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(54) Title: RAILWAY PLATE AND METHOD OF MANUFACTURE

(57) Abstract

A railway rail fastening plate comprising a base section (26) adapted to be secured to a rail foundation by securing means passing through each of a plurality of apertures (28) in the base section; a pair of spaced raised portions (32) upstanding from an upper surface of the base section, the raised portions being spaced apart so as to receive a railway rail therewith; the raised portions (32) each having a slot (34) extending generally horizontally therethrough and an aperture (36) extending generally vertically therethrough, the slot and the aperture being partially co-incident; and the slot (34) extending laterally beyond the aperture (36) into the raised portion to create regions of undercut in the raised portions, the aperture and slot combining to permit passage of a rail clip (17) therethrough and the undercut portions being sufficient to retain a rail in position.
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RAILWAY PLATE AND METHOD OF MANUFACTURE

TECHNICAL FIELD

The present invention relates to a rail fastening plate used to secure a railway rail to a sleeper or other rail foundation using a spring clip. In particular, the present invention is concerned with railway plates that are economical to manufacture and are useful with a number of clip designs available.

BACKGROUND ART

Traditional railway rail fastening plates are formed from cast metal specifically suited for use with clips designed to hold a rail in position. Such a plate would typically include a base member having a central channel adapted to receive a railway rail, the central channel being bounded on opposing sides by an upstanding shoulder on the base. The shoulder includes a cutaway portion for receiving a clip to hold the rail in place.

The shape of the plate is such that, in most cases, the plate needs to be made by a casting procedure. Further, in many cases the geometry of the clip is such that a coring procedure is also required. Such processes are relatively expensive and, where the pieces are used in very large numbers as is the case with railway rail fastening plates, the cost of an individual unit is very significant. Such plates as are available to be manufactured by lower cost processes are typically specific to one clip and are therefore less useful.

The use of a railway rail fastening plate formed of rolled metal rather than cast metal would be preferable because of the very much lower cost of an item made by such a process. To be suitable for manufacture by such a process the plate has of necessity to be of a relatively simple design.

It is an object of the present invention to provide a railway rail fastening plate which is capable of being formed from rolled metal such as rolled steel. Advantageously, railway rail fastening plate of the present invention is also useful with a number of currently available fastening clips.
DISCLOSURE OF THE INVENTION

Therefore, according to one aspect of the present invention, although this need not be the broadest, nor indeed the only aspect, there is provided a railway rail fastening plate comprising:

5 a base section adapted to be secured to a rail foundation by securing means passing through each of a plurality of apertures in the base section;

a pair of spaced raised portions upstanding from an upper surface of the base section, the raised portions being spaced apart so as to receive a railway rail therebetween;

10 the raised portions each having a slot extending generally horizontally therethrough and an aperture extending generally vertically therethrough, the slot and the aperture being partially co-incident; and

the slot extending laterally beyond the aperture into the raised portion to create regions of undercut in the raised portions, the aperture and slot combining to permit passage of a rail clip therethrough and the undercut portions being sufficient to retain a rail in position.

The shape of the railway rail fastening plate of the present invention is such that the plate can be manufactured from a rolled metal such as rolled steel and subsequently shaped in machining and/or punching operations.

20 Preferably, the aperture extending through the raised portions and the slot act co-operatively as a gate to prevent a retaining clip from being displaced from a retained condition.

The aperture cut into the raised portions may extend fully through the raised portion and the base section of the base plate, or, alternatively, the aperture may extend through the raised portions only.

In some embodiments of the present invention, the base plate may also include a cut out portion generally co-incident with the aperture formed in the raised portion, the cut out portion serving as a seat for a rail securing clip.

The invention therefore also provides for a method of manufacturing a railway rail fastening plate comprising the steps of:
rolling a section of metal to a predetermined profile to produce a plate having a base section and a pair of spaced raised portions upstanding from an upper surface of the base section;

punching or machining a plurality of apertures in the base section, at least one aperture being formed in each raised portion; and

punching or machining a respective slot in each raised portion, the slots being at least partially co-incident with the at least one aperture formed in the raised portion, the slot extending laterally beyond the aperture into the raised portion to create regions of undercut in the raised portions, the aperture and slot combining to permit passage of a rail clip therethrough and the undercut portions being sufficient to retain a rail in position.

Preferably, the rail plate of the present invention is formed in a single machining operation, each of the apertures and slot being milled from a section of metal of pre-determined profile.

