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(54) **Rail dampers**

Schienenendämpfer

Amortisseurs de rails

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Description

[0001] The invention relates to rail dampers. More especially, the invention relates to a clip for attaching a damper to a rail and a method of installing such a clip.

[0002] The noise emitted by moving rail vehicles is a major limitation on their use, in that it will limit the ability of operators to install new lines in populated areas, and will limit speeds and traffic volumes on existing lines. The noise tends to be dominated by rolling noise from the wheel/rail interface, which is caused partly by vibration of the wheels and partly by vibration of the track.

[0003] It is not possible to select alternative materials for these elements as they are subject to very high transient loads during use, and must be able to withstand these loads. Materials which would be able to absorb vibration and hence reduce noise would be unable to survive in use for any appreciable time.

[0004] It is known to reduce the track noise emitted by a rail system by attaching one or more dampers to a rail. The dampers typically consist of elongate members made of a material which is able to absorb vibration, and are positioned on either side of the rail at the junction between the web of the rail and the foot of the rail.

[0005] It is known to attach such dampers to a rail using an adhesive. It is also known to attach such dampers to a rail using magnets.

[0006] WO 2005/007969 relates to a clip for attaching a damper to a rail according to the pre-characterising portion of claim 1. The clip is attached to the rail by positioning the first section of the clip beneath the foot of the rail and bending the second section rearward, and from side to side until the first section engages with the side surface of the rail foot opposite the damper and the second section engages with the top surface of the damper.

[0007] It is an object of the invention to provide an alternative means of attaching a damper to a rail.

[0008] According to a first aspect, the invention provides a clip for attaching a damper to a rail having a head, a foot and a web which extends between the head and foot, the damper being positioned on one side of the rail, at the junction between the web of the rail and the foot of the rail, wherein the clip comprises first and second sections, which are connected by a spring, the first section having a first element which, in use, engages the bottom surface of the foot of the rail and a second element, which, in use, engages a side surface of the foot of the rail, and the second section having a first element which, in use, engages the top surface of the damper, and a second element which, in use, engages a side surface of the damper, **characterised in that** the clip comprises one or more further spring(s) and the clip is attachable to the rail by positioning the foot of the rail between the first and second sections of the clip and driving the clip towards the rail so that the first and second sections of the clip are forced apart.

[0009] The first section may comprise a spring.

[0010] Alternatively or in addition, the second section may comprise a spring.

[0011] The additional spring(s) may be positioned at any point on the first/second section. For example, a spring may be positioned in the middle of the first/second section, or a spring may be positioned at the end of the first/second section which is distal from the pivotal connection.

[0012] In the illustrated embodiments, the springs are coil springs. Each spring may comprise a part turn, a single turn, or a plurality of turns. Increasing the number of turns will increase the "springiness" of the clip. Accordingly, the number of turns may be selected to control the clamping force applied by the clip, and to reduce variations in the clamping force.

[0013] Where a spring comprises a part turn, it may be used as a point of engagement for a tool used to open the clip ready for application to a rail.

[0014] The turns of the spring may be oriented in any suitable plane.

[0015] The first and second sections may be spaced apart when the clip is in its closed (i.e. unloaded) position. That is, the first and second sections may be inclined to one another. The spacing between the first and second sections may be sufficient to enable the foot of a rail to be inserted between the first and second section.

[0016] The second element may be flexible, whereby it can be bent so that the second element also engages the top surface of the foot of the rail.

[0017] The second section may comprise a third element which, in use, engages the top surface of the foot of the rail.

[0018] The third element may be connected to the second element by a spring.

[0019] The second section may interlock with the first section.

[0020] The clip may further comprise a third section, which, in use, engages a damper positioned on the other side of the rail, at the junction between the web of the rail and the foot of the rail.

[0021] The third section may be the mirror image of the second section.

[0022] The clip may be made of any suitable material, for example, steel. The clip may be made from wire or, where the springs comprise part turns only, from sheet material. Where the clip is made from wire, the wire may be doubled up so that each of the first and second sections is substantially U-shaped. The springs may also be doubled up so that the clip contains twice as many springs as a clip made from a single length of wire.

[0023] According to a second aspect the invention provides a method of installing a clip according to the invention, wherein the foot of the rail is positioned between the first and second sections of the clip and the clip is driven towards the rail so that the first and second sections are forced apart.

[0024] According to a third aspect the invention provides a method of installing a clip according to the inven-

tion, the method comprising the step of positioning an open clip so that the first section is beneath the rail.

[0025] The clip may be held open by holding means while the clip is being positioned

[0026] The holding means may comprise a removable frame or a releasable locking bar.

[0027] The invention will now be illustrated by way of example with reference to the following drawings of which:

Figure 1 shows a first embodiment of a clip according to the invention;

Figure 2 shows the clip of Figure 1 after crimping;

Figure 3 shows the clip of Figure 1 being installed on a rail using a first method according to the invention (step 1);

Figure 4 shows step 2 of the method shown in Figure 3;

Figure 5 shows step 3 of the method shown in Figure 3;

Figure 6 shows step 4 of the method shown in Figure 3;

Figure 7 shows step 5 of the method shown in Figure 3;

Figure 8 shows the clip of Figure 1 being installed on a rail using a second method according to the invention;

Figure 9 shows a second embodiment of a clip according to the invention being installed on a rail using the second method according to the invention; and

Figure 10 shows a third embodiment of a clip according to the invention;

Figure 11 shows two views of a fourth embodiment of a clip according to the invention;

Figure 12 shows two views of a fifth embodiment of a clip according to the invention and;

Figure 13 shows two views of a sixth embodiment of a clip according to the invention.

[0028] Each drawing shows a vertical section through a rail 1 fitted with a pair of dampers 2.

[0029] The rail 1 is a standard rail. It comprises a head 3 which carries the traffic and a narrower web 4, which extends downwardly from the head 3 to a foot 5, which is wider than both the head 3 and the foot 5.

[0030] A damper 2 is positioned on either side of the

rail 1, at the junction between the web 4 and the foot 5. Each damper 2 is a standard damper and consists of an elongate member made from a material which absorbs vibration such as rubber.

[0031] In Figure 1, one of the dampers 2 is attached to the rail 1 by a clip 6.

[0032] The clip 6 comprises a first section 7 and a second section 8. The first section 7 engages the foot 5 of the rail 1 and the second section 8 engages one of the dampers 2. The first section 7 is connected to the second section 8 by a spring 9 which comprises a plurality of turns. Even when the clip is in its closed position, the first and second sections 7,8 are spaced apart, being inclined to one another at an angle of about 40 degrees.

[0033] The first section 7 comprises a first element 10 which engages the bottom surface of the foot 5 of the rail 1 and a second element 11 which engages one side of the foot 5 of the rail 1. Both elements 10,11 are substantially planar and are perpendicular to one another. The second element 11 may optionally be crimped so that it also engages the top surface of the foot 5 of the rail 1 (see Figure 2).

[0034] The second section 8 comprises a first element 12 which engages the top surface of the damper 2, a second element 13 which engages one side of the damper 2 and a third element 14 which engages the top surface of the foot 5 of the rail 1. The first 12 and second 13 elements are connected together and consist of a sheet of metal formed into a hook. The third element 14 is substantially planar. The first and second elements 12,13 are connected to the third 14 element by a spring 15 which comprises a plurality of turns.

[0035] The clip 6 may be made from any suitable material such as steel.

[0036] The clip 6 shown in Figure 1 may be installed on a rail in a single action by driving the clip 6 towards the rail 1.

