(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 273 709 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.01.2003 Bulletin 2003/02

(51) Int Cl.[7]: **E01B 9/48**

(21) Application number: **02022626.2**

(22) Date of filing: **02.07.1998**

(84) Designated Contracting States:
FR

(30) Priority: **15.07.1997 GB 9714899**
13.05.1998 GB 9810241

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
98932355.5 / 0 996 789

(71) Applicant: **PANDROL LIMITED**
Addlestone, Surrey KT15 2AR (GB)

(72) Inventors:
- **Marshall, Barry**
  Sheffield, S17 3DG (GB)
- **Conroy, Brian George**
  Worksop, Nottinghamshire S80 1XD (GB)

(74) Representative: **Fenlon, Christine Lesley et al**
Haseltine Lake & Co.,
Imperial House,
15-19 Kingsway
London WC2B 6UD (GB)

Remarks:
This application was filed on 09 - 10 - 2002 as a divisional application to the application mentioned under INID code 62.

(54) Railway rail fastening assembly

(57) A railway rail fastening assembly, for fastening a railway rail to an underlying foundation comprises a resilient railway rail fastening clip (20) having thereon stop means (21c), for engaging cooperating means provided on a rail fastening clip anchoring device (400), whereby overdriving of the clip (20) into the said anchoring device (400) is prevented, the stop means (21c) comprising one of an abutment surface and a projection and the said cooperating means comprising the other of the abutment surface and the projection.

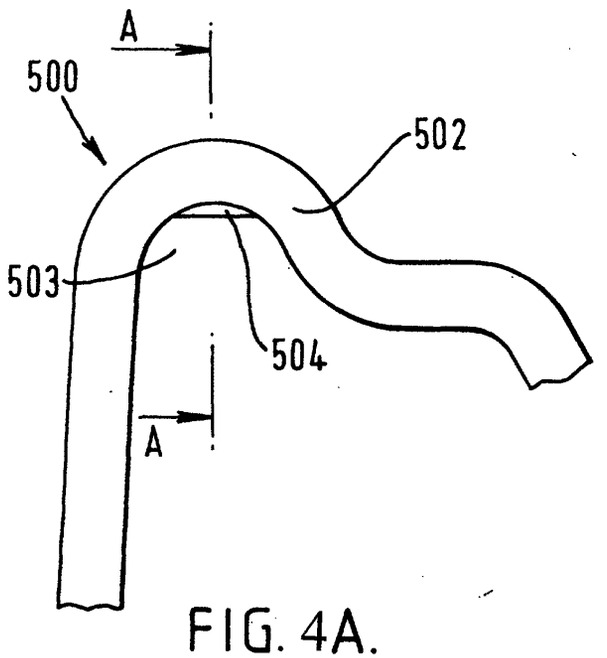

FIG. 4A.

EP 1 273 709 A2

(Cont. next page)

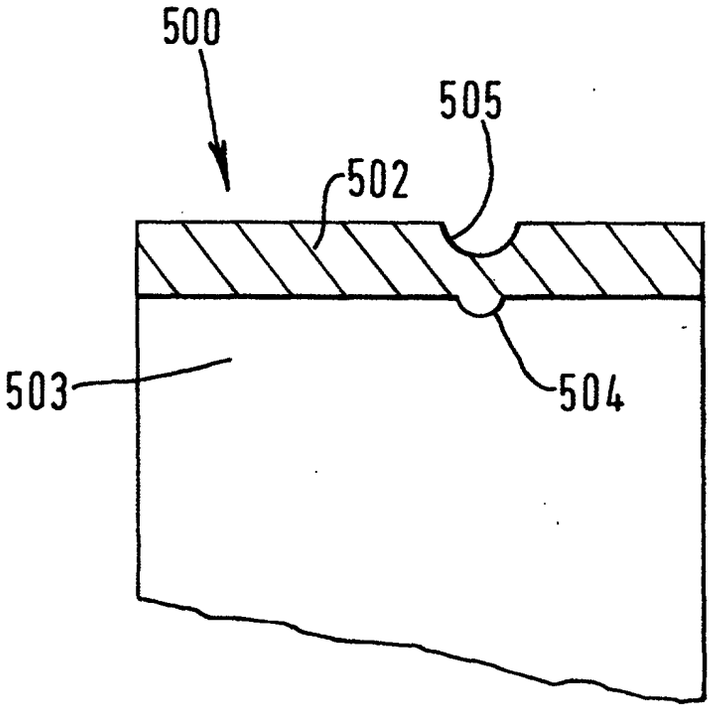

FIG. 4B.

