

(19) **DANMARK**

(10) **DK/EP 2900536 T3**



Patent- og
Varemærkestyrelsen

(12) **Oversættelse af
europæisk patentskrift**

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- (51) Int.Cl.: **B 61 D 17/12 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2021-01-11**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2020-11-04**
- (86) Europæisk ansøgning nr.: **13795192.7**
- (86) Europæisk indleveringsdag: **2013-11-08**
- (87) Den europæiske ansøgnings publiceringsdag: **2015-08-05**
- (86) International ansøgning nr.: **EP2013073333**
- (87) Internationalt publikationsnr.: **WO2014082831**
- (30) Prioritet: **2012-11-30 DE 102012221985**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
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- (54) Benævnelse: **Skinnekøretøj med et konsol til fastgørelse af tagpåbygninger**
- (56) Fremdragne publikationer:
EP-A1- 0 599 031
EP-A2- 0 990 574
EP-A2- 2 055 609
US-A1- 2012 193 493

Description

Rail vehicle comprising a bracket for securing roof-mounted structures

- 5 The invention relates to a rail vehicle for passenger traffic, which comprises a body shell with a first and at least one further, second roof longitudinal beam.

The roof of a rail vehicle is usually embodied in a highly stable manner, in order to mount heavy attachments, for example devices such as current converters, auxiliary inverters or air-
10 conditioning units to the roof of the rail vehicle. For this purpose, accordingly stable transverse beams are arranged between the roof longitudinal beams, either only in the regions at which attachments are provided, in a targeted manner, or distributed over the entire length of the roof of a rail vehicle. In the first case, the positions of the attachments are stipulated. It is not possible to subsequently change their positions. In the second case, the rail vehicle is
15 accordingly cost-intensive to manufacture.

Generic vehicles are known from the publications US 2012/0193493 A1 or EP 0 990 574 A2. Document EP 0 599 031 A1 shows the fastening of a roof container to a trolleybus.

- 20 The object underlying the invention is to enable a highly flexible positioning of attachments on a roof of a rail vehicle in a cost-effective manner.

The object is achieved by the subject matter of independent claim 1. Developments and embodiments of the invention are to be found again in the features of the dependent claims.
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A vehicle according to the invention, in particular a car of a rail vehicle for passenger traffic, which has a body shell with a first and at least one further, second roof longitudinal beam, for mounting attachments onto the roof of the rail vehicle, or roof attachments for short, comprises a first and at least one further, second rail, and a first bracket embodied in a
30 complementary manner to the first rail and at least one further, second bracket embodied in a complementary manner to the second rail. The first rail is connected to the first roof longitudinal beam in a direct manner, and in particular with a material bond, for example by welding, and the second rail is connected to the second roof longitudinal beam in an

analogous manner and in the same way as the first rail. The rails run along the roof longitudinal beam. They are therefore for the most part arranged in parallel with one another and at a distance from one another on the roof of the rail vehicle. The rails serve to freely position the brackets along the rails, before the brackets are connected to the rails, in particular with a material bond, for example by welding. The rails have an L-shaped cross-section. In turn, the brackets serve to connect the rails and the roof attachments, in particular as a connecting link between the rails and the roof attachments in a direct or indirect manner, by crossbars being provided as further connecting links between the brackets and the roof attachments.

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The brackets can initially be positioned freely along the rails, which means that they can be positioned freely and connected to the rail at least along a rail section, which has a length of at least twice, five times or in particular even more than ten times the width of the bracket. In this context, the width of the bracket is measured in the longitudinal direction of the rail. In particular, brackets can be positioned freely along the entire length of the rails. In turn, according to a development of the invention, the rails extend over the entire length of the body shell of the car of the rail vehicle.

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The body shell usually also comprises door and/or window pillars, or pillars for short, which are arranged vertically and therefore perpendicularly to the horizontal roof longitudinal beams, and a chassis, for example with floor longitudinal beams and floor transverse beams. Roof transverse beams described in the introduction may also be provided. Compared to the prior art, however, these are in particular unsuitable for supporting heavy loads. For example, they may be manufactured from bent sheet metal.

