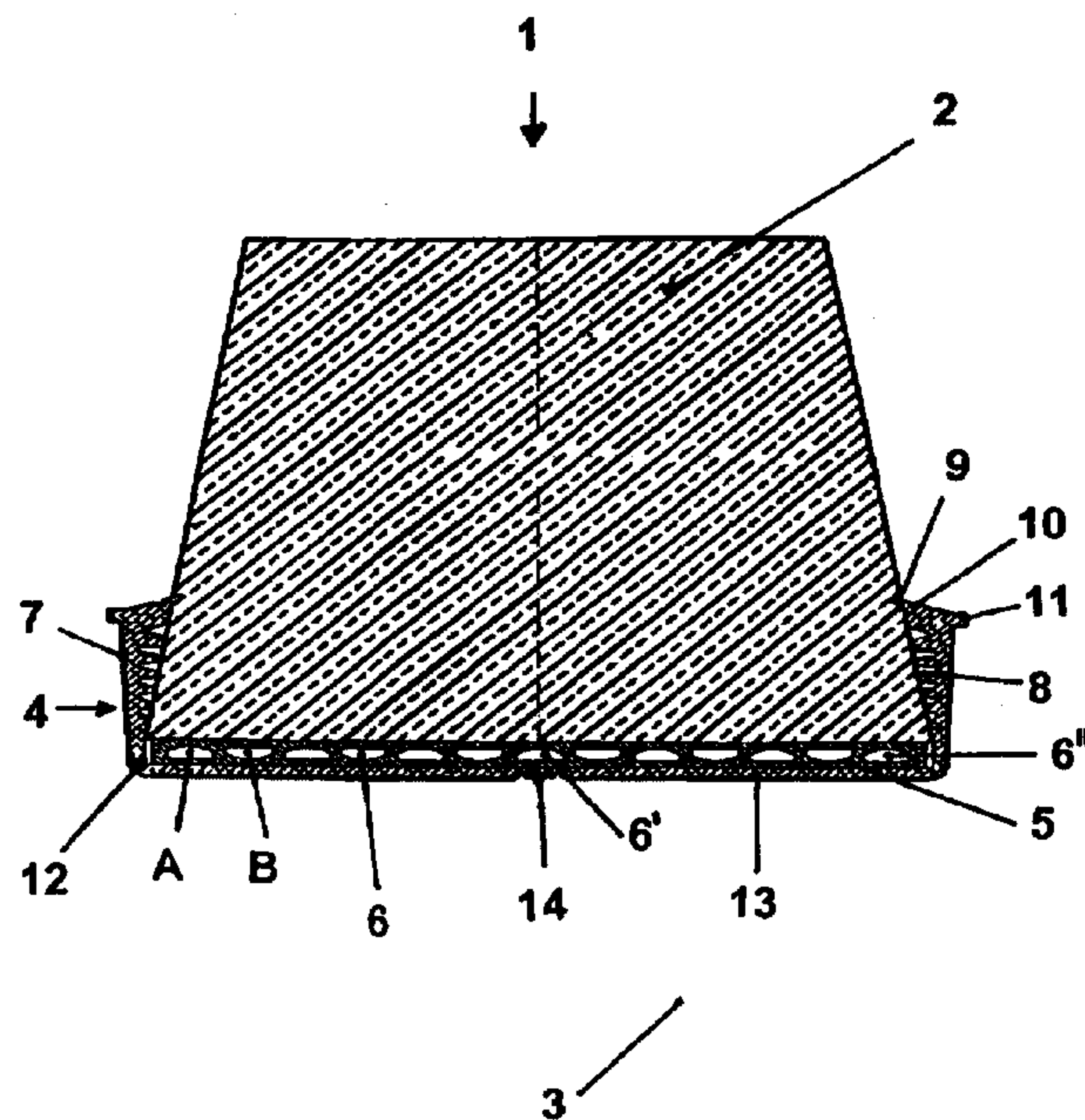


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(54) **SYSTEME DE RAILS**
(54) **RAIL SYSTEM**