Description

[0001] The present invention relates to a railway rail fastening assembly.

[0002] A common system for fastening a railway rail to an underlying foundation, such as a concrete or wooden railway sleeper, comprises a pair of anchoring devices secured to the foundation on either side of the rail when it is in position, which devices retain the anchoring legs of respective resilient rail fastening clips which bear down on the rail. Such an arrangement is disclosed in GB 1510224, which relates particularly to a railway rail fastening clip (known as an "e"-clip) comprising (in one version) a rod of resilient material bent so as to have, proceeding from one free end of the rod to the other free end thereof, firstly a straight anchoring leg, secondly a reverse bend portion, thirdly a portion beside the anchoring leg forming a "heel", fourthly another reverse bend portion and finally another portion beside the anchoring leg forming a "toe". This version of the clip is referred to hereafter as a "right-handed" clip. In another version, referred to hereafter as a "left-handed" clip, the clip is a mirror image of a "right-handed" clip, made such that the anchoring leg may be inserted into the opposite end of the anchoring device.

[0003] The "e"-clip, and its predecessor the "PR"-clip disclosed in GB-861473, provide safe and secure rail fastenings and have become very widely used. However, with conventional clips, such as "e"-clips and "PR"-clips, it can be difficult to ensure that the clip is installed in the correct position; if it is driven too far into the housing then, instead of there being contact between the top of the anchoring leg and the inside of the anchoring device, there may be a contact between another part of the clip and the anchoring device. This unintended change in contact can lead to undesirably high "toe" loads and stresses in the clip.

[0004] According to the present invention there is provided a railway rail fastening assembly for fastening a railway rail to an underlying foundation, the assembly comprising a resilient railway rail fastening clip and a rail fastening clip anchoring device, characterised in that the clip has thereon stop means, for engaging cooperating means provided on the rail fastening clip anchoring device, whereby overdriving of the clip into the said anchoring device is prevented, the said stop means comprising one of an abutment surface and a projection and the said cooperating means comprising the other of the abutment surface and the projection.

[0005] Thus, in an assembly embodying the present invention a clip can be correctly positioned within the housing of an anchoring device.

[0006] Preferably, the abutment surface may be provided by a face of a recess, which is desirably inclined with respect to the direction of installation of the clip by an angle in the range from 35° to 90°. The preferred angle is about 90°.

[0007] If the clip is of the type having an anchoring leg whereby the clip is retained by the anchoring device, the said stop means may be provided on the anchoring leg and the cooperating means may be provided inside the housing of the anchoring device.

[0008] The clip to which the invention is applied is preferably, but not essentially, an "e"-clip or "PR" clip. It should be noted that there is no need to make any adjustments to the overall shape of such clips, for example to lengthen the anchoring legs thereof, in order to apply the invention thereto.

[0009] Reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1A shows in plan view a prior art resilient railway rail fastening clip;
Figure 1B shows a part sectional side view of a railway rail fastening assembly incorporating the clip of Figure 1A;
Figure 2 shows a sectional end view of parts of a resilient railway rail fastening clip and anchoring device not embodying the present invention;
Figure 3 shows a sectional side view of parts of another resilient railway rail fastening clip and anchoring device not embodying the present invention;
Figure 4A shows an end view of part of a rail fastening anchoring device embodying the present invention, and Figure 4B shows a partial cross-sectional view taken on the line A-A in Fig. 4A; and
Figure 5A shows a side view of part of a railway rail fastening clip embodying the present invention for use with the anchoring device of Figures 4A and 4B, and Figure 5B shows a partial cross-sectional view taken on the line A-A in Fig. 5A.

