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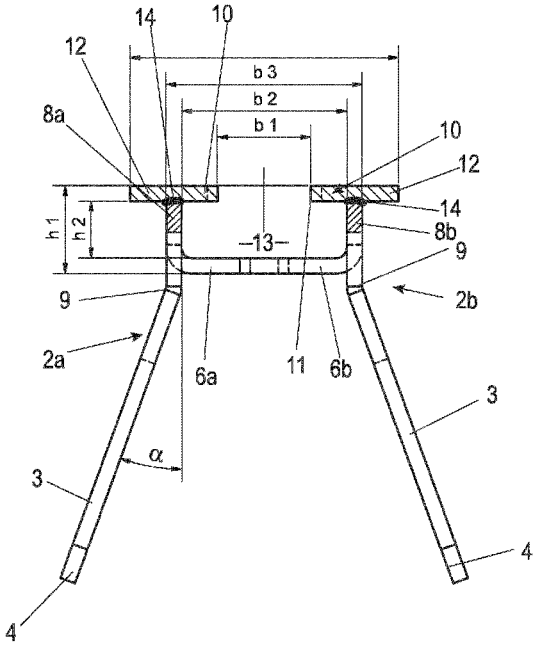
(54) **Title:** ANCHOR RAIL AND METHOD FOR PRODUCING AN ANCHOR RAIL

(54) **Bezeichnung:** ANKERSCHIENE UND VERFAHREN ZUR HERSTELLUNG EINER ANKERSCHIENE

Fig. 2



(57) **Abstract:** The invention relates to an anchor rail (1) for fixing fasteners (20), comprising a first rail part (2a) and a second rail part (2b), which are connected to each other and on each of which anchor flanges (3) are formed, wherein a channel-like receptacle (13) for a head section (21) of a fastener (20) is formed between a first wall (8a) of the first rail part (2a) and a second wall (8b) of the second rail part (2b), and an inwardly protruding flange (10) is provided on the first wall (8a), and an inwardly protruding flange (10) is provided on the second wall (8b), and the inwardly protruding flanges (10) cover the edges of the channel-like receptacle (13), wherein an outwardly protruding supporting flange (12) opposite the inwardly protruding flange (10) projects from at least some sections of the first wall (8a) and/or the second wall (8b). The invention also relates to a method for producing an anchor rail (1) which can absorb particularly large forces.

(57) **Zusammenfassung:** Eine Ankerschiene (1) zur Fixierung von Befestigungsmitteln (20) umfasst ein erstes Schienenteil (2a) und ein zweites Schienenteil (2b), die miteinander verbunden sind und an denen jeweils Ankerstege (3) ausgebildet sind, wobei zwischen einer ersten Wand (8a) des ersten Schienenteils (2a) und einer zweiten Wand (8b) des zweiten Schienenteils (2b) eine kanalförmige Aufnahme (13) für einen Kopfabschnitt (21) eines Befestigungsmittels (20) ausgebildet ist und an der ersten Wand (8a) ein nach innen ragender Steg (10) und an der zweiten Wand (8b) ein nach innen ragender Steg (10) vorgesehen sind und die nach innen ragenden Stege (10) die kanalförmige Aufnahme (13) randseitig überdecken, wobei an der ersten Wand (8a) und/oder der zweiten Wand (8b) gegenüber dem nach innen ragenden Steg (10) zumindest abschnittswei se ein nach außen ragender Stützsteg (12) hervorsteht. Ferner betrifft die Erfindung ein Verfahren zur Herstellung einer Ankerschiene (1), die besonders hohe Kräfte aufnehmen kann.

[Fortsetzung auf der nächsten Seite]

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Anchor rail and method for producing an anchor rail

The present invention relates to an anchor rail for fixing fastening means, having a first rail part and a second rail part, which are connected to one another, and on each of which anchor webs are formed, wherein a channel-shaped receptacle for a head section of a fastening means is formed between a first wall of the first rail part and a second wall of the second rail part, and an inwardly projecting web is provided on the first wall and an inwardly projecting web is provided on the second wall, and the inwardly projecting webs cover the channel-shaped receptacle at the edge, and a method for producing an anchor rail.

