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(71) Applicant: **CWL Patent AB**
792 22 Mora (SE)

(72) Inventors:
• **FRÖDERBERG, Andreas**
Mora (SE)
• **LUNDBERG, Bengt**
Mora (SE)

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(74) Representative: **Ehrner & Delmar Patentbyrå AB**
Götgatan 78
118 30 Stockholm (SE)

(54) **ROOF CONSOLE AND A FASTENING ARRANGEMENT**

(57) The invention relates to a roof console (100) for fastening roof equipment (400) at a roof (500), the roof console (100) comprising: an upper section (110) comprising first attachment means (112) for attaching roof equipment (400) to the roof console (100); a lower section (120) comprising second attachment means (122) for attaching the roof console (100) to a fastening device (200), the fastening device (200) being configured to be an-

chored to a roof structure (510) of the roof (500), wherein the lower section (120) comprises a first leg (124) configured to be attached to a first side surface (224) of a raised section (220) of the fastening device (200) and at least one second leg (126) configured to be attached to a second side surface (226) of the raised section (220). Furthermore, the invention also relates to a fastening arrangement including such a roof console.

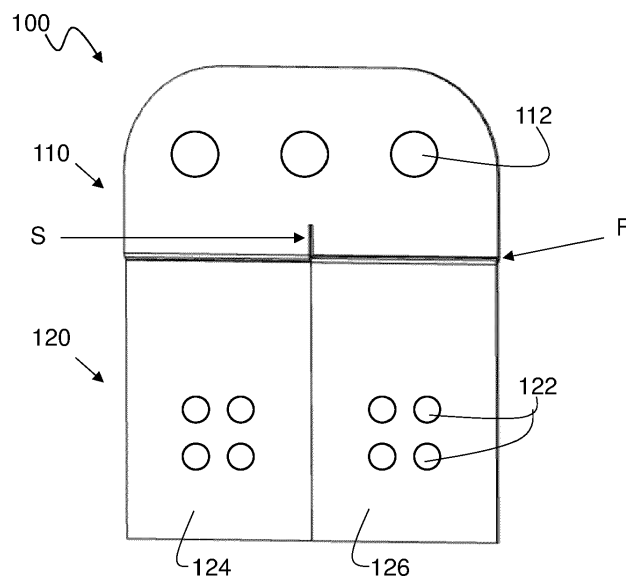


Fig. 1

Description

Technical Field

[0001] The invention relates to a roof console for fastening roof equipment at a roof. Furthermore, the invention also relates to a fastening arrangement including such a roof console.

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 more robust roof console which is also easier to mount compared to conventional solutions.

[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 a first aspect of the invention, the above mentioned and other objectives are achieved with a roof console for fastening roof equipment at a roof, the roof console comprising:

an upper section comprising first attachment means for attaching roof equipment to the roof console in operation;

a lower section comprising second attachment means for attaching the roof console to a fastening device in operation, the fastening device being configured to be anchored to a roof structure of the roof, wherein the lower section comprises a first leg configured to be attached to a first side surface of a raised section of the fastening device and at least one second leg configured to be attached to a second side surface of the raised section.

[0007] The roof console herein disclosed may also be denoted a roof bracket or simply a bracket. The roof console according to the first aspect provides simplified mounting of the roof console at a fastening device, the latter being configured to be anchored to a roof structure of a roof. Furthermore, the design with two or more legs also means a very robust construction with increased strength which e.g., means that the present roof console can be produced from thinner material with equal robustness thus reducing production cost.

[0008] In an embodiment of a roof console according to the first aspect, the first side surface of the raised section is arranged opposite to the second side surface of the raised section.

5 [0009] Thus, an even more robust roof console is provided with this embodiment.

[0010] In an embodiment of a roof console according to the first aspect, an inside surface of the first leg is configured to be attached to the first side surface and an inside surface of the second leg is configured to be attached to the second side surface.

10 [0011] In an embodiment of a roof console according to the first aspect, the inside surface of the first leg is configured to be at least partially in mechanical contact with the first side surface and the inside surface of the second leg is configured to be at least partially in mechanical contact with the second side surface.

15 [0012] In an embodiment of a roof console according to the first aspect, the first leg and the second leg are angled in relation to each other in relation to an extension plane of the raised section of the fastening device in operation.

20 [0013] The expression "in operation" herein may be understood as how the parts of the roof console are arranged and/or located in relation to each other and to the fastening device when mounted in use at the roof.

25 [0014] Thereby, the roof console may be produced from a single piece of sheet metal reducing production complexity and production cost.

30 [0015] In an embodiment of a roof console according to the first aspect, the upper section extends in plane parallel to or along the extension plane of the raised section.

35 [0016] In an embodiment of a roof console according to the first aspect, the roof console comprises a horizontal fold delimiting the upper section and the lower section from each other.

[0017] In an embodiment of a roof console according to the first aspect, the first leg and the second leg extend downwards from the horizontal fold.

40 [0018] In an embodiment of a roof console according to the first aspect, the roof console comprises a vertical slit delimiting the first leg and the second leg from each other.

45 [0019] In an embodiment of a roof console according to the first aspect, the roof console comprises first guiding means configured to cooperate with second guiding means of the fastening device for guiding the roof console to a mounting position at the fastening device.

50 [0020] Thereby, the mounting of the roof console is even more simplified. Also, the overall robustness is further increased with this embodiment.

[0021] In an embodiment of a roof console according to the first aspect, the first guiding means is a cut out and the second guiding means is a protrusion.

55 [0022] In an embodiment of a roof console according to the first aspect, the first guiding means is/are arranged at the lower section of the roof console.

[0023] Thereby, the overall robustness of the roof console is increased with this embodiment.