[0010] The prior art resilient railway rail fastening clip 10 shown in Figure 1 is a type of "e"-clip. The clip 10 is made by bending a metal rod so as to have, proceeding from one end A of the rod to the other end B, a substantially straight first portion or anchoring leg 11, then a second reverse bend portion 12, then a third portion 13, then a fourth reverse bend portion 14, and finally a fifth portion 15. When the clip 10 is in the configuration shown, such that the lowermost points on the third and fifth portions are in the same plane and the clip 10 is viewed from directly above or below that plane, the third and fifth portions appear to lie on opposite sides of the first portion 11. Although not shown in this application, the so-called "PR"-clip is of a similar shape.

[0011] Both the "e"-clip and the "PR"-clip may be retained, such that the "toe" of the clip (either the third portion 13 or the fifth portion 15) bears on an adjoining rail, by a cast metal rail fastening clip anchoring device or shoulder 100 such as shown in Figure 1B. Only one of the pair of anchoring devices 100 which would be used in the rail fastening assembly is illustrated in Figure 1B. The anchoring device 100 is secured to a rail foundation, in this case a concrete sleeper 2, by means of a leg 101 embedded in the concrete. The leg 101 is joined to a

housing 102 of the anchoring device 100, which housing 102 has a passageway 103 therethrough. A rail 1 having a foot 1a is positioned on a cushioning rail pad 4 between the pair of shoulders 100 and a rail insulator 3 is placed on the rail foot 1a. The anchoring leg 11 of the rail clip 10 is then driven into the passageway 103, deflecting the clip 10 such that the "toe" portion of the clip (in this case the fifth portion 15) exerts a desired force on the foot 1a of the rail 1 through the rail insulator 3. The "heel" portion (in this case the third portion 13) of the clip 10 comes to rest on a ledge portion 104 of the housing 102. An upper surface of the anchoring leg 11 is held in contact with the roof of the passageway 103.

[0012] Although not shown in Figure 1A the anchoring leg 11 of the clip 10 may be chamfered at its free end so as to facilitate insertion of the anchoring leg 11 into the passageway 103 of the anchoring device 100.

[0013] The invention will now be described with reference to its application to an "e"-clip, although it can also be applied to other forms of resilient railway rail fastening clip.

[0014] Figures 2 and 3 show clips and anchoring devices which are the subject of co-pending European patent application no. 98932355.5, which do not embody, but are useful for understanding, the present invention.

[0015] Figure 2 shows an anchoring leg 21 of a rail fastening clip 20. The rail fastening clip 20 is not shown in its entirety, but other than its anchoring leg 21 could be similar to, for example, an "e"-clip, a "PR"-clip or the like. The anchoring leg 21 has a chamfer 21b at its free end A and, spaced from the free end A, first locating means comprising a detent or recess 21a having an abutment surface 21c. An anchoring device or shoulder 200 (not shown in its entirety) for retaining the rail fastening clip 20 has a housing 202 formed therethrough with a passageway 203. Inside the passageway 203, on the roof thereof, are second locating means comprising a projection 203a. The first and second locating means cooperate together to provide means for resisting unauthorised removal of the clip 20 from the anchoring device 200. The remainder of the anchoring device 200 could be similar to the anchoring device 100 shown in Figure 1B The detent 21a may be stamped onto the anchoring leg of the clip 20, during or after forming of the clip, and the projection 203a is formed during forming of the anchoring device 200.

[0016] The clip and anchoring device shown in Figure 3 differ from those of Figure 2 in that the rail fastening clip 30 (not shown in its entirety) has an anchoring leg 31 with chamfer 31b having first locating means comprising a projection 31a and the anchoring device 300 (not shown in its entirety) has a housing 302 with a passageway 303 formed on a roof thereof with second locating means comprising a recess 303a having an abutment surface 303b.

[0017] Upon insertion of the anchoring leg 21 (31) of a clip 20 (30) into the passageway 203 (303) of an anchoring device, pressure either of the projection 203a on the anchoring leg 21, and in particular on the chamfer 21b, or of the roof of the passageway 303 on the projection 31a, causes the clip to be deflected downwards slightly until the anchoring leg 21 (31) reaches a point where the first and second locating means snap into engagement with one another.

