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(54) **FASTENING ARRANGEMENT FOR ROOF EQUIPMENT**

(57) The invention relates to a fastening arrangement (100) for fastening roof equipment at a roof surface/structure, the fastening arrangement (100) comprising: a fastening plate (110) having an upside (112) comprising: at least one fastening means (118) for fastening a roof equipment (200) at the fastening plate (110), a downside (114) arranged to be placed on a roof surface/structure (310) in operation, and at least one attachment means (116) for attaching the fastening plate (100) at the roof surface/structure (310); at least one load braking device (150) configured to at least partially penetrate the roof surface/structure (310) and/or grip onto the roof surface/structure (310) when a load (L) is applied at the fastening means (118).

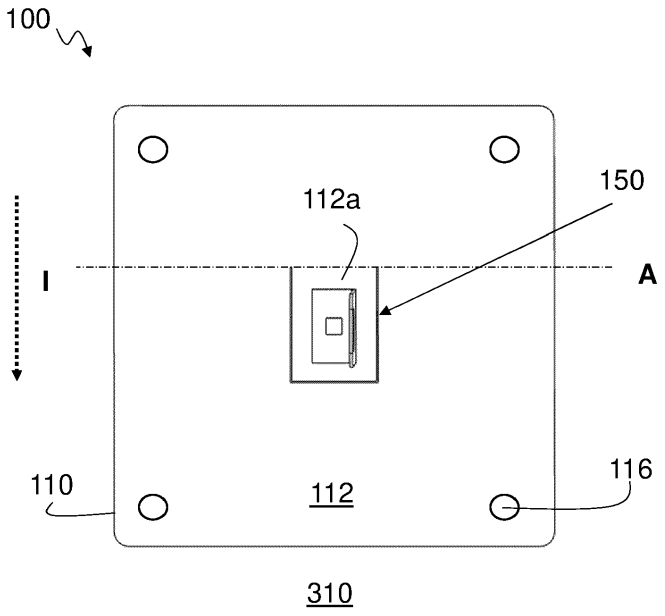

Fig. 1

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Description

Technical Field

[0001] The invention relates to a fastening arrangement for fastening roof equipment at a roof.

Background

[0002] Different fastening arrangement for fastening roof equipment to a roof are provided on the market. Such fastening arrangements may comprise a fastening device for fastening roof equipment to a roof via a roof console. Examples of roof equipment are ladders, snow fences, safety equipment and solar panels.

Summary

[0003] An objective of embodiments of the invention is to provide a solution which mitigates or solves the drawbacks and problems of conventional solutions.

[0004] Another objective of embodiments of the invention is to provide a solution which can absorb load applied at a fastening arrangement.

[0005] The above and further objectives are solved by the subject matter of the independent claims. Further advantageous embodiments of the invention can be found in the dependent claims.

[0006] According to an aspect of the invention, the above mentioned and other objectives are achieved with a fastening arrangement for fastening roof equipment at a roof surface/structure, the fastening arrangement comprising:

> a fastening plate having an upside comprising: at least one fastening means for fastening a roof equipment at the fastening plate, a downside arranged to be placed on a roof surface/structure in operation, and at least one attachment means for attaching the fastening plate at the roof surface/structure; and
> at least one load braking device configured to at least partially penetrate the roof surface/structure and/or grip onto the roof surface/structure when a load is applied at the fastening means.

[0007] That the load braking device is configured to penetrate the roof surface/structure at least partially may be understood such that at least one part of the load braking device is configured to penetrate the roof surface/structure at least partially. That the load braking device is configured to grip onto the roof surface/structure may be understood such that the load braking device grips hold of a section of the roof surface/structure. In non-limiting examples, the load braking device may penetrate softer roof surface/structure such as waterproofing surfaces while grip hold of harder roof surface/structure such as battens.

[0008] The disclosed fastening arrangement provides a solution in which a load applied at the fastening means is directed by the load braking device into the roof surface/structure thus fully or partially absorbing the load and thereby braking the applied load. Hence, the load braking device may also be denoted a load absorbing device, or a load braking and absorbing device, or simply a load braking/absorbing device. A function of the load braking device is thus to guide load into the roof surface/structure acting as a load transmission device.

[0009] In an embodiment of a fastening arrangement according to the first aspect, the load braking device extends in the same plane as the fastening plate before the load is applied at the fastening means.

[0010] The load braking device may hence be aligned with the fastening plate in an initial state and move relative to the fastening plate towards the roof surface/structure when a load is applied at the fastening means. The downside of the fastening arrangement can thereby be made essentially plane, while the fastening arrangement can still provide improved load braking and/or load absorption.

[0011] In an embodiment of a fastening arrangement according to the first aspect, the load braking device is configured to rotate around an axis when the load is applied at the fastening means. The load braking device may be configured to rotate around the axis towards the roof surface/structure when the load is applied at the fastening means.

[0012] In this way, a simple and robust movement of the load braking device can be achieved, allowing the load braking device to penetrate into and/or grip onto the roof surface/structure in a controllable way, when the load is applied.

[0013] In an embodiment of a fastening arrangement according to the first aspect, the axis extending in the same plane as the fastening plate.

[0014] Thus, the load braking device can rotate relative to the fastening plate, allowing the load braking device to rotate towards the roof surface/structure when the load is applied.

