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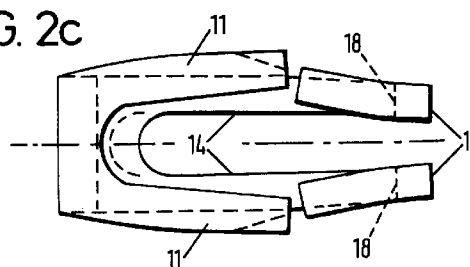
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(54) Elastic rail clamps

(57) An elastic rail clamp 10, for fastening a rail to an underlying rail plate or rail tie 1, of the type comprising a pair of substantially parallel members 19 folded into a D configuration so as to have a front toe portion 16 adapted to seat on a flange of the rail, which toe portion 16 is formed by respective free ends 18 of the substantially parallel members 19, and a base portion 11 adapted to seat in a slot 4 in the rail plate or rail tie 1, is shaped such that the parts 14 of the substantially parallel members 19 between the base portion 11 and the toe portion 16 are tapered in external dimensions towards the toe portion 16 of the clamp 10, and the free ends 18 of the substantially parallel members 19 are turned back toward a rear portion 13 of the clamp 10 and project outwardly so as to abut a portion of the rail plate or rail tie 1 when the clamp 10 is in use, thereby to prevent the rail clamp 10 sliding off the rail flange. Alternatively or in addition, the pair of substantially parallel members 19 are joined together between the curved rear portion 13 of the members 19 adjacent the base portion 11.

FIG. 2c



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Description

This invention relates to elastic rail clamps, used in rail fastening systems, of the kind which are applied at right angles to the rail.

Elastic rail clamps of this kind are described in U.S. Patents 3,067,947 (Deenik) and 4,313,563 (Young). Generally both these clamps are designed for use with a custom made shoulder into which the base of the elastic clamp fits. Both rail clamps have toe portions which lie on the rail flange and the outer edges of these abut the support shoulder to prevent them sliding off the rail flange. The "Young" clip is used with a shoulder as described in U.S. Patent 4,688,719 which has a shoulder with a tapered slot leading to the gate which acts to compress the arms together as the clamp is driven into place with the toe portion on the rail flange.

However, many railway tracks that are already laid have existing rail plates or shoulders but could be upgraded at low cost by utilizing an elastic rail clamp without having a custom built support shoulder. A common rail plate used in Europe is called a K plate which includes a pair of parallel ribs adjacent and parallel to the rail flange and slots in the ribs at right angles to the rail flange. These slots are not tapered and thus the toes of the rail clamps need to be compressed to pass through the slot if the toes are to be prevented from sliding off the rail flange. The Deenik clip can only be applied to the K plate with a tool which compresses the arms of the toe portion to pass through the gate in the shoulder. With older rail tracks the variation in height between rail plate slot and rail flange can vary greatly in stationary and dynamic modes and thus maximum clamp deflection between the base of the toe portions is needed.

It is the object of this invention to provide an elastic rail clamp which can be used in rail tracks without a custom built rail shoulder.

In one aspect of this invention there is provided an elastic rail clamp comprising a base portion and a toe portion wherein the toe portion lies on the rail flange and the base portion is adapted to be secured to a rail plate or rail tie, said clamp comprising a pair of substantially parallel members bent into a D configuration such that one end of said pair of members forms the toe of the clamp and the other end forms the base of said clamp, the pair of members being joined together between the curved portion of the members adjacent the base portion.

This arrangement means that the base comprises two free arms extending toward the rail. This contrasts with "Deenik" which had a U-shaped base where the base of the U was next to the rail and provided no free movement for the individual members, and also contrasts with "Young" which had a solid base portion. The advantage which arises from the provision of free ends for the base is greater deflection for the clamp which means it can fit into a wider range of rail track environments. The provision of the junction between the mem-

bers at a position at the rear of the clamp just above the base means that there is a large non-critical area as a target for hitting the clamp with a sledge hammer to drive the clamp into position. In addition, this is the portion of the clamp most likely to receive high sideward forces from ballast pressure during ballast regulation and the fact that the two members of the clamp are joined at this position minimises the possibility of clamp damage. In summary, joining the members together at the rear of the clamp provides a means to maximize clamp deflection for a given toe load while retaining sufficient strength to minimise damage during application of the clamp and during track working processes such as ballast regulation.

Preferably to improve deflection even further the legs of the base are tapered toward their ends.

The clamps may be formed from rod or bar steel. Preferably the clamps are formed from 40mm wide bar stock in a forging and shaping operation. In some situations the base needs to be of a wider dimension than the width of the stock bar. By widening the gap between the legs in the base so that they protrude partially sideways, the clamp base can be made to fit the dimensions of the slot in the rail plate or rail tie.

