United States Patent [19]

Houghton

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[54] **PAD FOR POSITIONING UNDER A RAILWAY RAIL AND AN ASSEMBLY INCLUDING THE PAD**

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[30] **Foreign Application Priority Data**

June 21, 1973 United Kingdom 29613/73

[52] **U.S. Cl.** **238/283;** 238/287; 238/349; 248/350

[51] **Int. Cl.²** **E01B 9/68**

[58] **Field of Search** 238/283, 287, 349; 248/350

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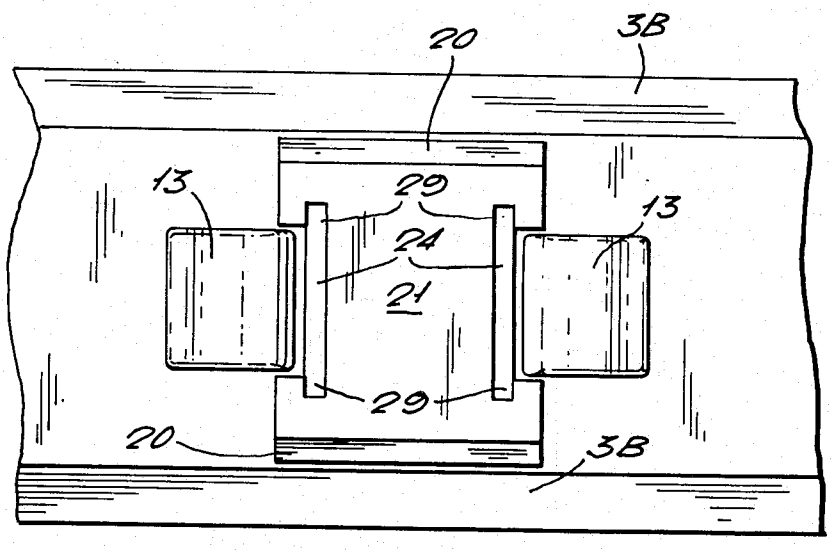
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Assistant Examiner—Randolph A. Reese
Attorney, Agent, or Firm—Waters, Schwartz & Nissen

[57] **ABSTRACT**

A pad for interposition between the bottom of a railway rail and a rail foundation upon which the rail stands is a single piece of elastomeric material in the form of a substantially rectangular sheet with substantially rectangular cut-outs at the center of two opposite sides and chamfering of at least the upper major face at the other two opposite sides. In a rail and fastening assembly projections which extend upwardly from the rail foundation, and are engaged by means holding the rail down, lie partly in the cut-outs and impede movement of the pad along the rail.

10 Claims, 11 Drawing Figures



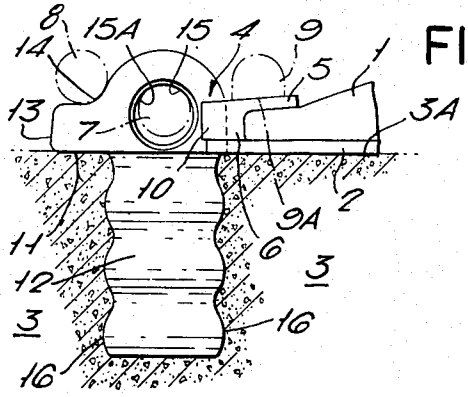
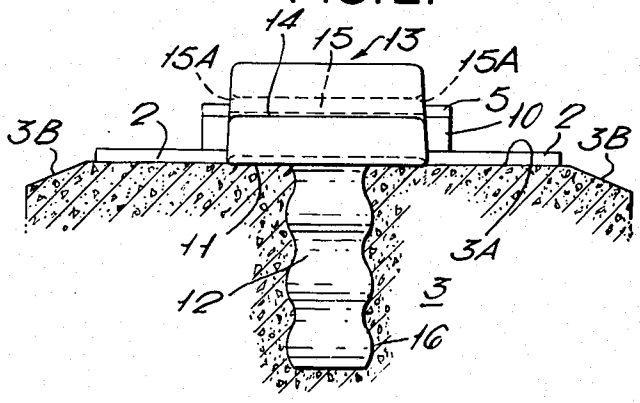


FIG. 1.

FIG. 2.