EP 1 764 448 A2 discloses an anchor rail in which anchor webs are formed on a first rail part, which is connected to a second C-shaped rail part in a bottom area. This connection point between the two rail parts forms a weak point that can fail when fastening means are inserted into the second rail part and high forces are applied.

In addition, anchor rails in which the anchor rail is made from two rail parts are known (DE 10 2008 029 838 A1, DE 10 2018 003 160 A1), wherein each rail part comprises anchor webs and forms a wall which surrounds a channel for receiving fastening means. A bent-over, inwardly projecting web is formed on each wall which can be engaged behind by a head section of a fastening means. This allows tensile forces through the fastening means to be introduced directly into the anchor webs via each rail section, resulting in high holding forces. Such anchor rails have generally proven themselves, but bending high-strength steel sheets is problematic, especially if they are to be produced with somewhat greater thickness. In the area of the channel-shaped receptacle, an inwardly projecting web on a wall section is bent almost at right angles, which limits the strength and thickness of the steel sheet and thus also the maximum holding forces permitted by the anchor rail.

It is therefore the object of the present invention to provide an anchor rail and a method for manufacturing an anchor rail that can absorb particularly high holding forces and can be manufactured effectively.

In accordance with one aspect of the present invention there is provided an anchor rail for fixing fastening means including a first rail part and a second rail part, which are connected to one another and on each of which anchor webs

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are formed, wherein a channel-shaped receptacle for a head section of a fastening means is formed between a first wall of the first rail part and a second wall of the second rail part and an inwardly projecting web is provided on the first wall and an inwardly projecting web is provided on the second wall, and the inwardly projecting webs overlap the channel-shaped receptacle on the edge side, wherein an outwardly projecting support web projects at least in sections on the first wall and/or the second wall opposite the inwardly projecting web.

In accordance with another aspect of the present invention there is provided a method for producing an anchor rail for fixing fastening means, including the following steps:

producing two blanks for a first and a second rail part with anchor webs from a steel sheet;

producing strip-shaped blanks from a steel sheet;

welding a first strip-shaped blank to a first wall of a first rail part;

welding a strip-shaped blank to a second wall of the second rail part, and

connecting the first rail part to the second rail part wherein a channel-shaped receptacle for a head section of a fastening means is formed between the first wall and second wall, wherein each strip-shaped blank forms an inwardly projecting web on the first and second walls, which covers the receptacle at the edge, and an outwardly projecting support web.

As a result, in embodiments, after the anchor rail has been cast in concrete or another casting material, the outwardly projecting support web can be used to stabilize the inwardly projecting web. When a tensile load is applied by a fastening means, the inwardly projecting web is pivoted slightly in a direction away from the anchor rail, wherein deformation is limited by the outwardly projecting support web, which forms an abutment. The outwardly projecting support web is supported on the cast material and can thus counteract deformation at the inwardly projecting web. This also prevents deformation of the wall, which acts as a kind of bending bearing. The attachment of at least one support web thus increases the strength of the anchor rail in this area, resulting in the provision of higher holding forces.

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Preferably, a support web is provided on both the first and the second wall, in particular a continuous support web, which extends over substantially the same length as the inwardly projecting web. This allows support to be provided over the entire length of the anchor rail. Alternatively, several sections of support webs can be fixed to one wall each.

The first wall, the inwardly projecting web and the outwardly projecting support web are preferably designed T-shaped in cross-section, so that the first wall is aligned essentially at right angles to the inwardly projecting web and the support web. The same applies to the second wall, which is preferably also arranged at right angles to the inwardly projecting web and support web attached thereto.

For effective manufacturing, the support web can be welded to the first or second wall, for example by a laser welding process. Preferably, the support web is integrally formed with the inwardly projecting web so that they can be fixed to the first or second wall with high accuracy. Tests have shown that a sufficiently stable connection between webs and the wall aligned at an angle to them can be produced by a welded connection, in particular by laser welding.

In a preferred design, the support web and the inwardly projecting web are made of a metal sheet, in particular a steel sheet, which is thicker than the first and second rail parts, which are preferably also made of a metal sheet, in particular a steel sheet. As a result, the inwardly projecting web, against which a head section of a fastening means rests, can be of particularly stable design. The inwardly projecting web is preferably at least 20% thicker, for example at least 1 mm thicker, than one of the two rail parts forming the walls.