In another aspect, this invention provides a rail clamp for fastening a rail to an underlying rail plate or rail tie, which rail clamp comprises a pair of substantially parallel members folded into a D configuration so as to have a front portion adapted to seat on a flange of the rail, which front portion is formed by respective free ends of the substantially parallel members, and a base portion adapted to seat in a slot in the rail plate or rail tie, wherein the parts of the substantially parallel members between the base portion and the front portion of the clamp are tapered in external dimensions towards the front portion, and the free ends of the substantially parallel members are turned back toward a rear portion of the clamp and project outwardly so as to abut a portion of the rail plate or rail tie when the clamp is in use, thereby to prevent the rail clamp sliding off the rail flange.

This tapering of the toe portion of the clamp means that as the clamp enters the slot of the rail plate or clamp support shoulder the arms of the clamp and the outwardly projecting ends of the toe portion are compressed toward each other to pass through the slot and once the toe portion is on the rail flange the external width of the outwardly projecting toe portions is greater than the slot width and the rail clamp is locked onto the rail flange. This arrangement overcomes the need for a custom built support shoulder or applicator tool.

Reference will now be made, by way of example, to the accompanying drawings, in which:

Figures 1A, 1B and 1C show respective plan and sectional views of a K plate rail plate for use with embodiments of the present invention;
Figures 2A, 2B and 2C show respective front elevational, side elevational and underneath plan views

of a rail clamp embodying the present invention;
and

Figures 3A and 3B show views of first and second blanks formed during the process of shaping such a rail clamp from bar stock steel.

As shown in Fig. 1, a K plate 1 is shaped to hold a rail (not shown) between the ribs 3 which abut the rail flange. Slots 4 shown in cross section in Figure 1c are located on opposite sides of the rail in ribs 3 and are of constant cross section perpendicular to the rail. The rail clamp base 11 (Fig. 2) fits in the slot 4 and the rearwardly facing ends 18 of the toe 16 of the clamp 10 abut the sides 5 of the slots 4.

The rail clamp 10 shown in Figures 2A, 2B, 2C comprise base legs 11, rear web 13, legs 14, toe 16 and toe ends 18.

The rail clamp 10 is formed from bar stock by hot blanking the bar stock into the form shown in Figure 3A. The blanking forms a pair of substantially parallel members 19 forming the base legs 11 and legs 14 in tapered form extending from the web 13. The hot blank is then coined along edges 12 of the web and legs 11 and edges 15 of the web 13 and legs 14. The outer edges 17 of the clamps are also coined. Coining reduces the likelihood of stress fractures.

The next step in forming the rail clamp is as shown in Figure 3B to form the legs 14 into a curved form in the two dimensional blank which will produce the tapered toe portion of the final three dimensional form as shown in Figure 2A.

The narrowest width across the legs 14 in the Figure 3B blank corresponds to the frontmost portion of the toe portion 16 of the clamp 10.

The second step also widens the base legs 11 to a size which will fit and secure the rail clamp 10 in the slot of the rail plate 1.

As shown in Figures 2A, 2B and 2C the rail clamp 10 has the web 13 joining the two arms 19 of the clamp at the rear 13 of the clamp 10 which can function to receive the force to push the clamp 10 onto the rail flange.

The toe portion 16 is narrow enough to seat within the upper portion of the slot 4 and pass between the edges 5 and onto the rail flange. The ends 18 of the legs 14 snap apart and prevent removal of the clamp 10 and keep the toe portion 18 on the rail flange. The long tapered legs of the toe and base portions 11, 14 of the clamp 10 mean that the deflection range of the clamp 10 is greater than possible in prior art constructions.

From the above it can be seen that the present rail clamp is able to be used in a wider range of track situations without a custom made shoulder clamp or a special applicator tool.

Claims

1. A rail clamp (10) for fastening a rail to an underlying rail plate or rail tie (1), which rail clamp (10) com-

prises a pair of substantially parallel members (19) folded into a D configuration so as to have a front portion (16) adapted to seat on a flange of the rail, which front portion (16) is formed by respective free ends (18) of the substantially parallel members (19), and a base portion (11) adapted to seat in a slot (4) in the rail plate or rail tie (1), wherein the parts (14) of the substantially parallel members (19) between the base portion (11) and the front portion (16) of the clamp (10) are tapered in external dimensions towards the front portion (16), and the free ends (18) of the substantially parallel members (19) are turned back toward a rear portion (13) of the clamp (10) and project outwardly so as to abut a portion of the rail plate or rail tie (1) when the clamp (10) is in use, thereby to prevent the rail clamp (10) sliding off the rail flange.

