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**WO-A1-2015/124834**  
**JP-A- 2004 215 960**  
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**US-A1- 2017 159 243**



# DESCRIPTION

## Field

[0001] The field of the invention relates to a rail cover and, in particular, to an adjustable rail cover for covering an underside of a foot of a railway rail.

## Background

[0002] A common problem in the field of railway design and, in particular, railway rail cabling is how to appropriately manage or organise cables which need to be routed underneath the running rails of a train track. Existing methods of routing cables underneath running rails include clipping the cables to railway sleepers, which support the rails. This technique can be detrimental to the life of the sleepers depending on the methods used to clip the cables to the sleepers and can also take significant time for installation, which in turns raises cost and complexity. Another method for routing cables underneath railway tracks includes laying simple plastic drainpipes underneath the rails as a guide and running cables through the plastic drainpipes. It can however be impossible or very difficult to run cables with plug couplers (plug ends) through such drainpipes as they may be too large or a very tight fit. When cables are run under rails and/or next to sleepers, relative movement between the cables and the rails and/or sleepers can result in wear of the cables and in particular wear of the protective insulation part of the cable. Non-invasive systems for a connection between a railroad track rail and any electrical conductor, for example signal lines, wires or cables, are also known from the prior art. For instance, US 2008/257973 A1 shows a device for connecting a component to track rail, the device having the form of a rail cover for covering an underside of a foot of a railway rail, the rail cover comprising mutually connectable cover parts configured to respectively extend at least partially around opposing sides of the foot of the railway rail and connectable by an adjustable ratcheting connection to resist separation of the mutually connectable cover parts.

[0003] It is therefore desirable to provide a rail cover capable of protecting at least the cable from wear, while not damaging the sleeper or rail. It may be further preferable for the rail cover to be rapidly installable, at a low cost and requiring little or no on-site adaptation during deployment.

## Statements

[0004] In an embodiment of the present invention there is provided a rail cover for covering an underside of a foot of a railway rail. In accordance with the invention the rail cover comprises mutually connectable cover parts configured to respectively extend at least partially around opposing sides of the foot of the railway rail. The mutually connectable cover parts also being

connectable by an adjustable ratcheting connection to resist separation of the mutually connectable cover parts.

**[0005]** In use, the rail cover comprises two parts which, when attached together, substantially mimic or conform to the shape of the foot of the rail. The two parts may initially be completely separated, prior to attachment to a rail. Alternatively, the two parts may be positioned so that the adjustable ratcheting system is engaged, but the two parts are distanced to pass around at least part of the foot of the rail, so as to be easily connectable to the foot of the rail. This may be described as an open position. The two parts may then be moved to a closed position so that the parts extend around opposing sides of the foot of the rail sufficiently so as to hold the rail cover against the rail.

**[0006]** An advantage associated with the embodiments is a rapidly installable rail cover, which may be positioned between a rail and a cable, passing under the rail, so as to protect the cable from wear.

**[0007]** Optionally, the mutually connectable cover parts include a first cover part. The first cover part may include a first connecting portion and a first side portion. The mutually connectable cover parts may further include a second cover part. The second cover part may include a second connecting portion and a second side portion. In an example, the first and second connecting portions are configured to connect together by the adjustable ratcheting connection which is adjustable to adjust the relative positions of the first and second cover parts. The first and second side portions may be configured to extend at least partially around opposite sides of the foot of the rail so that, when the first and second connecting portions are connected and pressed together (moved from the open position to the closed position), the first and second side portions hold the adjustable rail cover against the foot of the rail.

**[0008]** In a preferred example, the ratcheting connection may be a rack and pawl-type mechanism. Further, preferably, the first and second cover parts may be electrically non-conductive.

**[0009]** The rack and pawl-type mechanism may preferably be used in order to connect the cover parts together. In an example, the rack may be made to a rigid material and the pawl may be sufficiently flexible to pass over the rack when being connected. The mechanism may be set up to allow for easy connection of the cover parts, but may inhibit separation. Providing electrically non-conductive cover parts has the advantage of an extra layer of protection for any cables running under the rail.

**[0010]** According to the invention, the rail cover further comprises a first sleeper cover part. The first sleeper cover part is configured to extend from one edge of the first cover part, in a direction perpendicular to a plane in which the first cover part extends, so that, when positioned adjacent to a rail and against a sleeper, covers at least part of the sleeper. Further, the rail cover further comprises a second sleeper cover part. The second sleeper cover part is configured to extend from one edge of the second cover part, in a direction perpendicular to a

plane in which the second cover part extends, so that, when positioned adjacent to a rail and against a sleeper, is arranged to cover at least part of the sleeper.

