that comprises a ballast bed resting on a solid underground, crossties lying on the ballast bed, and rails fastened on the crossties by rail fixtures, into a slab track, wherein the method comprises the following steps: removing the ballast bed in a section of the track that extends over a plurality of the crossties, releasing said rail fixtures, removing a first number of said crossties after releasing the rail fixtures, inserting crosstie blocks in said section of the track in vertical positions, fastening the crosstie blocks to the rails, inserting temporary and vertically adjustable supports in said section of the track such that said adjustable supports are supported on said solid underground, resting said rails on said adjustable supports, filling concrete in an area that extends over a number of said crosstie blocks in a direction of said rails, from said solid underground up to at least part of a height of said crosstie blocks, removing a least a part of each of said adjustable supports located between said crosstie blocks in a direction of the rails; and wherein, said conversion is carried out without changing positions of the rails, and the track is immediately operable after placement of the supports without a need for closing the track until all method steps are completed.

In particular, the solution according to embodiments of the invention offers the advantage that the removal of ballast in a section that extends over a plurality of sleepers makes room for producing a slab track without the need of changing the position of the rails. After the placement of the supports, the track is immediately operable again so that the relevant section need not remain closed until all method steps are completed. Since the supports are adjustable, no additional adjusting means are required for a precise vertical adjustment of the rails.

~~Particular embodiments of the method according to the invention are indicated in the dependent claims.~~

Disclosed herein is~~Another aspect of the invention relates to~~ a sleeper unit for implementing the above method ~~according to the invention~~.

Disclosed herein is~~A further aspect of the invention relates to~~ a support for implementing the above method ~~according to the invention~~.

Exemplary embodiments of the method according to embodiments of the invention and of the sleeper unit and the support will be described in more detail hereinafter by way of examples with reference to the appended drawings. The latter show

Figure 1 in a perspective view, the initial condition of a ballasted track laid in a concrete trough;

Figures 2 to 5 different method steps;

Claims

1. Method for converting a ballasted track consisting of a ballast bed (2) resting on a solid underground and of sleepers (3) lying thereon, to which rails (5) are fastened by means of fixtures (4), into a slab track, characterized by the following method steps:
- ballast (2) is removed in a section (6) that extends over a plurality of sleepers (3),
- in the section (6) a first number of sleepers (3) are removed after releasing the rail fixtures (4),
- in the section (6), sleeper blocks (10) are inserted, vertically positioned, and fastened to the rails (5),
- in the section (6), temporary, vertically adjustable supports (17) are inserted on which the rails (5) are resting and are supported on the underground,
- in an area that extends over a number of sleeper blocks (10) as seen in the direction of the rails, infill concrete (24) is filled in from the underground up to at least part of the height of the sleeper blocks (10),
- after the infill concrete (24) has at least partly hardened, at least a part (19, 20) of each of the supports (17) located between two respective sleeper blocks (10) in the direction of the rails is removed.

2. Method according to claim 1, characterized in that before removing the first number of sleepers (3), a second number of sleepers (3) are pushed together at one end of the section (6) after loosening their rail fixtures (4).

3. Method according to claim 2, characterized in that the ballast (2) is initially removed down to a level situated

below the contact surface of the sleepers (3), and after the second number of sleepers (3) have been pushed together, the remaining ballast (2) is removed down to the underground in an area (7) that is free of sleepers.

4. Method according to claim 2, characterized in that in order to be removed, the first number of sleepers (3) are rotated in the longitudinal direction of the sleepers (5) and lifted out between the rails (5).

5. Method according to one of claims 3 to 4, characterized in that at one end at least of the section (7) that is free of sleepers, temporary boarding (8) for retaining the ballast (2) remaining outside the section (7) without sleepers is arranged.

6. Method according to one of the preceding claims, characterized in that at least two sleeper blocks (10) are placed in a respective concrete slab (9) and inserted together with the concrete slab (9).

7. Method according to claim 6, characterized in that the concrete slabs (9) are inserted by lowering them between the rails (5) while oriented in the longitudinal direction of the rails (5) and turning them around below the rails (5).

8. Method according to one of the preceding claims, characterized in that before filling in the infill concrete (24), the space to be filled is separated by form boards.

