

RAIL FASTENING

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The present invention relates to apparatus for fastening rails to a support structure to provide a railway track.

It is well known to provide a railway track by means of a pair of parallel rails which are supported upon cross ties. Conventionally the cross ties are themselves supported on a bed of granular material such as crushed stone to properly support the loads placed on the track as a train passes. The use of the crushed stone bed enables variations in grade to be evened out so that a smooth bed may be provided for the track. Whilst the bed is generally planar it is also preferable to spiral the track upon entering curves which requires an elevation of one side of the track to the other. Again the use of the crushed stone bed enables the bed to be contoured to provide the necessary support for the ties.

The material conventionally used for the ties of the railway track is wood. However in recent years there has been an increased interest in the use of concrete and steel as ties for railroad track. These materials have been adopted in conjunction with the conventional granular bed to provide the support and gradual change in grade required to adequately support the track. There is now however an interest in the use of light railways for use in a mass transit system in urban areas and several proposals require the use of elevated track in order to maintain cost and disturbance to the environment at a

minimum. The elevated track is usually supported on a concrete structure. Whilst it is possible to utilize a conventional granular bed with such concrete structures, there is obviously a potential saving in cost and maintenance if the rails can be directly attached to the concrete or the ties. However a problem associated with such arrangements is that the concrete guideway cannot be formed with the necessary accuracy to provide a uniform grade for the track. It has previously been proposed to use shims between the underside of the track and the support structure to compensate for small differences in vertical height of the support structure. However a problem with such an arrangement is that, with the conventional clips used to attach the rail to its tie or support structure, the vertical loading imposed on the rail will vary as the height of the rail relative to the support structure is varied. This variation in vertical loading is undesirable as it produces inconsistent loadings on the track.

It is therefore an object of the present invention to obviate or mitigate the above disadvantages and to provide a rail fastening in which vertical adjustment of the rail relative to its support structure may be accomplished.

In accordance with the present invention there is provided a rail fastening comprising: a base for attachment to a rail bed; a pair of spaced retaining means located on the base for receiving and retaining respective opposite ends of a rail engaging clip, the clip having an intermediate portion for engaging the rail being fastened, one of the retaining means being adjustably mounted on the base such that the respective retained end of the clip is vertically

displaceable with respect to the base, and means for locking the said one of the retaining means in its adjusted position.

5 An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings in which:-

FIGURE 1 is a cross-section through a rail and
10 fastening device;

FIGURE 2 is a plan view of the rail and fastening system shown in Figure 1;

15 FIGURE 3 is an enlarged view of a portion of the fastening system shown in Figure 1 with an alternate position of the fastening system shown in chain dot lines.

Referring now to Figure 1, a concrete guideway 10
20 provides a rail supporting structure and may be in the form of either an individual tie or a part of an at grade or elevated concrete structure. The upper surface 12 of the structure 10 provides a support surface for a railway track. A resilient pad 14 is located on the upper
25 surface 12 and supports a rail 16 in spaced relationship from the upper surface 12. The rail is secured in place by means of a pair of rail fastenings 28 which are identical and therefore only one will be described in detail.

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The rail fastening 18 includes a base 20 from which depends an irregular pin 22. The pin 22 is received in a bore 24 preformed in the upper surface 12 of the concrete structure 10. The pin 22 is secured in place
35 by means of an epoxy grout 26 which is cast insitu with the pin placed in the bore 24. The irregular shape of

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the pin 22 provides adequate location for the rail fastening 18 relative to the concrete structure 10.

5 The base 20 is formed with a shoulder 21 and with a shoe 28 in the form of a channel recess below the upper surface of the shoulder 21. Located adjacent to the shoe 28 is a longitudinal bore 30 in the shoulder 21, the axis of the bore extending generally parallel to the axis of the rail 16. A number of depressions 32
10 are cut into the surface of the bore 30.

