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Amended claims in accordance with Rule 137(2) EPC.

(54) **Carrier Element**

(57) The invention relates to a carrier element (1), which has a plurality of segments (2), wherein the segments (2) are arranged side by side in a longitudinal direction (L), wherein each segment (2) has a centre region (3) and two side regions (4, 5) extending to different sides (6, 7) from the centre region (3), wherein two adjacent segments (2) are separated by a cut (8) extending substantially along the entire width of the centre region (3) between the segments (2), wherein two adjacent segments (2) are connected by a common strip of material (9) formed by the side region (4, 5) of the two adjacent

segments (2) at a first side (6), wherein two adjacent segments (2) are separated by a side cut (10) arranged in the side region (4, 5) of two adjacent segments (2) at a second side (6, 7) opposite the first side (6, 7) and wherein the connection between two side regions (4) and the separation between two side regions (5) are altering from side to side along the longitudinal direction (L) from segment (2) to segment (2). To facilitate the forming of an arch with the carrier element, the invention is characterized in that at least one bore (11, 12, 13) is arranged in the centre region (3) adjacent to the side cut (10) between two side regions (4, 5).

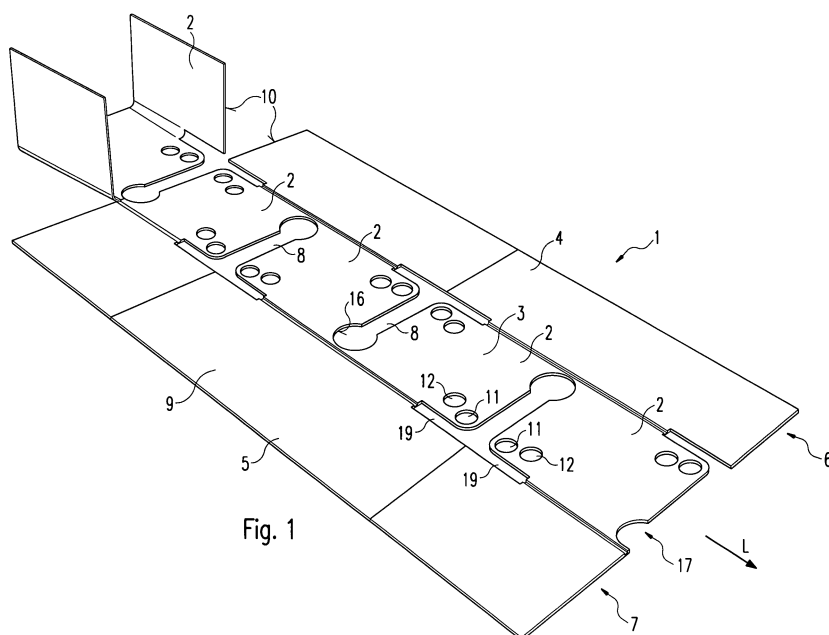


Fig. 1

Description

[0001] The invention relates to a carrier element, which has a plurality of segments, wherein the segments are arranged side by side in a longitudinal direction, wherein each segment has a centre region and two side regions extending to different sides from the centre region, wherein two adjacent segments are separated by a cut extending substantially along the entire width of the centre region between the segments, wherein two adjacent segments are connected by a common strip of material formed by the side region of the two adjacent segments at a first side, wherein two adjacent segments are separated by a side cut arranged in the side region of two adjacent segments at a second side opposite the first side and wherein the connection between two side regions and the separation between two side regions are altering from side to side along the longitudinal direction from segment to segment.

[0002] Carrier elements of this kind are pre-known and used in the field of construction of buildings, especially in the field of dry mortarless construction. The advantage of such a carrier element is that it is quite easy to construct a round arch by bending two adjacent segments of the carrier element relatively to another until the desired shape of the whole carrier element is formed.

[0003] It has been found that it is sometimes complicated to ensure the uniformity of such an arch structure. This applies as well if another non-straight structure has to be formed for which a high degree of uniformity is desired. It depends on the skills of the construction worker to achieve a good result.

[0004] If such a skilled worker is not available the securing of a high degree of uniformity becomes very time consuming and expensive.

[0005] Therefore, it is an object of the present invention to propose a carrier element according to the above mentioned kind which allows to form an arch structure or, generally spoken, a non-straight structure, with a high degree of uniformity without the necessity of a skilled worker and/or without a time consuming process.

[0006] The solution of this object according to the invention is characterized in that at least one bore is arranged in the centre region adjacent to the side cut between two side regions.

[0007] By bringing two of the bores of adjacent segments in an overlapping position it becomes possible in an easy way to define an exact angle between the axis of two adjacent segments.

[0008] Preferably, a plurality of bores is arranged in the centre region adjacent to the side cut between two side regions; the number of bores can be 3 or 4 or even more.

[0009] A preferred embodiment is equipped with bores which are arranged mirrored to the cut between the centre region of two adjacent segments.