[0037] A closed clip 6 is held at the correct starting angle (see Figure 3) and driven towards the rail 1 until one flange of the foot 5 is positioned between the first section 7 and the second section 8 (see Figure 4). As the clip 6 continues to be driven towards the rail 1, the first section 7 pushes against the other flange of the foot 5 and the second section 8 pushes against the damper 2, thereby forcing the clip 6 to open (see Figure 5). The clip 6 continues to open until the second element 11 of the first section 7 is forced over the bottom surface of the other flange of the foot 5 and the third element 14 of the second section 8 is forced over the side of the damper 2 (see Figure 6). The clip 6 then springs shut, thereby clamping the damper 2 to the rail 1 (see Figure 7).

[0038] Alternatively, if it is desired to delay clamping the damper 2, the clip 6 may be installed on a rail in its open position and held open until it is desired that clamping takes place. As shown in Figure 8, the clip 6 is positioned so that the first section 7 is beneath the rail 1 and then lifted while still in the open position. The clip 6 is held open while it is being positioned by a frame (not

shown). When desired, the frame is removed and the clip 6 springs shut, thereby clamping the damper 2 to the rail 1.

[0039] The clip 6 may be held open by other holding means such as a locking bar. The clip 16 shown in Figure 8 is the same as the clip 6 shown in Figures 1 and 2 except that it includes a locking bar 17. The locking bar 17 is attached to the spring 9 which connects the first section 7 to the second section 8. The locking bar 17 is used instead of the removable frame to hold the clip 16 open while it is being positioned on the rail 1. When the locking bar 17 is released, the clip 16 springs shut, thereby clamping the damper 2 to the rail 1.

[0040] In each case, a second clip 6 is installed in the same manner to clamp the other damper 2 to the rail 1.

[0041] The clip 18 shown in Figure 10 is the same as the clip 6 shown in Figures 1 and 2 except that it includes a third section 19 which engages the damper 2 on the other side of the rail 1. The third section 19 is connected to the free end of the first section 7, that is, to the end which is opposite to the end which carries the second section 8. The third section 19 is connected to the first section 7 by a spring 20 which comprises a plurality of turns, and is the mirror image of the second section 8. With the clip 18, there is no need for another clip to clamp the other damper 2 to the rail 1.

[0042] The clips 21, 22, 23 shown in Figures 11 to 13 differ from the clips 6, 16 and 18 in that the spring 24, 25, 26 between the first section 27, 28, 29 and the second section 30, 31, 32 of each of those clips only comprises a part turn.

[0043] Clip 21 further comprises two springs 33, 34. Spring 33 has a part turn, and is located towards the middle of the first section 27 of clip 21. Spring 33 is oriented in the plane of the foot 5 of the rail 1. Spring 34 has a plurality of turns, and is located towards the middle of the second section 30 of clip 21. Spring 34 is orientated with its axis perpendicular to the axis of the springs of clips 6, 16 and 18.

[0044] Clip 22 further comprises a spring 35 having a part turn in the middle of its first section 28.

[0045] Clip 23 further comprises two springs 36, 37 each having a part turn, one spring 36 being in the middle of the first section 29 and the other spring 37 being in the middle of the second section 32 in a plane perpendicular to the plane of the foot 5 of the rail 1.

[0046] Clips 22 and 23 have been made from a length of wire which has been doubled up so that each of the first and second sections is substantially U-shaped. The springs 35, 36, 37 have also been doubled up so that each clip contains twice as many springs as a clip made from a single length of wire.

[0047] Many other arrangements are possible as will be apparent to the person skilled in the art.

[0048] The clips may be installed on a rail by a machine, mounted on the track, which grips the clips and drives them through the necessary path to pass over the foot 5 of the rail 1 and into engagement with the rail 1.

The path may be achieved through a system of levers and or gears. The activation of this mechanism may be electrical, hydraulic, pneumatic or manual.

Claims

1. A clip (6) for attaching a damper (2) to a rail (1) having a head (3), a foot (5) and a web (4) which extends between the head (3) and foot (5), the damper (2) to be positioned on one side of the rail (1), at the junction between the web (4) of the rail (1) and the foot of the rail (1), wherein the clip (6) comprises first and second sections (7, 8), which are connected by a spring (9), the first section (6) having a first element (10) which, in use, can engage the bottom surface of the foot (5) of the rail (1) and a second element (11), which, in use, can engage a side surface of the foot (5) of the rail (1), and the second section (8) having a first element (12) which, in use, can engage the top surface of the damper (2), and a second element (13) which, in use, can engage a side surface of the damper (2), **characterised in that** the clip comprises one or more further spring(s) and the clip is attachable to the rail by positioning the foot of the rail between the first and second sections of the clip and driving the clip towards the rail so that the first and second sections of the clip are forced apart.
2. A clip according to claim 1, wherein the first section (7) comprises a spring.
3. A clip according to claim 1 or claim 2, wherein the second section (8) comprises a spring.
4. A clip according to any preceding claim, wherein one or more springs comprise a part turn.
5. A clip according to any preceding claim, wherein one or more springs comprise a single turn.
6. A clip according to any preceding claim, wherein one or more springs comprise a plurality of turns.
7. A clip according to any preceding claim, wherein the second element (11) of the first section (7) is flexible, whereby it can be bent so that the second element also engages the top surface of the foot (5) of the rail (1).
8. A clip according to any preceding claim, wherein the second section (8) comprises a third element (14) which, in use, engages the top surface of the foot (5) of the rail (1).
9. A clip according to claim 8, wherein the third element (14) is connected to the second element (13) by a spring (15).

10. A clip according to any preceding claim, wherein the second section (8) interlocks with the first section (7).
11. A clip according to any preceding claim, wherein the clip (6) further comprises a third section (19), which, in use, engages a damper (2) positioned on the other side of the rail (1), at the junction between the web (4) of the rail (1) and the foot (5) of the rail (1).
12. A clip according to claim 11, wherein the third section (19) is a mirror image of the second section.
13. A method of installing a clip according to any preceding claim, wherein the foot of the rail is positioned between the first (7) and second sections (8) of the clip (6) and the clip is driven towards the rail (7) so that the first and second sections are driven apart.
14. A method of installing a clip according to claim 13, the method comprising the step of positioning an open clip (6) so that the first section is beneath the rail (1).
15. A method according to claim 14, wherein the clip (6) is held open by holding means while the clip is being positioned.
16. A method according to claim 15, wherein the holding means comprises a removable frame or a releasable locking bar (17).

Patentansprüche

1. Klammer (6) zum Anbringen eines Dämpfers (2) an einer Schiene (1) mit einem Kopf (3), einem Fuß (5) und einem Steg (4), der sich zwischen dem Kopf (3) und dem Fuß (5) erstreckt, wobei der Dämpfer (2) auf einer Seite der Schiene (1) am Übergang zwischen dem Steg (4) der Schiene (1) und dem Fuß der Schiene (1) zu positionieren ist, wobei die Klammer (6) einen ersten und einen zweiten Abschnitt (7, 8) umfasst, die über eine Feder (9) verbunden sind, wobei der erste Abschnitt (7) ein erstes Element (10), das im Gebrauch die untere Fläche des Fußes (5) der Schiene (1) in Eingriff nehmen kann, und ein zweites Element (11) hat, das im Gebrauch eine Seitenfläche des Fußes (5) der Schiene (1) in Eingriff nehmen kann, und der zweite Abschnitt (8) ein erstes Element (12), das im Gebrauch die obere Fläche des Dämpfers (2) in Eingriff nehmen kann, und ein zweites Element (13) hat, das im Gebrauch eine Seitenfläche des Dämpfers (2) in Eingriff nehmen kann, **dadurch gekennzeichnet, dass** die Klammer eine oder mehrere weitere Federn umfasst und die Klammer an der Schiene anbringbar ist, indem der Fuß der Schiene zwischen den ersten und den zweiten Abschnitt der Klammer positioniert wird und die

Klammer zur Schiene hin getrieben wird, so dass der erste und der zweite Abschnitt der Klammer auseinandergezwungen werden.