Alternatively or in addition to the thickness design, the support web and the inwardly projecting web may be formed from a material of higher strength than the first and second rail parts. By using a high-strength steel sheet to produce a strip-shaped blank for the support web and the inwardly projecting web, the area subjected to forces by fastening means can be made more stable even with the same thickness as the rail part by selecting a suitable material.

The support web and the inwardly projecting web are preferably made from a flat steel sheet, in particular by a strip-shaped blank, wherein this blank is connected to the first or second wall in a central region by a welded butt seam. The

inwardly projecting web and the support web can project from the respective wall by, for example, 1 mm to 20 mm, in particular 3 mm to 12 mm. The thickness of the strip-shaped blank for producing the two webs can be, for example, between 2 mm to 10 mm, in particular 3 mm to 8 mm.

Each rail part is preferably made of a bent steel sheet. The anchor webs are preferably aligned at an angle to the respective wall on the rail part. The first and second rail parts can be connected to each other by welded connecting webs, as disclosed for example in DE 10 2020 103 568. Optionally, the two rail parts can also be integrally formed with each other and manufactured from a single blank.

In a further design, the inwardly projecting webs each have a toothing in order to be able to fix the fastening means in the longitudinal direction of the anchor rail. To fix the fastening means in the longitudinal direction, a retaining plate with teeth at the edge can be provided, as disclosed in DE 10 2020 102 977.

Thus, in the method according to an embodiment of the invention, instead of bending two rail parts and then joining them, an additional component is produced by the strip-shaped blank, which is welded to a wall of a rail part. As a result, the loaded area of the anchor rail can be made particularly stable by selecting the strip-shaped blank in accordance with the mechanical requirements. In addition, the outwardly projecting support web can limit deformation of the inwardly projecting web, since the support web is supported on the cast body in the cast state.

Preferably, the welding of the first and second strip-shaped blanks is performed by laser welding, in which the material in the contact area between the strip-shaped blank and an end face of a wall of a rail part is melted without welding additions. This allows the inwardly projecting web to be positioned on the first or second rail part with a high degree of accuracy.

Preferably, a strip-shaped blank is welded to an end face of each of the first or second walls in a central region via a butt seam so that the strip-shaped blank protrudes from the respective wall on opposite sides.

The invention is explained in more detail below by means of an exemplary embodiment with reference to the accompanying drawings, wherein:

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Figs. 1A and 1B show two views of an anchor rail according to the invention;

Fig. 2 shows a sectional view through the anchor rail of Fig. 1, and

Fig. 3 shows a sectional view through the anchor rail of Fig. 1 with a fastening means.

An anchor rail 1 comprises two rail parts 2a and 2b which are made of a metal sheet, in particular a steel sheet. Integrally formed anchor webs 3 are provided on each rail part 2a and 2b, which have a widened foot section 4 and are later immersed in a cast body, in particular one of concrete.

A recess 5 is provided at least on one part of the anchor webs 3 in order to use the web-shaped material punched out on three sides at the recess 5 to produce a connecting web 6a or 6b. The connecting webs 6a and 6b are of stepped design at their facing end so that the two rail parts 2a and 2b can be fixed at a predefined distance. The connecting webs 6a and 6b are preferably welded together as described in DE 10 2020 103 568.

As shown in particular in Fig. 2, there is a wall 8a on the first rail part 2a, and spaced from the first wall 8a a second wall 8b formed integrally with the second rail part 2b. A channel-shaped receptacle 13 for inserting a head section of a fastening means is formed between the two walls 8a and 8b. The channel-shaped receptacle 13 is bounded by the connecting webs 6a and 6b, which are fixed to each other.

The anchor webs 3 are aligned at an angle to the wall 8a or 8b, preferably by an angle α, which can lie in a range between 5° and 30°. A kink 9 is provided between the anchor bars 3 and the wall 8a or 8b.