[0010] The cut between two centre regions of the segments and the side cut between two side regions of the

segments can be formed continuously.

[0011] Furthermore, the bores can be located on a circle line having its centre at the end of the cut between two centre regions adjacent to the common strip. The bores can be arranged equidistantly or not-equidistantly along the circle line. To use a nonius effect in the precise angled orientation of two adjacent segments it can be provided that the distance between two bores increases or decreases from bore to bore by a defined amount.

[0012] A stiff construction is achieved if the centre region and the two side regions form a U-shaped structure.

[0013] The cut between the centre regions of two adjacent segments can have a T-shaped form in the top plan view. Furthermore, the cut between the centre regions of two adjacent segments can have a circle shaped form at one end. By this the bending of adjacent segments is facilitated.

[0014] The at least one bore can be arranged for receiving a connection element. The connection element is preferably a bolt or a screw.

[0015] The carrier element is preferably made from a metallic material, especially from sheet metal with steel as basis material.

[0016] A cost efficient production of the carrier element is ensured if the carrier element is produced by a punching process.

[0017] With the suggested concept a very easy non-straight orientation of the segments of the carrier element can be realized with a high degree of uniformity.

[0018] In the drawings embodiments of the invention are depicted.

Fig. 1 shows a perspective view of a sheet metal from which the carrier element according to the invention is formed, mainly in an unfolded state, partly in a folded state,

Fig. 2 shows the top plan view of a sheet metal from which the carrier element is formed, in the left part of the figure in an unfolded, plan state, in the right part of the figure in the folded state,

Fig. 3 shows a perspective view of two adjacent segments of the carrier element,

Fig. 4 shows the top plan view of a carrier element, formed to a bow, and

Fig. 5 and

Fig. 6 show two different perspective views of the carrier element according to fig. 4.

[0019] In fig. 1 a perspective view is depicted of a flat sheet metal from which a carrier element 1 according to the invention is formed. The figure shows a sheet metal element which consists of a steel material; the figure shows mainly a flat, not yet folded state of the carrier

elements while a finish folded part of the carrier element 1 is shown in the left upper part of the figure.

[0020] As can be seen in fig. 1 the carrier element 1 is basically machined by punching of a flat strip of sheet metal. It can be seen that cuts 8, 10 and bores 11, 12 of a certain form and magnitude are brought into the sheet metal strip. Consequently, the production of the basis part of the carrier element 1 is quite simple and cost efficient.

[0021] By punching cuts 8, which have a substantial T-shaped form, the following regions are defined in the punched part: By the cuts 8 - arranged parallel to each other along the longitudinal direction L of the sheet metal strip - segments 2 are defined which are arranged adjacent to another. Furthermore, by the length of the cuts 8 (seen in transversal direction perpendicular to the longitudinal direction L) a centre region 3 of each segment 2 is defined; to both sides side regions 4 and 5 about the centre region 3, wherein the side regions 4 and 5 respectively are located at the sides 6 and 7 of the sheet metal strip.

[0022] After having punched the sheet metal strip according to the design shown in fig. 1 the material is bent into the shape which is depicted in the left upper region of fig. 1, i. e. into a U-shaped configuration.

[0023] In the synopsis of figures 1 till 3 the following design of the carrier element 1 becomes apparent:

[0024] The cuts 8 have - as mentioned - a T-shaped form in the top plan view, whereby the segments 2 are defined. The orientation of the T-shaped configuration alters from segment 2 to segment 2 as can be easily seen. From the T-bar 19 of the T-shaped cut 8 a side cut 10 extends transversally to the longitudinal direction L and through the whole side region 4, 5 to separate the adjacent side regions 4, 5 of two segments 2. It should be noted that not necessarily all cuts 8 have a respective side cut 10; side cuts 10 can be limited to a certain selection of the cuts 8. The side cuts 10 are also produced by a punching process.

[0025] While the side cuts 10 separate adjacent side regions 4, 5 of the segments 2, common strips 9 of material are formed at the opposite side of the segments 2, i. e. at the other side 4, 5 with respect to the longitudinal direction L. The common strips 9 connect two adjacent side regions 4, 5 in a stiff way.

[0026] With this design it becomes possible to form the segments 2 not only along a straight line but also along a desired curve. Specifically, it becomes possible to form an arch structure as it can be seen in figures 4 till 6.

[0027] To facilitate the forming of such a structure with a high degree of uniformity and in an easy way the invention proposes that at least one bore 11, 12, 13 - preferably a plurality of bores - is arranged in the centre region 3 adjacent to the side cut 10 between two side regions 4, 5. For purpose of illustration reference is made to fig. 2. Here, it can be seen that near the T-bar 19 of the T-shaped cut 8 two bores 11 and 12 are punched into the material of the sheet metal.