**[0011]** When viewed along the length axis of the sleeper, the rail cover as described defines an "L" shape. Cables may preferably be positioned to extend under the rail, alongside the sleeper. In this case, in accordance with an embodiment, a sleeper cover may be provided, to be positioned between the cable and the sleeper, so as to provide mutual protection from wear to the cable and the sleeper. The sleeper cover may include first and second parts and may extend along a surface of the sleeper.

**[0012]** Optionally, the first and second sleeper cover parts may be connectable by another adjustable ratcheting connection, such that, when connected and pressed together, both ratcheting connections are engaged.

**[0013]** In accordance with this example, the first cover part is connected to or integral with the first sleeper cover part and the second cover part is connected to or integral with the second sleeper cover part. Advantageously, both the first and second cover parts, and the first and second sleeper cover parts, may be connected by a ratcheting connection. This provides additional stability of the cover and further inhibits the parts from separating, meaning the rail cover is held securely in place.

**[0014]** According to an example, at least one of the first and second connecting portions may be made of a resiliently deformable material.

**[0015]** In order to allow the mutually connectable cover parts to be connected, the connecting portions may include resiliently deformable material such that the connecting portion including the resiliently deformable material flexes enough for the cover parts to be connected.

**[0016]** Optionally, the first and second cover parts are made of different materials, respectively. It may be preferable for one of the first and second cover part to be made of a rigid material and the other to be deformable/flexible, to aid connection of the two cover parts.

**[0017]** Further, according to an embodiment, at least one of the first and second side portions are made of a rigid material. The portions of the rail cover that extend over the sides of the foot of the rail may be rigid as these allow the rail cover to grip or hold the rail, when in use.

**[0018]** Other advantages associated with embodiments described above include rapid and low cost installation, low cost of the adjustable rail cover and no need for tools to install the cover.

### **Brief Description of the Drawings**

**[0019]** The invention will hereinafter be described, by way of example only, with reference to the attached drawings, in which:

- **Figures 1a, 1b and 1c** show perspective views of an exemplary embodiment of a rail cover;
- **Figure 2** shows an exemplary embodiment of a rail cover attached to a rail.

**[0020]** Throughout this description any features which are similar to features in other figures have been given the same reference numerals.

### **Detailed Description**

**[0021]** The description below sets forth example rail covers according to this disclosure. Further examples and implementations will be apparent to those having ordinary skill in the art. Further, those having ordinary skill in the art will recognize that various equivalent techniques may be applied in lieu of, or in conjunction with, the examples discussed below, and all such equivalents should be deemed as being encompassed by the present disclosure.

**[0022]** The arrangements described herein can be implemented in a wide range of devices and systems. However, for ease of explanation, an illustrative example will be described.

**[0023]** According to one or more embodiments of the invention, there is provided a rail cover capable of providing protection from wear to cables which are to be run from one side of one or more railway rails (rails), underneath the rails, to the other side.

**[0024]** **Figure 1a** shows an example of an embodiment of a rail cover 1. As shown, the rail cover 1 is suitable for covering an underside of a foot 110 of a railway rail 100. The rail cover 1 comprises mutually connectable cover parts 10, 20 which are configured to respectively extend at least partially around opposing sides of the foot of the railway rail. The mutually connectable cover parts 10, 20 are connectable by an adjustable ratcheting connection 50 to resist separation of the mutually connectable cover parts 10, 20.

**[0025]** In accordance with an embodiment, a rail cover 1 is attachable to a railway rail 100 and, more specifically to the foot 110 of a railway rail 100. A railway rail 100, when viewed in cross-section, conventionally has a shape including wider sections at the top and bottom and a narrower middle section. These sections are known as the foot (bottom) 110, web (middle) 120 and head (top) 130. In railway infrastructure, cables sometimes need to be routed underneath the rail(s). In order to inhibit the effects of wear on such cables due to relative movement of the cable and rail, a rail cover in accordance with the described embodiments may be implemented.

**[0026]** The rail cover 1, in use, is attached to the foot 110 of the rail 100, so as to cover the underside. **Figure 1a** shows an exemplary embodiment of a rail cover 1. As shown in **Figure**

**1a**, the rail cover 1 includes two parts; a first cover part 10 and a second cover part 20. The two parts 10, 20 are configured to be connectable to each other. The two parts 10, 20 may be connected together by various types of connections, including for example a ratcheting connection, opposing racks of interdigitating teeth and/or opposing surfaces, for example, which when connected produce an interference fit, as shown in **figure 1a**.