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According to a further development, for mounting roof attachments, the vehicle henceforth comprises at least one crossbar, which is connected to the first and to the second bracket.

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In particular, the rails are connected to outer roof longitudinal beams of the rail vehicle, which run on different sides of the roof of the vehicle. If the rails are arranged on different sides of the roof of the rail vehicle, then the crossbar therefore spans the roof. The crossbar is suitable for supporting the roof attachments and is embodied to connect the roof attachments to itself.

In a development, for connecting to the brackets, a crossbar has a first interface with the first bracket and a second interface with the second bracket, which first and second interface are in particular embodied in an identical manner. If the interfaces of the respective brackets are also embodied in an identical manner, in particular the first bracket and the second bracket are embodied in an identical manner, then the crossbar can be connected to the brackets in at least two different positions. In particular, the crossbars have a symmetrical design, for example with mirror symmetry in relation to a cross-sectional plane as plane of symmetry.

If a plurality of brackets and crossbars are provided, then these in each case have identical interfaces with the rail and crossbar and/or with bracket and attachments.

In particular, the crossbars are connected to the brackets in a releasable manner, for example by way of screw connections. To this end, the brackets have elongated holes in a first horizontal direction and the crossbar has elongated holes in a second horizontal direction, which is perpendicular to the first direction when the crossbar is in the installed state on the brackets. In particular, the crossbar has elongated holes in the longitudinal direction of the rail vehicle. The brackets likewise accordingly have elongated holes perpendicular to the longitudinal direction of the rail vehicle.

The rails have an L-shaped cross-section. In particular, two mutually opposing rails are oriented with mirror symmetry in relation to one another, wherein the transverse bars of both "L"s lie in a horizontal plane and both upright bars point upwards in the vertical direction. The mirror plane runs in parallel with the longitudinal axis of the vehicle, for example, in particular the mirror plane is formed by a central longitudinal plane of the rail vehicle, in which the longitudinal axis lies. The brackets are accordingly shaped in a complementary manner to the rails, with a trapezium-shaped cross-section in this embodiment.

The roof of the rail vehicle has roof transverse beams with a simple construction, which are unsuitable for supporting attachments with a weight of greater than 150kg, in particular greater than 250kg, without experiencing plastic deformation. Since the overall weight of the attachments is derived via the crossbars, brackets and rails, these are embodied accordingly in relation to their load carrying capacity. They form a unified interface for heavy attachments.

The invention permits numerous embodiments. It is explained in further detail on the basis of the following figures, in which one exemplary embodiment is shown in each case. The same elements are provided with the same reference characters in the figures.

- 5 Fig. 1 shows a schematic representation of a cross-section through a roof of a rail vehicle according to the invention,
Fig. 2 shows a schematic representation of a bracket viewed from the side,
Fig. 3 shows a schematic representation of the bracket from Fig. 2 from the front,
Fig. 4 shows a perspective representation of a cutout of a roof of a rail vehicle
10 according to the invention with two brackets on a rail.

Fig. 1 shows a cross-section through a roof of a rail vehicle according to the invention. Two L-shaped rails 2 and 22 can be seen, on which a bracket 1 and 21 is arranged in each case. The first bracket 1 is connected to the first rail 2 and the second bracket 21 is connected to the
15 second rail 22, with a material bond. In particular, the brackets 1 and 21 are welded onto the rails 2 and 22. The rails 2 and 22 are not only directly connected to roof longitudinal beams of the rail vehicle here; they form the roof longitudinal beams.

The body shell of the rail vehicle comprises at least two roof longitudinal beams. Here, a first
20 roof longitudinal beam is arranged on a first side of the body shell and a second roof longitudinal beam is arranged on an opposite side of the body shell. Further roof longitudinal beams may lie therebetween, which have been dispensed with in this exemplary embodiment. The first roof longitudinal beam and the second roof longitudinal beam in particular have an identical design. They run in parallel with one another and in parallel with a longitudinal axis
25 of the rail vehicle. Here, the distance between them is predefined by the width of the rail vehicle, but it is always greater than zero.