[0018] The anchoring devices described above are made by a casting process. An anchoring device embodying the present invention may be made by a casting process, but may also comprise a pressed steel anchoring device, for example as described below with reference to Figs. 4A, 4B, 5A and 5B, or to a rolled steel plate (not shown).

[0019] As shown in Figures 4A and 4B, a pressed steel anchoring device 500 has a housing 502 formed so as to have a passageway 503 therethrough. The roof of the passageway 503 is provided, at a position adjacent to but spaced from one end of the passageway 503, with a projection 504 made by forming an indentation 505 on the top of the housing 502. The projection 504 can be seen more clearly in Fig. 4B, which shows a cross-sectional view of the top of the housing 502 parallel to the passageway 503. The shape and dimensions of the projection 504 are dependent upon the shape and dimensions of the abutment surface with which it is to cooperate. In a housing 502 of thickness 10mm, having a passageway 503 of length 70mm, the projection 504 may be formed at a distance of 45mm from one end of the passageway 503 so as to have a width of 5mm, a height of 2mm and a radius of curvature of 3mm.

[0020] Figures 5A and 5B show the anchoring leg 51 of a rail fastening clip 50 (not shown in its entirety) of an assembly embodying the present invention, which clip is similar in many respects to the clips of Figures 2 and 3. The anchoring leg 51 has a chamfer 51b formed at its free end A and, spaced a short distance from the free end A, a detent or recess 51a. The recess 51a has two abutment faces 51c and 51d, respectively extending downwardly and upwardly (proceeding along the anchoring leg 51 away from the free end A). In this embodiment the upwardly-extending face 51d is steeper than the downwardly-extending face 51c; in the example shown the angle of inclination with respect to the longitudinal axis of the anchoring leg 51 is about 30° for the downwardly-extending face 51c and about 90° towards the top of the upwardly-extending face 51d, the bottom of which has a radius of 1R.

[0021] In one embodiment of the clip shown in Figure 5A the recess 51a may be formed so that the edge nearest the end A of the leg 51 is 10mm therefrom and so as to be 12.5mm long (in the direction in which the leg 51 extends) and 2mm deep. The radius at the foot of the upwardly-extending face 51d is 1mm.

[0022] The angle of inclination of the upwardly-extending face 51d can also be varied, but in the embodiment of Figures 4A, 4B, 5A and 5B it has been chosen so as to provide a stop which comes up against the projection 504 when the clip 50 is driven into the anchoring

device 500, thereby ensuring that the clip 50 cannot easily be driven beyond its nominal installed position in which the clip sits in its intended working position. In particular, by providing at an appropriate position a suitably steep upwardly-extending face 51d, for example at an angle with respect to the longitudinal axis of the anchoring leg 51 in the range form 35° to 90°, the clip driving force required increases sharply when the clip reaches the correct position, thus preventing overdriving of the clip.

[0023] A clip embodying the present invention, provided on its anchoring leg with a detent (rather than a projection) can be used with existing anchoring devices, not embodying the present invention, thereby allowing the railway to maintain stocks of only one type of clip, which can be used with additional benefits in anchoring devices embodying the invention, but also without disadvantage as compared to conventional clips in existing anchoring devices which do not embody the invention.

Claims

1. A railway rail fastening assembly for fastening a railway rail to an underlying foundation, the assembly comprising a resilient railway rail fastening clip (50) and a rail fastening clip anchoring device (500), **characterised in that** the clip (50) has thereon stop means (51d), for engaging cooperating means (504) provided on the rail fastening clip anchoring device (500), whereby overdriving of the clip (50) into the said anchoring device (500) is prevented, the said stop means (51d) comprising one of an abutment surface and a projection and the said cooperating means (504) comprising the other of the abutment surface and the projection.

2. An assembly as claimed in claim 1, wherein the said abutment surface is provided by a face (51d) of a recess (51a).

3. An assembly as claimed in claim 1 or 2, wherein the said abutment surface is inclined with respect to the direction of installation of the clip (50) by an angle in the range from 35° to 90°.

4. An assembly as claimed in any one of claims 1 to 3, wherein the clip (50) is of the type having an anchoring leg (51) whereby the clip (50) is retained by the anchoring device (500), the said stop means (51d) being provided on the said anchoring leg (51) and the said cooperating means (504) being provided inside the housing (502) of the said anchoring device (50).

