~~According to a first aspect of the invention there is provided~~Herein disclosed is a railway rail anchoring device for fastening a railway rail to an underlying foundation, the anchoring device comprising a protrusion provided on a lower surface of the anchoring device, the anchoring device protrusion being configured to engage with a corresponding recess provided in a receiving portion associated with the underlying foundation, wherein the anchoring device protrusion is further configured such that the engagement of the anchoring device protrusion with the receiving portion recess permits a substantially vertical adjustment of the anchoring device relative to the underlying foundation and that the anchoring device protrusion and recess remain in engagement during such vertical adjustment.

According to a first aspect, there is provided a railway rail fastening assembly comprising a railway rail anchoring device for fastening a railway rail to an underlying foundation, wherein the anchoring device is configured to receive a first fastening means for fastening the anchoring device to the underlying foundation when in an installed configuration, and wherein the anchoring device is further configured to receive a second fastening means, which bears down on the rail when in the installed configuration, the second fastening means being separate from the first fastening means, the anchoring device comprising a protrusion provided on a lower surface of the anchoring device, the anchoring device protrusion being configured to engage with a corresponding recess provided in a receiving portion associated with the underlying foundation, wherein the anchoring device protrusion is further configured such that the engagement of the anchoring device protrusion with

the receiving portion recess permits a substantially vertical adjustment of the anchoring device relative to the underlying foundation and that the anchoring device protrusion and recess remain in engagement during such adjustment, wherein the railway rail fastening assembly further comprises the receiving portion associated with the underlying foundation, the receiving portion comprising the recess, and wherein the receiving portion recess comprises a first side surface and a second side surface, the first side surface and the second side surface being substantially perpendicular to the lower surface of the anchoring device when in the installed configuration; or angled relative to the lower surface of the anchoring device such that the first side surface and the second side surface are vertical in the installed configuration.

According to a second aspect, there is provided a railway rail fastening assembly, the railway rail fastening assembly comprising: a railway rail anchoring device for fastening a railway rail to an underlying foundation; and an intermediate member, the intermediate member being configured for placement between the anchoring device and the underlying foundation, wherein the anchoring device is configured to receive a first fastening means for fastening the anchoring device to the underlying foundation when in an installed configuration, wherein the anchoring device is further configured to receive a second fastening means, which bears down on the rail when in the installed configuration, the second fastening means being separate from the first fastening means, wherein the anchoring device comprises a protrusion provided on a lower surface of the anchoring device, the anchoring device protrusion being configured to engage with a corresponding recess

provided in the intermediate member, wherein the anchoring device protrusion is further configured such that the engagement of the anchoring device protrusion with the intermediate member recess permits a substantially vertical adjustment of the anchoring device relative to the underlying foundation and that the anchoring device protrusion and recess remain in engagement during such adjustment, wherein the intermediate member recess comprises a first side surface and a second side surface, the first side surface and the second side surface being substantially perpendicular to the lower surface of the anchoring device when in the installed configuration; or angled relative to the lower surface of the anchoring device such that the first side surface and the second side surface are vertical in the installed configuration, and wherein the intermediate member is configured such that it may be cast into the underlying foundation.

According to a third aspect, there is provided a method of forming an underlying foundation, the method comprising: positioning the intermediate member of any of claims 21 to 24; pouring a mixture around the intermediate member; and solidifying the mixture so as to form the underlying foundation with the intermediate member fixed to the underlying foundation.

As shown in the first and second aspect, ~~T~~the anchoring device ~~may be~~ is configured to receive a first fastening means for fastening the anchoring device to the underlying foundation when in an installed configuration. The anchoring device ~~may be~~is further configured to receive a second fastening means, which bears down on the rail when in the installed configuration. The second fastening means

~~may be~~ is separate from the first fastening means. Accordingly, the rail may be clamped to the underlying foundation indirectly, e.g. via the first fastening means, anchoring device and second fastening means.

Accordingly, the present invention advantageously provides a means for fastening a railway that may have moderate stiffness and the ability to make positional adjustments.

The anchoring device protrusion may be configured such that the cooperation of the anchoring device protrusion with the

point at which the clip contacts the anchoring device in an installed configuration. The railway rail anchoring device may comprise a railway rail fastening clip anchoring device.