[0028] If two adjacent segments 2 stay in a straight orientation - as shown in fig. 3 - the bores 11, 12 have no function.

[0029] But if a non-straight profile has to be formed by the carrier element 1 - as depicted in the right half in fig. 2 - the purpose of the bores 11, 12 becomes apparent: Two adjacent segments 2 are bended relatively to another so that the common strip 9 of material has a kink 20. The side regions 4, 5 of the segments 2 at the other side 6, 7 of the segments 2 overlap a certain amount as well as the sides of the centre regions 3 which becomes possible due to the cuts 8 and side cuts 10. Also the bores 11 come to an overlapping position which is depicted with reference numeral 18. Overlapping of the bores 11, 12 is made possible because the bores 11, 12 are arranged along a circle line 14 (see fig. 2) which has its centre 15 at the point where the kink 20 will be arranged.

[0030] The distance a between the bores 11, 12, 13 can be constant. Another possibility is that the distance a varies from bore to bore - which is basically relevant if a bigger number of holes 11, 12, 13 is used. By a difference in the distance between the bores 11, 12, 13 it becomes possible to use the effect of a nonius (vernier scale).

[0031] So, it is now very easy to bend two adjacent segments until the bores 11 are in an overlapping position. It should be noted that the bores can serve just as an optical control to check if the precise desired angle of the kink 20 is reached.

[0032] It is also possible but not mandatory to insert a bolt or screw into the overlapping bore 18 to fix two segments 2 relatively to another in the desired position.

[0033] The bending of two adjacent segments is facilitated by punching a circle shaped form 16 (see figures 1 and 2) in the end 17 of the cut 8.

[0034] With reference to figures 4 till 6 it can be seen that here three bores 11, 12, 13 are employed at the side of each segment 2 adjacent to the cut 8.

Reference Numerals

[0035]

45	1	carrier element
	2	segment
	3	centre region
	4	side region
	5	side region
50	6	side
	7	side
	8	cut
	9	common strip of material
	10	side cut
55	11	bore
	12	bore
	13	bore
	14	circle line

- 15 centre
- 16 circle shaped form
- 17 end
- 18 overlapping bore
- 19 T-bar
- 20 kink

- L longitudinal direction
- a distance

Claims

1. Carrier element (1), which has a plurality of segments (2), wherein the segments (2) are arranged side by side in a longitudinal direction (L), wherein each segment (2) has a centre region (3) and two side regions (4, 5) extending to different sides (6, 7) from the centre region (3), wherein two adjacent segments (2) are separated by a cut (8) extending substantially along the entire width of the centre region (3) between the segments (2), wherein two adjacent segments (2) are connected by a common strip of material (9) formed by the side region (4, 5) of the two adjacent segments (2) at a first side (6), wherein two adjacent segments (2) are separated by a side cut (10) arranged in the side region (4, 5) of two adjacent segments (2) at a second side (6, 7) opposite the first side (6, 7) and wherein the connection between two side regions (4) and the separation between two side regions (5) are altering from side to side along the longitudinal direction (L) from segment (2) to segment (2),
characterized in that
at least one bore (11, 12, 13) is arranged in the centre region (3) adjacent to the side cut (10) between two side regions (4, 5).
2. Carrier element according to claim 1, **characterized in that** a plurality of bores (11, 12, 13) is arranged in the centre region (3) adjacent to the side cut (10) between two side regions (4, 5).
3. Carrier element according to claim 1 or 2, **characterized in that** the at least one bore (11, 12, 13) is arranged mirrored to the cut (8) between the centre region (3) of two adjacent segments (2).
4. Carrier element according to at least one of claims 1 to 3, **characterized in that** the cut (8) between two centre regions (3) of the segments (2) and the side cut (10) between two side regions (4, 5) of the segments (2) are formed continuously.
5. Carrier element according to at least one of claims 1 to 4, **characterized in that** the bores (11, 12, 13) are located on a circle line (14) having its centre (15) at the end of the cut (8) between two centre regions

(3) adjacent to the common strip (9).

6. Carrier element according to claims 5, **characterized in that** the bores (11, 12, 13) are arranged equidistantly along the circle line (14).
7. Carrier element according to claims 5, **characterized in that** the bores (11, 12, 13) are arranged not equidistantly along the circle line (14).
8. Carrier element according to claims 7, **characterized in that** the distance (a) between two bores (11, 12, 13) increases or decreases from bore to bore by a defined amount.
9. Carrier element according to at least one of claims 1 to 8, **characterized in that** the centre region (3) and the two side regions (4, 5) form a U-shaped structure.
10. Carrier element according to at least one of claims 1 to 9, **characterized in that** the cut (8) between the centre regions (3) of two adjacent segments (2) has a T-shaped form in the top plan view.
11. Carrier element according to at least one of claims 1 to 10, **characterized in that** the cut (8) between the centre regions (3) of two adjacent segments (2) has a circle shaped form (16) at one end (17).
12. Carrier element according to at least one of claims 1 to 11, **characterized in that** the at least one bore (11, 12, 13) is arranged for receiving a connection element.
13. Carrier element according to claim 12, **characterized in that** the connection element is a bolt or a screw.
14. Carrier element according to at least one of claims 1 to 13, **characterized in that** the carrier element (1) is made from a metallic material.
15. Carrier element according to claim 14, **characterized in that** the carrier element (1) is made from sheet metal.
16. Carrier element according to at least one of claims 1 to 15, **characterized in that** it is produced by a punching process.