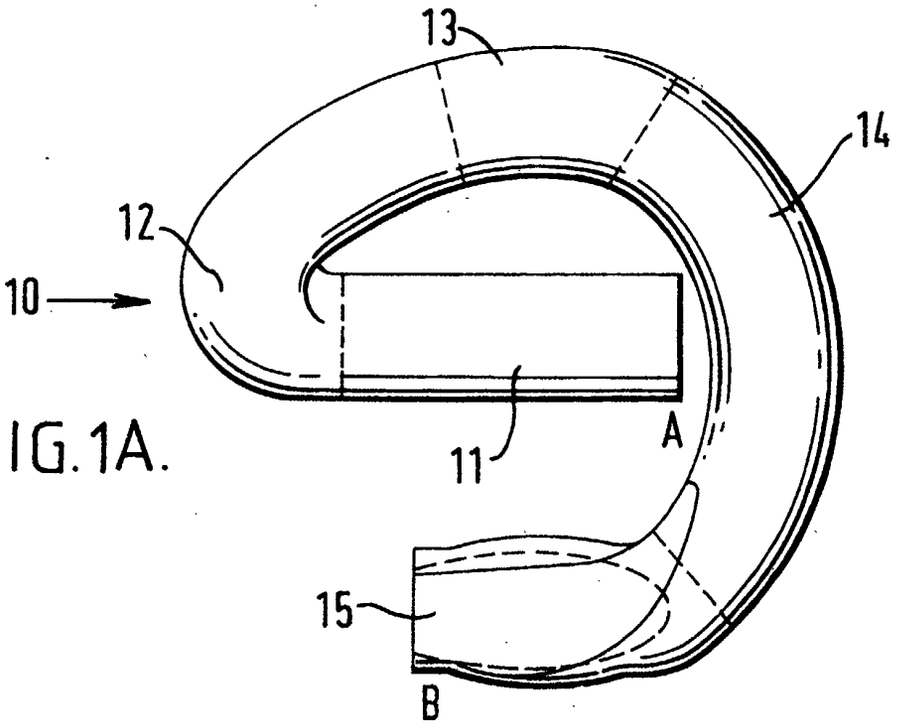

FIG.1A.