The metal may be hot or cold rolled steel. Similarly, the punching and/or machining operations can be hot or cold operations. In alternative embodiments, the plate of the invention can be formed by an extrusion process.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described, by way of the following non-limiting example, in which;

FIG 1 illustrates in perspective view a railway rail attached to a rail foundation using a plate in accordance a first embodiment of the present invention;

FIG 2 illustrates in plan view the plate of FIG 1;

FIG 3 illustrates an end view of the plate of FIG 1;

FIG 4 illustrates a cross-sectional view of the plate of FIG 2 drawn through the line 4'-4';

FIG 5 illustrates a cross-sectional view of the plate of FIG 2 drawn through the line 5'-5'.
FIG 6 illustrates in perspective view a rail plate in accordance with a second embodiment of the present invention;

FIG 7 illustrates in plan view the plate of FIG 6;

FIG 8 illustrates a cross-sectional view of the plate of FIG 6 drawn through the line 8'-8'; and

FIG 9 illustrates a cross-sectional view of the plate of FIG 6 drawn through the line 9'-9'.

DESCRIPTION OF PREFERRED EMBODIMENT

Shown in FIG 1 is a portion of a railway assembly 10 comprising a railway rail 12 attached to a rail foundation 14 by means of an intermediary railway rail fastening plate 16 and fastening spring clip 17. The rail 12 is of traditional shape and includes a lowermost rail foot 18, the rail foot 18 having a rail member 22 upstanding therefrom and terminating in a rail head 24.

The fastening plate 16 comprises a base section 26 adapted to be secured to the rail foundation 14 by securing means (not shown) passing through each of a plurality of apertures 28 in the base section 26. The securing means used may include any of the securing means known to those skilled in the art. Further, there may be any number of apertures 28 formed in the fastening plate 16. Further still, the apertures 28 may be located on the fastening plate 16 in any positions thought desirable.

As will be appreciated from FIGS 4 and 5, an upper surface 30 of the base section 26 is formed with a slight incline. The incline shown in the drawings is a 1 in 40 incline. However, the surface may be horizontal or otherwise inclined as desired.

The fastening plate 16 also comprises a pair of spaced raised portions 32 upstanding from the upper surface 30 of the base section 26. The raised portions 32 are spaced apart so as to receive the rail 12 therebetween. As can be seen clearly from FIG 1, the rail 12 fits snugly between the raised portions 32. Moreover, the raised portions 32 extend higher than the rail foot 18. In the embodiment illustrated the raised portions 32 each have a pair of spaced securing apertures 28 formed therein, the securing apertures 28 being
displaced from a centre of each raised portion 32 towards an outer edge thereof.

The fastening plate 16 further includes the raised portions 32 each having a slot 34 extending generally horizontally therethrough and an aperture 36 extending generally vertically therethrough. As shown in FIGS 1 and 2 the slot 34 and aperture 36 are generally centrally located in the raised portions 32. It can also be seen that the slot 34 and the aperture 36 are at least partially coincident.

In the embodiment illustrated in the drawings the slots 34 are shown in an opposed fashion, however, they can be arranged in a staggered fashion if needed.

The end view of the fastening plate shown in FIG 3 illustrates how the slots 34 extend laterally beyond the apertures 36 into the raised portions 32 to create regions of undercut 38 in the raised portions 32. Moreover, the slots 34 are cut only in the raised portions 32 and not into the base section 26. By contrast, the cross-sectional views shown in FIGS 4 and 5 illustrate that the apertures 36 extend completely through the fastening plate 16.

The apertures 36 and slots 34 combine to permit passage of a rail clip 17 therethrough, the undercut portions 38 being sufficient to secure the rail 14 in a retained position and the slot 34 being of sufficient width to accommodate the clip 17. The plan view of the fastening plate 16 shown in FIG 2 shows the upper surface of the raised portions 32, and in particular, the outline shape of the aperture 36. As can be seen, the outer edges of the aperture 36 have projections 40 directed inwardly into the aperture 36 on opposing sides of the portions 32. The projections 40 serve as a gate through which the clip 17 must be urged in order to retain the rail 12 securely.

The slots 34 and apertures 36 are designed to act together such that the clip is loaded easily onto the plate and then retained in position.

The projections 40 comprise an inner pair of projections 40a which enable the clip to be loaded onto the rail, and prevents the clip from coming out during the loading process. Similarly the outer, deeper projections 40b ensure that when a clip 17 is removed from the rail 12, the clip 12 remains loosely on the plate 18.
The fastening plate 16 of the present invention is such that the plate 16 can be manufactured from a rolled metal such as rolled steel and subsequently shaped in machining and/or punching operations.

Thus, in the embodiment of the invention illustrated in FIGS 1-5, the plate 16 is manufactured according to the following method.

Firstly, a section of steel plate is rolled to a predetermined profile to produce a plate having the base section 26 and the pair of spaced raised portions 32 upstanding from an upper surface of the base section.

The plate is then machined/punched to form a plurality of apertures 28 and 36 in the base section 26. At least one aperture is punched/machined in each raised portion to represent the apertures 36.