[0015] In an embodiment of a fastening arrangement according to the first aspect, the axis extends perpendicular to or near perpendicular to an inclination direction of the roof surface/structure in operation, i.e., when the fastening arrangement is installed or mounted on the roof.

[0016] In an embodiment of a fastening arrangement according to the first aspect, the load braking device comprises a hinge portion extending along the axis, the hinge portion acting as a hinge around the axis for the load braking device when the load braking device penetrates into the roof surface/structure and/or grip onto the roof surface/structure.

[0017] The hinge portion can act as a mechanical hinge function, allowing the load braking device to rotate around the axis, when the load is applied at the fastening means.

[0018] In an embodiment of a fastening arrangement according to the first aspect, the hinge portion is arranged

at an upper section of the load braking device, the upper section facing a roof ridge in operation.

[0019] In an embodiment of a fastening arrangement according to the first aspect, the load comprises a load component in an inclination direction of the roof surface/structure.

[0020] In an embodiment of a fastening arrangement according to the first aspect, the load braking device is arranged adjacent to the fastening means.

[0021] This implies improved load transmission from the fastening means to the load braking device and thus also improved load absorption.

[0022] In an embodiment of a fastening arrangement according to the first aspect, the fastening arrangement comprises a bracket attached to the upside of the fastening plate, wherein the fastening means is arranged at the bracket.

[0023] In an embodiment of a fastening arrangement according to the first aspect, the bracket extends outwards from the upside of the fastening plate.

[0024] Thus, the load braking device can penetrate into and/or grip onto the roof surface/structure in an angle dependent on the vertical height position of the fastening means.

[0025] In an embodiment of a fastening arrangement according to the first aspect, the bracket extends perpendicularly from the upside of the fastening plate.

[0026] In an embodiment of a fastening arrangement according to the first aspect, the fastening means is arranged at a distal end of the bracket in relation to the upside of the fastening plate.

[0027] In an embodiment of a fastening arrangement according to the first aspect, the bracket and/or load braking device is arranged at a centre section of the fastening plate.

[0028] Thereby, the applied load can be evenly distributed over the fastening plate due to the central location of the bracket and/or load braking device.

[0029] In an embodiment of a fastening arrangement according to the first aspect, the bracket is arranged at the load braking device and attached thereto.

[0030] Thereby, improved load absorption is possible due to improved load transmission.

[0031] In an embodiment of a fastening arrangement according to the first aspect, the fastening plate and/or the load braking device comprises a weakening and/or a slit having a transversal section extending perpendicular or near perpendicular to an inclination direction of the roof surface/structure in operation.

[0032] The weakening and/or the slit will define and delimit the load braking device at the fastening arrangement.

[0033] In an embodiment of a fastening arrangement according to the first aspect, the weakening and/or the slit further comprises at least one non-transversal section extending in an angle in relation to the transversal section.

[0034] In an embodiment of a fastening arrangement according to the first aspect, the load braking device comprises at least one protrusion or at least one sharp edge at least partially penetrating the roof surface/structure and/or grip onto the roof surface/structure in operation.

[0035] Thereby, the penetration capability and/or the griping capability of the load braking device is improved or secured.

[0036] In an embodiment of a fastening arrangement according to the first aspect, the load braking device comprises a hinge portion acting as a hinge for the load braking device when the load braking device penetrates into the roof surface/structure and/or grip onto the roof surface/structure.

[0037] The hinge portion act as a mechanical hinge function as a rotational axis when the load braking device penetrates into and/or grip onto the roof surface/structure.

[0038] In an embodiment of a fastening arrangement according to the first aspect, wherein the hinge portion is arranged at an upper section of the load braking device, the upper section facing a roof ridge in operation.

[0039] In an embodiment of a fastening arrangement according to the first aspect, the fastening arrangement comprises at least one reinforcing section arranged on the fastening plate below the load braking device in an inclination direction of the roof surface/structure in operation.

[0040] Thereby, the fastening plate is more robust in this part of the fastening plate facing the roof eave which means that this part will withstand higher loads and not tear apart when the load is applied. This means that the load will be absorbed into the roof surface/structure instead of tearing apart or break the whole fastening arrangement.

[0041] In an embodiment of a fastening arrangement according to the first aspect, the attachment means is arranged at a circumference of the fastening plate.

[0042] This means a secure anchoring of the fastening plate at the roof surface/structure.

[0043] Further applications and advantages of the embodiments of the invention will be apparent from the following detailed description.

Brief Description of the Drawings

[0044] The appended drawings are intended to clarify and explain different embodiments of the invention, in which:

- Fig. 1 shows a fastening arrangement in a view from above according to embodiments of the invention;
- Fig. 2 shows the fastening arrangement in Fig. 1 in a perspective side view without attachment means;
- Fig. 3 and 4 show a fastening arrangement in a side view cording to embodiments of the invention;
- Fig. 5 shows the fastening arrangement in Fig. 3 and 4 in a side perspective view;
- Fig. 6 and 7 show fastening arrangements according

to further embodiments of the invention; and

- Fig. 8 illustrates a house with a roof.

Detailed Description

[0045] Fig. 1 shows a fastening arrangement 100 in a view from above according to embodiments of the invention and Fig. 2 shows the fastening arrangement 100 in Fig. 1 in a slight perspective side view without attachment means 116 illustrated.