Amended claims in accordance with Rule 137(2) EPC.

1. Carrier element (1), which has a plurality of segments (2), wherein the segments (2) are arranged side by side in a longitudinal direction (L), wherein

each segment (2) has a centre region (3) and two side regions (4, 5) extending to different sides (6, 7) from the centre region (3), wherein two adjacent segments (2) are separated by a cut (8) extending substantially along the entire width of the centre region (3) between the segments (2), wherein two adjacent segments (2) are connected by a common strip of material (9) formed by the side region (4, 5) of the two adjacent segments (2) at a first side (6), wherein two adjacent segments (2) are separated by a side cut (10) arranged in the side region (4, 5) of two adjacent segments (2) at a second side (6, 7) opposite the first side (6, 7) and wherein the connection between two side regions (4) and the separation between two side regions (5) are altering from side to side along the longitudinal direction (L) from segment (2) to segment (2),

characterized in that

a plurality of bores (11, 12, 13) is arranged in the centre region (3) adjacent to the side cut (10) between two side regions (4, 5) which serves as an optical control to check if the precise desired angle of a kink between two adjacent segments (2) in overlapping position is reached.

2. Carrier element according to claim 1, **characterized in that** the at least one bore (11, 12, 13) is arranged mirrored to the cut (8) between the centre region (3) of two adjacent segments (2).

3. Carrier element according to at least one of claims 1 to 2, **characterized in that** the cut (8) between two centre regions (3) of the segments (2) and the side cut (10) between two side regions (4, 5) of the segments (2) are formed continuously.

4. Carrier element according to at least one of claims 1 to 3, **characterized in that** the bores (11, 12, 13) are located on a circle line (14) having its centre (15) at the end of the cut (8) between two centre regions (3) adjacent to the common strip (9).

5. Carrier element according to claim 4, **characterized in that** the bores (11, 12, 13) are arranged equidistantly along the circle line (14).

6. Carrier element according to claim 4, **characterized in that** the bores (11, 12, 13) are arranged not equidistantly along the circle line (14).

7. Carrier element (1), which has a plurality of segments (2), wherein the segments (2) are arranged side by side in a longitudinal direction (L), wherein each segment (2) has a centre region (3) and two side regions (4, 5) extending to different sides (6, 7) from the centre region (3), wherein two adjacent segments (2) are separated by a cut (8) extending substantially along the entire width of the centre region

(3) between the segments (2), wherein two adjacent segments (2) are connected by a common strip of material (9) formed by the side region (4, 5) of the two adjacent segments (2) at a first side (6), wherein two adjacent segments (2) are separated by a side cut (10) arranged in the side region (4, 5) of two adjacent segments (2) at a second side (6, 7) opposite the first side (6, 7) and wherein the connection between two side regions (4) and the separation between two side regions (5) are altering from side to side along the longitudinal direction (L) from segment (2) to segment (2),

characterized in that

a plurality of bores (11, 12, 13) is arranged in the centre region (3) adjacent to the side cut (10) between two side regions (4, 5) and the distance (a) between two bores (11, 12, 13) increases or decreases from bore to bore by a defined amount.

8. Carrier element according to at least one of claims 1 to 7, **characterized in that** the centre region (3) and the two side regions (4, 5) form a U-shaped structure.

9. Carrier element according to at least one of claims 1 to 8, **characterized in that** the cut (8) between the centre regions (3) of two adjacent segments (2) has a T-shaped form in the top plan view.