9. Method according to one of the preceding claims, characterized in that after the infill concrete (24) has hardened, the sleepers (3) that were initially pushed together are again set apart and ballast (2) is packed under them.

10. Sleeper unit for implementing the method according to one of the preceding claims, consisting of a concrete slab (9) and of at least two sleeper blocks (10) received therein that are provided with fixtures (11) for rails (5).

11. Sleeper unit according to claim 10, characterized in that threaded sleeves (14) for lifting spindles are embedded in the concrete slab (9).

12. Sleeper unit according to one of claims 10 to 11, characterized in that at least one lateral surface thereof is provided with a recess (12) in the area of the fixture (11).

13. Sleeper unit according to one of claims 10 to 12, characterized in that each sleeper block (10) is received in the concrete slab (9) with an intercalated elastic shoe that partly encloses the sleeper block.

14. Support (17) for implementing the method according to one of claims 1 to 9, consisting of a supporting body (18) and of a bearing plate (20) for the rail (5), characterized in that adjusting means (22) for adjusting the distance between the supporting body (18) and the bearing plate (20) are provided.

15. Support (17) according to claim 14, characterized in that on the bearing plate (20), fixtures (21) for fastening the rails (5) are arranged and preferably retaining means (23) for lateral fasteners (16) are arranged.

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Claims

1. A method for converting a ballasted track that comprises a ballast bed resting on a solid underground, crossties lying on the ballast bed, and rails fastened on the crossties by rail fixtures, into a slab track, wherein the method comprises the following steps:

removing the ballast bed in a section of the track that extends over a plurality of the crossties,

releasing said rail fixtures,

removing a first number of said crossties after releasing the rail fixtures,

inserting crosstie blocks in said section of the track in vertical positions,

fastening the crosstie blocks to the rails,

inserting temporary and vertically adjustable supports in said section of the track such that said adjustable supports are supported on said solid underground,

resting said rails on said adjustable supports,

filling concrete in an area that extends over a number of said crosstie blocks in a direction of said rails, from said solid underground up to at least part of a height of said crosstie blocks,

removing a least a part of each of said adjustable supports located between said crosstie blocks in a direction of the rails; and

wherein, said conversion is carried out without changing positions of the rails, and the track is immediately operable after placement of the supports without a need for closing the track until all method steps are completed.

2. The method of claim 1, wherein before removing said first number of said crossties, a second number of said crossties are pushed together at one end of said section after releasing the rail fixtures.

3. The method of claim 2, wherein said ballast is initially removed down to a level situated below a contact surface of said crossties; and after said second number of said crossties have been pushed together, the remainder of said ballast is removed down to said solid underground in an area that is free of said crossties.

4. The method of claim 2, wherein in order to be removed, said first number of crossties are rotated in the longitudinal direction of said crossties and lifted out between said rails.

5. The method of claim 3, wherein at least one end of said section of track that is free of said crossties, a temporary boarding for retaining said ballast remaining outside said section of track is arranged.

6. The method of claim 1, wherein at least two of said crosstie blocks are placed in a respective concrete slab and inserted together with said concrete slab.

7. The method of claim 6, wherein said concrete slabs are inserted by lowering them between said rails while oriented in the longitudinal direction of said rails and turning them around below said rails.

8. The method of claim 1, wherein before filling in said infill concrete, a space to be filled is separated by form boards.

9. The method of claim 1, wherein after said infill concrete has hardened, said crossties that were initially pushed together are again set apart and ballast is packed under them.

10. The method of claim 1, wherein a crosstie unit is provided and comprises a concrete slab and at least two of said crosstie blocks that are provided with fixtures for said rails.

11. The method of claim 10, wherein threaded sleeves for lifting spindles are embedded in said concrete slab.

12. The method of claim 10, wherein at least one lateral surface of said crosstie unit is provided with a recess in an area of one of said crosstie blocks.

13. The method of claim 10, wherein each of said crosstie blocks is received in said concrete slab with an intercalated elastic shoe that partly encloses said crosstie block.

14. The method of claim 1, wherein one of said supports comprising a supporting body and a bearing plate for one of said rails, wherein an adjuster device is provided for adjusting a distance between said supporting body and said bearing plate.

15. The method of claim 14, wherein on said bearing plate, fasteners for fastening said rails are arranged, and retainer devices for lateral fasteners are arranged.