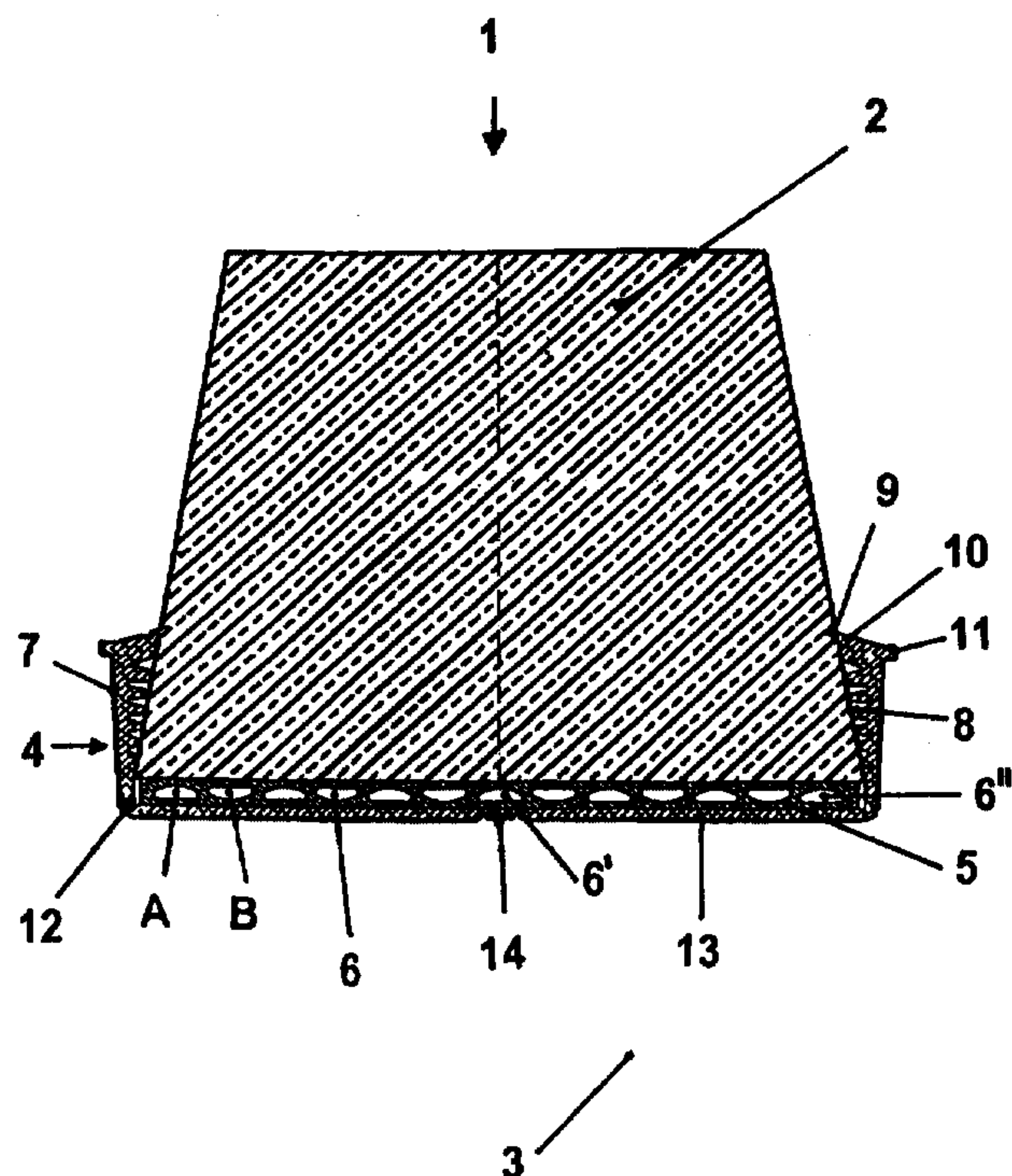
(57) La présente invention concerne un système de rails (1) comprenant une file de rails avec fixations, des traverses en bois, béton, etc, une infrastructure (3) sur laquelle les traverses sont posées, ainsi qu'un sabot de traverse en élastomère, dont la paroi latérale (7), qui s'élargit vers le haut, ceint la traverse entièrement ou partiellement, la paroi latérale intérieure étant conçue en forme de lèvres flexibles (9), posée étanche contre la traverse (2); en outre, entre le fond du sabot de traverse (13) et la semelle de la traverse (2) est insérée une garniture élastique (5). Le système de rails selon l'invention (1) se caractérise en ce que la paroi latérale (7) du sabot de traverse (4) présente sur sa face intérieure (8) un réseau de rainures-nervures et que la garniture élastique (5) est pourvue de canaux (6, 6', 6'') d'aspect extrudé, situés sensiblement dans un même plan où apparaissent deux géométries de canaux disposés en alternance.