2. A rail clamp as claimed in claim 1, wherein the front portion (16) comprises two arms joined together by a web located remote from the front portion (16).
3. A rail clamp as claimed in claim 2, wherein the base portion (11) comprises two tapered legs adapted to extend toward the rail flange.
4. A rail clamp as claimed in claim 3, wherein the clamp (10) is formed from bar steel of a width less than the width of the slot (4) in the rail plate or rail tie (1) and the legs of the base portion (11) are widened to approximate the width of the slot (4).
5. An elastic rail clamp (10) for fastening a rail to an underlying rail plate or rail tie (1), which clamp (10) comprises a toe portion which is adapted to lie on a flange of the rail and a base portion (11) which is adapted to be secured to a rail plate or rail tie (1), said clamp (10) comprising a pair of substantially parallel members (19) bent into a D configuration such that one end of said pair of members (19) forms the toe portion of the clamp (10) and the other end forms the base of said clamp (10), the pair of members (19) being joined together between the curved rear portion (13) of the members (19) adjacent the base portion (11).
6. A clamp as claimed in claim 5, wherein the pair of members (19) are joined by a web which forms a rear surface of the rail clamp (10) adapted to be parallel to the rail, and two free arms adapted to extend from said web toward said rail from the base portion (11) of the clamp (10).
7. A rail clamp as claimed in claim 5, wherein the legs of the base portion (11) are tapered towards respective free ends (18) thereof.

FIG. 1a

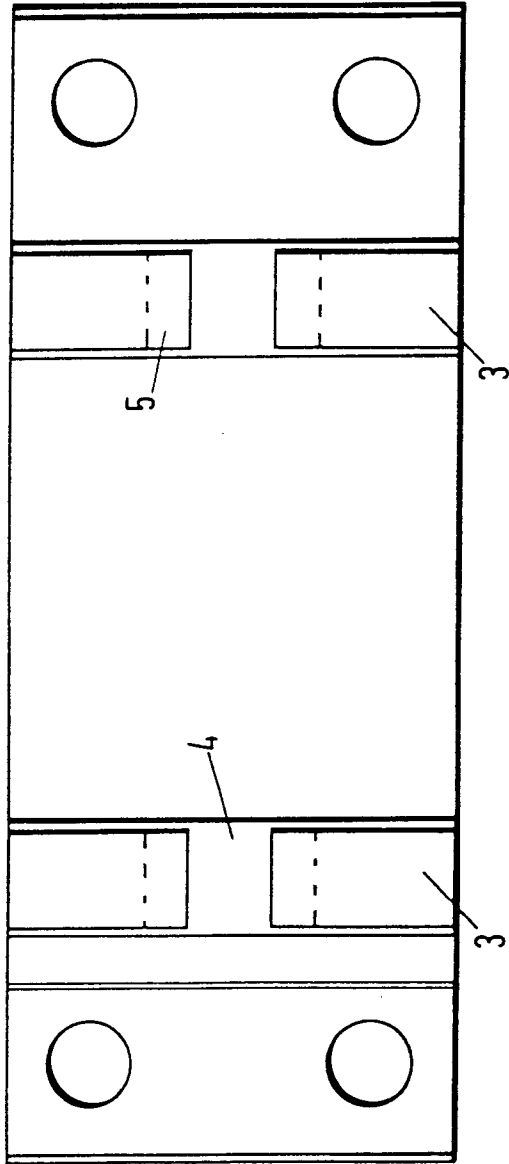


FIG. 1c

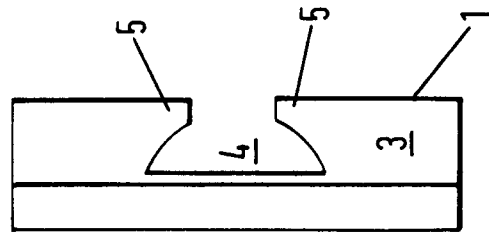
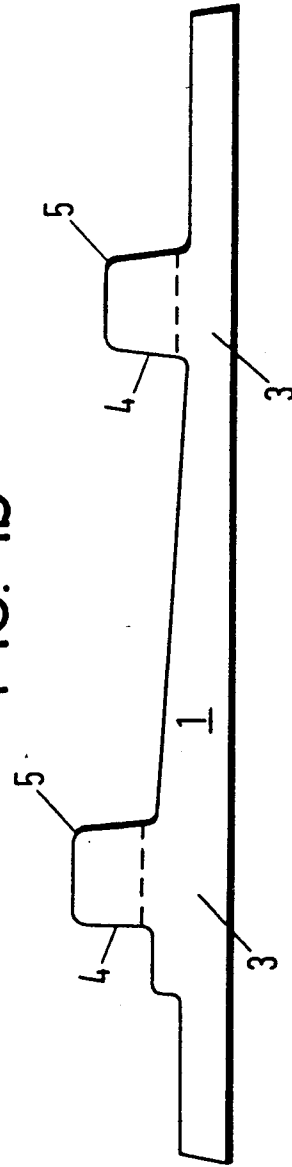