**[0027]** In the ratcheting connection, in accordance with the example, at least one of the mutually connectable parts 10, 20 comprises teeth in the form of a linear rack and an opposing mutually connectable part comprises a protrusion, for example a pawl, configured to allow the connectable parts to be pressed together, but to resist the connectable parts being separated. The protrusion may be elastically deformable or may be spring-loaded to encourage engagement with the opposing teeth of the linear rack. When in use, the teeth of the linear rack are positioned to engage with the protrusion when the connectable parts are connected. When the connectable parts are pressed together, the teeth are pressed against the side of, and pass over, the protrusion, such that, when connected, the protrusion is positioning between two of the teeth thus preventing the connectable parts from being pulled apart/separated. **Figures 1b and 1c** show alternative views of the rail cover 1 shown in **figure 1a**.

**[0028]** **Figure 2** shows an exemplary embodiment of a rail cover 1 attached to the foot 110 of a rail 100. As shown, the mutually connectable cover parts 10, 20 include a first cover part 10 including a first connecting portion 11 and a first side portion 12 and a second cover part 20 including a second connecting portion 21 and a second side portion 22. The first and second connecting portions 11, 21 are arranged to connect together by the adjustable ratcheting connection 50 which is adjustable to adjust the positions of the first and second cover parts 10, 20 relative to each other. The first and second side portions 12, 22 are configured to extend at least partially around opposite sides of the foot 110 of the rail 100 so that, when the first and second connecting portions 11, 21 are connected and pressed together, the first and second side portions 12, 22 hold the rail cover 1 against the foot 110 of the rail 100.

**[0029]** The first connecting portion 11 may comprise a flat elongate member. According to an embodiment, as shown for example in **figure 1c**, the first connecting portion 11 defines, on one side, teeth in the form of a linear rack 11a. The second connecting portion 21 defines a protrusion 21a, which can be seen in **figure 1b**, which may resemble one tooth, similar to those of the first connecting portion 11. The second connecting portion 21 further defines an arm 21b and support 21c, wherein the arm 21b includes the protrusion 21a, positioned so as to oppose and interdigitate with the teeth of the linear rack 11a and extends substantially in parallel with the first connecting portion 11. The support 21c extends, on the opposite side of the first connecting portion 11, substantially in parallel with the first connecting portion 11 also, such that the first connecting portion 11, when the mutually connectable cover parts 10, 20 are connected, is held between the arm 21b and the support 21c.

**[0030]** The support 21c may for example be made of a relatively rigid/inflexible material and the arm 21b may for example be made of an elastically/resiliently deformable material, so as to

allow some flex when the protrusion 21a passes over the linear rack 11a.

**[0031]** Alternatively, the teeth of the linear rack 11a or the protrusion 21a may be made of an elastically/resiliently deformable material, so as to allow some flex when the protrusion 21a passes over the linear rack 11a.

**[0032]** In a further exemplary embodiment, the first connecting portion 11 defines teeth in the form of a linear rack 11a, as described above. The second connecting portion 21 defines opposing teeth in the form of another linear rack. Therefore, where in the above described embodiment, a single protrusion 21a opposed and interdigitated with the teeth of the linear rack 11a, in this embodiment opposing racks of teeth pass over each other, as the mutually connectable cover parts 10, 20 are connected and the teeth, when connected, interdigitate.

**[0033]** In a further exemplary embodiment, the first connecting portion 11, which comprises a flat elongated member, defines a surface on at least one side, which may be a flat surface or configured to produce a desired level of friction when in contact with an opposing surface of the second connecting portion 21. The second connecting portion 21 comprises an arm defining a surface, which is arranged to oppose the surface of the flat elongated member of the first connecting portion 11, and, when the mutually connectable cover parts 10, 20 are connected, contacts the opposing surface so as to provide an interference fit, which resists the mutually connectable cover parts 10, 20 being separated.

**[0034]** According to the invention, the rail cover 1 further comprises a first sleeper cover part 15 configured to extend from one edge of the first cover part 10, in a direction perpendicular to a plane in which, in use, the first cover part 10 extends, and is to be positioned adjacent to a rail 100 and against a sleeper 300, so as to cover at least part of the sleeper 300. The rail cover 1 further comprises a second sleeper cover part 25 configured to extend from one edge of the second cover part 20, in a direction perpendicular to a plane in which, in use, the second cover part 20 extends, and is to be positioned adjacent to a rail 100 and against a sleeper 300, so as to cover at least part of the sleeper 300.