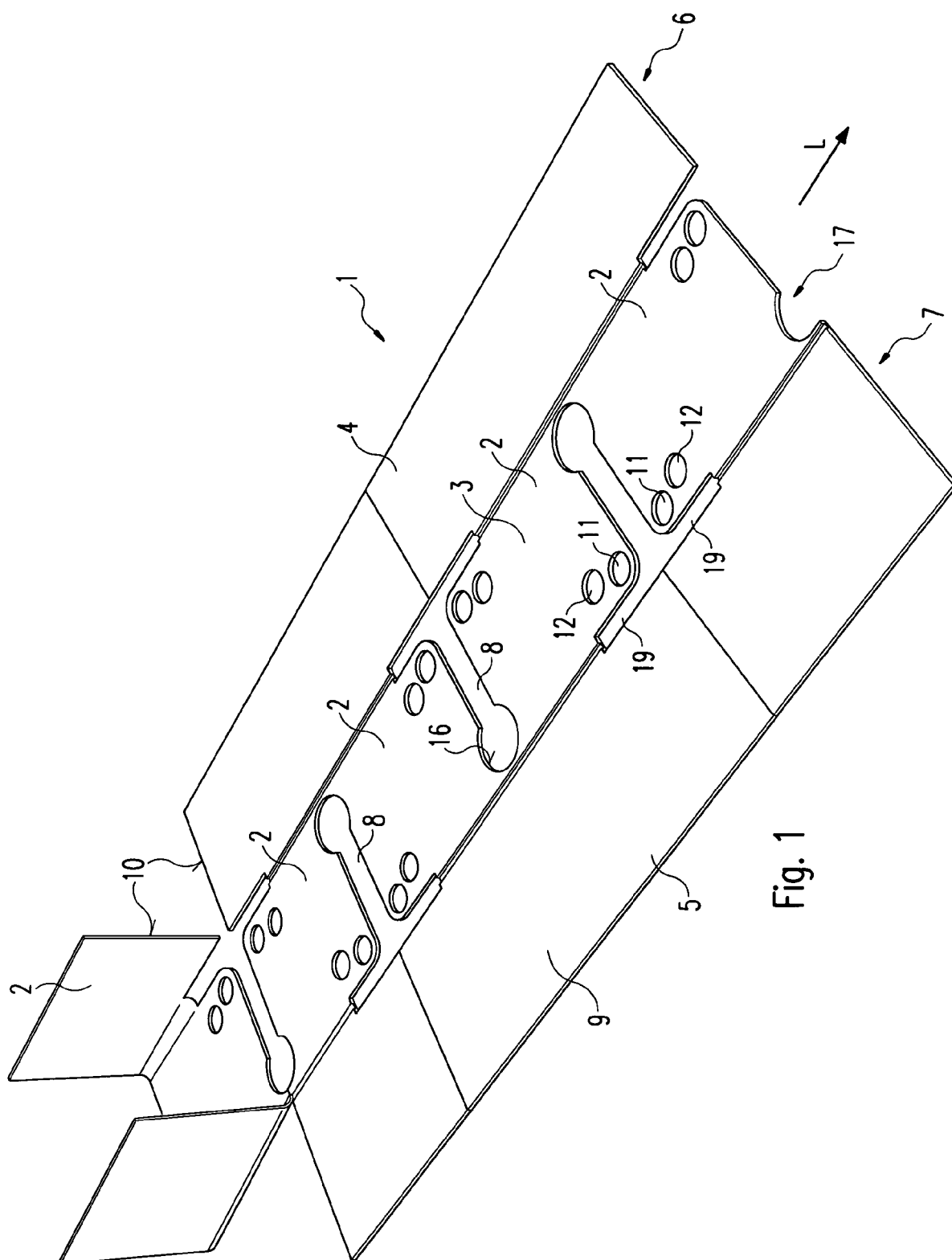
10. Carrier element according to at least one of claims 1 to 9, **characterized in that** the cut (8) between the centre regions (3) of two adjacent segments (2) has a circle shaped form (16) at one end (17).

11. Carrier element according to at least one of claims 1 to 10, **characterized in that** the at least one bore (11, 12, 13) is arranged for receiving a connection element, which preferably is a bolt or screw.

12. Carrier element according to at least one of claims 1 to 11, **characterized in that** the carrier element (1) is made from a metallic material.

13. Carrier element according to claim 12, **characterized in that** the carrier element (1) is made from sheet metal.

14. Method to produce a carrier element according to one of the previous claims 1 to 13, **characterized in that** the carrier element is produced by a punching process.