A cylindrical clip retainer 34 is mounted in the bore 30 and has a peg 36 projecting from the outer surface. The peg 36 is dimensioned to engage in a
15 selected one of the depressions 32 and thereby prevent rotation of the clip retainer relative to the base shoulder 21. The peg 36 therefore acts as a locking device to locate the clip retainer relative to the
20 shoulder.

A clip receiving bore 38 is formed in the clip retainer 34 to extend generally parallel to the longitudinal axis of the retainer. The clip receiving bore 38 is displaced from the axis and is dimensioned to
25 snugly receive one end of a rail clip 40.

The vertical position of bore 38 is adjusted prior to the bore receiving the rail clip 40. The clip retainer 34 is slid into the bore 30 at such an
30 orientation that the peg 36 engages with one of the recesses 32 and, by selecting which recess 32 the peg 36 is to engage, the height of the bore 38 relative to the base 20 and to rail 16 can be adjusted.

The clip 40 is of generally known construction and
35 is widely referred to as a Pandrol Clip (Registered Trade Mark). The clip 40 has an arched portion 42 which terminates at one end in a leg 44 _____

extending generally parallel to the axis of the rail. The other end of the arched portion merges with a second arched portion 46 which terminates in a leg 48 received within the clip receiving bore 38. The legs 44, 48 are therefore spaced apart in the transverse horizontal direction and the junction between the two arched portions 42, 46 bears against a spacer plate 50 positioned on the toe of the rail.

The spacer plate 50 conforms to the cross section of the rail 16 and provides an upper planar surface 52 against which the junction of the arched portions bears. The upper planar surface 52 therefore permits lateral adjustment of the rail relative to the rail fastening 18 without varying the vertical spacing between the upper surface 12 and the contact point of the clip with the spacer plate 50.

The leg 44 lies in the shoe 28 and is supported on a shim stack 54. The stack 54 is chosen to maintain the toe load at the required value for variations in the relative height of the rail and the rail fastening 18.

To install the rail 16 on the structure 10, the rail fastenings 18 are secured to the structure 10 by locating the pin 22 in the bore 24 and pouring the epoxy grout into the bore. To obtain the required grade and compensate for any small deviations of the grade in the upper surface 12, a resilient pad 14 of required thickness is chosen. The rail is placed on the upper surface of the pad 14 and a spacer plate 50

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positioned on each side of the toe of the rail 16. The clip retainer 34 is then positioned within the bore 30 with the peg 36 engaging an appropriate one of the depressions 32 to position the clip receiving bore 38 at the required height relative to the rail. Should a relatively thick pad 14 be required to support the rail 16 at the required height, the peg 36 will be located in one of the depression 32 to the right of the center line of the pin 22 when viewed in figure 1. Similarly should a relatively thin resilient pad 14 be required, the peg 36 will be located in one of the depressions 32 to the left of the center line of the pin 22. In general, the position of the peg 36 in the depression 32 should be chosen to maintain the axis of the bore 32 at a constant height above the upper planar surface 52. At the same time, the thickness of the shim stack 54 is selected in accordance with the position of the peg 36 in the depression 32. Where a relatively thin pad 14 is required, a correspondingly thin shim stack 54 will also be required as the location of the clip receiving bore 38 will move down towards the upper surface 12. This effect is best seen in figure 3 in which the solid lines indicate the position of the clip 40 with the peg 36 engaged in the median position of the depression 32. The chain dotted outline indicates the position obtained by the clip 40 with the peg 36 located in the extreme clockwise depression 32.

With the position of the clip retainer 34 and the

thickness of the shim stack 54 selected, the clip 40 may be located by simply positioning the leg 48 in alignment with the bore 38. The clip 40 is then pulled axially so that the leg 48 enters the bore 38 and the leg 44 rides up onto the upper surface of the shim stack 54. The clip 40 is then maintained in position with a predetermined preload acting on the toe of the rail.

It will be seen that by selecting the appropriate depression 32 for the peg 36 and the corresponding height for the shim stack 54, the height of the clip 40 can be adjusted relative to the base 20 to accommodate varying thicknesses of the pad 14. This is achieved without altering the configuration of the clip, and thereby provides a substantially constant preload on the toe of the rail 16.