**[0035]** **Figure 2** further shows an example of a rail cover 1 including first and second sleeper cover parts 15, 25 positioned next to a sleeper 300. As shown, the first and second cover parts 10, 20 extend along the underside of the foot 110 of the rail 100 and over the sides of the foot 110 to hold the rail cover 1 in place. The first and second sleeper cover parts 15, 25 extend along the side surface of the sleeper 300. With this arrangement, the cable 200, which extends next to the sleeper 300 and under the rail 100, is offered protection by the rail cover 1 from wear caused by relative movement of the rail 100, sleeper 300 and cable 200.

**[0036]** In use, the rail cover 1 may be moved between an open position, wherein the connecting parts 10, 20 are sufficiently separated to allow the rail cover 1 to be attached to the foot 110 of the rail 100. The connectable parts 10, 20 are then moveable to a closed position, by application of force towards the respective opposing connectable part, wherein the connectable parts 10, 20 move until, at least at a point, sitting flush against either side of the

foot 110 of the rail 100. The opposing connectable parts 10, 20, produce an interference fit to resist further movement to hold the rail cover 1, in this closed position.

**[0037]** In use, the rail cover 1 may be moved between an open position, wherein the connecting parts 10, 20 are sufficiently separated to allow the rail cover 1 to be attached to the foot 110 of the rail 100. The connectable parts 10, 20 are then moveable to a closed position, by application of force towards the respective opposing connectable part, wherein the connectable parts 10, 20 move until, at least at a point, sitting flush against either side of the foot 110 of the rail 100. The opposing connectable parts 10, 20, produce an interference fit to resist further movement to hold the rail cover 1, in this closed position.

**[0038]** In an embodiment, the rail cover 1 may be positioned to attach to the underside of the foot 110 of the rail 100 adjacent to a railway sleeper 300, which is supporting the rail 100, such that the connecting parts 10, 20 extend along the underside of the rail 100 and the sleeper cover parts 15, 25 extend alongside the sleeper 300. Positioning the rail cover 1 adjacent to a sleeper 300 provides the added benefit that cables 200 extending under the rail 100 will have extra protection from damage.

**[0039]** The rail cover 1 is preferably made of one or more non-conductive materials, preferably with a high durability. For example nylon 66 may be used for the rail cover 1, or at least one of the mutually connectable cover parts 10, 20.

**[0040]** According to the above examples, it is possible to reduce wear of cables directed under the rail, for example by positioning the rail cover 1 between the cable 200 and the rail 100.

## **REFERENCES CITED IN THE DESCRIPTION**

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

### **Patent documents cited in the description**

- US2008257973A1 [0002]

**PATENTKRAV**

1. Skinneafdækning (1) til afdækning af en underside af en fod (110) af en jernbaneskinne (100), hvilken skinneafdækning omfatter:

- 5 Afdækningsdele (10, 20), der kan forbindes indbyrdes, konfigureret til hver for sig at strække sig mindst delvist rundt om modstående sider af foden (110) af jernbaneskinnen (100) og kan forbindes ved hjælp af en justerbar skraldeforbindelse (50) for at modstå adskillelse af afdækningsdelene, som indbyrdes kan forbindes; og **kendetegnet ved:**

10

en første svelleafdækningsdel (15), der er konfigureret til at strække sig fra den ene kant af en første afdækningsdel (10), i en retning vinkelret på et plan, i hvilket, under anvendelsen, den første afdækningsdel (10) strækker sig, således at, når den er positioneret som grænsende op til

15 en skinne (100) og mod en svelle (300), den mindst dækker en del af svellen; og/eller

en anden svelleafdækningsdel (25), der er konfigureret til at strække sig fra den ene kant af en anden afdækningsdel (20) i en retning vinkelret på et plan, i hvilket, under anvendelsen, den anden afdækningsdel strækker sig, således at, når den er positioneret grænsende op til en

20 skinne (100) og mod en svelle (300), den er arrangeret til at dække mindst en del af svellen.