2. Klammer nach Anspruch 1, wobei der erste Abschnitt (7) eine Feder umfasst.
3. Klammer nach Anspruch 1 oder 2, wobei der zweite Abschnitt (8) eine Feder umfasst.
4. Klammer nach einem der vorhergehenden Ansprüche, wobei eine oder mehrere Federn eine Teilwindung umfassen.
5. Klammer nach einem der vorhergehenden Ansprüche, wobei eine oder mehrere Federn eine einzige Windung umfassen.
6. Klammer nach einem der vorhergehenden Ansprüche, wobei eine oder mehrere Federn mehrere Windungen umfassen.
7. Klammer nach einem der vorhergehenden Ansprüche, wobei das zweite Element (11) des ersten Abschnitts (7) flexibel ist, so dass es gebogen werden kann, so dass das zweite Element auch die obere Fläche des Fußes (5) der Schiene (1) in Eingriff nimmt.
8. Klammer nach einem der vorhergehenden Ansprüche, wobei der zweite Abschnitt (8) ein drittes Element (14) umfasst, das im Gebrauch die obere Fläche des Fußes (5) der Schiene (1) in Eingriff nimmt.
9. Klammer nach Anspruch 8, wobei das dritte Element (14) über eine Feder (15) mit dem zweiten Element (13) verbunden ist.
10. Klammer nach einem der vorhergehenden Ansprüche, wobei sich der zweite Abschnitt (8) mit dem ersten Abschnitt (7) verriegelt.
11. Klammer nach einem der vorhergehenden Ansprüche, wobei die Klammer (6) ferner einen dritten Abschnitt (19) umfasst, der im Gebrauch einen Dämpfer (2) in Eingriff nimmt, der auf der anderen Seite der Schiene (1) an einem Übergang zwischen dem Steg (4) der Schiene (1) und dem Fuß (5) der Schiene (1) positioniert ist.
12. Klammer nach Anspruch 11, wobei der dritte Abschnitt (19) ein Spiegelbild des zweiten Abschnitts ist.
13. Verfahren zur Installierung einer Klammer nach einem der vorhergehenden Ansprüche, wobei der Fuß der Schiene zwischen den ersten (7) und den zweiten Abschnitt (8) der Klammer (6) positioniert wird

und die Klammer zur Schiene (1) getrieben wird, so dass der erste und der zweite Abschnitt auseinandergetrieben werden.

14. Verfahren zur Installierung einer Klammer nach Anspruch 13, wobei das Verfahren den Schritt des Positionierens einer offenen Klammer (6) umfasst, so dass der erste Abschnitt unter der Schiene (1) ist.
15. Verfahren nach Anspruch 14, wobei die Klammer (6) durch ein Haltemittel offengehalten wird, während die Klammer positioniert wird.
16. Verfahren nach Anspruch 15, wobei das Haltemittel einen entfernbaren Rahmen oder eine freigebbare Verriegelungsstange (17) umfasst.

Revendications

1. Pince (6) destinée à attacher un amortisseur (2) à un rail (1) ayant une tête (3), une base (5) et une âme (4) qui s'étend entre la tête (3) et la base (5), l'amortisseur (2) devant être positionné d'un côté du rail (1), à la jonction entre l'âme (4) du rail (1) et la base du rail (1), la pince (6) comprenant des première et deuxième sections (78) qui sont connectées par un ressort (9), la première section (6) ayant un premier élément (10) qui, lors de l'utilisation, peut s'engager avec la surface inférieure de la base (5) du rail (1) et un deuxième élément (11) qui, pendant l'utilisation, peut s'engager avec une surface latérale de la base (5) du rail (1), et la deuxième section (8) ayant un premier élément (12), qui, pendant l'utilisation, peut s'engager avec la surface supérieure de l'amortisseur (2) et un deuxième élément (13), qui, pendant l'utilisation, peut s'engager avec une surface latérale de l'amortisseur (2), **caractérisée en ce que** la pince comprend un ou plusieurs ressorts supplémentaires et la pince peut être attachée au rail en positionnant la base du rail entre les première et deuxième sections de la pince et en entraînant la pince vers le rail de telle sorte que les première et deuxième sections de la pince soient forcées de s'écarter l'une de l'autre.
2. Pince selon la revendication 1, dans laquelle la première section (7) comprend un ressort.
3. Pince selon la revendication 1 ou 2, dans laquelle la deuxième section (8) comprend un ressort.
4. Pince selon l'une quelconque des revendications précédentes, dans laquelle un ou plusieurs ressorts comprennent un tour partiel.
5. Pince selon l'une quelconque des revendications précédentes, dans laquelle un ou plusieurs ressorts

comprennent un tour complet.

6. Pince selon l'une quelconque des revendications précédentes, dans laquelle un ou plusieurs ressorts comprennent une pluralité de tours.
7. Pince selon l'une quelconque des revendications précédentes, dans laquelle le deuxième élément (11) de la première section (7) est flexible, de sorte qu'il peut être courbé afin que le deuxième élément s'engage aussi avec la surface supérieure de la base (5) du rail (1).
8. Pince selon l'une quelconque des revendications précédentes, dans laquelle la deuxième section (8) comprend un troisième élément (14) qui, pendant l'utilisation, s'engage avec la surface supérieure de la base (5) du rail (1).
9. Pince selon la revendication 8, dans laquelle le troisième élément (14) est connecté au deuxième élément (13) par un ressort (15).
10. Pince selon l'une quelconque des revendications précédentes, dans laquelle la deuxième section (8) s'emboîte avec la première section (7).
11. Pince selon l'une quelconque des revendications précédentes, dans laquelle la pince (6) comprend en outre une troisième section (19), qui, pendant l'utilisation, s'engage avec un amortisseur (2) positionné de l'autre côté du rail (1) à la jonction entre l'âme (4) du rail (1) et la base (5) du rail (1).
12. Pince selon la revendication 11, dans laquelle la troisième section (19) est une image inverse de la deuxième section.
13. Procédé pour installer une pince selon l'une quelconque des revendications précédentes, dans lequel la base du rail est positionnée entre la première (7) et la deuxième (8) section de la pince (6) et la pince est entraînée vers le rail (1) de telle sorte que les première et deuxième sections soient amenées à s'écarter l'une de l'autre.
14. Procédé pour installer une pince selon la revendication 13, le procédé comprenant l'étape consistant à positionner une pince ouverte (6) de telle sorte que la première section soit sous le rail (1).
15. Procédé selon la revendication 14, dans lequel la pince (6) est maintenue ouverte par des moyens de retenue pendant le positionnement de la pince.
16. Procédé selon la revendication 15, dans lequel les moyens de retenue comprennent un cadre amovible ou une barre de verrouillage libérable (17).