[0046] With reference to Fig. 1 and 2, the fastening arrangement 100 for fastening roof equipment at a roof surface/structure comprises a fastening plate 110 having an upside 112 and the upside 112 comprises at least one fastening means 118 for fastening a roof equipment 200 at the fastening plate 110. The fastening plate 110 further has a downside 114 arranged to be placed on a roof surface/structure 310 in operation, and at least one attachment means 116 for attaching the fastening plate 100 at the roof surface/structure 310. The fastening arrangement 100 in operation, i.e., installed or mounted on a roof 300, and attached to a roof equipment 200 is shown in Fig. 8. The fastening arrangement 100 further comprises at least one load braking device 150 configured to at least partially penetrate the roof surface/structure 310 and/or grip onto the roof surface/structure 310 when a load L is applied at the fastening means 118.

[0047] The load braking device 150 may extend in the same plane as the fastening plate 110 before the load L is applied at the fastening means 118, as shown in Figs. 1 to 3. The load braking device 150 may hence be aligned with the fastening plate 110 in an initial state, e.g., be manufactured to be aligned with the fastening plate 110. With reference to Figs. 1 and 3, the load braking device 150 may be formed in the fastening plate 110 and have the same main extension as the fastening plate 110. In addition, an upside 112a of the load braking device 150 may be aligned with the upside 112 of the fastening plate 110, and a downside 114a of the load braking device 150 may be aligned with the downside 114 of the fastening plate 110. When the load L is applied at the fastening means 118, the load braking device 150 moves relative to the fastening plate 110, as shown in Figs. 4 and 5. The load braking device 150 may move relative to the fastening plate 110 in a downward direction D, as indicated in Figs. 4.

[0048] In embodiments, the load braking device 150 rotates around an axis A when the load L is applied at the fastening means 118. The load braking device 150 may rotate around the axis A towards the roof surface/structure 310 in the downward direction D. With reference to Figs. 1, 2 and 5, the axis A may extend in the same plane as the fastening plate 110. The axis A may e.g., extends perpendicular to or near perpendicular to an inclination direction I of the roof surface/structure 310 in operation.

[0049] The fastening plate 110 may have any suitable shape such as being rectangular, circular, oval, etc. The thickness of the fastening plate 110 may be constant such that the fastening plate 110 can be produced from a single piece of sheet metal e.g., by punching and possibly folding/bending operations. The attachment means 116 may be through holes in the fastening plate 110 with associated screws, bolts, nuts, nails, adhesives, etc. for fastening the fastening plate 110 to the roof surface/structure 310. However, also other attachment means 116 may be employed for attaching the fastening plate 100 at the roof surface/structure 310. Moreover, the attachment means 116 may be located at different positions on the fastening plate 110 and the fastening plate 110 may comprise any number of attachment means 116 for attachment to the roof surface/structure 310. One possible layout of the attachment means 116 is when a plurality of attachment means 116 are arranged along the circumference of the fastening plate 110 as shown in Fig. 1. For example, in each corner of the fastening plate 110 for secure attachment to the roof surface/structure 310.

[0050] It may further be noted that the load braking device 150 may be arranged adjacent to the fastening means 118, according to embodiments of the invention, for improved load transmission and hence load absorption of the roof surface/structure 310. Thus, when the load L comprises a load component in an inclination direction I of the roof surface/structure 310, the load braking device 150 will penetrate into and/or grip onto the roof surface/structure 310 the roof surface/structure 310 in an angle to the extension of the roof surface/structure 310.

[0051] Furthermore, the fastening arrangement 100 may also comprise a bracket 160 or a bracket part 160 which is attached to the upside 112 of the fastening plate 110. The bracket 160 may comprise the fastening means 118 which thus is arranged at the bracket 160 according to this embodiment of the invention. The bracket 160 may thus be a separate part attached to the fastening plate 110 by means of one or more bolts which e.g., may be anchored at the roof surface/structure 310 and extending up and through the fastening plate 110 and a horizontal section of the bracket 160, respectively. The bolt may be locked by a nut at the upside of the horizontal section of the bracket 160 for secure fastening. The bracket 160 could however in embodiments be integrated with the fastening plate 110 and thus formed together with the fastening plate 110.

[0052] The bracket 160 may extend outwards from the upside 112 of the fastening plate 110 as disclosed in the presented Figs. The bracket 160 may in this respect extend perpendicularly from the upside 112 of the fastening plate 110 and outwards therefrom thus being substantially L-shaped where a horizontal section of the bracket 160 forms a foot section resting on the upside 112 of the fastening plate 110 and hence correspond to the previously mentioned horizontal section. The bracket 160 may be located on different positions on the fastening plate 110 and a non-limiting example is at the centre section of the fastening plate 110 as shown in the Figs. for an

even load distribution on the different parts of the fastening plate 110 when the load is applied on the fastening arrangement 100.

[0053] Fig. 3 and 4 show a fastening arrangement 100 in a side view according to embodiments of the invention and Fig. 5 shows the fastening arrangement 100 in Fig. 3 and 4 in a side perspective view. In embodiments of the invention, the bracket 160 is arranged at, or on the load braking device 150 and attached thereto. In such configurations, the fastening means 118 may be arranged at a distal end 162 of the bracket 160 in relation to the upside 112 of the fastening plate 110. Thereby, the penetration angle and/or the gripping angle of the load braking device 150 into and/or onto the roof surface/structure 310 will be dependent on the height position of the fastening means 118 in relation to the roof surface/structure 310. In the shown embodiments, the bracket 160 and the load braking device 150 are arranged together at the centre section of the fastening plate 110. However, the bracket 160 and/or the load braking device 150 may be located in different positions on the fastening plate 110 without deviating from the scope of the invention.