FIG. 1b



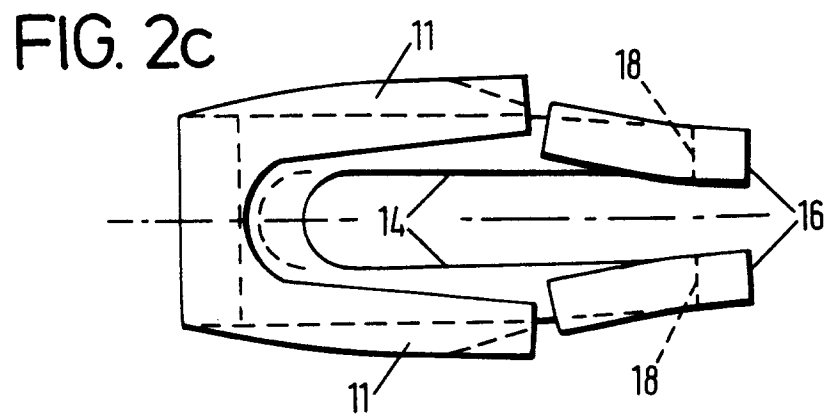
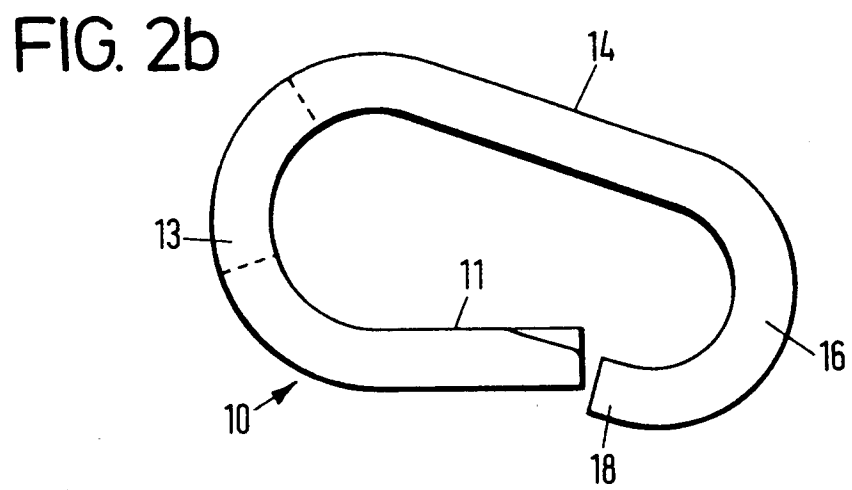
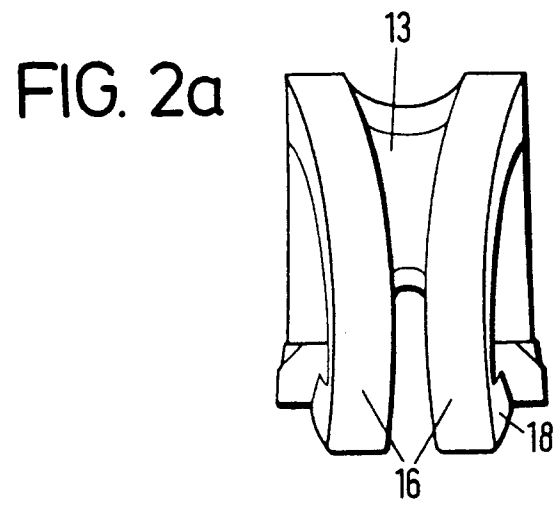