(57) The invention relates to a rail system (1) comprising a line of rails with fixations, cross ties (wood, concrete, etc.), an infrastructure (2) on which the cross ties are laid, as well as an elastomeric cross tie shoe, whose sidewall (7), which tapers upward, entirely or partially surrounds the cross tie, the inner sidewall being in the form of a flexible lip (9) sealingly laid against said cross tie (2); besides, between the bottom of the cross tie shoe (13) and the cross tie underside (2) is inserted an elastic intermediate layer (5). The rail system according to the invention (1) is characterized in that the sidewall (7) of the cross tie shoe (4) presents on its inner face (8) a pattern of ribs and grooves and that the elastic intermediate layer (5) is provided with extruded-like channels (6, 6', 6'') located virtually in the same plane as that in which two geometries of alternating channels appear.



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(21) Internationales Aktenzeichen: PCT/DE98/02570 (22) Internationales Anmeldedatum: 2. September 1998 (02.09.98) (30) Prioritätsdaten: 197 42 544.5 26. September 1997 (26.09.97) DE (71) Anmelder (für alle Bestimmungsstaaten ausser US): PHOENIX AKTIENGESELLSCHAFT [DE/DE]; Hannoversche Strasse 88, D-21079 Hamburg (DE). (72) Erfinder; und (75) Erfinder/Anmelder (nur für US): BLANK, Helmuth [DE/DE]; Elbdeich 115A, D-21217 Seevetal (DE). PAHL, Bernd [DE/DE]; Spritzwiese 37, D-22547 Hamburg (DE). (81) Bestimmungsstaaten: AU, BR, CA, CN, HU, JP, KR, RU, US, europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Veröffentlicht <i>Mit internationalem Recherchenbericht.</i>		
(54) Title: RAIL SYSTEM (54) Bezeichnung: SCHIENENANORDNUNG (57) Abstract The invention relates to a rail system (1) comprising a line of rails with fixations, cross ties (wood, concrete, etc.), an infrastructure (2) on which the cross ties are laid, as well as an elastomeric cross tie shoe, whose sidewall (7), which tapers upward, entirely or partially surrounds the cross tie, the inner sidewall being in the form of a flexible lip (9) sealingly laid against said cross tie (2); besides, between the bottom of the cross tie shoe (13) and the cross tie underside (2) is inserted an elastic intermediate layer (5). The rail system according to the invention (1) is characterized in that the sidewall (7) of the cross tie shoe (4) presents on its inner face (8) a pattern of ribs and grooves and that the elastic intermediate layer (5) is provided with extruded-like channels (6, 6', 6'') located virtually in the same plane as that in which two geometries of alternating channels appear. (57) Zusammenfassung Die Erfindung betrifft eine Schienenanordnung (1), bestehend aus: einem Schienenstrang mit Befestigungsmitteln; Schwellen (2) aus Holz, Beton oder dgl.; einem Unterbau (3), auf dem die Schwellen (2) gelagert sind; sowie aus einem Schwellenschuh (4) aus elastomerem Werkstoff, dessen Seitenwand (7), die nach oben hin breiter wird, die Schwelle (2) ganz oder teilweise umgreift, wobei die Seitenwand an ihrer Innenseite in Form einer biegsamen Lippe (9) ausläuft, die an der Schwelle (2) abdichtend anliegt; wobei ferner zwischen dem Schwellenschuhboden (13) und der Unterseite der Schwelle (2) eine elastische Einlage (5) vorhanden ist. Die erfindungsgemäße Schienenanordnung (1) zeichnet sich dadurch aus, daß die Seitenwand (7) des Schwellenschuhes (4) auf ihrer Innenseite ein Rippen-Rillen-System (8) aufweist; und die elastische Einlage (5) mit strangförmig verlaufenden Kanälen (6, 6', 6'') versehen ist, die im wesentlichen in einer Ebene liegen, wobei zwei Geometrien (A, B) von Kanälen auftreten, die alternierend zueinander angeordnet sind.		