[0054] As further shown in Fig. 3 and 4, the load braking device 150 may comprises one or more protrusions 154 and/or one or more sharp edges 154 at least partially penetrating the roof surface/structure 310 and/or grip onto the roof surface/structure 310 in operation, i.e., when the fastening arrangements 100 is mounted on the roof surface/structure 310. The protrusion and/or the sharp edge may fully or partially dig into the roof surface/structure 310 when the load L is applied. The dimensions of the protrusion and/or the sharp edge may depend on the application. Furthermore, the angle of the extension of the protrusion and/or the sharp edge in relation to the roof surface/structure 310 may be adapted to the application and may be 90 degrees or less in relation to the surface of the roof.

[0055] Fig. 6 and 7 show fastening arrangements 100 according to yet further embodiments of the invention. The load braking device 150 may according to such embodiments comprise or be partially formed or defined on the fastening plate 110 by a weakening and/or a slit 152 having a transversal section extending perpendicular or near perpendicular to an inclination direction I of the roof surface/structure 310 in operation. The weakening and/or the slit 152 may further comprises at least one non-transversal section extending in an angle in relation to the transversal section so as to define the load braking device 150. Fig. 6 shows the example when the non-transversal section is parallel to or angled in relation to the inclination I of the roof. The dimension, length, and position of the weakening and/or the slit 152 will impact the properties of the load braking device 150 such as load transmission, load absorption, and robustness.

[0056] In Fig. 7, the load braking device 150 is formed by three weakenings and/or slits 152 in the fastening plate 110, one weakening and/or slit 152 having a transversal section and two weakenings and/or slits 152 having a non-transversal section being perpendicular to the transversal section. Thus. the load braking device 150 is formed on the fastening plate 110 as a rectangular with three sides being weakenings and/or slits 152 in the fastening plate 110.

[0057] From the present disclosure it may also be derived that the load braking device 150 can comprises a hinge portion 156 acting as a mechanical hinge for the load braking device 150 when the load is applied such that the load braking device 150 penetrates down into the roof surface/structure 310 and/or grip onto the roof surface/structure 310. With reference to Fig. 6, the hinge portion 156 may extend along the axis A and the hinge portion 156 may hence act as a hinge around the axis A for the load braking device 150. When the load L is applied at the fastening means 118, the hinge portion 156 may enable the load braking device 150 to rotate around the axis A towards the roof surface/structure 310 such that load braking device 150 penetrates into and/or grip onto the roof surface/structure 310. Thus, the hinge portion 156 may be considered as a rotational axis for the load braking device 150 when the load is applied. In this respect the hinge portion 156 may be fully or partially defined by the previously mentioned weakening and/or slit 152. In these examples, the hinge portion 156 may be formed by a section of the fastening plate 110 not having a weakening and/or slit 152 and may in embodiments of the invention be arranged at an upper section of the load braking device 150, where the upper section faces the roof ridge when the fastening arrangements 100 is mounted on the roof.

[0058] Moreover, the fastening arrangement 100 may comprise one or more reinforcing sections 140 arranged below the load braking device 150 in the inclination direction I of the roof surface/structure 310 in operation. Fig. 6 shows an example with a single reinforcing section 140 extending perpendicular to the inclination I in use while Fig. 7 shows an example with two separate reinforcing sections 140 being aligned with each other and arranged perpendicular to the inclination I. However, the separate reinforcing sections 140 do not have to be aligned to each and may hence be arranged at different height levels on the fastening plate 110. The reinforcing section(s) strengthens the lower section of the fastening plate 110 so that the fastening plate 110 at the lower section can withstand the applied load L and thus not tear or break apart. This means that the load braking device 150 instead of fully tearing apart may dig into or penetrate into the roof surface/structure 310 and/or grip onto the roof surface/structure 310 since the reinforcing section act as a stop and/or a guide for the load braking device 150. The reinforcing sections 140 may be produced by punching sheet metal into a raised section which may have a convex shape extending outwards from the upside 112 of the fastening plate 110.

[0059] Fig. 7 also shows a through hole 154' in the fastening plate 110, where the load braking device 150

is located, for receiving a nail, a screw, or any other equivalent means configured to penetrate through the through hole and into the roof surface/structure 310 thereby function as the mentioned protrusion 154. This is an easy, low-complex, low-cost solution of realising the protrusion 154 from a production point of view.

[0060] Fig. 8 finally illustrates a roof 300 of a house on which a roof equipment 200 is fastened with a fastening arrangement 100 according to embodiments of the invention. The roof 300 of a house has a roof ridge 320 and a roof eve 330 and a roof surface/structure 310 having an inclination I directed from the roof ridge 320 to the roof eve 330. The roof 300 may be formed by a roof structure having battens or being of any other roof design. The roof equipment 200 may be any type of roof equipment intended for installation at a roof. Non-limiting examples are ladders, snow fences, safety equipment of safety systems, walkways, walkway sections, and solar panels.

[0061] It should finally be understood that the invention is not limited to the embodiments described above, but also relates to and incorporates all embodiments within the scope of the appended independent claims.