2. Skinneafdækning ifølge krav 1,

25 hvorved den første afdækningsdel (10) omfatter et første forbindelsesafsnit (11) samt et første sideafsnit (12); og

hvorved den anden afdækningsdel (20) omfatter et andet forbindelsesafsnit (21) samt et andet sideafsnit (22);

30 hvorved det første og andet forbindelsesafsnit er konfigureret til at blive forbundet sammen ved hjælp af en justerbar rasteforbindelse (50), som er justerbar med henblik på justering af de indbyrdes positioner af den første og den anden afdækningsdel, og

- 5 hvorved det første og det andet sideafsnit er konfigureret til at strække sig mindst delvist rundt om modstående sider af foden (110) på skinnen (100), således at, når det første og det andet forbindelsesafsnit er forbundet og presset sammen, det første og andet sideafsnit holder den justerbare skinneafdækning mod skinnens fod.
3. Skinneafdækning ifølge krav 1 eller 2, hvorved rasteforbindelsen (50) er en mekanisme af tandstang-og-pal typen.
- 10 4. Skinneafdækning ifølge et hvilket som helst af de foregående krav, hvorved den første og anden afdækningsdel (10, 20) er elektrisk ikke-ledende.
- 15 5. Skinneafdækning ifølge et hvilket som helst af de foregående krav, hvorved den første og den anden svelle-afdækningsdel (15, 25) kan forbindes ved hjælp af en anden justerbar rasteforbindelse, således at, efter forbindelse og sammenpresning, begge justerbare rasteforbindelser er i indgreb.
- 20 6. Skinneafdækning ifølge et hvilket som helst af de foregående krav, hvorved mindst et af første og andet forbindelsesafsnit (11, 21) er fremstillet af et elastisk deformerbart materiale.
- 25 7. Skinneafdækning ifølge et hvilket som helst af de foregående krav, hvorved henholdsvis den første og den anden afdækningsdel (10, 20) er fremstillet af forskellige materialer.
8. Skinneafdækning ifølge et hvilket som helst af de foregående krav, hvorved mindst eet af det første og det andet sideafsnit (12, 22) er fremstillet af et stift materiale.