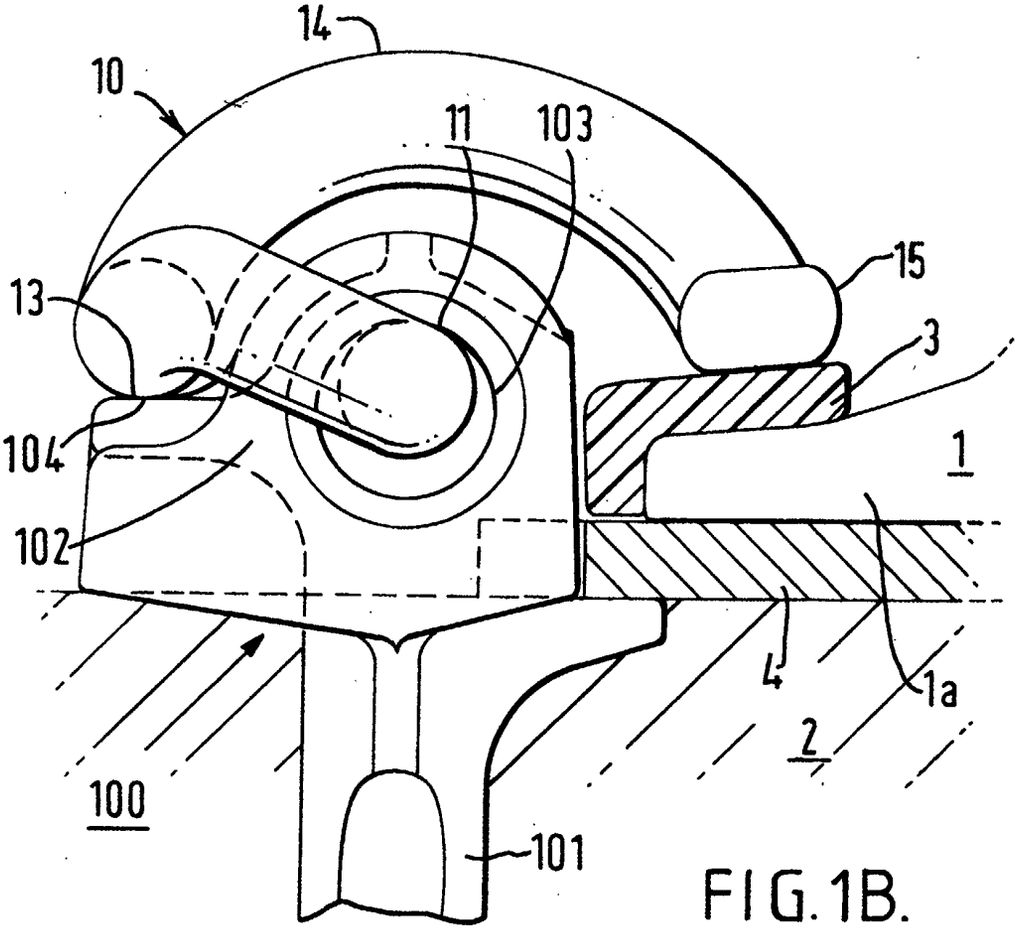

FIG.1B.

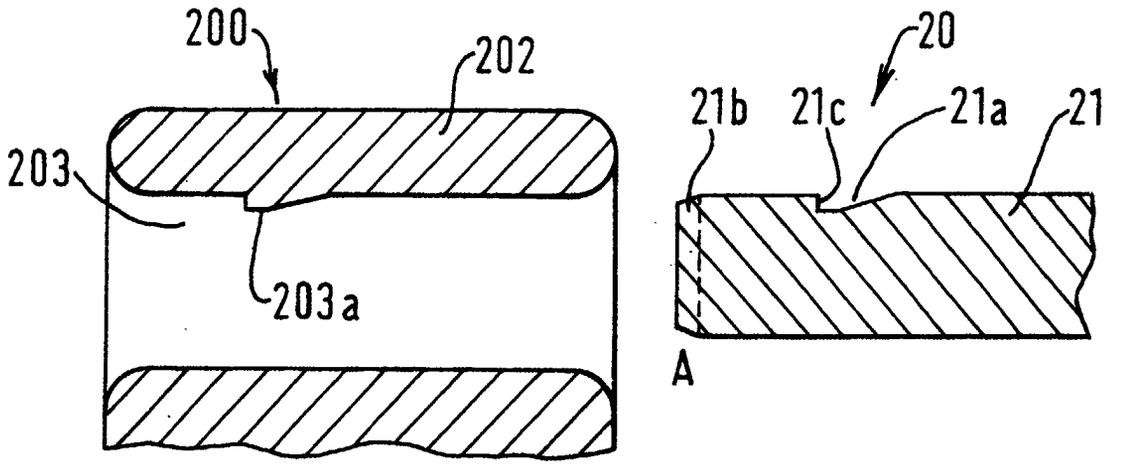
200
202
203
203a
20
21b
21c
21a
21
A

FIG. 2.