Claims

1. A fastening arrangement (100) for fastening roof equipment at a roof surface/structure, the fastening arrangement (100) comprising:

   a fastening plate (110) having an upside (112) comprising: at least one fastening means (118) for fastening a roof equipment (200) at the fastening plate (110), a downside (114) arranged to be placed on a roof surface/structure (310) in operation, and at least one attachment means (116) for attaching the fastening plate (100) at the roof surface/structure (310); and
   at least one load braking device (150) configured to at least partially penetrate the roof surface/structure (310) and/or grip onto the roof surface/structure (310) when a load (L) is applied at the fastening means (118).

2. The fastening arrangement (100) according to claim 1, wherein the load braking device (150) extends in the same plane as the fastening plate (110) before the load (L) is applied at the fastening means (118).

3. The fastening arrangement (100) according to claim 1 or 2, wherein the load braking device (150) is configured to rotate around an axis A when the load (L) is applied at the fastening means (118).

4. The fastening arrangement (100) according to claim 3, wherein the axis A extending in the same plane as the fastening plate (110).

5. The fastening arrangement (100) according to claim 3 or 4, wherein the axis A extends perpendicular to or near perpendicular to an inclination direction (I) of the roof surface/structure (310) in operation.

6. The fastening arrangement (100) according to any one of claim 3 to 5, wherein the load braking device (150) comprises a hinge portion (156) extending along the axis A, the hinge portion (156) acting as a hinge around the axis A for the load braking device (150) when the load braking device (150) penetrates into the roof surface/structure (310) and/or grip onto the roof surface/structure (310).

7. The fastening arrangement (100) according to claim 6, wherein the hinge portion (156) is arranged at an upper section of the load braking device (150), the upper section facing a roof ridge in operation.

8. The fastening arrangement (100) according to any one of the preceding clams, wherein the load (L) comprises a load component in an inclination direction (I) of the roof surface/structure (310).

9. The fastening arrangement (100) according to any one of the preceding claims, comprising a bracket (160) attached to the upside (112) of the fastening plate (110), wherein the fastening means (118) is arranged at the bracket (160).

10. The fastening arrangement (100) according to claim 9, wherein the bracket (160) extends outwards from the upside (112) of the fastening plate (110).

11. The fastening arrangement (100) according to claim 9 or 10, wherein the fastening means (118) is arranged at a distal end (162) of the bracket (160) in relation to the upside (112) of the fastening plate (110).

12. The fastening arrangement (100) according to any one of claims 9 to 11, wherein the bracket (160) and/or the load braking device (150) is arranged at a centre section of the fastening plate (110).

13. The fastening arrangement (100) according to any one of claims 9 to 12, wherein the bracket (160) is arranged at the load braking device (150) and attached thereto.

14. The fastening arrangement (100) according to any one of the preceding claims, wherein the fastening plate (110) and/or the load braking device (150) comprises a weakening and/or a slit (152) having a transversal section extending perpendicular or near perpendicular to an inclination direction (I) of the roof surface/structure (310) in operation.

15. The fastening arrangement (100) according to claim 14, wherein the weakening and/or the slit (152) further comprises at least one non-transversal section extending in an angle in relation to the transversal section.

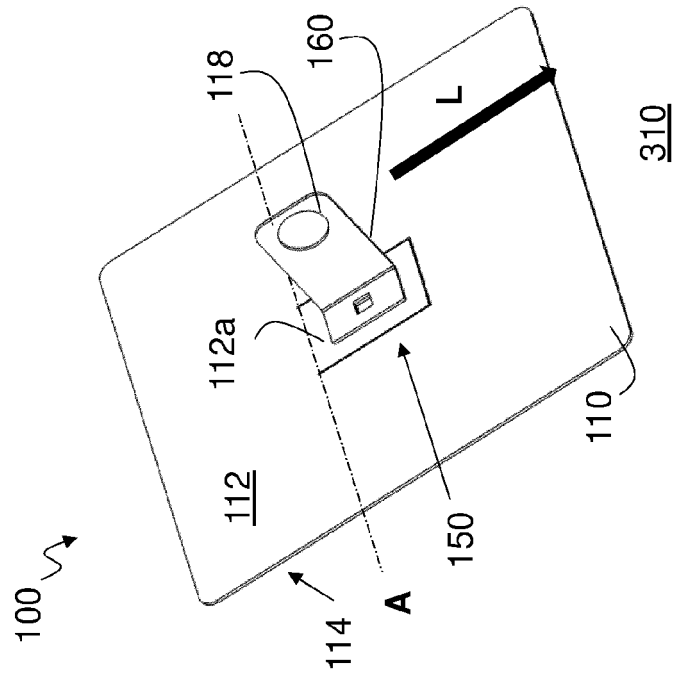
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Fig. 2