FIG. 3a

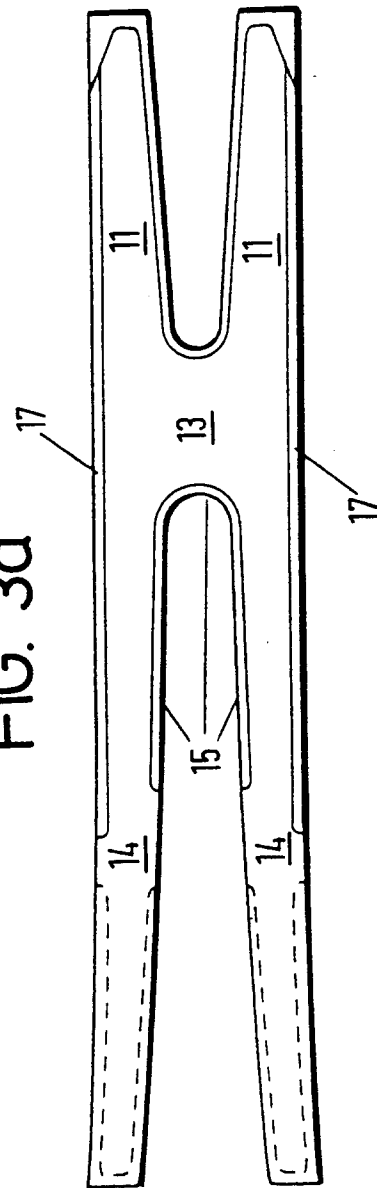
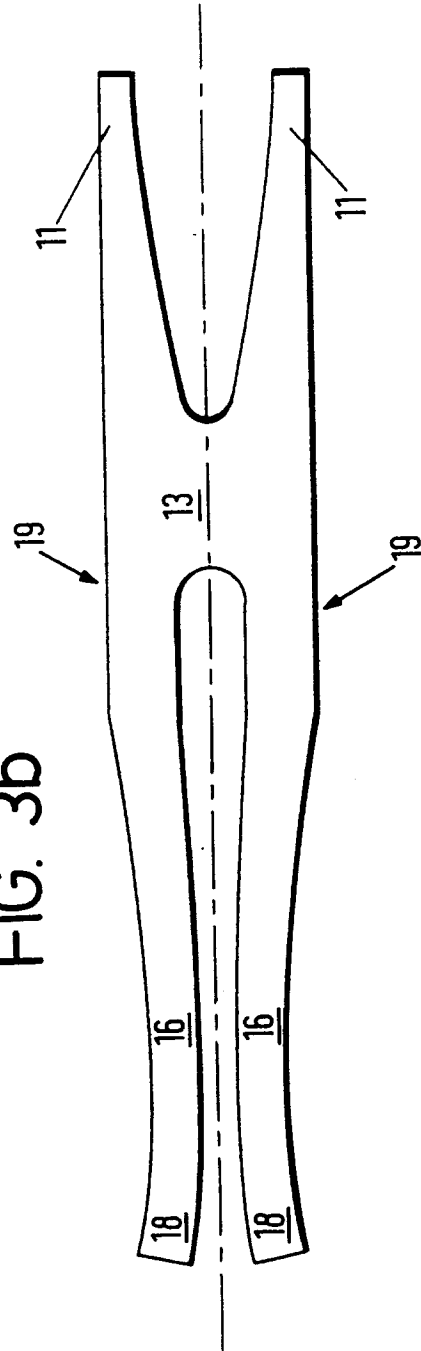


FIG. 3b





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EUROPEAN SEARCH REPORT

Application Number
EP 95 30 7509

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	NL-A-7 503 503 (IR LODEWIJK GODERBAUER) 28 September 1976	1,5	E01B9/30
Y	* page 1, line 1 - page 3, line 21 *	2,3,6,7	
A	* page 4, line 33 - page 6, line 27; figures *	4	

Y	DE-B-11 43 218 (EXECUTORS OF JAMES MILLS LTD.) 7 February 1963	2,3,6,7	
A	* the whole document *	5	

X	AU-B-630 250 (GENERAL & RAILWAYS SUPPLIES PTY LTD) 22 October 1992	5,6	
A	* page 2, line 13 - page 4, line 3; figures *	1,2,7	

X	WO-A-94 10382 (IND ARTE TECNICA S A ;CIECIELSKI EZILDO (BR)) 11 May 1994	5	
A	* figures *	1-4,6,7	

X	GB-A-2 269 198 (PANDROL LTD) 2 February 1994	5	
A	* abstract; figures *	1-4,6,7	

A	DE-A-30 03 867 (SCHWIHAG GMBH ;RICHTBERG KG KARL (DE)) 10 September 1981		TECHNICAL FIELDS SEARCHED (Int.Cl.6) E01B

A	US-A-4 150 792 (QURESHI KHURSHID A) 24 April 1979		

A	WO-A-95 18888 (REX ROBERT JOHN) 13 July 1995		

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14 March 1996	Examiner Blommaert, S
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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