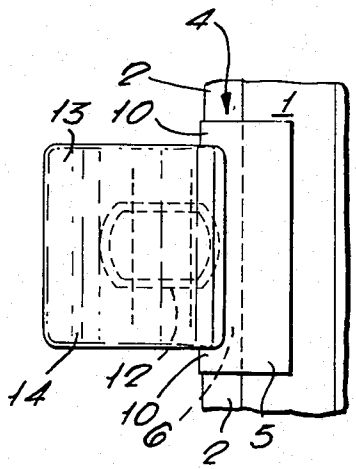


FIG. 3.

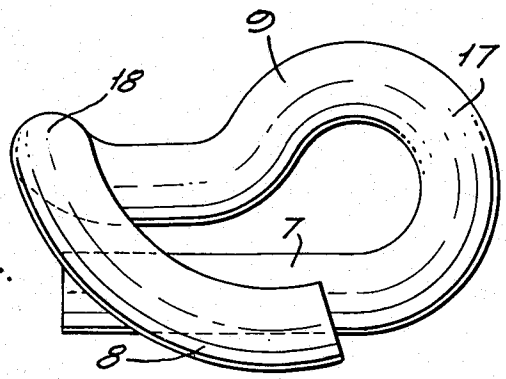


FIG. 4.

FIG. 5.

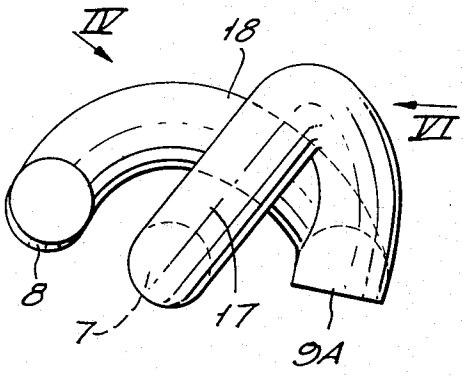


FIG. 6.

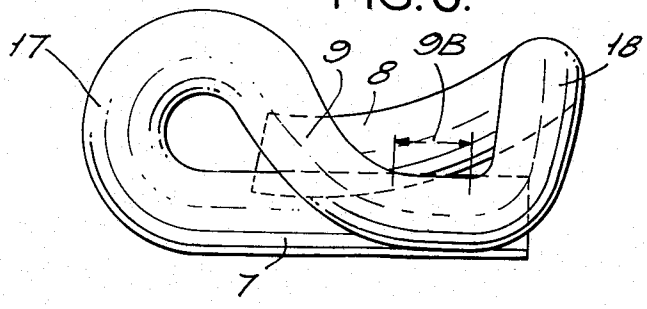


FIG. 7.

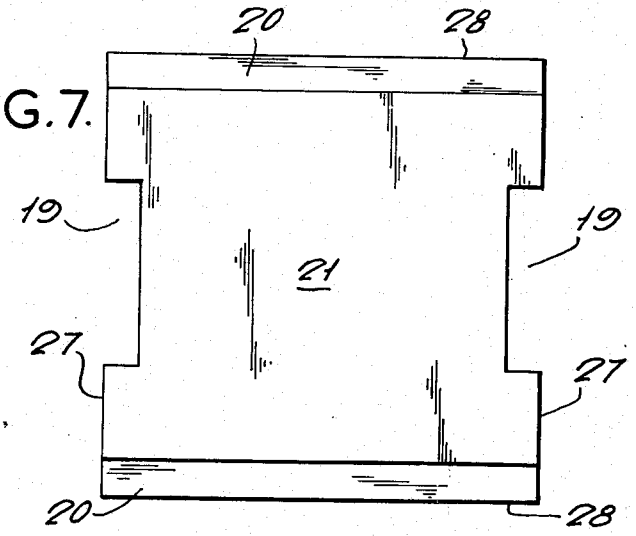


FIG.8.

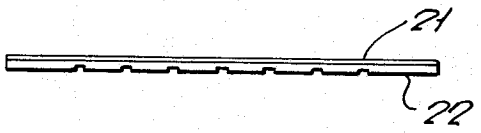


FIG.9.

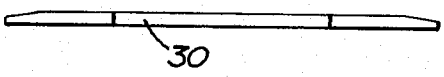


FIG.10.