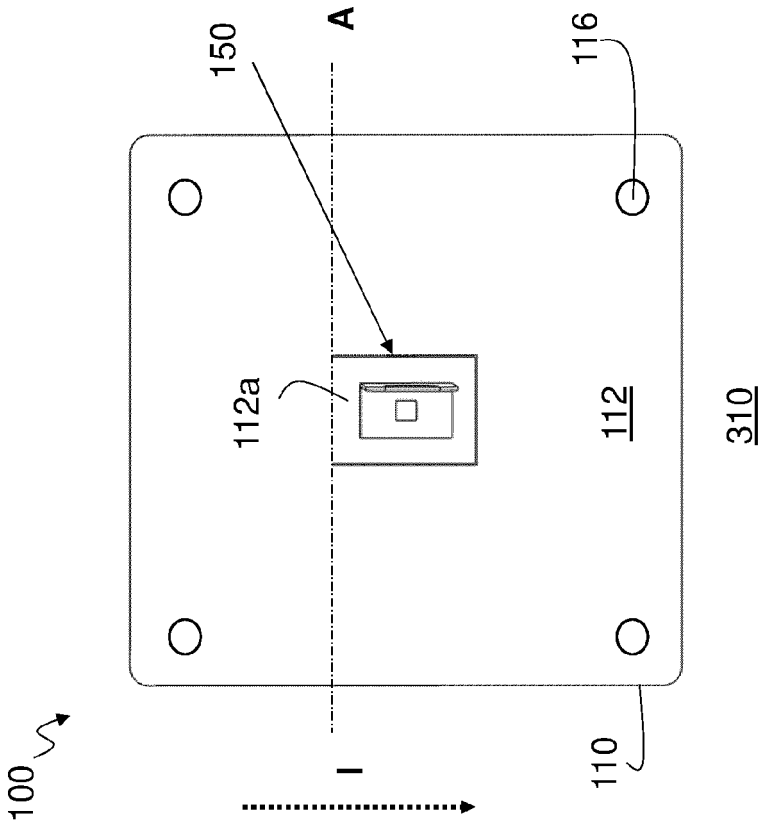
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Fig. 1

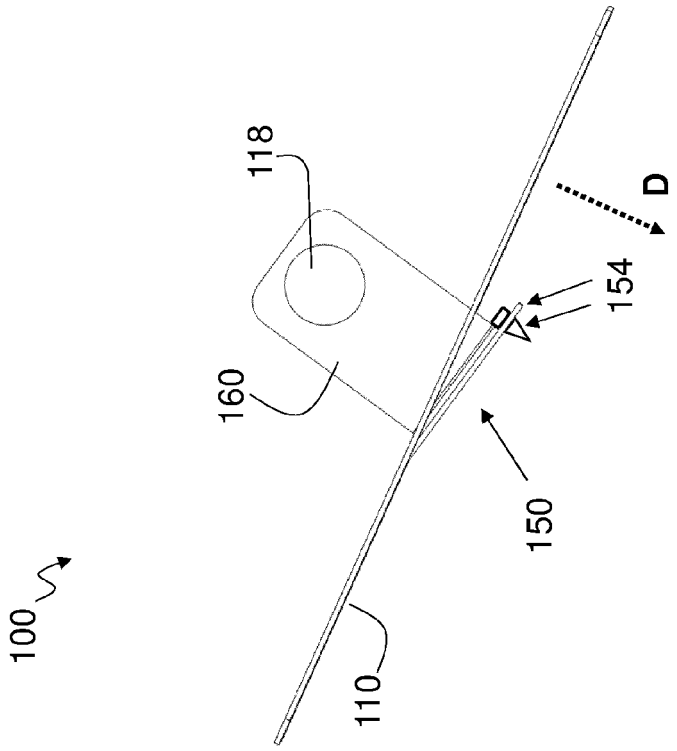
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Fig. 4

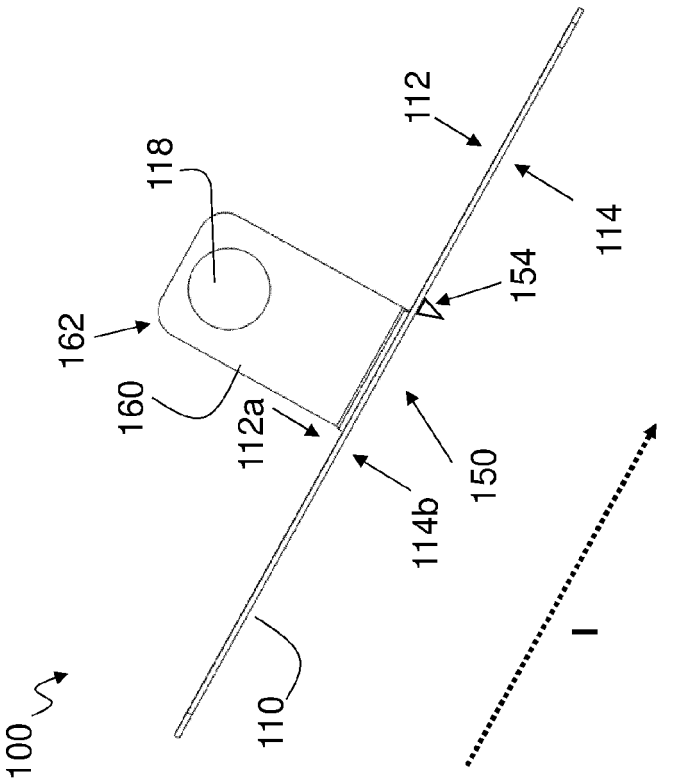
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Fig. 3