Fig.1

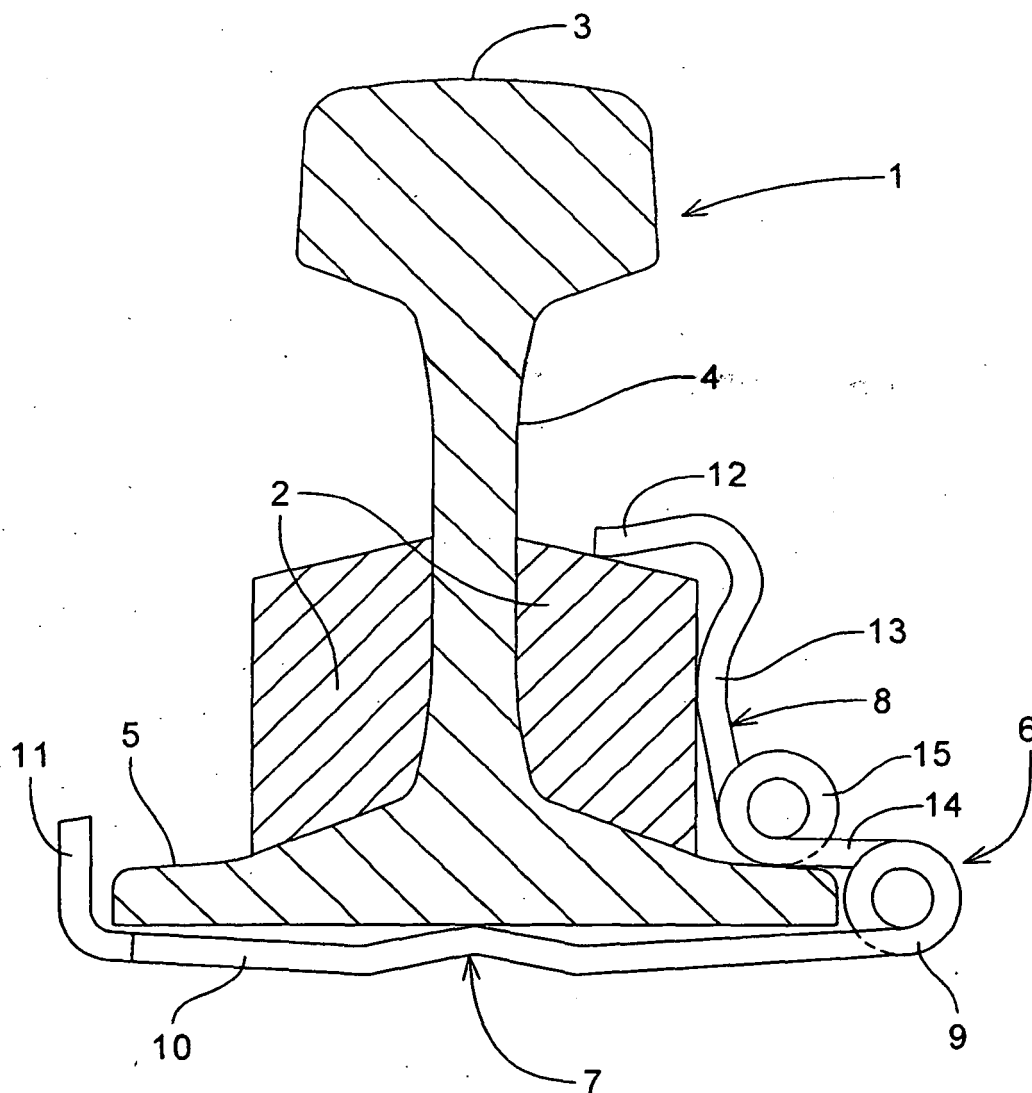


Fig.2

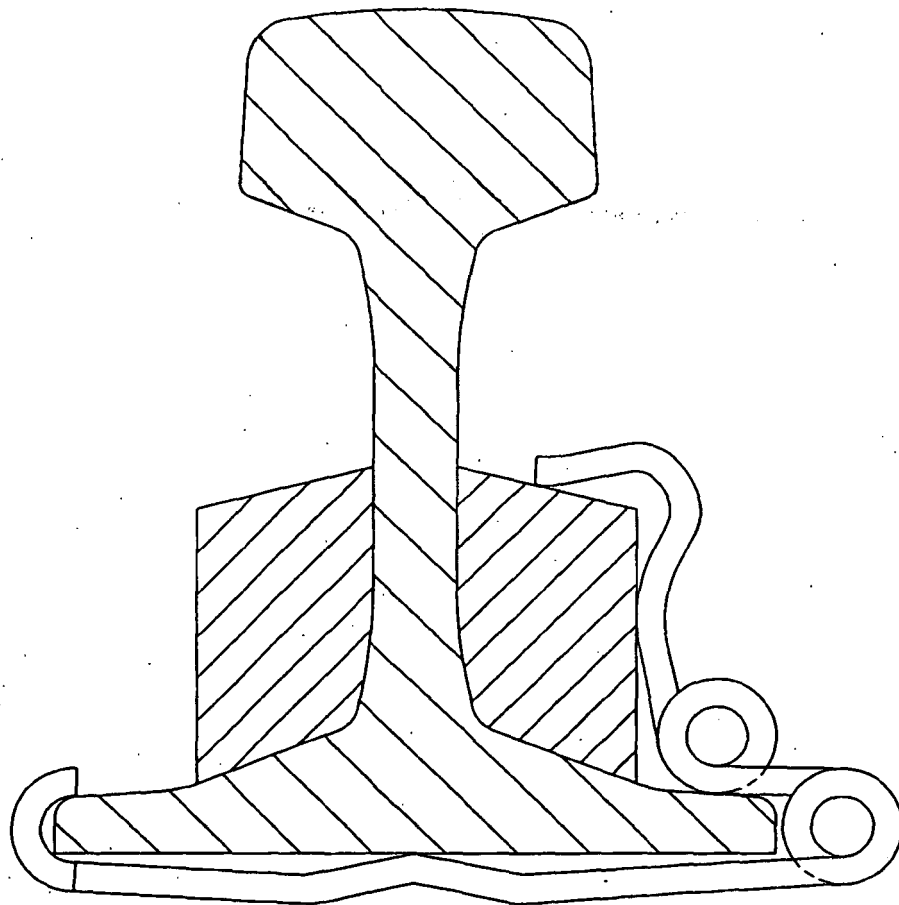


Fig.3

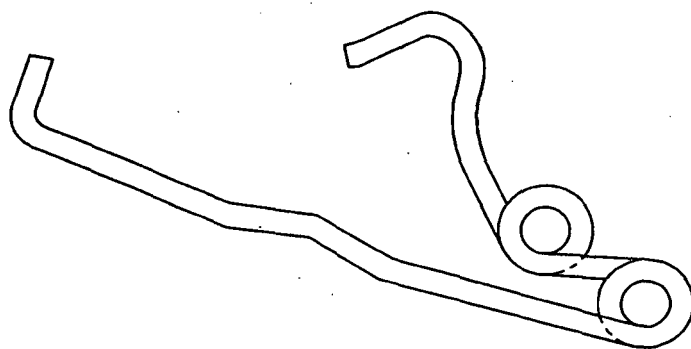
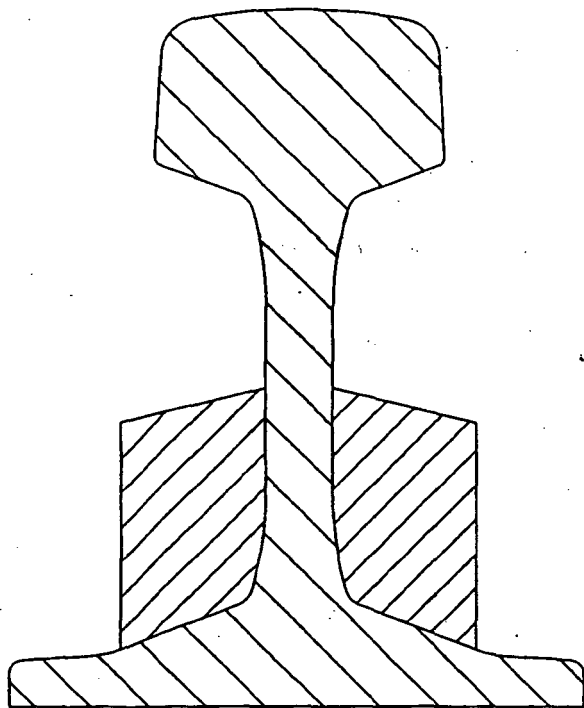