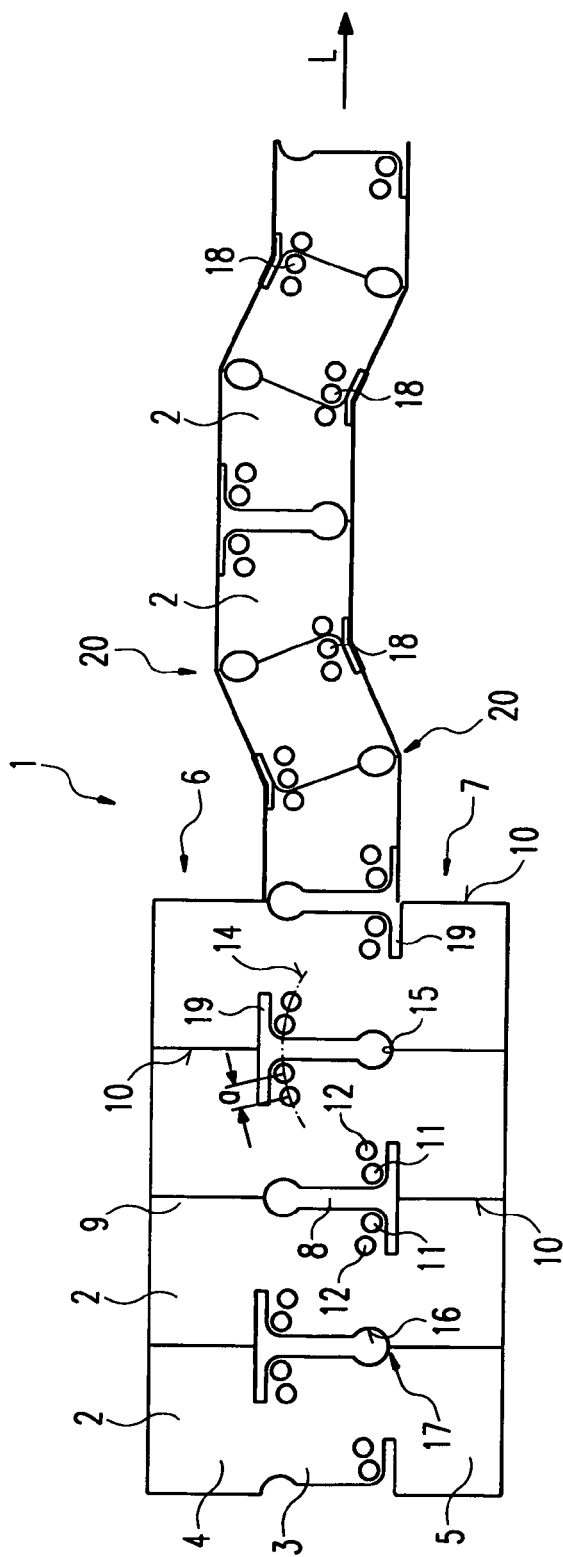


Fig. 2

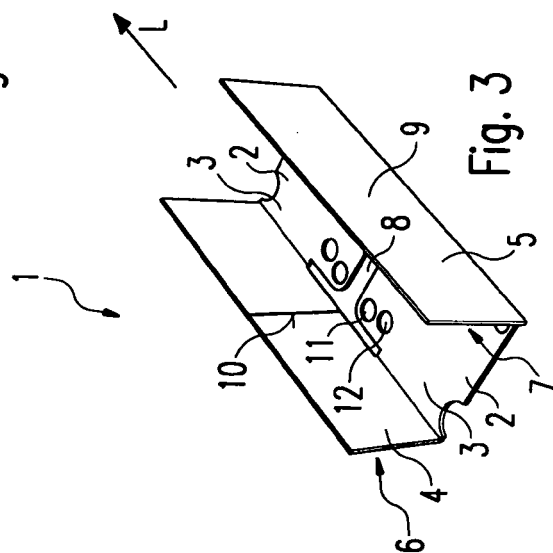


Fig. 3

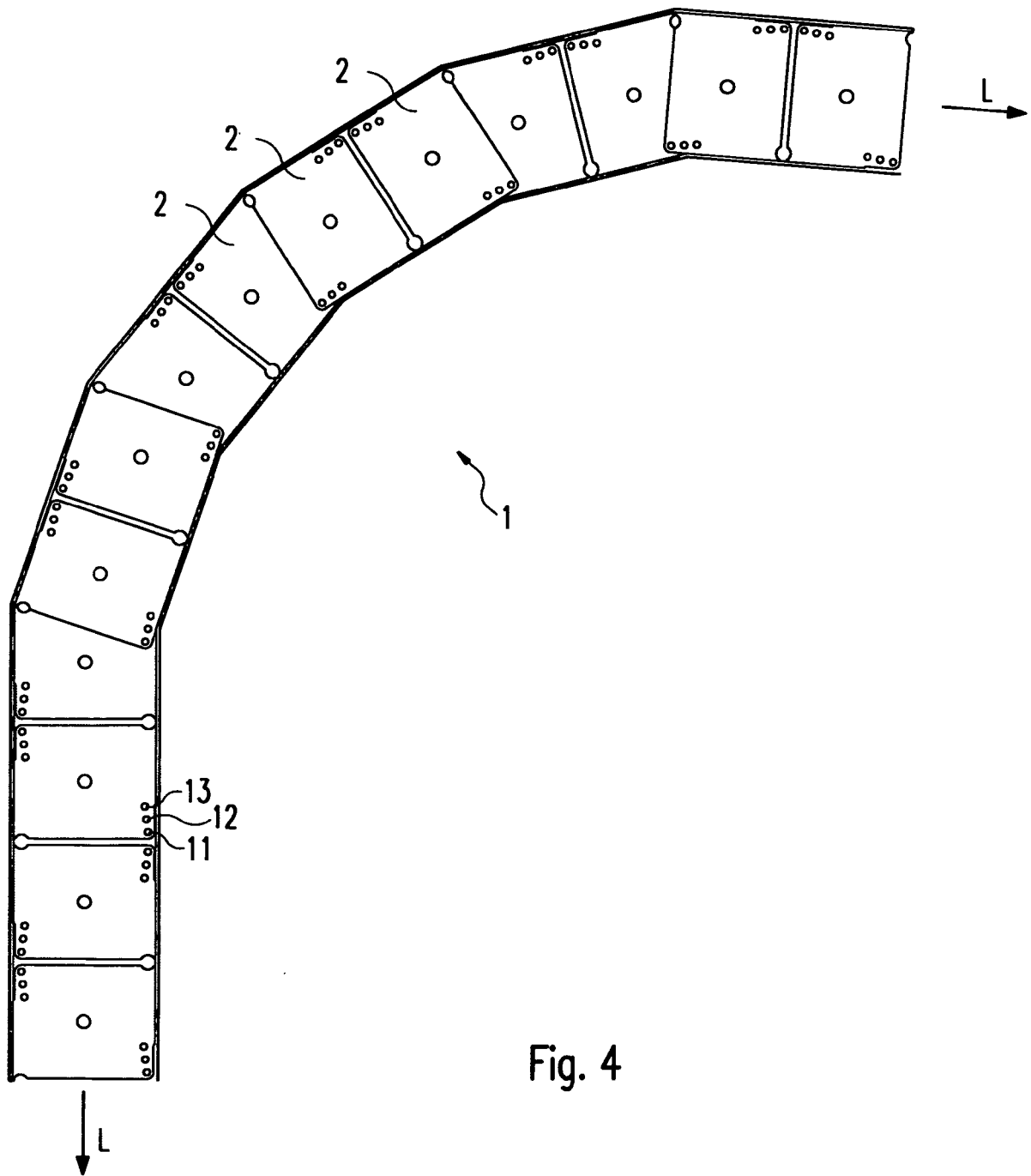


Fig. 4