An inwardly projecting web 10 is provided on opposite sides of the channel-shaped receptacle 13. The two inwardly projecting webs 10 cover the edge of the channel-shaped receptacle 13 and leave a slot through which the fastening means with the head section can be inserted into the channel-shaped receptacle 13. A toothing 11 is formed on the inwardly projecting webs 10 in order to be able to fix the fastening means in the longitudinal direction of the anchor rail 1.

The inwardly projecting webs 10 are not integrally formed with one of the rail parts 2a or 2b, but are made from a strip-shaped blank which also forms an outwardly projecting support web 12. This flat blank is preferably made of a steel sheet which is connected in a central region to an end face of the first wall 8a or the second wall 8b by a welded butt seam 14. The inwardly projecting web 10 and the support web 12 thus protrude from the respective wall 8a or 8b on opposite sides.

In Fig. 3, the anchor rail 1 is shown with a fastening means 20 in the form of a hammerhead screw. A head section 21 of the fastening means 20 has been inserted into the channel-shaped receptacle 13 and rotated so that the head section 21 engages behind the two inwardly projecting webs 10. A threaded section 22 protrudes from the head section 21 from the anchor rail 1, to which further components can be attached.

In order to fix the anchor rail 1 precisely in a casting, in particular a concrete body, a retaining bracket 30 is provided, which has a projecting flange 31 on opposite sides in each case, which can be fixed to a formwork component by means of fastening means, for example nails. A bracket-shaped section 32 thereby embraces the channel-shaped receptacle 13, which is surrounded by the walls 8a and 8b and the connecting webs 6a and 6b. The retaining bracket 30 may be designed as described in DE 10 2019 124 308.

To manufacture the anchor rail 1, two blanks are made from a steel sheet, from which the first and second rail parts with the anchor webs are formed. In addition, strip-shaped blanks are produced from a steel sheet which later form the inner webs 10 and the support webs 12. The steel sheet for the strip-shaped blank can be thicker and/or of higher strength than the steel sheet for the rail parts. For example, the thickness of the strip-shaped blanks may be 20% greater than the thickness of the blanks made of the steel sheet for the rail parts. In particular, the thickness can be more than 0.5 mm, in particular more than 1 mm. Alternatively or additionally, a steel sheet can be selected for the strip-shaped blank which has a higher strength than the steel sheet for producing the rail parts.

After the blanks have been produced, a first blank is welded to a first wall 8a of the first rail part 2a and a second strip-shaped blank is welded to a second wall 8b of the second rail part 2b. The welding is preferably carried out using a laser

welding process, in which the material on the wall 8a or 8b is melted in the area of the contact surface to the strip-shaped blank with or without welding additions. The strip-shaped blank is welded in a central area via a butt seam 14.

Temporally independent of this welding, the two rail parts 2a and 2b can be welded to each other via the connecting webs 6a and 6b, wherein preferably the rail parts 2a and 2b are manufactured individually with the welded-on blanks, since these can be manufactured identically. After the weld has been produced, the rail parts 2a and 2b can then be welded together via the connecting webs 6a and 6b.

In the illustrated exemplary embodiment, the connecting webs 6a and 6b are made of material provided by making a recess 5 on the anchor webs 3. It is obviously also possible to connect the rail parts 2a and 2b by connecting webs made from the blank for the rail parts 2a and 2b at a different position. In addition, separate connecting webs made of a different material can also be used to connect the two rail parts 2a and 2b. In a further alternative, the rail parts 2a and 2b can also be manufactured in one piece.

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List of reference signs

1	Anchor rail
2a, 2b	Rail part
3	Anchor web
4	Foot section
5	Recess
6a, 6b	Connecting web
8a, 8b	Wall
9	Kink
10	Web
11	Toothing
12	Support web
13	Channel-shaped receptacle
14	Butt seam
20	Fastening means
21	Head section
22	Threaded section
30	Retaining bracket
31	Flange
32	Bracket-shaped section
α	Angle

The Claims defining the present invention are as follows:

1. An anchor rail for fixing fastening means including a first rail part and a second rail part, which are connected to one another and on each of which anchor webs are formed, wherein a channel-shaped receptacle for a head section of a fastening means is formed between a first wall of the first rail part and a second wall of the second rail part and an inwardly projecting web is provided on the first wall and an inwardly projecting web is provided on the second wall, and the inwardly projecting webs overlap the channel-shaped receptacle on the edge side, wherein an outwardly projecting support web projects at least in sections on the first wall and/or the second wall opposite the inwardly projecting web.