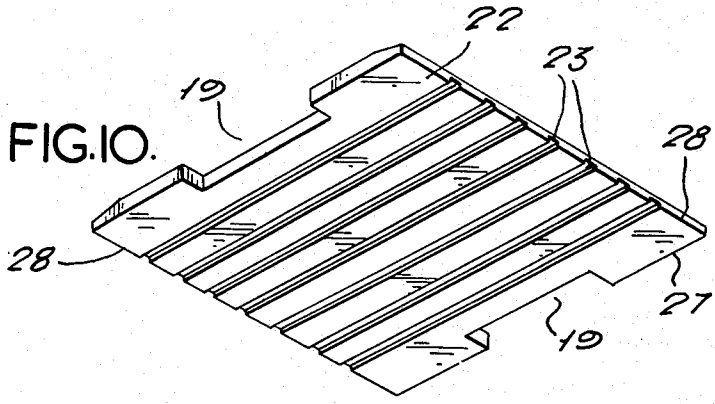
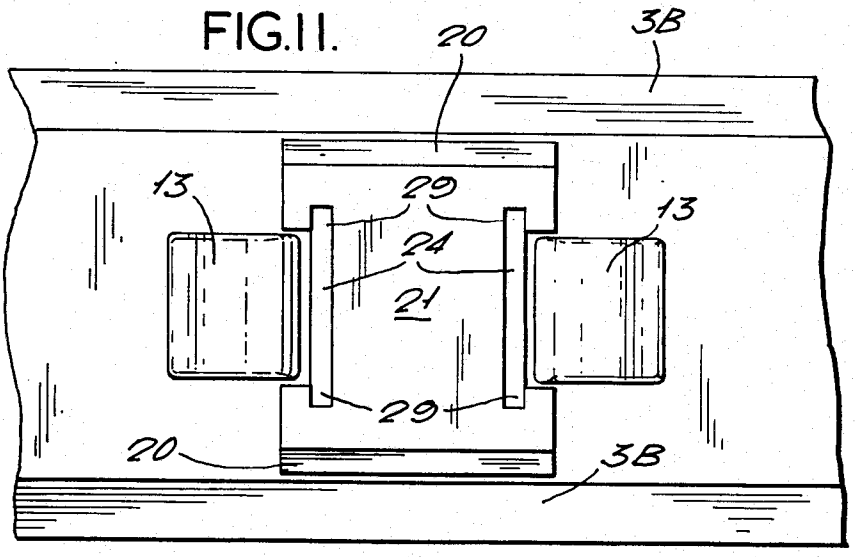


FIG.11.



PAD FOR POSITIONING UNDER A RAILWAY RAIL AND AN ASSEMBLY INCLUDING THE PAD

It is known to interpose a pad between the bottom of a railway rail and a rail foundation upon which the rail stands. If the rail foundation is a concrete sleeper extending across the railway track or a concrete slab running along the railway track, the pad compensates for unevenness of the upper surface of the concrete, it provides the electrical insulation which is necessary if the rail is to be used to carry electric current for signalling and damps vibration which would otherwise be transmitted from the rail to the concrete with resultant damage to the concrete. A pad, to provide electrical insulation, is useful also in the case where the rail foundation is a steel sleeper. A common form of pad is simply a rectangular sheet of rubber or of rubber-bonded cork. Such a pad can be carelessly placed on the rail foundation so that it is not symmetrically positioned with respect to the rail. Such pads could also move in the direction of the length of the rail if the rail itself is displaced lengthwise. The pads have usually had a hardness of about 70 to 75 International Rubber Hardness Degrees and are apt to become damaged in normal use.

According to the invention, there is provided a pad for interposition between the bottom of a railway rail and a rail foundation upon which the rail stands, the pad being a single piece of elastomeric material in the form of a substantially rectangular sheet comprising an upper major face, a lower major face, portions defining two substantially rectangular recesses extending right through the pad substantially at the centers of first and second opposite sides of the pad, first and second walls each extending transversely with respect to said major faces and providing third and fourth opposite sides of the pad, and first and second sloping surfaces extending from respective ones of said walls to said upper major face, each of said sloping surfaces having a gradient substantially less than that of the wall from which it extends. The recesses mentioned above are referred to below as "cut-outs". The provision of the first and second sloping surfaces extending from the first and second walls to the upper major face is referred to below as chamfering.