RAIL SYSTEM

The invention relates to a rail system consisting of the following:

- A line of rails with securing means;
- crossties made of wood, concrete or the like;
- a substructure (ballast of broken stone; solid bed), on which the crossties are supported; as well as
- a crosstie shoe made of elastomeric material (i.e., rubber or a plastic similar to rubber), the sidewall of which is becoming wider upwardly and wholly or partially surrounding the crosstie, whereby the sidewall ends on its inner side in the form of a flexible lip sealingly abutting the crosstie, and has a nose with a substantially rectangular cross section and preferably located on the outer side of said sidewall within its upper zone; and whereby, furthermore, an elastic intermediate layer is present between the crosstie shoe and the underside of the crosstie.

Based on the prior art outlined above, which is described in greater detail in German laid-open patent specification 43 35 516 A1, the problem is to provide a rail system with with crosstie shoes in which both horizontal rigidity and vertical shock absorption are assured in an optimal way primarily in view of the type of construction of solid beds, which is increasingly becoming more important.

Now, said problem is solved according to the characterizing part of patent claim 1 in that

- the sidewall of the crosstie shoe has a system of ribs and grooves on its inner side; and

- the elastic intermediate layer is provided with channels extending in the form of strands substantially disposed in one plane, whereby two geometries of channels appear, which are arranged alternating with each other.

Useful developments of the invention are specified in the claims 2 to 13.

Now, the invention is explained with the help of an exemplified embodiment and by reference to the schematic drawings, in which:

FIG. 1 shows a cross section through a crosstie and a crosstie shoe.

FIG. 2 shows an enlarged representation of the expansion fold.

The following list of reference numbers and symbols is applicable in association with said figures:

- | | | |
|-----------|---|--|
| 1 | = | rail system |
| 2 | = | crosstie made of concrete |
| 3 | = | substructure |
| 4 | = | crosstie shoe made of elastomeric material |
| 5 | = | elastic intermediate layer |
| 6, 6', 6" | = | channels with geometries (A, B) |
| 7 | = | sidewall of crosstie shoe |
| 8 | = | rib-groove system |
| 9 | = | lip |
| 10 | = | notching in region of the lip |
| 11 | = | nose |
| 12 | = | notching in region of the corner zone of the crosstie shoe |
| 13 | = | bottom of crosstie shoe |
| 14 | = | expansion fold. |

According to FIG. 1, the crosstie shoe 4 has a sidewall 7, which becomes wider in the upward direction, forming a substantially triangular cross sectional shape. In this connection, the sidewall surrounds the crossties 6 only partially in the present case, i.e., within the lower zone of the crosstie.

On its inner side, sidewall 7 ends in the form of a flexible lip 9, which is sealingly abutting crosstie 2. For the purpose of increasing the elasticity, said lip has a notching 10 on the outer side. Owing to said design measures with respect to lip 9, the penetration of concrete between crosstie shoe 4 and crosstie 2 is excluded to the greatest possible extent within the framework of the solid bed during concreting of the latter.

Furthermore, on its outer side, namely within the upper zone, sidewall 7 has a nose 11, which is substantially rectangular viewed in the cross section. Said nose indicates the height of the level of the concrete of the solid bed.

In addition, on its inner side, sidewall 7 has a rib-groove system 8 preferably having at least five grooves, said system assuring horizontal rigidity.

Crosstie shoe 4 has an inside notching 12 located in the corner zone between bottom 13 of the crosstie shoe and sidewall 7. Said notching provides the shoe of the crosstie with increased flexibility. In addition, in its center, the bottom 13 of the crosstie shoe is provided with an expansion fold, which is explained in greater detail in the following in association with FIG. 2.