2. The anchor rail according to claim 1, wherein a continuous, outwardly projecting support web is provided on each of the first and second walls.

3. The anchor rail according to claim 1 or 2, wherein the first wall, the inwardly projecting web and the outwardly projecting support web are of T-shaped design in cross-section.

4. The anchor rail according to any one of the preceding claims, wherein the support web is welded to the first or second wall.

5. The anchor rail according to any one of the preceding claims, wherein the support web is integrally formed with the inwardly projecting web.

6. The anchor rail according to claim 5, wherein the support web and the inwardly projecting web are made at least 20% thicker than the first and second rail parts.

7. The anchor rail according to claim 5 or 6, wherein the support web and the inwardly projecting web are formed of a material of higher strength than the first and second rail parts.

8. The anchor rail according to any one of the preceding claims, wherein the support web and the inwardly projecting web are made of a flat steel sheet which is connected to the first or second wall in a central region via a welded butt seam.

9. The anchor rail according to any one of the preceding claims, wherein each rail part is made of a bent steel sheet.

10. The anchor rail according to any one of the preceding claims, wherein the first and second rail parts are connected to each other via mutually welded connecting webs.

11. The anchor rail according to one of the preceding claims, wherein a toothing is formed on each of the inwardly projecting webs.

12. A method for producing an anchor rail for fixing fastening means, including the following steps:

    producing two blanks for a first and a second rail part with anchor webs from a steel sheet;

    producing strip-shaped blanks from a steel sheet;

    welding a first strip-shaped blank to a first wall of a first rail part;

    welding a strip-shaped blank to a second wall of the second rail part, and

    connecting the first rail part to the second rail part wherein a channel-shaped receptacle for a head section of a fastening means is formed between the first wall and second wall, wherein each strip-shaped blank forms an inwardly projecting web on the first and second walls, which covers the receptacle at the edge, and an outwardly projecting support web.

13. A method according to claim 12, wherein the welding of the first and second strip-shaped blanks is performed by laser welding.

14. A method according to claim 12 or 13, wherein a strip-shaped blank is welded to a front side of each of the first and second walls in a central region via a butt seam.