Fig.4

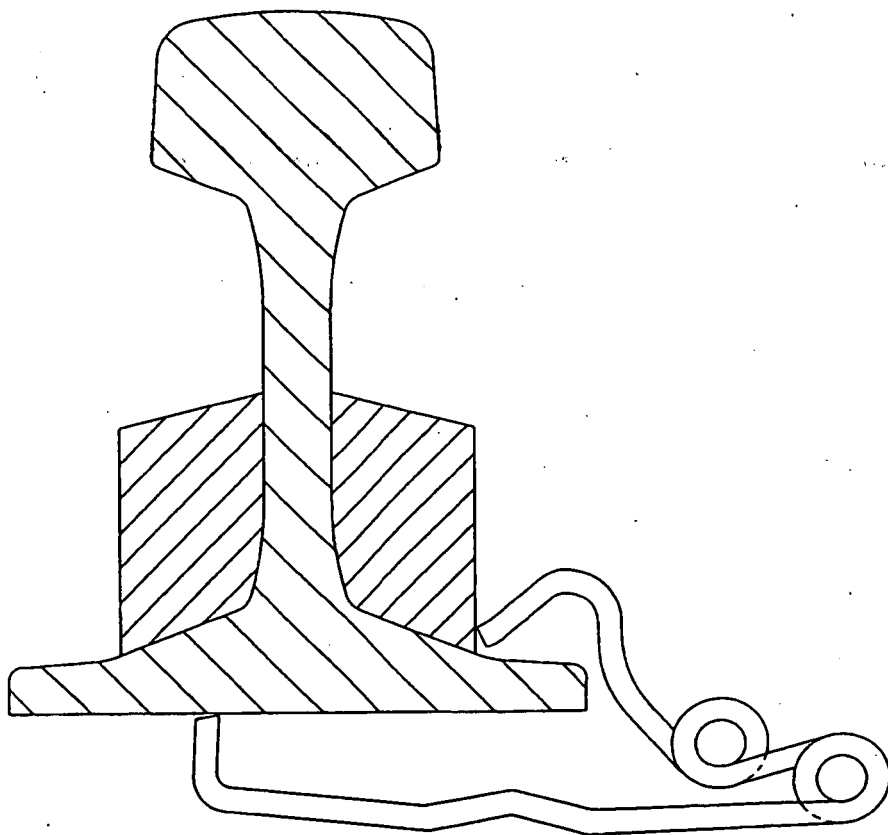


Fig.5

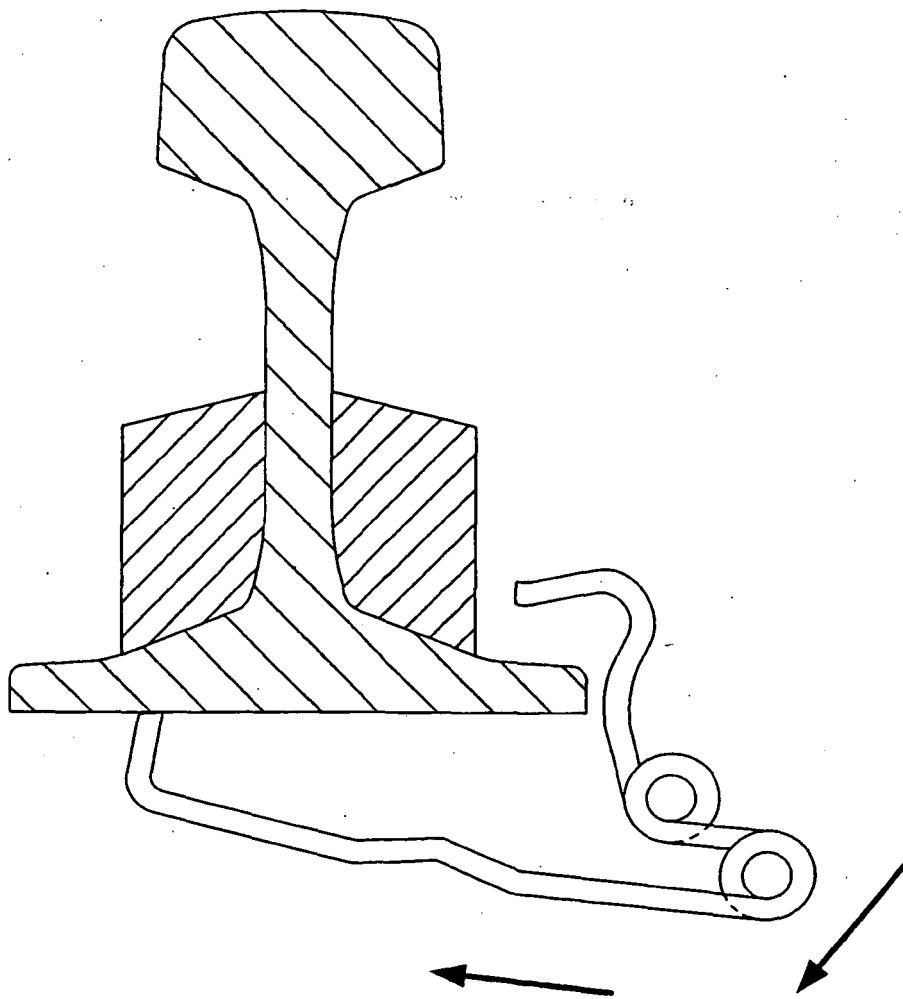


Fig.6

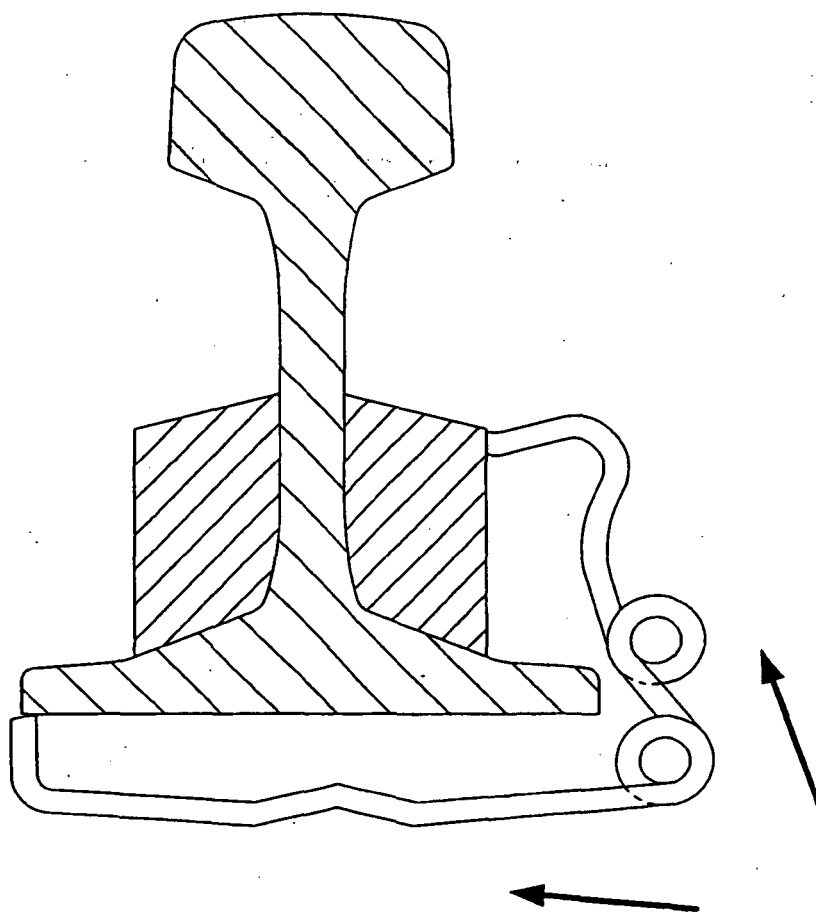