# DRAWINGS

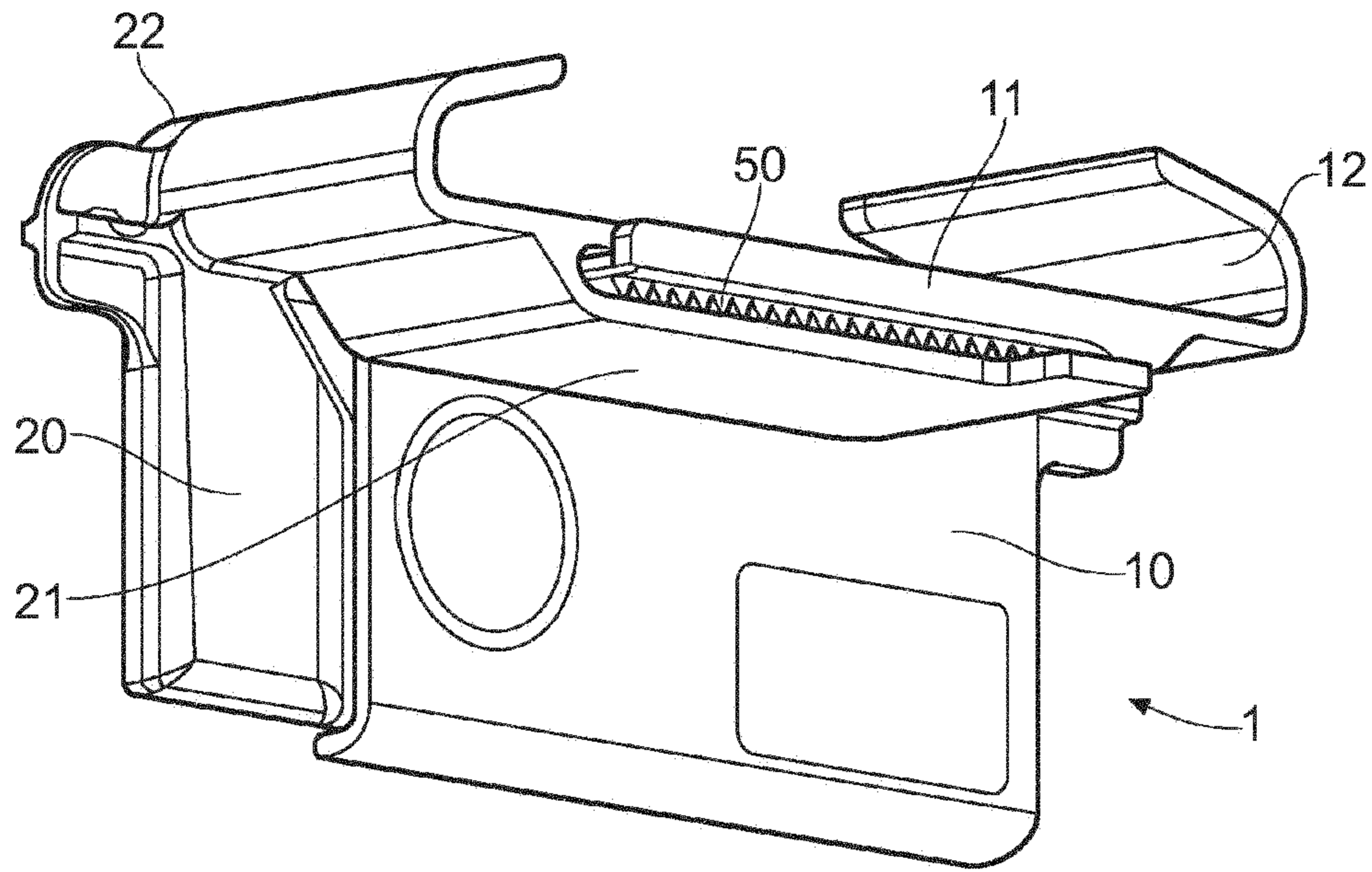


FIG. 1a