Fig. 1A

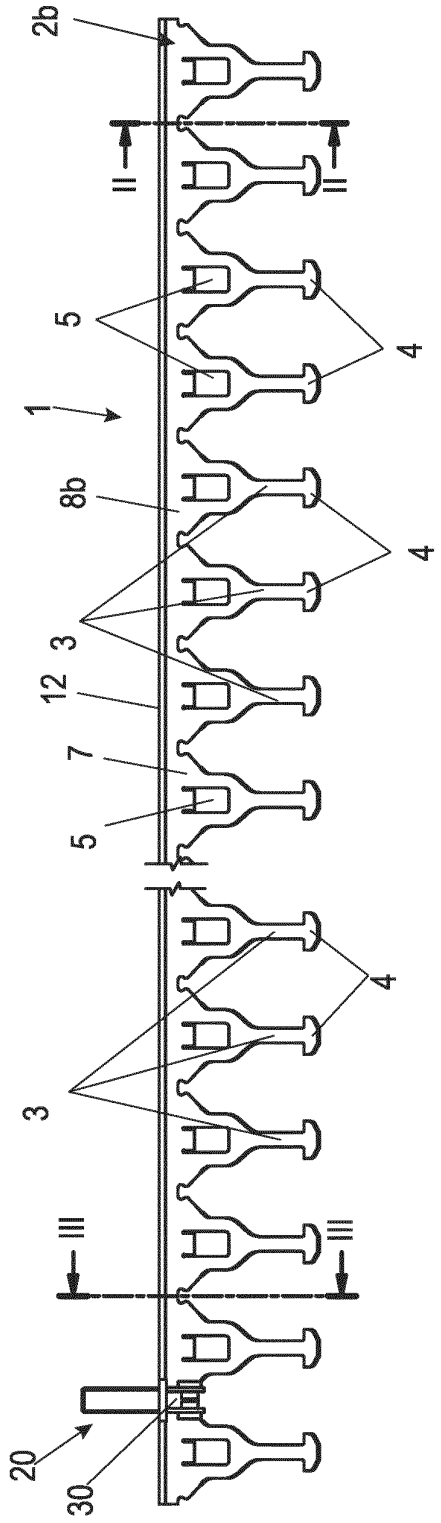
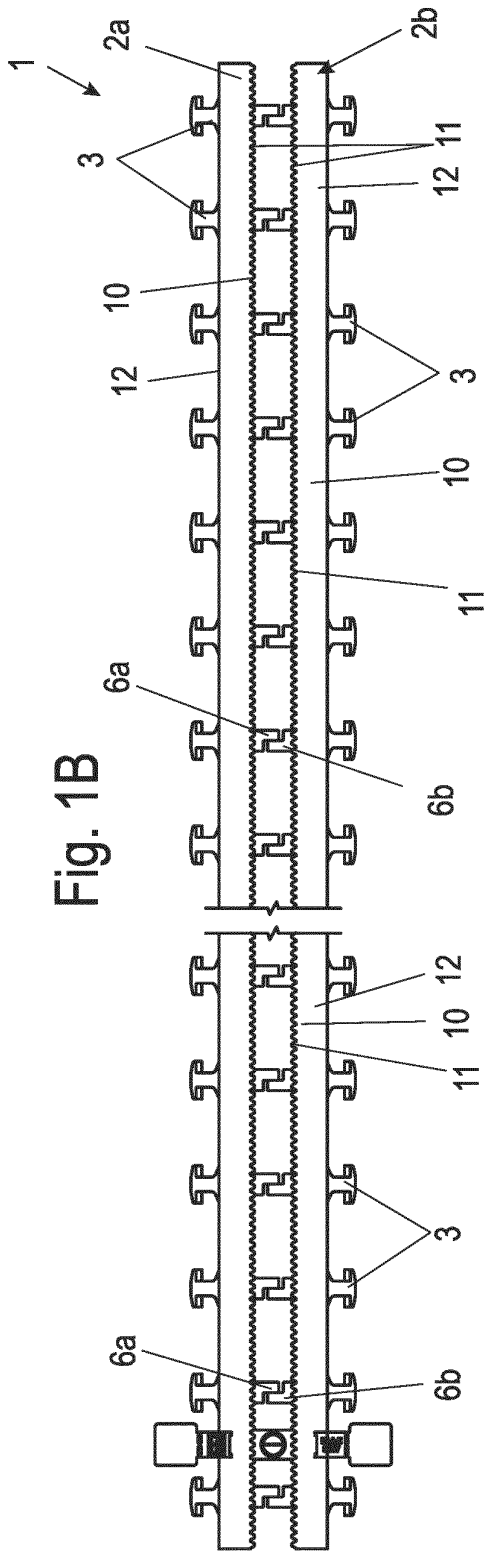