The elastic intermediate layer 5, which like shoe 4 of the crosstie is made of elastomeric material, is provided with the channels 6, 6' and 6" extending in the form of an extruded strand, said channels being substantially disposed in the same plane, whereby two geometries A and B of the channels appear. The channels have a substantially semicircular, semioval or hemi-ellipsoidal cross-sectional shape (in the unstressed state), whereby the flattened and the curved sides of the channels point upwardly and downwardly in an alternating way. Number "n" of the channels is an uneven number ($n = 13$). Furthermore, the flattened sides of channel 6', which is arranged in the center, like also the ones of the two channels 6", point downwardly in the marginal zone of elastic intermediate layer 5. Through said measures, elastic intermediate layer 5 provides for vertical shock absorption.

The following material parameters usefully apply to crosstie shoe 4 and elastic intermediate layer 5:

Crosstie shoe

SBR/BR mixture

Shore hardness A:

63 $\pm$ 5

Elastic intermediate layer

EPDM

Shore hardness A:

38 $\pm$ 5

The abbreviations stand for:

SBR = styrene-butadiene rubber

BR = butadiene rubber

EPDM = ethylene propylene diene copolymer

FIG. 2 shows within the framework of an enlarged representation a crosstie shoe bottom 13 with an expansion fold 14, which is preferably formed by two to five folds. This measure assures easier deformation of crosstie shoe 4 in the vertical direction.

In addition, the special features of the construction of sidewall 7 are shown here again enlarged.

CLAIMS

1. A rail system (1) consisting of
 - a rail line with securing means;
 - crossties (2) made of wood, concrete or the like;
 - a substructure (3), on which the crossties (2) are supported; as well as of
 - a crosstie shoe (4) made of elastomeric material, whose sidewall (7) becomes wider upwardly and wholly or partially surrounds the crosstie (2), whereby the sidewall ends on its inner side in the form of a flexible lip (9) sealingly abutting the crosstie (2), and has a nose preferably on its outer side, said nose being located in the upper zone and having a preferably rectangular shape viewed in the cross section; and whereby, furthermore, an elastic intermediate layer (5) is present between the bottom (13) of the crosstie shoe and the underside of the crosstie (2), characterized in that
 - the sidewall (7) of the crosstie shoe (4) has a rib-groove system (8) on its inner side; and
 - the elastic intermediate layer (5) is provided with channels (6, 6', 6'') extending in the form of a strand,

said channels being substantially disposed in the same plane, whereby two geometries (A, B) of channels appear, said geometries being arranged alternating with each other.

2. The rail system according to claim 1, characterized in that the rib-groove system (8) consists of at least five grooves.

3. The rail system according to claim 1 or 2, characterized in that the lip (9) has a notching (10) on the outer and/or inner side for increasing the elasticity.

4. The rail system according to any one of claims 1 to 3, characterized in that the crosstie shoe (4) has an inside notching (12) in the corner zone between the crosstie shoe bottom (13) and the sidewall (7).

5. The rail system according to any one of claims 1 to 4, characterized in that the crosstie shoe bottom (13) has an expansion fold (14) in its center.

6. The rail system according to any one of claims 1 to 5, characterized in that the expansion fold (14)

is formed by two to five folds.

7. The rail system according to any one of claims 1 to 6, characterized in that the channels (6, 6', 6'') have a substantial semicircular, semioval or hemi-ellipsoidal cross-sectional shape, whereby the flattened and the curved sides of the channels point alternately upwardly, i.e. in the direction of the crosstie (2), and downwardly, i.e. in the direction of the bottom (13) of the crosstie shoe.

8. The rail system according to any one of claims 1 to 7, characterized in that number "n" of the channels (6) is uneven, preferably amounting to $n = 13$.

9. The rail system according to any one of claims 1 to 8, characterized in that the flattened sides of the channel (6') arranged in the center, like the ones of the two channels (6'') in the marginal zone of the elastic intermediate layer (5), point downwardly, i.e. toward the bottom (13) of the crosstie shoe.

10. The rail system according to any one of claims 1 to 9, characterized in that the crosstie shoe (4) consists of an SBR/BR mixture.