Fig.7

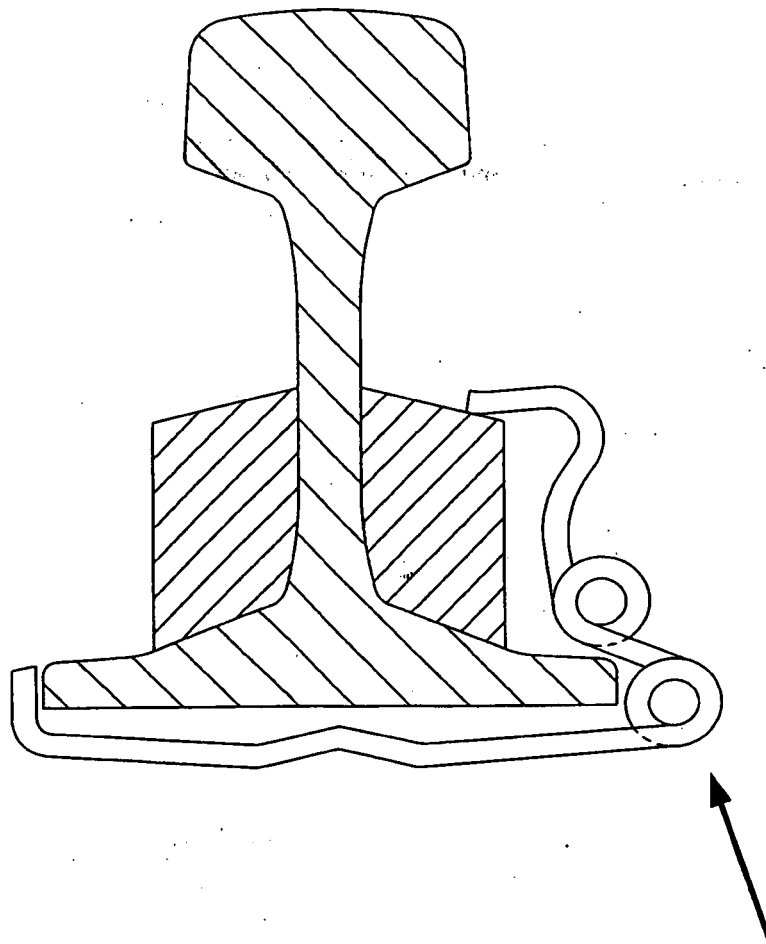


Fig.8

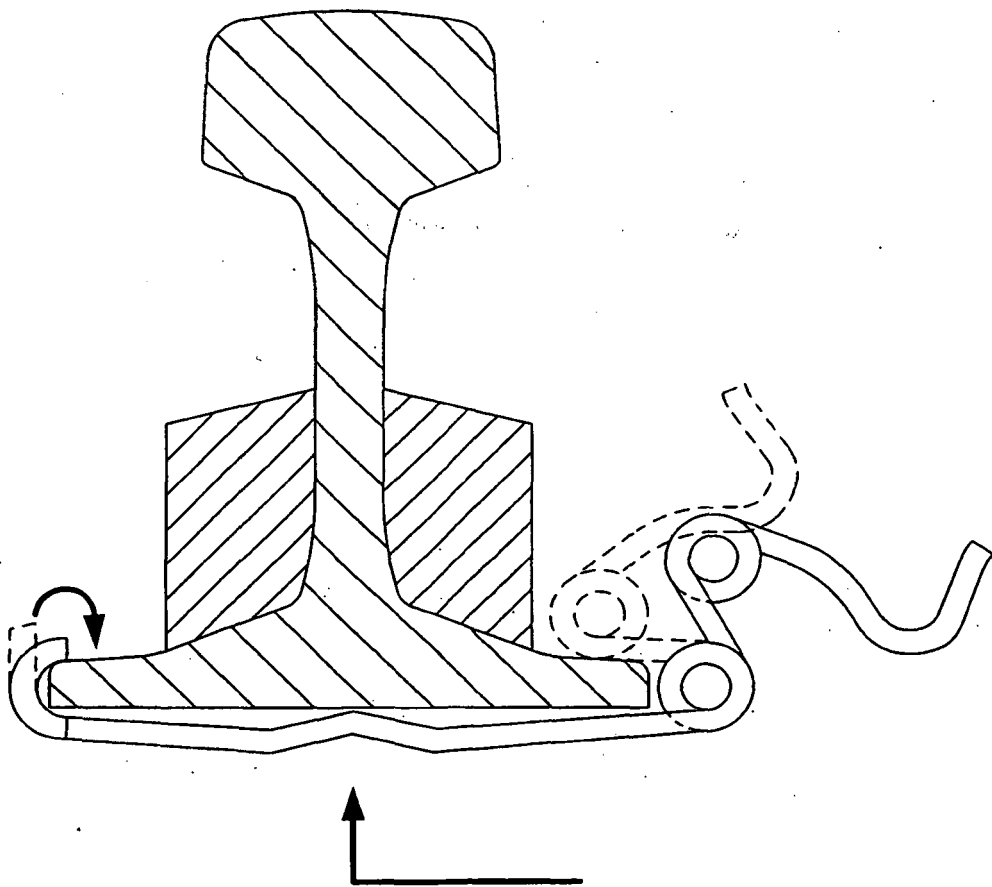


Fig.9

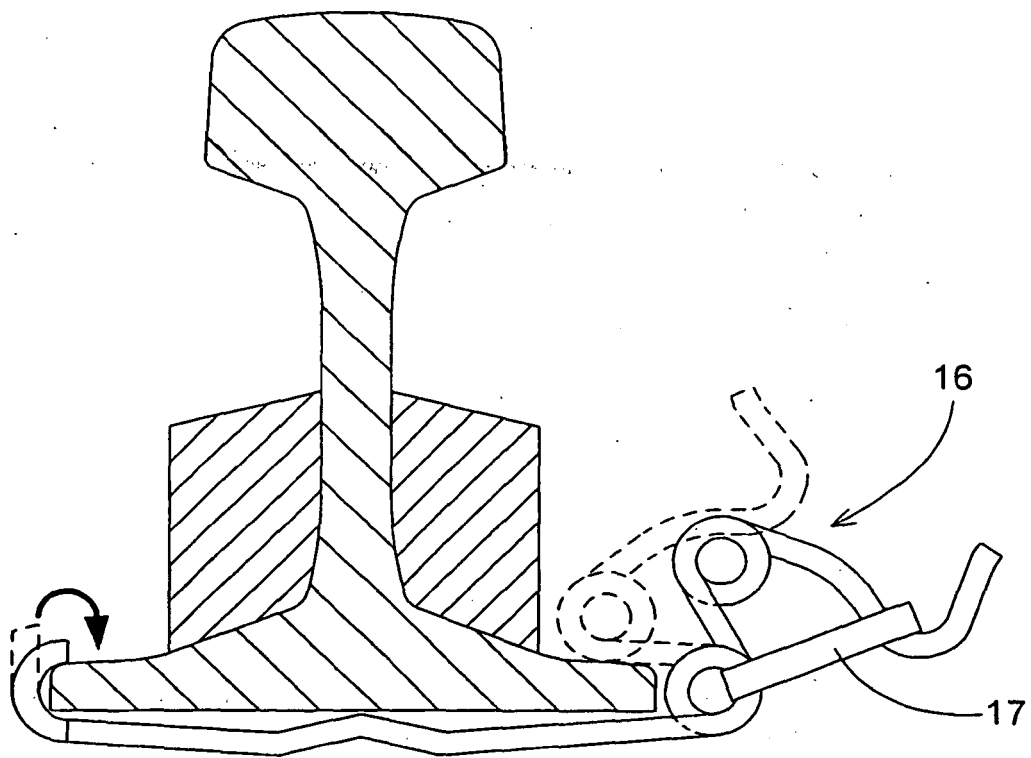


Fig.10