The anchoring device may engage directly with the underlying foundation, for example, the anchoring device may be directly fastened to the underlying foundation. The anchoring device may further comprise an opening configured to cooperate with the first fastening means, e.g. a bolt. The first fastening means may be configured to fasten the anchoring device to the underlying foundation. The opening may be provided in a region of the anchoring device adjacent to the rail when in the installed configuration, e.g. so that the opening may be closer to the rail than the protrusion. Alternatively, the opening may be provided in a region of the anchoring device away from the rail when in the installed configuration.

The anchoring device protrusion may comprise a first side surface and a second side surface. The first side surface and/or the second side surface may be substantially perpendicular to a lower surface of the anchoring device. The first side surface and/or the second side surface may be angled relative to the lower surface of the anchoring device, e.g. such that the first side surface and/or the second side surface are vertical in the installed configuration.

As shown in the first and second aspect, a~~A~~ railway rail fastening assembly ~~may~~ comprises the railway rail anchoring device described above.

As shown in the first and second aspect, ~~T~~the railway rail fastening assembly ~~may~~ further comprises the receiving portion associated with the underlying foundation. The receiving portion ~~may~~ comprises the recess. The recess may be provided in the underlying foundation. The receiving portion may be a portion of the underlying foundation. The receiving portion may be separate from the underlying foundation. The receiving portion may be substantially level with the underlying foundation. For example, a top surface of the receiving portion may be substantially level with a top surface of the underlying foundation.

As shown in the first and second aspect, ~~T~~the receiving portion recess ~~may~~ comprises a first side surface and a second side surface. The first side surface and/or the second side surface may be substantially perpendicular to a lower surface of the anchoring device and/or the local top surface of the receiving portion when in the installed configuration. The first side surface and/or the second side surface may be angled relative to the lower surface of the anchoring device and/or the local top surface of the receiving portion, e.g. such that the first side surface and/or the second side surface are vertical in the installed configuration.

The railway rail fastening assembly may further comprise an intermediate member. The intermediate member may comprise the receiving portion such that the recess is provided in the intermediate member. The intermediate member may be configured for placement between the anchoring device and the underlying foundation. Alternatively, the underlying foundation may comprise the receiving portion with the recess.

cast into the underlying foundation. For example, the intermediate member may comprise formations for interacting with the underlying foundation when cast.

The railway rail fastening assembly may further comprise one or more shims. The shims may be configured for placement between the anchoring device and the underlying foundation. The one or more shims may comprise a first side and a second side. The first and/or second sides may be substantially flat.

The railway rail fastening assembly may further comprise one or more fastening means, one or more rail clips, a further anchoring device for other side of rail and/or one or more base-plates.

~~According to a second aspect of the present invention there may provided~~Herein disclosed is a railway rail fastening assembly, the railway rail fastening assembly comprising: a railway rail anchoring device for fastening a railway rail to an underlying foundation; and an intermediate member, the intermediate member being configured for placement between the anchoring device and the underlying foundation, wherein the anchoring device is configured to receive a first fastening means for fastening the anchoring device to the underlying foundation when in an installed configuration, wherein the anchoring device is further configured to receive a second fastening means, which bears down on the rail when in the installed configuration, the second fastening means being separate from the first fastening means, wherein the anchoring device comprises a protrusion provided on a lower surface of the anchoring device, the anchoring device protrusion being configured to engage with

CLAIMS

1. A railway rail fastening assembly comprising a railway rail anchoring device for fastening a railway rail to an underlying foundation,

wherein the anchoring device is configured to receive a first fastening means for fastening the anchoring device to the underlying foundation when in an installed configuration, and

wherein the anchoring device is further configured to receive a second fastening means, which bears down on the rail when in the installed configuration, the second fastening means being separate from the first fastening means,

the anchoring device comprising a protrusion provided on a lower surface of the anchoring device, the anchoring device protrusion being configured to engage with a corresponding recess provided in a receiving portion associated with the underlying foundation, wherein the anchoring device protrusion is further configured such that the engagement of the anchoring device protrusion with the receiving portion recess permits a substantially vertical adjustment of the anchoring device relative to the underlying foundation and that the anchoring device protrusion and recess remain in engagement during such adjustment,

wherein the railway rail fastening assembly further comprises the receiving portion associated with the underlying foundation, the receiving portion comprising the recess, and

wherein the receiving portion recess comprises a first side surface and a second side surface, the first side surface and the second side surface being substantially perpendicular to the lower surface of the anchoring device

when in the installed configuration; or angled relative to the lower surface of the anchoring device such that the first side surface and the second side surface are vertical in the installed configuration.