11. The rail system according to any one of claims 1 to 10, characterized in that the elastic intermediate layer (5) consists of EPDM.

12. The rail system according to any one of claims 1 to 11, characterized in that the crosstie shoe (4) has a Shore hardness A of 63 ± 5 .

13. The rail system according to any one of claims 1 to 12, characterized in that the elastic intermediate layer (5) has a Shore hardness A of 38 ± 5 .

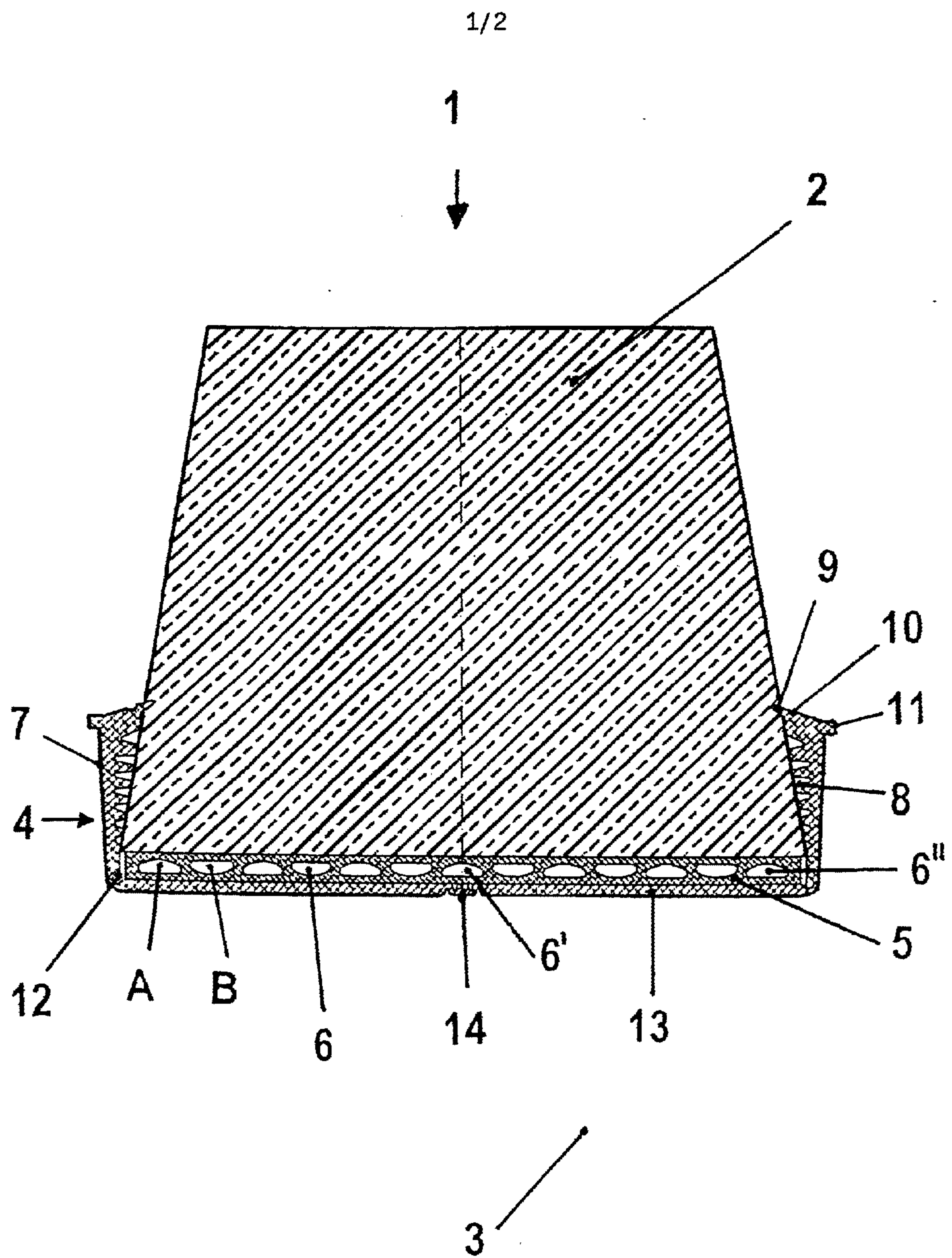


Fig. 1

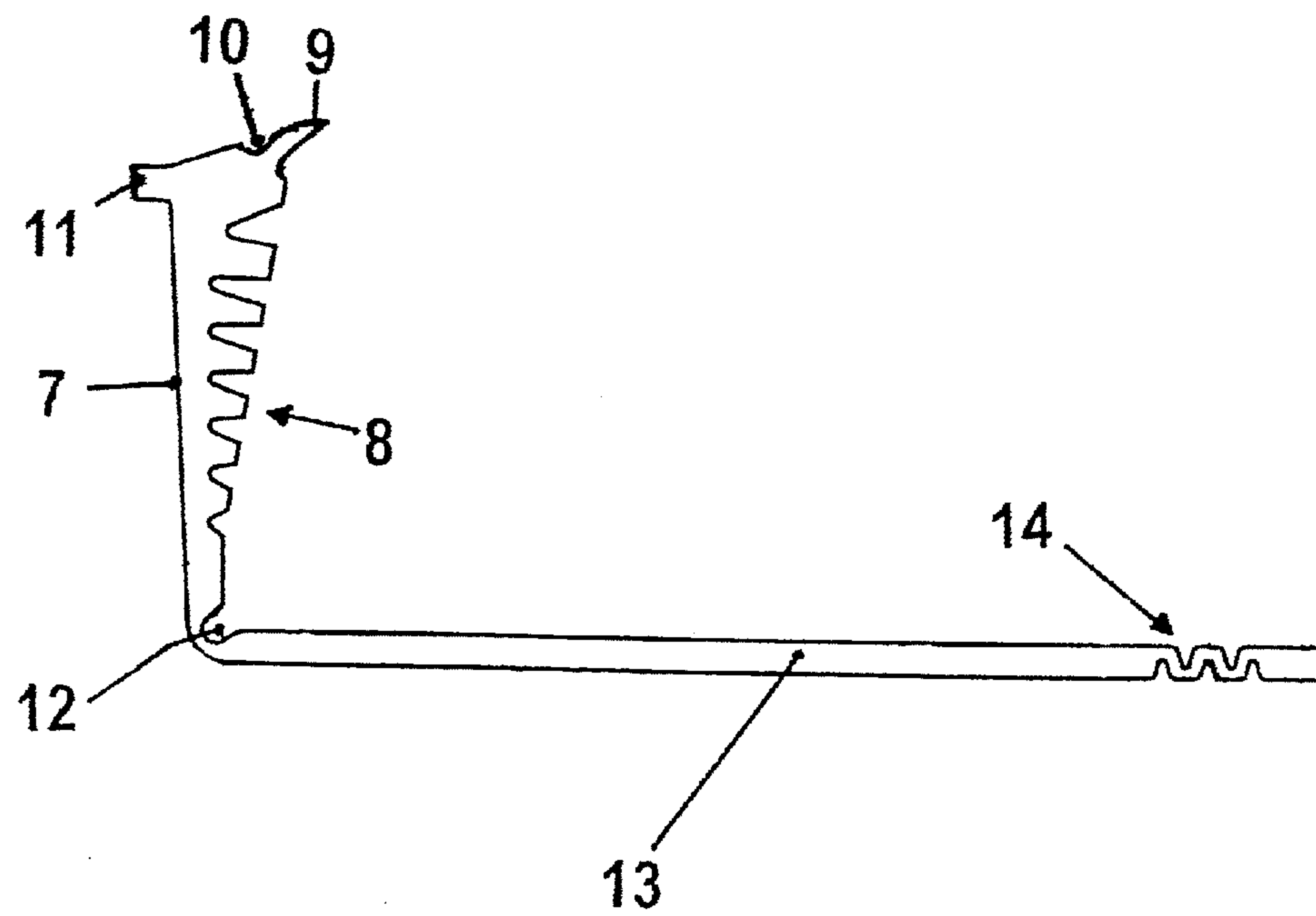


Fig. 2