An attachment 14 is connected to the rail vehicle by means of the brackets 1 and 21 and the rails 2 and 22. The brackets 1 support a crossbar 13. For its part, the crossbar 13 serves to
30 support the attachment 14. It runs between the rails 2, 22, over the roof, or at least over a subregion of the roof of the rail vehicle. The crossbar 13 has two interfaces, which are embodied in an analogous or even identical manner, for connecting to the brackets, so that it can be installed on the brackets 1, 21 in at least two different positions. Here, they would be

able to be screwed to the brackets 1, 21 in a back-to-front manner. The crossbar 13 has bore holes that are coaxial with the brackets 1, 21, in order to be screwed by means of screws. The bore hole axis 6 is drawn in a dashed manner.

5 A vehicle according to the invention may comprise a large number of brackets and a plurality of crossbars. It is advantageous if all the brackets and crossbars are embodied in an identical manner in each case, at least in relation to their mutual interfaces. The crossbars may have interfaces or structures in relation to the attachments which are entirely different from one another.

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In Fig. 2 and Fig. 3, as above, the roof longitudinal beams are shaped as L-shaped rails 2. The bracket 1 has two bore holes with bore hole axes 6 that are parallel with one another and run vertically. Here, both the rail 2 and the bracket 1 are embodied as simple bent sheet metal parts that are coordinated with another. The shape 7 of the bracket 1 is therefore identical to the contour of the rail 2 in the region of the rail 2. The roof longitudinal beam or the rail 2 is bent three times; the bracket 1 is bent four times. The bends are marked by 15, 16, 17 and 18. For reasons of clarity, the bends of the rail 2 that coincide with those of the bracket 1 are not separately provided with their own reference characters once more. The bends 17 and 18 of the bracket 1 may be dispensed with in the case of low loading due to attachments.

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The rail 2 in Fig. 4 is suitable for accommodating brackets 1 in a freely positionable manner along the rail 2, wherein the flow of force from the attachments onto the rails 2 in the vertical direction is conducted into the chassis of the rail vehicle via pillars 19. For their part, the brackets 1 are embodied so as to fasten the crossbars for accommodating attachments in such a way that forces on the rails 2 in the vertical direction are conducted into the chassis of the rail vehicle via the pillars 19.

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It is therefore an advantage of the invention that, as a result, the roof transverse beams 20 can be designed in such a way that they do not have to support loads heavier than a predefined limit value - they can therefore be designed with a simple construction, saving weight and costs.

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Patentkrav

- 5 1. Skinnekøretøj til persontrafik, der omfatter en råkonstruktion med en første og mindst en yderligere anden langsgående tagbærer, hvor skinnekøretøjet omfatter følgende til anbringelse af påbygninger (14) på skinnekøretøjets tag:
- 10 - en første og mindst en yderligere anden skinne (2, 22) til fri positionering af konsoller (1, 21), hvor den første skinne (2) er forbundet med den første langsgående tagbærer, og hvor den anden skinne (22) er forbundet med den anden langsgående tagbærer, hvor skinnerne (2, 22) forløber langs de langsgående tagbærere,
- 15 et første konsol (1), der er udformet komplementært med den første skinne (2), og mindst et yderligere andet konsol (21), der er udformet komplementært med den anden skinne (22), til at forbinde tagpåbygningerne med skinnerne (2, 22),
- 15 **kendetegnet ved, at** skinnerne (2, 22) er udformet med et L-formet tværsnit.
- 20 2. Skinnekøretøj ifølge krav 1, **kendetegnet ved, at** det første konsol (1) er forbundet med den første skinne (2), og det andet konsol (21) er forbundet materialesluttende med den anden skinne (22).
- 25 3. Skinnekøretøj ifølge et af kravene 1 eller 2, **kendetegnet ved, at** skinnerne (2, 22) er forbundet med ydre langsgående tagbærere af skinnekøretøjet, således at de forløber parallelt med hinanden og med afstand til hinanden på forskellige sider af skinnekøretøjets tag.
- 30 4. Skinnekøretøj ifølge et af kravene 1 til 3, **kendetegnet ved, at** det omfatter mindst et tværstykke (13), der er forbundet med det første og andet konsol (1, 21).
5. Skinnekøretøj ifølge krav 1, **kendetegnet ved, at** tværstykket (13) til forbindelse med konsolerne (1, 21) omfatter en første grænseflade til det første konsol (1) og en anden grænseflade til det andet konsol (21).