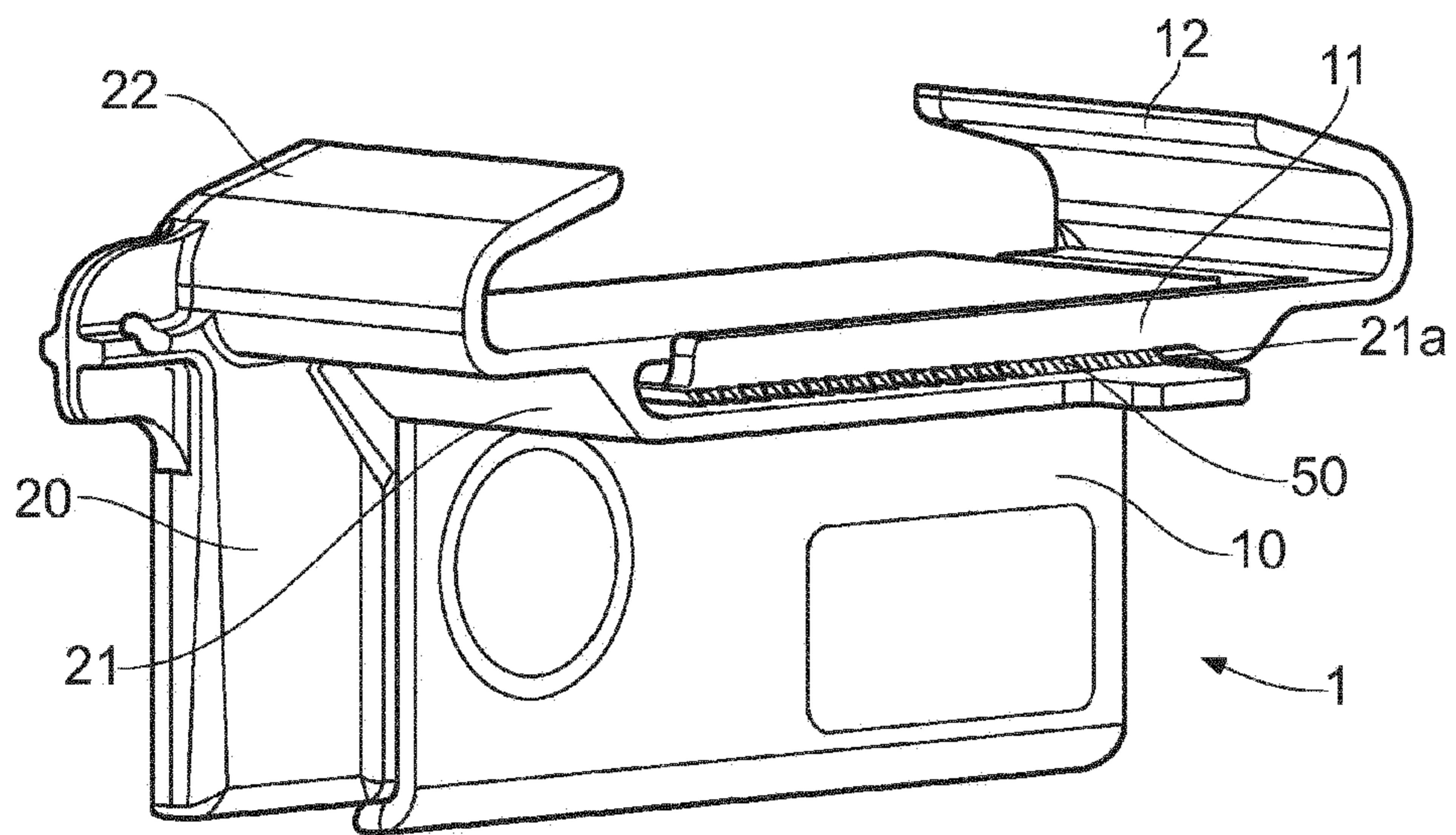


FIG. 1b

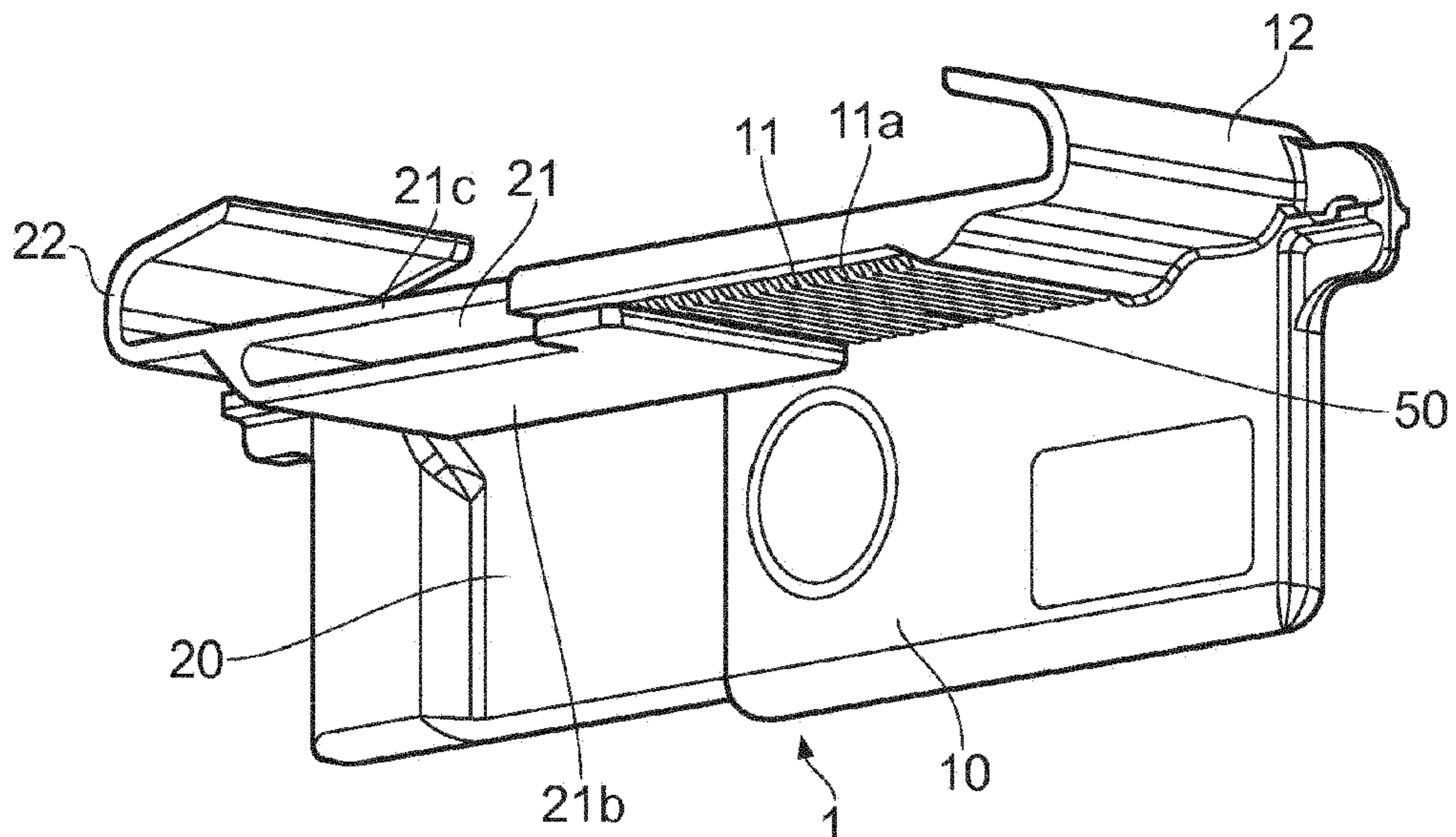