2b
II
II
5
4
1
8b
4
3
12
7
5
4
3
III
III
20
30

Fig. 1B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2a
2b
3
11
12
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10
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6a
6b
12
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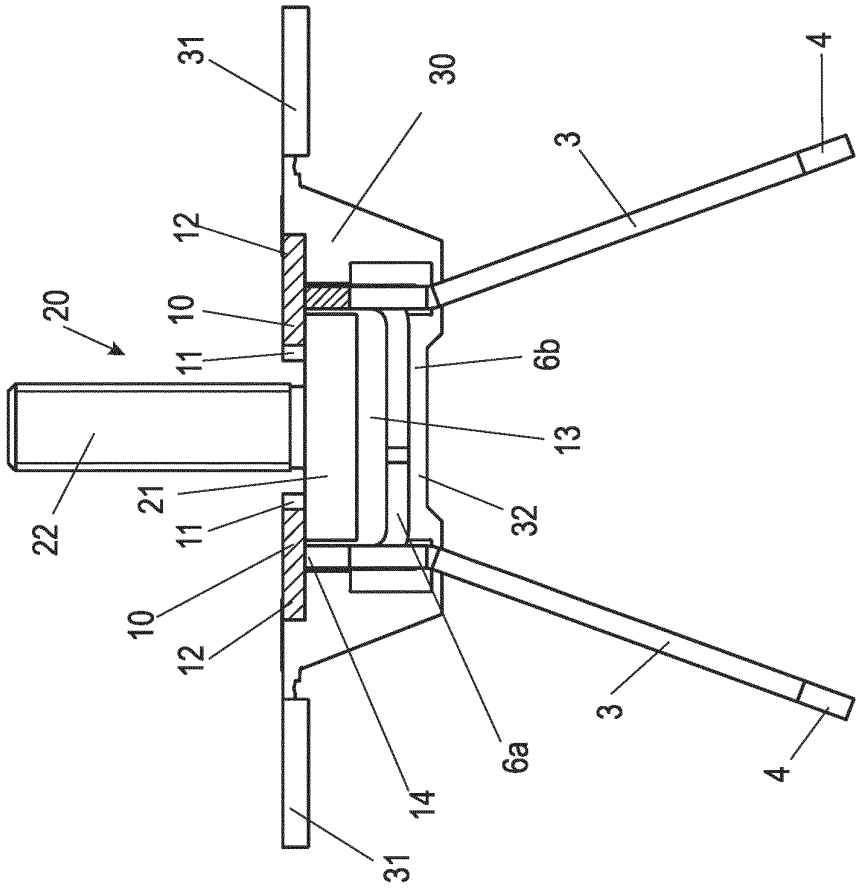
6a
6b

Fig. 3


31
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6b
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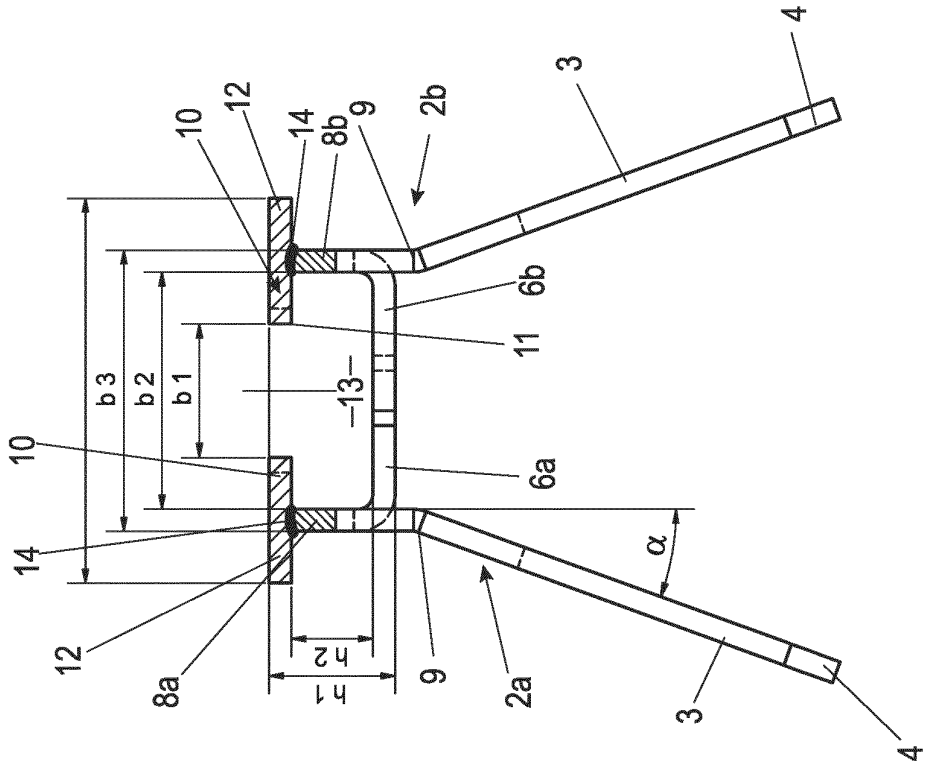
4
6a
14
31

Fig. 2


4
3
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12
14
8b
9
2b
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b 2
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10
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α
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8a
h 2
h 1
9
2a
3
4