Probably, in all pads according to the invention the length of the third and fourth sides is in the range 125 to 200 mm., the span of the pad perpendicular to theses sides is in the range 100 to 250 mm, the distance between cut-outs is in the range 95–160 mm. and the thickness of the pad is in the range 3–10 mm.

The elastomeric material of which the pad is made maybe rubber or synthetic plastics material and the pad is preferably made not by making a substantially rectangular sheet and then cutting the cut-outs out of it but by moulding the sheet to the desired shape, with the cut-outs. Projections extending upwardly from the rail foundation can lie partly in these cut-outs and impede movement of the pad along the rail.

The material of which the pad is made preferably has a hardness at least 80 International Rubber Hardness Degrees and we think that this will give the pad a longer life than it would have if the hardness were lower. A value within the range 90 to 100 is preferred. With such a hard material, but for the chamfering mentioned above, there would be a tendency for the bending of the rail, which occurs when a train passes, to cause severe local stresses, which would damage the pad, at the

third and fourth sides of the pad, i.e. at the two opposite extremities of the pad, spaced apart in a direction parallel to the rail.

The pad may have further recesses in the lower major face to allow lateral displacement of the material of the pad when it is subjected to compression on the passage of a train over it, and these may be grooves, for example of rectangular cross-section, extending parallel to the first and second two opposite sides. The pad may have additional chamfering of the upper major face between the cut-outs adjacent the innermost extremities of the cut-outs.

According to the invention, there is also provided a railway rail and fastening assembly comprising a rail foundation, two projections extending upwardly from the rail foundation, a pad laid on the rail foundation, a rail laid on the pad between the projections and means engaging the projections and holding the rail down, the pad being a pad according to the invention, with or without any one or more of the additional features expressed above after the first sentence beginning "According to . . . ", with parts of the projections in the cut-outs and with said upper major face facing upwardly, the arrangement being such that the projections impede movement of the pad along the rail. The rail foundation may be a concrete or steel sleeper extending across the railway track or a continuous slab of concrete running along the railway track. Preferably, the shortest distance between the two cut-outs is less than the distance between the two projections by no more than a quarter of an inch. This makes it more likely that the pad will be symmetrically placed with respect to the projections and thus with respect to the rail. It is advantageous for the pad to have the additional chamfering mentioned above if the assembly includes two elongate members of electrically insulating material of substantially L-shaped cross-section on opposite sides of the rail, each member having one limb of the L lying on the top of the rail flange and the other limb of the L lying between the outer edge of the rail flange and one of said projections and also having two portions extending on opposite sides of said projection for abutting said projection in the event of there being any tendency for said elongate member to move in a direction parallel to the length of the rail, because then the said members can be spaced from the pad by virtue of the additional chamfering.

Examples in accordance with the invention are described below with reference to the accompanying drawings in which:

FIGS. **1** and **2** show two side views and

FIG. **3** shows a plan view of a railway rail and fastening arrangement, parts being omitted for the sake of clarity;

FIGS. **4** to **6** show three views of a resilient railway rail-fastening member forming part of the arrangement shown in FIGS. **1** to **3**, FIGS. **4** and **6** showing views taken as indicated by the arrows IV and VI, respectively, in FIG. **5**.

FIG. **7** shows a plan view of a pad forming part of the arrangement shown in FIGS. **1** to **3**,

FIGS. **8** and **9** show two side views of the pad,

FIG. **10** shows a perspective view of the pad, and

FIG. **11** shows a plan view of a modified pad placed on a railway sleeper.

In FIGS. **1** and **3**, there is shown the flange **1** of a flange-footed railway rail resting on a rubber pad **2** which is laid on the upper surface **3A** of a concrete rail-

way sleeper 3 having chamfered upper edges 3B. On each side of the rail there is an arrangement for holding the rail down, the two arrangements being similar but only one of them being shown. It includes a clip as described below and illustrated in FIGS. 4 to 6. Only three limbs 7, 8 and 9 of the clip are shown, in dotted lines, in FIG. 1. On the edge of the flange there is placed an electrical insulator consisting of an elongate nylon moulding 4 of approximately L-shaped cross-section, one limb 5 of which lies on the rail flange and has the limb 9 of the clip bearing upon it, whereas the other limb 6 lies against the side of the rail flange and has portions 10 extending from opposite ends of it.