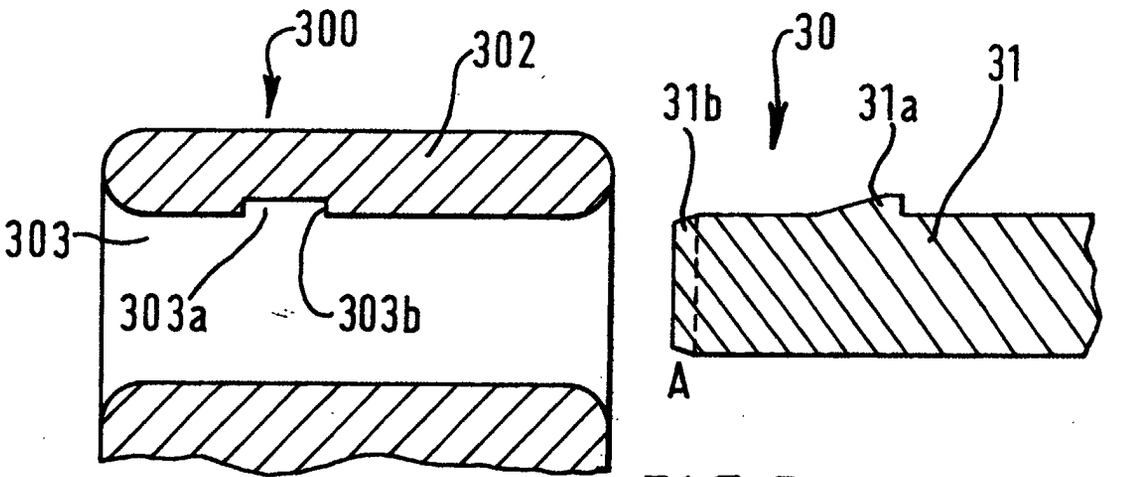
300
302
303
303a
303b
30
31b
31a
31
A

FIG. 3.

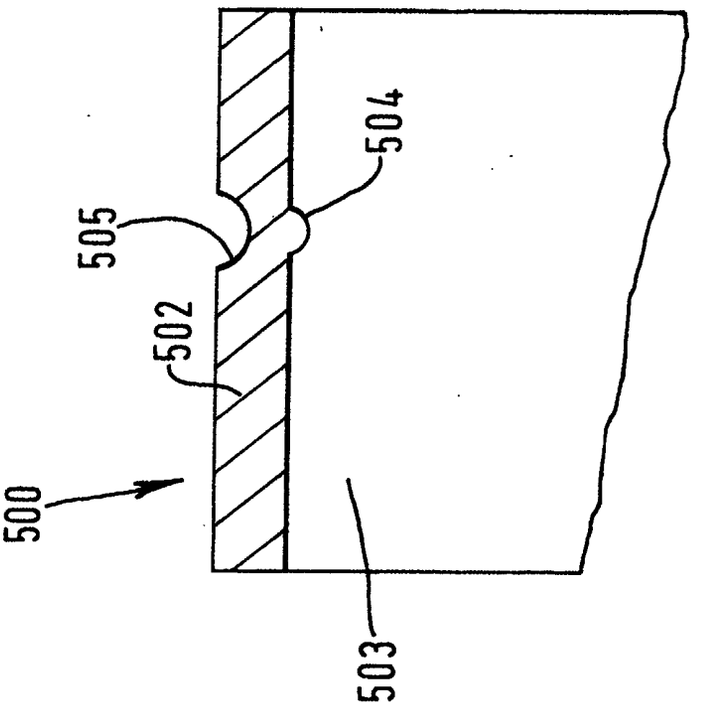

FIG. 4B.

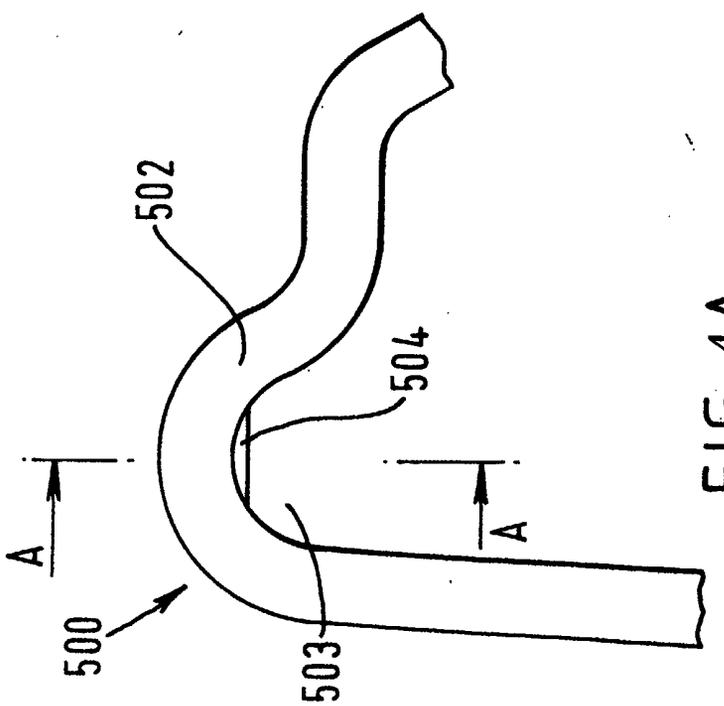

FIG. 4A.