FIG. 1c

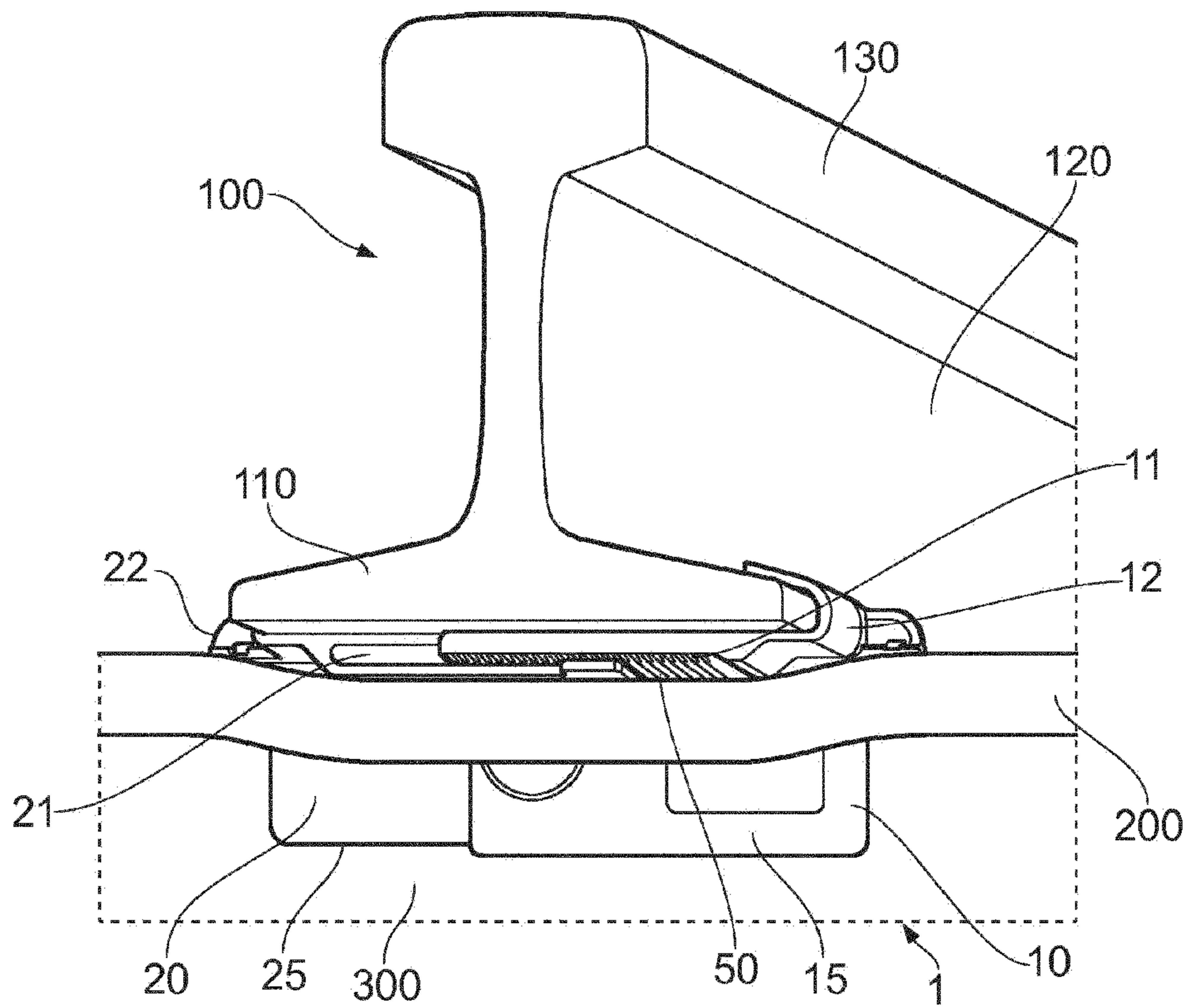


FIG. 2