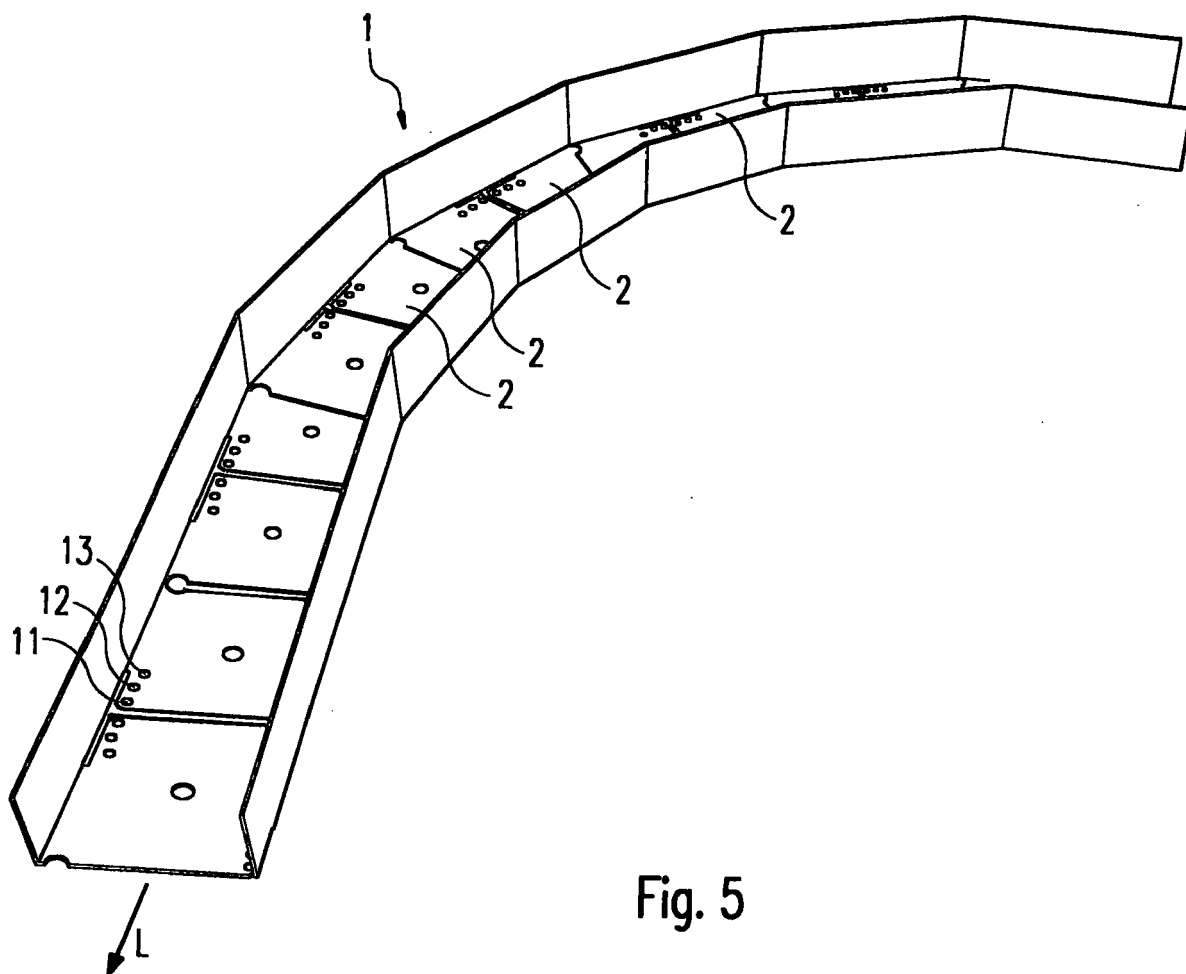


Fig. 5

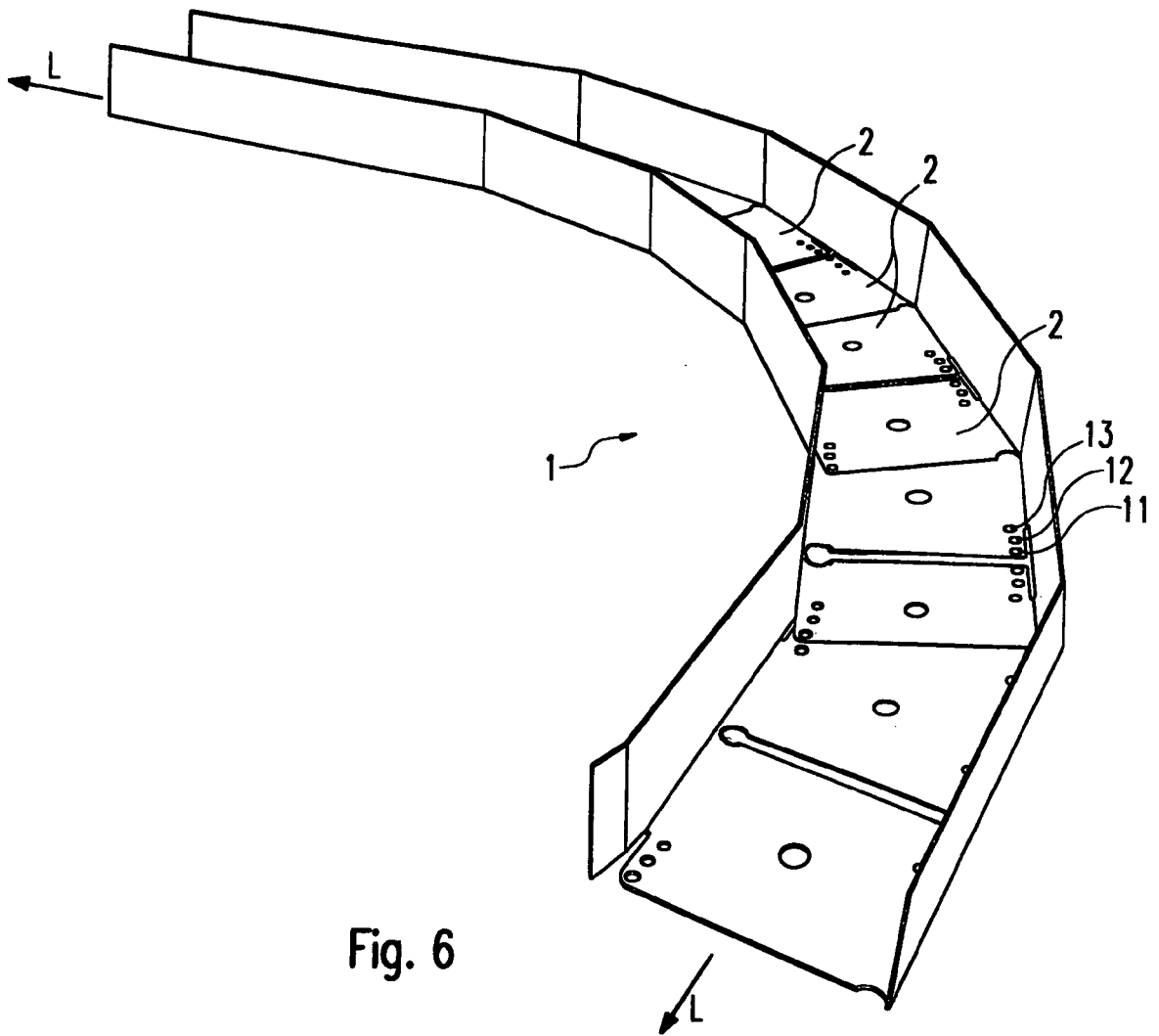


Fig. 6



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 06 12 4276

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 June 2007	Examiner Severens, Gert
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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