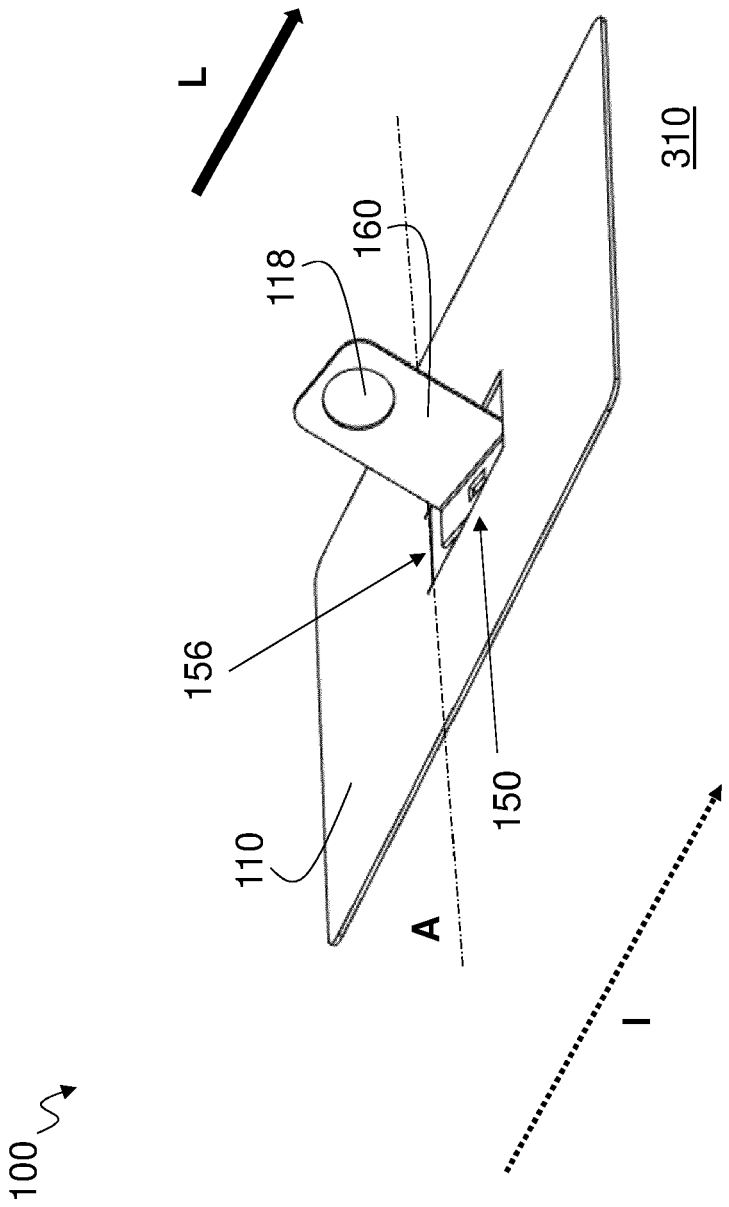

Fig. 5

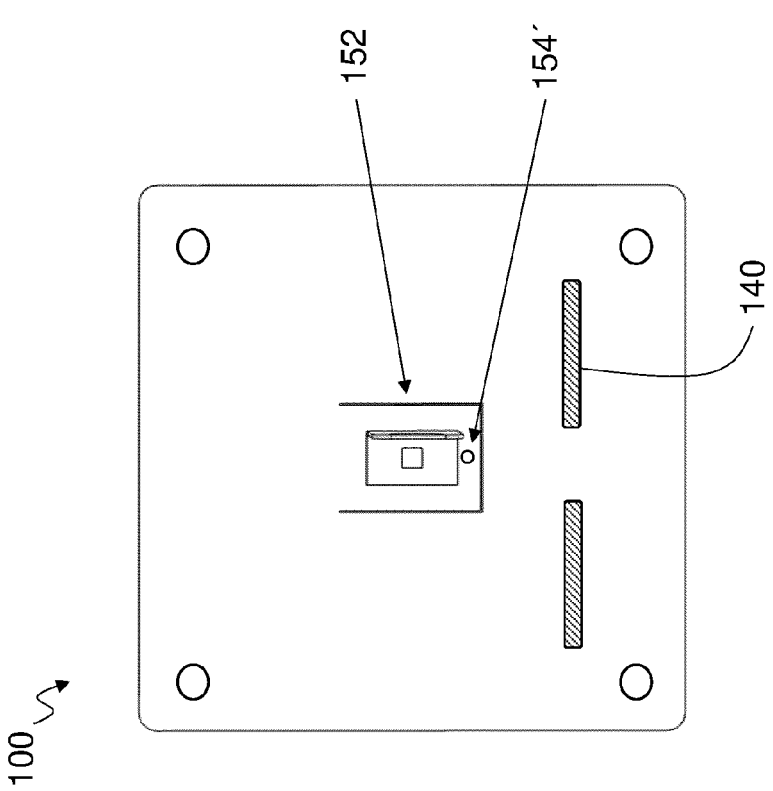

Fig. 7

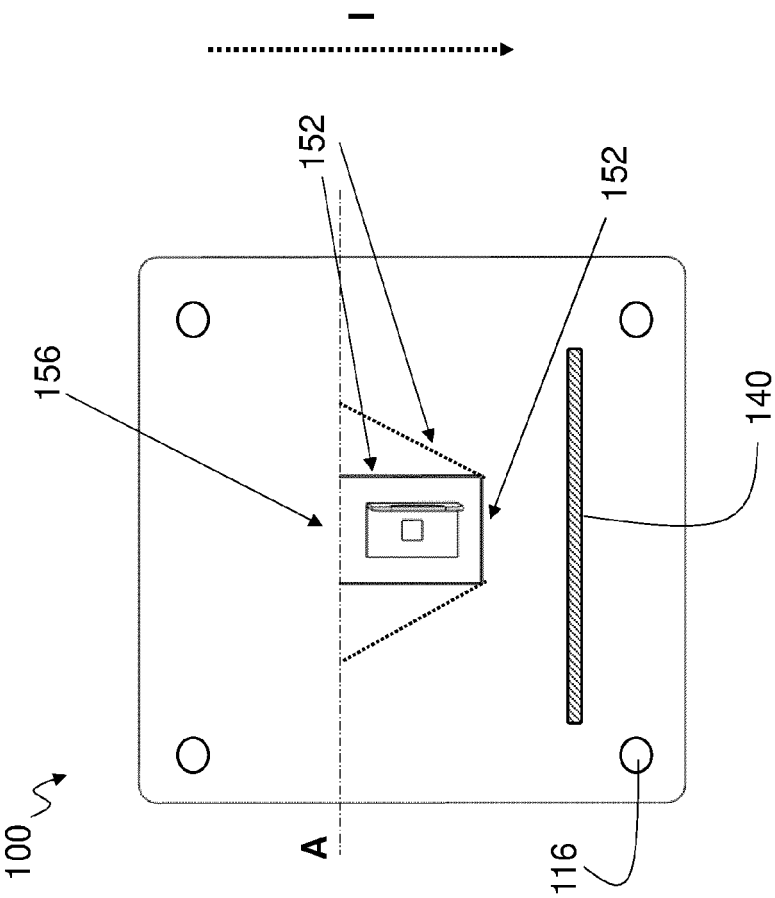

Fig. 6

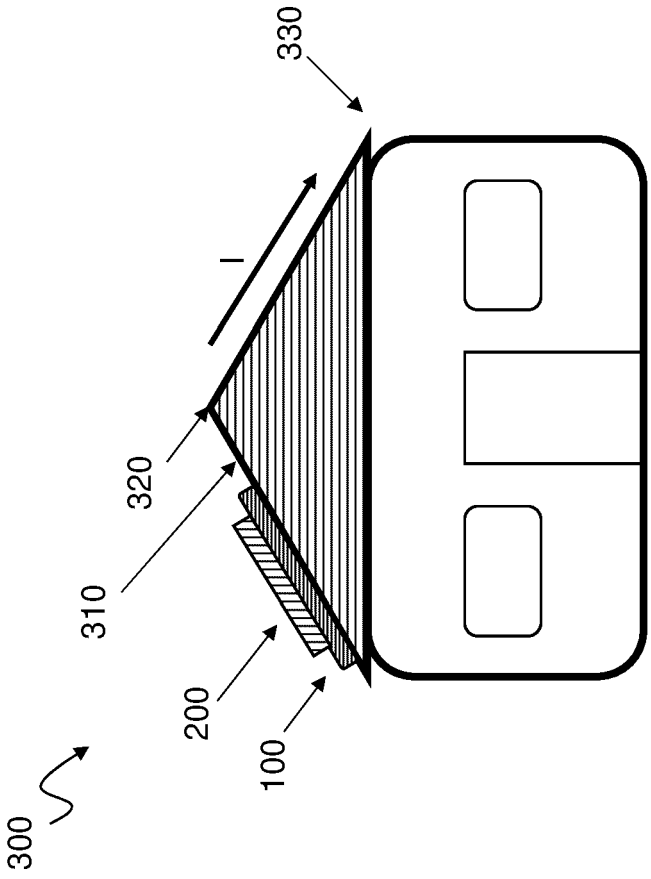

Fig. 8

Europäisches Patentamt
European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 23 20 3311

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2006/059844 A1 (ELY ERNIE W [US]) 23 March 2006 (2006-03-23) * figures 1-4 *	1,3-5, 8-11	INV. E04D13/12 E04G21/32 A62B35/00
X	CH 704 527 A1 (GABS AG [CH]) 31 August 2012 (2012-08-31) * figures 1-2 *	1,3-5, 8-12,14, 15	
X	US 2021/017777 A1 (ALBERT RINO P [CA] ET AL) 21 January 2021 (2021-01-21) * figure 3a *	1-10,12, 13	
X	FR 2 772 408 A1 (DEBEUX JANIE [FR]) 18 June 1999 (1999-06-18) * figures 1-6 *	1,8-11	
X	US 2020/164237 A1 (TEINER NILS [DE]) 28 May 2020 (2020-05-28) * figures 1-7a *	1-5,8-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04D E04G A62B F24S H01Q H02G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 March 2024	Leroux, Corentine

CATEGORY OF CITED DOCUMENTS

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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08-03-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006059844 A1	23-03-2006	NONE	
CH 704527 A1	31-08-2012	NONE	
US 2021017777 A1	21-01-2021	NONE	
FR 2772408 A1	18-06-1999	NONE	
US 2020164237 A1	28-05-2020	AT 16386 U2	15-08-2019
		AU 2018208514 A1	04-07-2019
		CA 3049873 A1	19-07-2018
		DE 102017100373 A1	12-07-2018
		DE 202018006106 U1	29-03-2019
		EP 3507432 A1	10-07-2019
		US 2020164237 A1	28-05-2020
		WO 2018130553 A1	19-07-2018

EPO FORM P0459

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