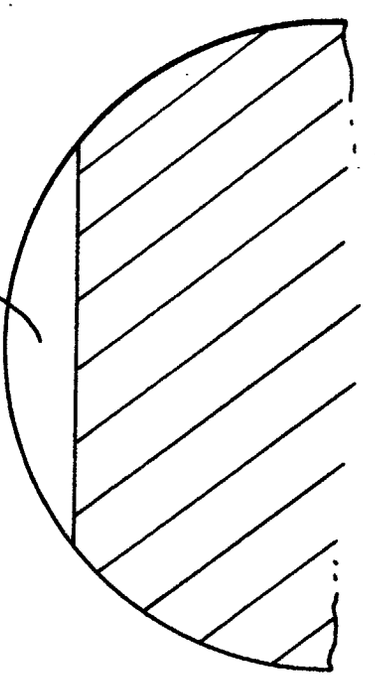

FIG.5B.

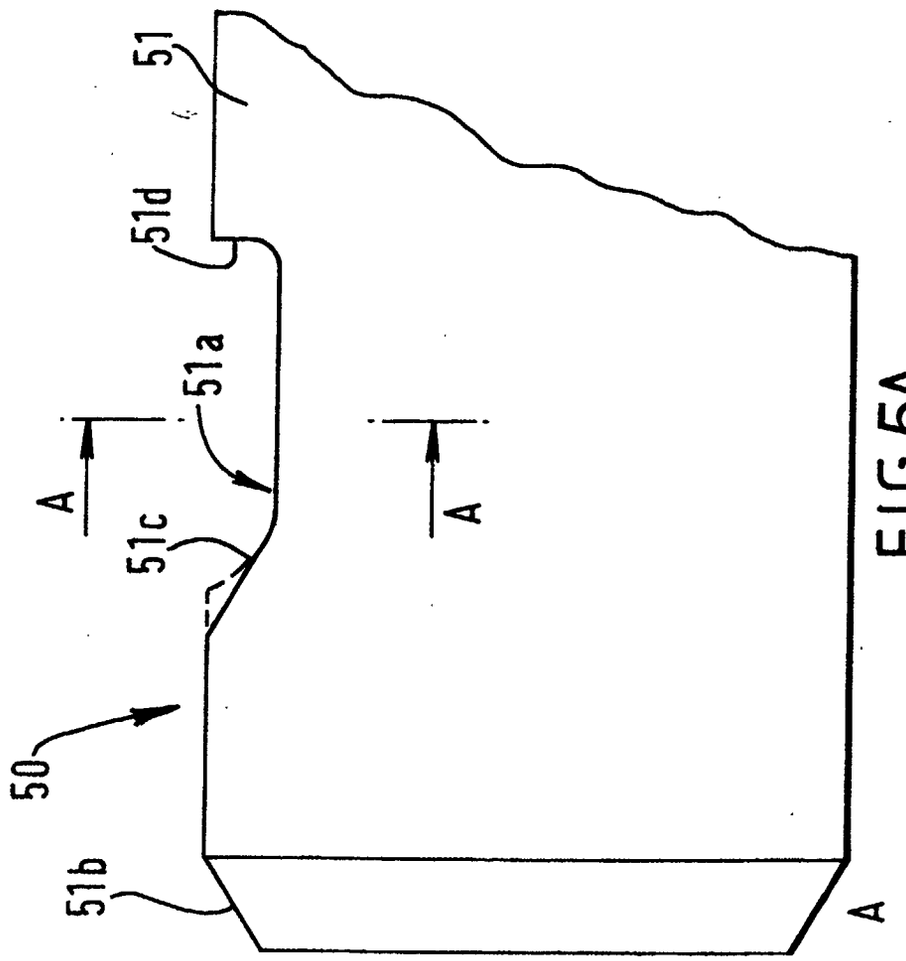

FIG.5A.