An anchoring member is fixed to the sleeper, this consisting of a malleable iron casting and comprising a flat surface 11 lying on the upper surface 3A of the sleeper, a projecting leg 12 extending downwardly into the sleeper, a block portion 13, substantially square as seen in plan, extending upwardly from the surface 11, a concave surface 14 at the top of the block portion 13 and a passage 15 of circular cross section, having flared mouths 15A, in the block portion 13, the passage 15 being substantially parallel to the length of the rail. The block portion 13 constitutes a projection extending upwardly from the sleeper. The limb 7 of the rail clip is driven in the passage 15 and presses upwardly on the upper surface of the passage, whereas the limb 8 of the rail clip presses downwardly on the concave surface 14. Part of the block portion 13 lies between the portions 10 of the insulator 4 so that the insulator is prevented from sliding along the rail, when the clip is being driven into position, by one of the portions 10 abutting the block portion 13.

The leg 12 of the anchoring member is formed with protuberances 16 on all four sides and it is cast in the concrete, that is to say incorporated in the concrete before the latter has set.

Referring to FIGS. 4 to 6, proceeding along the bar from which the clip was made, from end to end, it has first, second, third, fourth and fifth portions referenced 7, 17, 9, 18 and 8, respectively. When the clip is in use the first portion 7, which is a substantially straight leg, is horizontal and parallel to the rail and when the clip is viewed from above the third and fifth portions 8 and 9 appear to be on opposite sides of the axis of the first portion 7. Each of the portions 17 and 18 is a single reverse bend. The clip is made by bending a resilient steel bar of circular cross-section and providing it with a flat surface 9A extending along a short length of the limb 9 of the clip. This flat surface is in contact with and bears downwardly upon the limb 5 of the insulator 4. It is formed on the limb 9 without removing any material. Its purpose is to ensure that the area of contact between the limb 9 of the clip and the limb 5 of the insulator is greater than it would be if the limb 9 were of circular cross-section where it touches the limb 5. Thus any tendency for the limb 9 to sink into the insulator, after the assembly of the rail and fastening arrangement, is reduced.

If the clip were so positioned that the limb 8 of it bears upon the limb 5 of the insulator 4, then the limb 8, instead of the limb 9, could be provided with a flat surface making contact with the insulator material.

The pad 2 of FIGS. 1 to 3 is shown in FIGS. 7 to 10. It is made by moulding a single piece of rubber or plastics material and has a thickness of about 5 mm and a hardness of about 95 International Rubber Hardness Degrees. It is in the form of a rectangle, 190 mm (left to right in FIG. 7) by 178 mm, with first and second opposite sides 27 and third and fourth opposite sides 28, with rectangular cut-outs 19 at the centers of the sides 27 (there being no other cut-outs in these sides) and with chamfering 20 of the upper major face 21 at the sides 28. This chamfering is in each case such that there is a wall, which is vertical in the illustrated example, considering FIG. 9, extending transversely with respect to said major faces and providing one of the third and fourth sides and a sloping surface extending from that wall to the upper major face of the pad, the sloping surface having a gradient substantially less than the gradient of the wall (which latter is infinity in the illustrated case). The lower major face 22 of the pad is formed with seven grooves 23 parallel to the sides 27 and of rectangular cross-section, to allow lateral displacement of the rubber between the grooves when a train passes over the pad, so that the pad is more yielding than it otherwise would be.

The pad shown in FIG. 11 differs from that of FIGS. 7 to 10 only in that its face 21 is additionally chamfered at 24, between the cut-outs 19 adjacent the innermost extremities of the cut-outs 19, at an angle of 20° to the face 21. This chamfering is in each case such that there is a wall, which is vertical in the present example and which corresponds to the surface marked 30 in FIG. 9, this wall extending transversely with respect to the major face 21 of the pad and parallel to the sides 27 of the pad. Extending from this wall to the upper major face of the pad there is a sloping surface 24 having a gradient substantially less than the gradient of the wall (i.e. at 20° to the horizontal as compared with 90° to the horizontal). The sloping surface 24 continues in both directions beyond the cut-outs so that recesses 29 are formed. The chamfering 20 is at an angle of 3° to the face 21.