2. A railway rail fastening assembly ~~anchoring device~~ as claimed in claim 1, wherein the anchoring device protrusion is configured such that the cooperation of the anchoring device protrusion with the receiving portion recess limits lateral movement of the anchoring device relative to the underlying foundation.

3. A railway rail fastening assembly ~~anchoring device~~ as claimed in claim 1 or 2, wherein the anchoring device protrusion is provided at a position further away from the railway rail than the first fastening means.

4. A railway rail fastening assembly ~~anchoring device~~ as claimed in claim 1 or 2, wherein the anchoring device protrusion is provided at a position closer to the railway rail than the first fastening means.

5. A railway rail fastening assembly ~~anchoring device~~ as claimed in any of the preceding claims, wherein the anchoring device protrusion is provided in a region of the anchoring device away from the railway rail when in the installed configuration.

6. A railway rail fastening assembly ~~anchoring device~~ as claimed in any of claims 1 to 4, wherein the anchoring device protrusion is provided in a region of the anchoring device adjacent to the railway rail when in the installed configuration.

7. A railway rail fastening assembly ~~anchoring device~~ as claimed in any of the preceding claims, wherein the anchoring device further comprises an opening configured to cooperate with the first fastening means.

8. A railway rail fastening assembly ~~anchoring device~~ as claimed in claim 7, wherein the opening is provided in a region of the anchoring device adjacent to the rail when in the installed configuration.

9. A railway rail fastening assembly ~~anchoring device~~ as claimed in claim 7, wherein the opening is provided in a region of the

anchoring device away from the rail when in the installed configuration.

10. A railway rail fastening assembly ~~anchoring device~~ as claimed in any of the preceding claims, wherein the second fastening means comprises a rail fastening clip and the anchoring device is configured to receive the rail fastening clip, which bears down on the rail when in the installed configuration.

11. A railway rail fastening assembly ~~anchoring device~~ as claimed in claim 10, wherein the anchoring device protrusion is provided on the lower surface of the anchoring device at a point spaced apart from a contact point at which the rail fastening clip contacts the anchoring device in the installed configuration.

12. A railway rail fastening assembly ~~anchoring device~~ as claimed in any of the preceding claims, wherein the anchoring device protrusion comprises a first side surface and a second side surface, the first side surface and/or the second side surface being substantially perpendicular to the lower surface of the anchoring device.

13. A railway rail fastening assembly ~~anchoring device~~ as claimed in any of claims 1 to 11, wherein the anchoring device protrusion comprises a first side surface and a second side surface, the first side surface and/or the second side surface being angled relative to the lower surface of the anchoring device such that the first side surface and/or the second side surface are vertical in the installed configuration.

~~14. A railway rail fastening assembly comprising the railway rail anchoring device of any of the preceding claims.~~

~~15. A railway rail fastening assembly as claimed in claim 14, wherein the railway rail fastening assembly further comprises the receiving portion associated with the underlying foundation, the receiving portion comprising the recess.~~

~~16. A railway rail fastening assembly as claimed in claim 15, wherein the receiving portion recess comprises a first side surface and a second side surface, the first side surface and/or the second side surface being substantially perpendicular to the lower surface of the anchoring device when in the installed configuration.~~

~~17. A railway rail fastening assembly as claimed in claim 15, wherein the receiving portion recess comprises a first side surface and a second side surface, the first side surface and/or the second side surface being angled relative to the lower surface of the anchoring device such that the first side surface and/or the second side surface are vertical in the installed configuration.~~

~~18~~14. A railway rail fastening assembly as claimed in any of the preceding claims ~~14 to 17~~, wherein the railway rail fastening assembly further comprises an intermediate member, the intermediate member comprising the receiving portion such that the recess is provided in the intermediate member, the intermediate member being configured for placement between the anchoring device and the underlying foundation.