This therefore permits vertical adjustment of the rail relative to the concrete structure 10 whilst enabling the rail fastening 18 to be secured directly to the structure 10. This fastening device therefore enables the use of concrete guideways without requiring a conventional granular rail bed and enables the required toe loading on the rail to be maintained.

Whilst a single peg 36 has been shown as the preferred locking means for securing the clip retainer to the shoulder, it will be appreciated that other forms of locking means could be provided. For example a regular splined connection could be provided to distribute the load between a number of teeth of these spline. Similarly a locking bolt passing radially through the shoulder and the clip retainer could be used.

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The concrete may be cast in place or pre-cast. Whilst

the epoxy grout 26 has been shown for securing the pin to the structure it will be appreciated that other forms of securing means could be provided. For example, the pin 22 could be placed directly into the wet concrete during the casting process of the guideway or tie.



CLAIMS

1. A rail fastening comprising: a base for attachment to a rail bed; a pair of spaced retaining means located on the base for receiving and retaining respective opposite ends of a rail engaging clip, the clip having an intermediate portion for engaging the rail being fastened, one of the retaining means being adjustably mounted on the base such that the respective retained end of the clip is vertically displaceable with respect to the base; and means for locking the said one of the retaining means in its adjusted position.
2. A rail fastening according to Claim 1 wherein the said one of the retaining means is rotatably mounted in a bore in the base.
3. A rail fastening according to Claim 2 wherein the rotatable retaining means includes a bore for receiving the respective end of the clip, the bore being displaced from the axis of rotation of the retaining means.
4. A rail fastening according to Claim 3 wherein the locking means includes intermeshing formations located between the rotatable retaining means and the bore in the base.
5. A rail fastening according to any one of the preceding claims wherein shim means are locatable between the said intermediate portion of the rail engaging clip and the rail being fastened, the shim means having a substantially flat upper surface and being dimensioned such that the rail can be moved laterally relative to the rail fastening.

6. A rail fastening according to any one of the preceding claims wherein the means for receiving and retaining the other end of the clip comprises a recess formed in the base.
7. A rail fastening as claimed in Claim 6 further comprising shim means positionable between the clip and a floor of the recess, the height of the shim means relative to the floor being varied with the adjustment of the said one retaining means to accommodate variations in the height of the rail relative to the base such that the load applied to the rail by the clip is maintained at a predetermined value.
8. A rail fastening according to any one of the preceding claims wherein the base includes attachment means adapted to secure the base to the rail bed.
9. A rail installation comprising a rail and a rail fastening, the fastening including a base for attachment to a rail bed and a clip extending between the base and the rail to exert a restraining force thereon, the clip having an intermediate portion for retaining the rail and laterally spaced opposite end portions retained by corresponding laterally spaced retaining means on the base, one of the retaining means including vertically adjustable means for receiving the respective end of the clip to adjust the location thereof relative to the base, and lock means acting between the said one retaining means and the base for locking the receiving means in its adjusted position.
10. A rail installation according to Claim 9 wherein a spacer is located between the rail and the rail bed, and the receiving means is adjusted in accordance with the spacer to maintain a predetermined configuration for the clip.



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11. A rail installation according to Claim 9 or Claim 10 wherein the retained ends of the clip extend generally parallel to the rail.
- 5 12. A rail installation according to any one of the Claims 9 to 11 wherein the receiving means includes a bore having an axis generally parallel to the rail.
- 10 13. A rail installation according to Claim 12 wherein the said one of the retaining means is rotatable about an axis parallel to and spaced from the axis of the bore.
- 15 14. A rail installation according to any one of the Claims 9 to 13 wherein the lock means includes interengaging formations on the base and the said one of the retaining means.
- 20 15. A rail installation according to Claim 14 wherein the interengaging formations comprise a plurality of recesses and a projection for selectively engaging one of the recesses.
- 25 16. A rail fastening substantially as herein described with reference to the accompanying drawings.
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