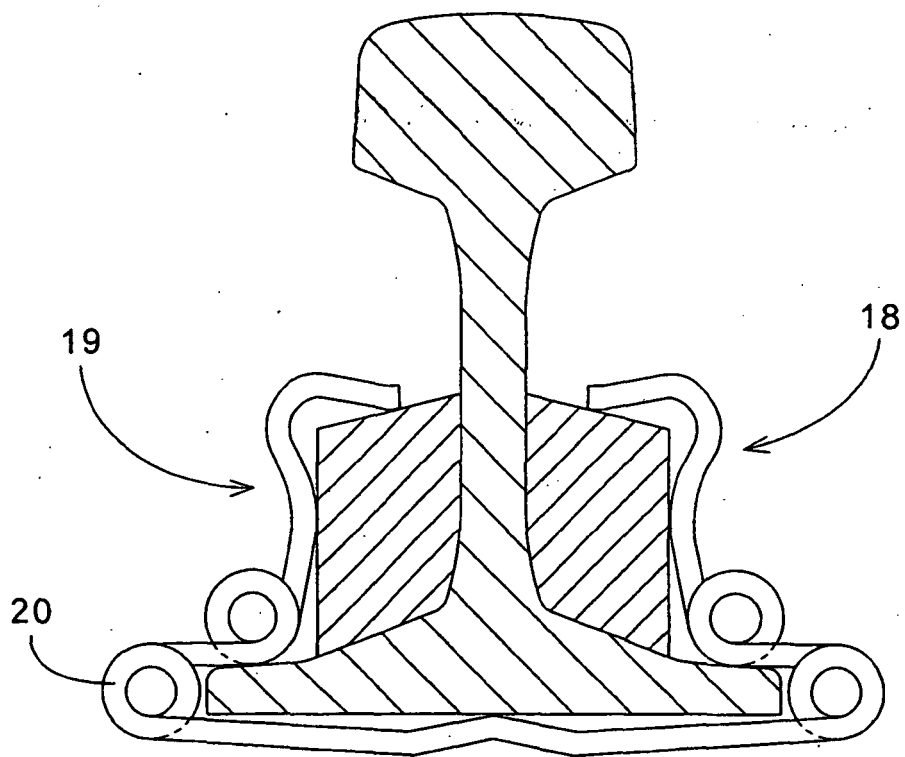


Fig.11

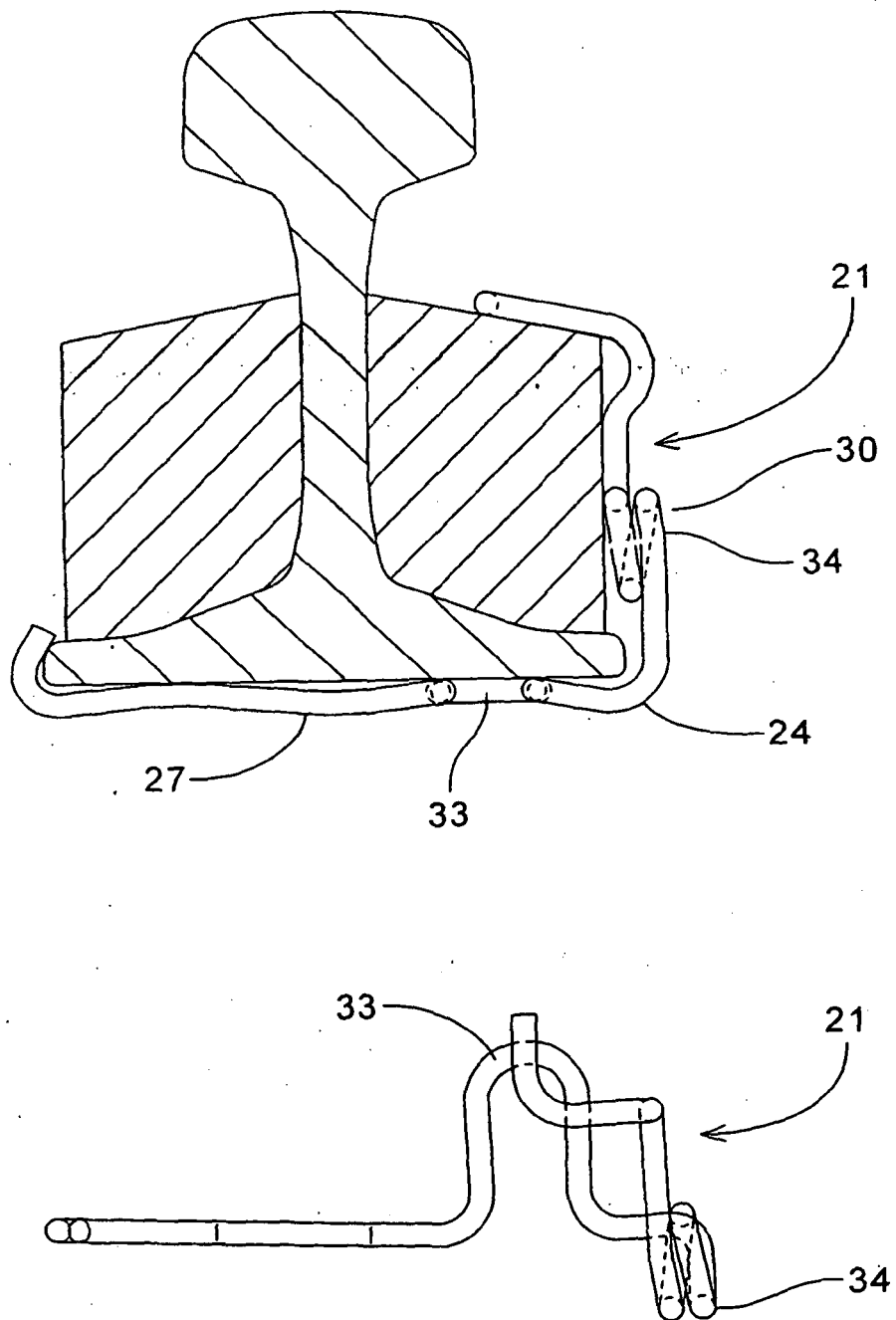


Fig.12

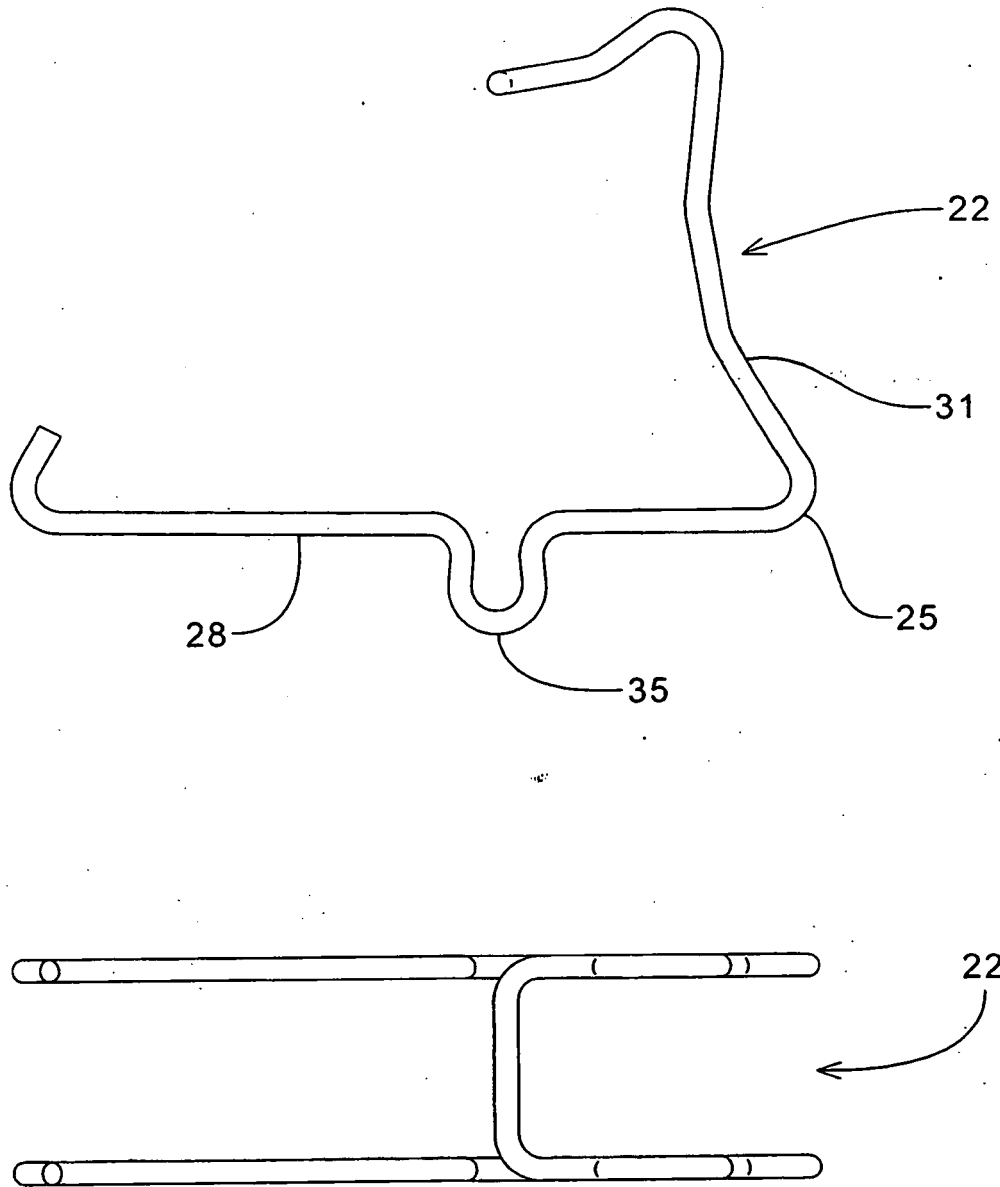