~~19~~15. A railway rail fastening assembly as claimed in claim ~~18~~14, wherein the intermediate member comprises a protrusion, the intermediate member protrusion being configured to engage a further recess provided in the underlying foundation.

~~20~~16. A railway rail fastening assembly as claimed in claim ~~18~~14 or ~~19~~15, wherein the intermediate member is configured such that it may be cast into the underlying foundation.

~~21~~17. A railway rail fastening assembly as claimed in any of claims ~~18~~14 to ~~20~~16, wherein the intermediate member further comprises one or more fastening means receiving portions, the fastening means receiving portions being configured to cooperate with the first fastening means.

~~22~~18. A railway rail fastening assembly as claimed in any of the preceding claims ~~14 to 21~~, wherein the railway rail fastening assembly further comprises one or more shims, the shims being configured for placement between the anchoring device and the underlying foundation.

~~23~~19. A railway rail fastening assembly as claimed in claim ~~22~~18, wherein the one or more shims comprise a first side and a second side, the first and/or second sides being substantially flat.

~~24~~20. A railway rail fastening assembly, the railway rail fastening assembly comprising:

a railway rail anchoring device for fastening a railway rail to an underlying foundation; and

an intermediate member, the intermediate member being configured for placement between the anchoring device and the underlying foundation,

wherein the anchoring device is configured to receive a first fastening means for fastening the anchoring device to the underlying foundation when in an installed configuration,

wherein the anchoring device is further configured to receive a second fastening means, which bears down on the rail when in the installed configuration, the second fastening means being separate from the first fastening means,

wherein the anchoring device comprises a protrusion provided on a lower surface of the anchoring device, the anchoring device protrusion being configured to engage with a corresponding recess provided in the intermediate member,

wherein the anchoring device protrusion is further configured such that the engagement of the anchoring device protrusion with the intermediate member recess permits a substantially vertical adjustment of the anchoring device relative to the underlying foundation and that the anchoring device protrusion and recess remain in engagement during such adjustment,

wherein the intermediate member recess comprises a first side surface and a second side surface, the first side surface and the second side surface being substantially perpendicular to the lower surface of the anchoring device when in the installed configuration; or angled relative to the lower surface of the anchoring device such that the first side surface and the second side surface are vertical in the installed configuration, and

wherein the intermediate member is configured such that it may be cast into the underlying foundation.

~~25~~21. An intermediate member for use in the railway rail fastening assembly of any preceding claim, wherein the intermediate member is configured for placement between the anchoring device ~~of any of claim 1 to 13~~ and the underlying foundation, the intermediate member comprising one or more receiving portions with the recesses, wherein the recesses are configured to engage with the anchoring device protrusions so as to permit a substantially vertical adjustment of the anchoring devices relative to the

underlying foundation with the anchoring device protrusions and recesses remaining in engagement during such adjustment.

~~26~~22. An intermediate member as claimed in claim ~~25~~21, wherein the intermediate member comprises two receiving portions each with a recess for engagement with a respective anchoring device, wherein the two receiving portions are arranged such that anchoring devices may be provided either side of the rail.

~~27~~23. An intermediate member as claimed in claim ~~25~~ 21 or ~~26~~22, wherein the intermediate member further comprises one or more fastening means receiving portions, the fastening means receiving portions being configured to cooperate with a first fastening means, the first fastening means being configured to fasten the anchoring device to the underlying foundation.

~~28~~24. An intermediate member as claimed in any of claims ~~25~~ 21 to ~~27~~23, wherein the intermediate member is configured such that it may be cast into the underlying foundation.

~~29~~25. A method of forming an underlying foundation, the method comprising:

positioning the intermediate member of any of claims ~~25~~ 21 to ~~28~~24;

pouring a mixture around the intermediate member; and

solidifying the mixture so as to form the underlying foundation with the intermediate member fixed to the underlying foundation.