6. Skinnekøretøj ifølge krav 4, **kendetegnet ved, at** den første og anden grænseflade er udformet ens.

5 7. Skinnekøretøj ifølge et af kravene 4 til 6, **kendetegnet ved, at** det første og/eller andet konsol (1, 21) omfatter langsgående huller i en første horisontal retning, og at tværstykket (13) omfatter langsgående huller i en anden horisontal retning, der står vinkelret på den første retning.

10 8. Skinnekøretøj ifølge et af kravene 1 til 7, **kendetegnet ved, at** det første konsol (1) og det andet konsol (21) er udformet ens.

9. Skinnekøretøj ifølge et af kravene 1 til 8, **kendetegnet ved, at** konsolerne (1, 21) er udformet trapezformet i tværsnit.

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FIG 1

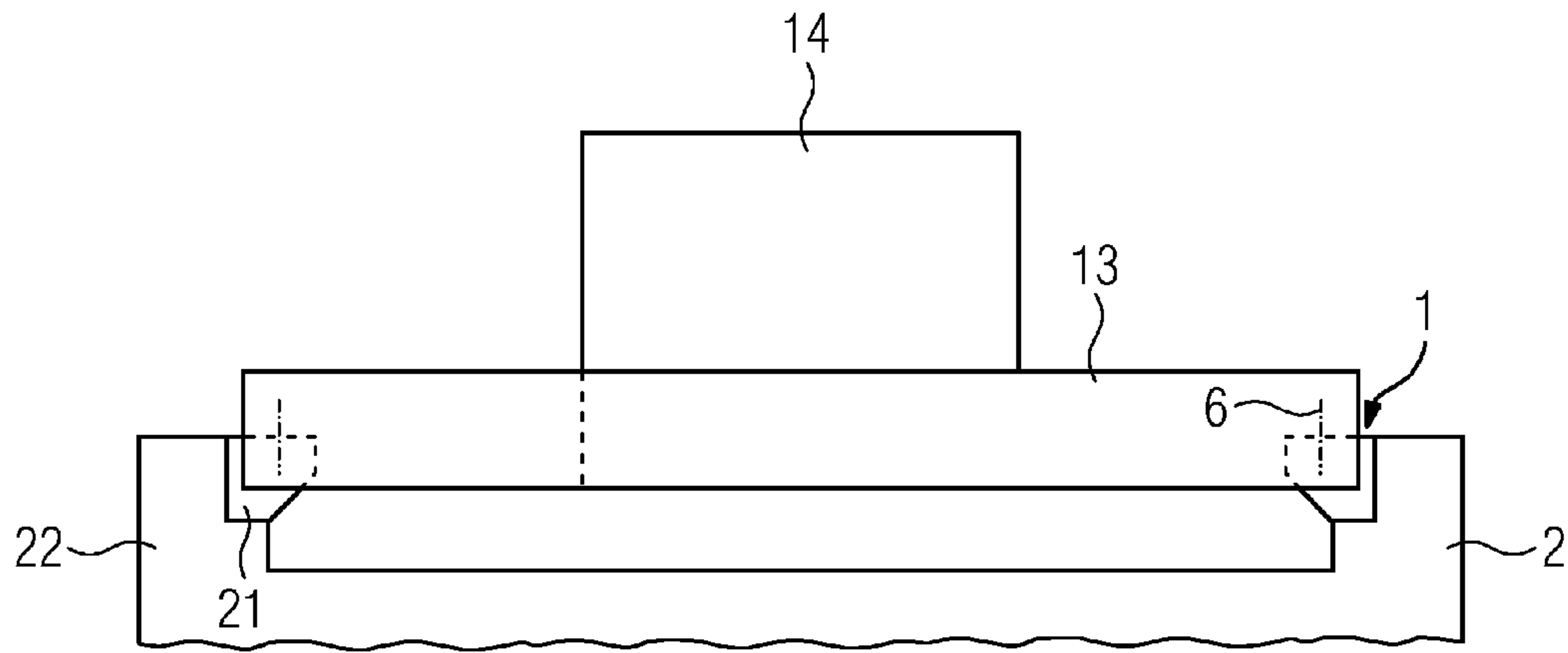


FIG 2

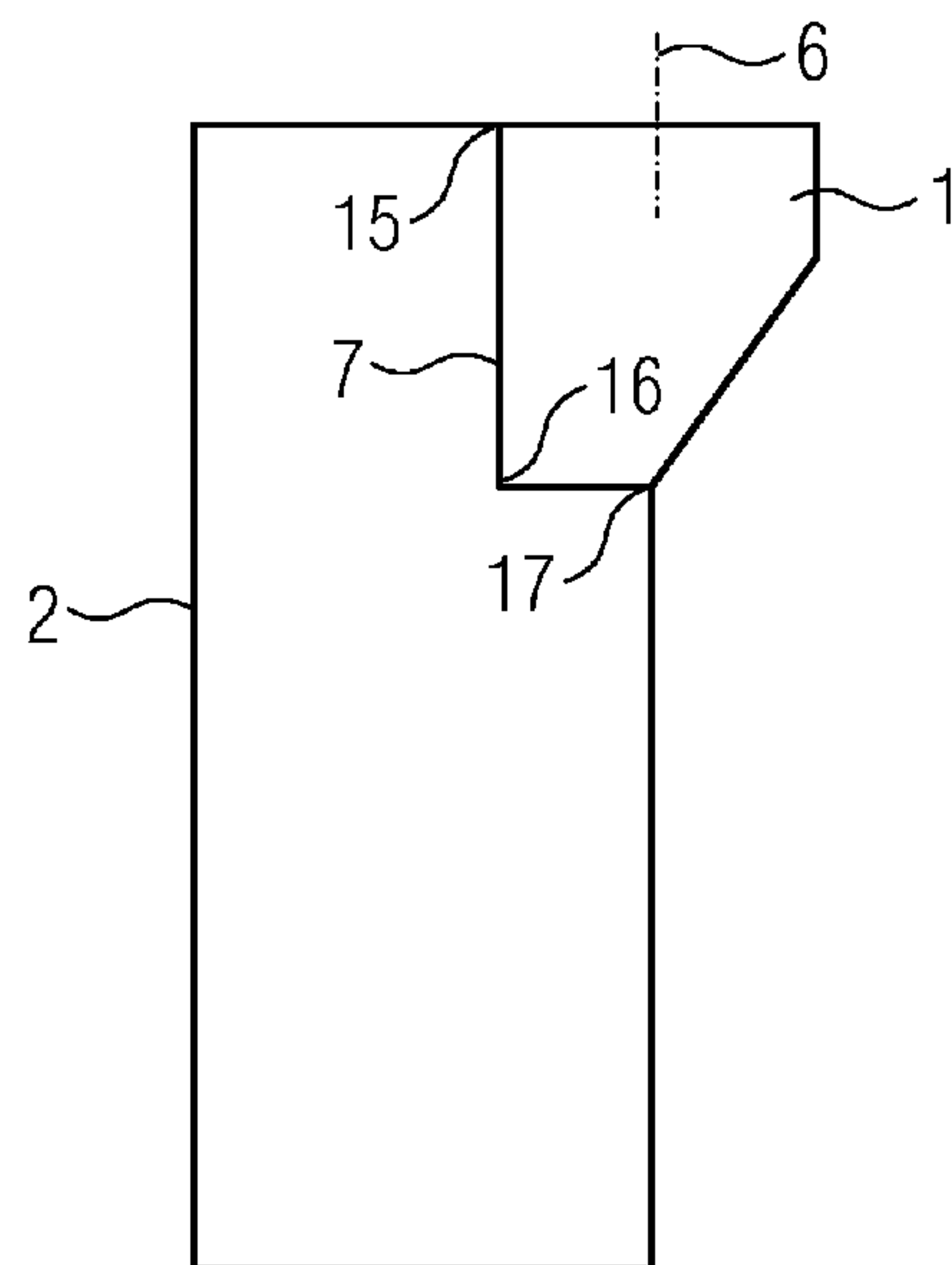


FIG 3

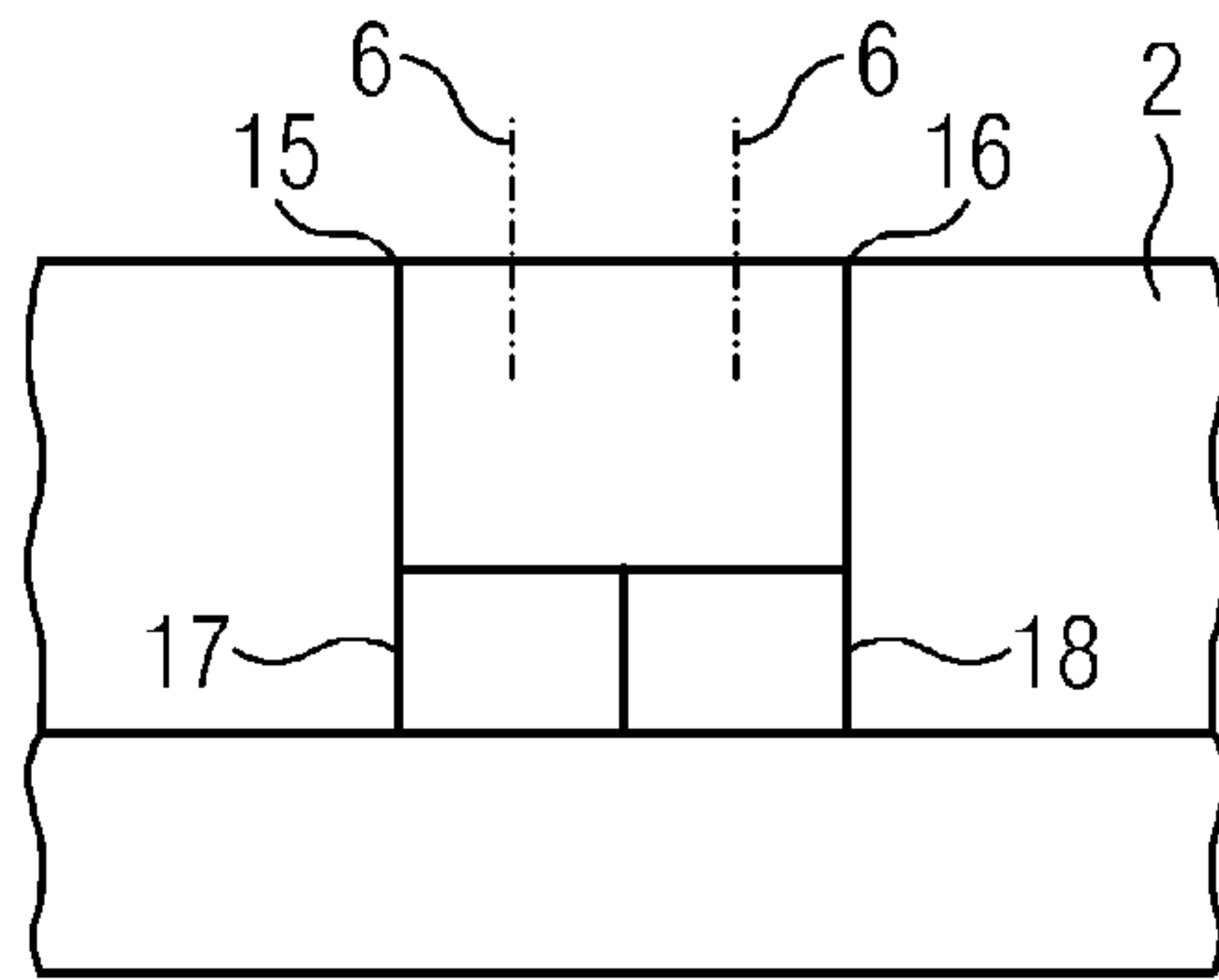


FIG 4