The rolled and punched plate is subsequently machined/punched to form a respective slot 34 in each raised portion 32. The slots 34 are placed so as to be at least partially co-incident with the at least one aperture 36 machined/punched in each raised portion 32. The slots 34 are also machined or punched so as to extend laterally beyond the aperture 36 into the raised portion 32 to thereby create the regions of undercut 38 in the raised portions 32.

FIGS 6-9 illustrate a second embodiment of the present invention in the form of a railway rail fastening plate 50.

The use of the plate is in all respects similar to that of the plate 16 illustrated in FIGS 1-5.

The plate 50 comprises a base section 52 and upstanding raised portions 54. The raised portions 54 are spaced apart so as to receive a rail therebetween. The raised portions 54 also include apertures 56 therefor securing the plate 50 to a rail foundation. As with the rail plate 16, the plate 50 has an inclined surface.

The raised portions 54 each have a horizontal slot 58 therethrough and a generally vertical aperture 60.

The slot 58 and aperture 60 are co-incident.
The slot 58 is formed in a milling operation and extends laterally beyond the apertures 60 into the raised portions 54 thereby creating regions of undercut 62 in the raised portions 54. Both the slots 58 and the apertures 60 are cut only in the raised portion 54 and not in the base section 52.

There are however recesses 64 cut into the upper surface of the base section 52, the recess 64 being located in the gap created in each raised portion 54 by the slot 58 and aperture 60. As will be appreciated from the cross sectional view shown in FIG 9, the recesses 64 are out generally parallel with a lower face of the plate 50 and therefore, are steeper towards the centre of the plate 50. The recesses 64 serve as a seat for a spring clip, typically of the plan view shown in FIG 7. The recesses 64 have a generally circular inner profile against which a clip can abut in use.

The aperture 60 is also profiled so as to be narrower towards the centre of the plate 50. The narrowing of the aperture creates inner projections 66 which act as a gate in use, a spring clip being urged through the gate and then retained in position by the inner projections 66.

Conveniently, the plate 50 is manufactured in a simple milling operation, the apertures, slots and recesses all being created by milling areas from a section of plate of appropriate profile.

The plate of the present invention is therefore readily manufactured from rolled steel plate by the above method.

Throughout this specification various indications are given as to the scope of the invention however, the invention is not limited to any one of these but may reside in two or more combined together. The examples are given for illustration only and not for limitation.
CLAIMS

1. A railway rail fastening plate comprising:

   a base section adapted to be secured to a rail foundation by securing
   means passing through each of a plurality of apertures in the base section;

   a pair of spaced raised portions upstanding from an upper surface of
   the base section, the raised portions being spaced apart so as to receive a
   railway rail therebetween;

   the raised portions each having a slot extending generally horizontally
   therethrough and an aperture extending generally vertically therethrough, the
   slot and the aperture being partially co-incident; and

   the slot extending laterally beyond the aperture into the raised portion
   to create regions of undercut in the raised portions, the aperture and slot
   combining to permit passage of a rail clip therethrough and the undercut
   portions being sufficient to retain a rail in position.

2. A railway fastening plate according to claim 1, in which the plate is
   manufactured from a rolled metal such as rolled steel and subsequently
   shaped in machining and/or punching operations.

3. A railway fastening plate according to claim 1, in which the aperture
   extending through the raised portions and the slot act co-operatively as a gate
   to prevent a retaining clip from being displaced from a retained condition.

4. A railway fastening plate according to claim 1, wherein the base plate
   may also include a cut out portion generally co-incident with the aperture
   formed in the raised portion, the cut out portion serving as a seat for a rail
   securing clip.

5. A railway fastening plate according to claim 1, wherein the plate is
   comprised of hot or cold rolled steel.

6. A method of manufacturing a railway rail fastening plate comprising the
   steps of:
rolling a section of metal to a predetermined profile to produce a plate having a base section and a pair of spaced raised portions upstanding from an upper surface of the base section;

punching or machining a plurality of apertures in the base section, at least one aperture being formed in each raised portion; and

punching or machining a respective slot in each raised portion, the slots being at least partially co-incident with the at least one aperture formed in the raised portion, the slot extending laterally beyond the aperture into the raised portion to create regions of undercut in the raised portions, the aperture and slot combining to permit passage of a rail clip therethrough and the undercut portions being sufficient to retain a rail in position.

7. A method of manufacturing a rail plate according to claim 6, in which the plate is produced in a single machining operation, each of the apertures and slot being milled from a section of metal of pre-determined profile.

8. A method of manufacturing a rail plate according to claim 6, wherein the punching and/or machining operations can be hot or cold operations.

9. A method of manufacturing a rail plate according to claim 6, in which the plate is formed in an extrusion process.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl: E01B 9/40, 9/48 B23P 15/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC E01B 9/40 9/48 9/54 9/58 B23P 15/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU : IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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