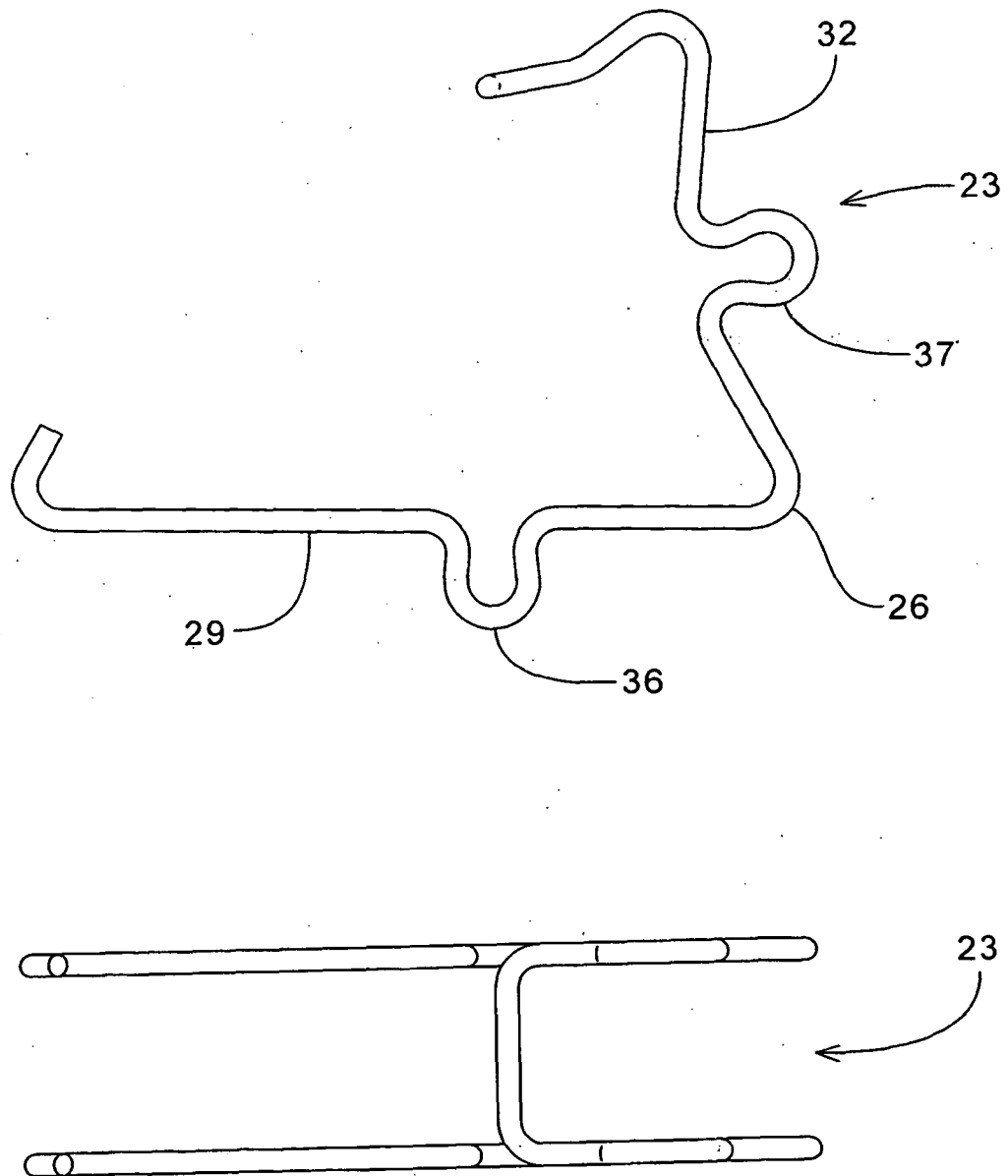


Fig.13



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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