The pad of FIGS. 7 to 10 or the pad of FIG. 11 is laid on the sleeper as shown in FIG. 11, with the face 21 uppermost and parts of the block portions 13 lying in the cut-outs 19 whereby the pad is prevented from moving more than a fraction of an inch along the rail. The distance between the innermost extremities of the two cut-outs is less than the distance between the two block portions 13 by no more than 1/4 inch and the length of each cut-out is greater by no more than 1/4 inch than the width, measured across the sleeper, of each block portion 13, whereby the pad is more likely to be placed initially in the correct position, even by a careless workman. The length of the pad, i.e. the distance between the sides 28, is a little less than the width of the flat top of the sleeper.

The chamfering 20 reduces stresses at the ends of the pad when a rail is bent downwardly as a train wheel approaches and leaves the part of the rail immediately above the pad and the chamfering 24 and the recesses 29 in the example of FIG. 11 prevent the limb 6 of the insulator touching the pad and perhaps being prevented by it from seating properly on the rail flange.

Both major faces of the pad could be chamfered at the sides 28 of the pad.

I claim:

1. A pad for interposition between the bottom of a railway rail and rail foundation upon which the rail stands, the pad comprising a single piece of elastomeric material in the form of a substantially rectangular sheet comprising an upper major face, a lower major face, portions defining two substantially rectangular recesses extending right through the pad substantially at the

centers of first and second opposite sides of the pad, first and second walls each extending transversely with respect to said major faces and providing third and fourth opposite sides of the pad, and first and second sloping surfaces extending from respective ones of said walls to said upper major face, each of said sloping surfaces having a gradient substantially less than that of the wall from which it extends.

2. A pad according to claim **1** made of material having a hardness of at least 80 International Rubber Hardness Degrees.

3. A pad according to claim **1** having further portions defining further recesses in said lower major face.

4. A pad according to claim **3** in which said further recesses are grooves extending parallel to said first and second opposite sides.

5. A pad according to claim **4** in which the grooves are of rectangular cross-section.

6. A pad according to claim **1** comprising additional portions defining chamfering of said upper major face between said recesses adjacent the innermost extremities of said recesses, this chamfering being such in each case that there is a wall extending transversely with respect to said upper major face, parallel to the first and second sides of the pad and at the innermost extremity of one of said recesses and a sloping surface extending from this wall to the upper major face of the pad and having a gradient substantially less than the gradient of said wall.

7. A railway rail and fastening assembly comprising a rail foundation, two projections extending upwardly from the rail foundation, a pad according to claim **1** laid on the rail foundation with parts of the projections in said recesses and with said upper major face facing upwardly, a rail laid on the pad between said projections, the arrangement being such that the projections impede movement of the pad along the rail, and means engaging said projections and holding the rail down.

8. An assembly according to claim **7** in which the shortest distance between said two recesses is less than the distance between the two projections by at most a quarter of an inch.

9. An assembly according to claim **7** in which the pad further comprises additional portions defining chamfering of said upper major face between said recesses adjacent the innermost extremities of said recesses, the chamfering being such that in each case there is a wall extending transversely with respect to said upper major face and parallel to the first and second sides of the pad and a sloping surface which extends from this wall to th upper major face of the pad, this surface having a gradient substantially less than that of said wall, said assembly further comprising two elongate members of electrically insulating material of substantially L-shaped cross-section on opposite sides of the rail, each member having one limb of the L lying on the top of the rail flange and the other limb of the L lying between the outer edge of the rail flange and one of said projections and also having two portions extending on opposite sides of said projection for abutting said projection in the event of there being any tendency for said elongate member to move in a direction parallel to the length of the rail, the said members being spaced from the pad by virtue of said camfering.

10. An assembly according to claim **7** in which said means engaging said projections and holding the rail down comprises two clips each made by bending a length of resilient metal of rod form so that it has, progressing from one end of the length of metal to the other, a first portion which is a substantially straight leg driven into one of said projections and lying substantially parallel to the rail, a second portion, a third portion, a fourth portion and finally a fifth portion, the third and fifth portions, when viewed from above, appearing to lie on opposite sides of the first portion and one of them bearing downwardly on the rail flange.

* * * * *