[0024] In an embodiment of a roof console according to the first aspect, each leg comprises first guiding means.

[0025] Thereby, the overall robustness of the roof console is increased with this embodiment.

[0026] In an embodiment of a roof console according to the first aspect, the roof console is formed from a single piece of sheet metal and/or the roof console has a substantially flat shape.

[0027] Thus, the roof console can be produced at a low cost with this embodiment.

[0028] In an embodiment of a roof console according to the first aspect, a common surface area of the first leg and the second leg is larger than half a surface area of the upper section and/or the common surface area of the first leg and the second leg is larger than or equal to a surface area of the raised section.

[0029] In an embodiment of a roof console according to the first aspect, the second attachment means are through holes.

[0030] According to a second aspect of the invention, the above mentioned and other objectives are achieved with a fastening arrangement for attaching roof equipment at a roof, the fastening arrangement comprising:

at least one roof console according to embodiments of the invention; and

at least one fastening device comprising a fastening section comprising third attachment means for anchoring the fastening device to a roof structure of the roof and a raised section extending outwards from the fastening section, the raised section comprising fourth attachment means for attachment of the roof console to the fastening device.

[0031] In an embodiment of a fastening arrangement according to the second aspect, the fastening section is configured to extend along an inclination of the roof in operation.

[0032] In an embodiment of a fastening arrangement according to the second aspect, the fastening section has an elongated flat shape.

[0033] In an embodiment of a fastening arrangement according to the second aspect, the raised section extends outwards perpendicularly in relation to the extension of the fastening section.

[0034] In an embodiment of a fastening arrangement according to the second aspect, the raised section extends along an inclination of the roof in operation.

[0035] In an embodiment of a fastening arrangement according to the second aspect, the raised section is arranged at an extension side of the fastening section.

[0036] In an embodiment of a fastening arrangement according to the second aspect, the third attachment means are arranged at a first end of the fastening section and the raised section is arranged at a second end of the

fastening section, the first end being located vertically above the second end in operation.

[0037] In an embodiment of a fastening arrangement according to the second aspect, the fastening arrangement comprises second guiding means configured to cooperate with first guiding means of the roof console for guiding the roof console to a mounting position at the fastening device.

[0038] In an embodiment of a fastening arrangement according to the second aspect, the second guiding means is/are arranged in an interface section between the fastening section and the raised section.

[0039] In an embodiment of a fastening arrangement according to the second aspect, the second guiding means is a protrusion.

[0040] The protrusion may also function as a stiffening rib thereby providing increased strength to the fastening arrangement. Thus, the fastening arrangement may be produced from thinner material while maintaining necessary strength.

[0041] Further applications and advantages of the embodiments of the invention will be apparent from the following detailed description.

Brief Description of the Drawings

[0042] The appended drawings are intended to clarify and explain different embodiments of the invention, in which:

- Fig. 1 - 4 show different embodiments of a roof console;
- Fig. 5-8 show different embodiments of a fastening arrangement;
- Fig. 9 shows a detail of a fastening device according to an embodiment of the invention; and
- Fig. 10 illustrates a house with an inclined roof.

Detailed Description

[0043] Fig. 1 - 4 shows different embodiments of a roof console 100 for fastening roof equipment 400 at a roof 500, where Fig. 1, 3 and 4 shows a roof console 100 in a side view, respectively, whilst Fig. 2 shows a roof console 100 in a slight perspective side view.

[0044] With reference to Fig. 1 - 4, the herein disclosed roof console 100 has an upper section 110 comprising first attachment means 112 for attaching roof equipment 400 to the roof console 100 in operation. The roof console 100 further has a lower section 120 comprising second attachment means 122 for attaching the roof console 100 to a fastening device 200 in operation. The fastening device 200 is configured to be anchored to a roof structure 510 of the roof 500, see Fig. 5-8. Thus, the lower section 120 of the roof console 100 comprises a first leg 124 configured to be attached to a first side surface 224 of a raised section 220 of the fastening device 200 and at least one second leg 126 configured to be attached to a

second side surface 226 of the raised section 220. The first side surface 224 and the second side surface 226 of the raised section 220 are different side surfaces.

[0045] The first attachment means 112 and the second attachment means 122 may be any suitable attachment means known in the art for attaching different parts to each other. Thus, non-limiting examples of attachment means are screws, adhesives, bolts and corresponding through holes, welding, and combinations thereof. In examples of the invention, the attachment means 112 and the second attachment means 122 are through holes combined with bolts and/or screws. The bolts and/or screws are however not shown in the disclosed Figs. For adjustment of the roof console 100 in relation to the fastening device 200, and hence also the roof equipment 400 in relation to the fastening arrangement 300 and the roof 500, the shape of the through holes and the location of the through holes can be varied. For example, in Fig. 1 - 3 the second attachment means 122 are circular in shape and arranged vertically and horizontally. Thus, the roof console 100 can be adjusted in discrete steps/amounts in the vertical, horizontal and/or diagonal directions. However, in Fig. 3 the second attachment means 122 have elongated shape and thus the roof console 100 can be adjusted continuously in the vertical and horizontal directions depending on the layout of the attachment means. Correspondingly, also the shape and location of the first attachment means 112, in the form of through holes, can be varied for achieving the same function. For example, the roof console 100 in Fig. 1, 3 and 4 comprises three horizontally located attachment means for discrete stepwise adjustment in the horizontal direction while the roof console 100 in Fig. 2 only comprises one first attachment means 112.

[0046] In embodiments of the invention, the first leg 124 and the second leg 126 are folded/bent from the upper section 110 and downwards in the direction towards the fastening device 200 in operation. A horizontal folding line F is illustrated in Fig. 1 and 2 and may extend substantially horizontal when the roof console 100 is installed in operation/use. The horizontal fold F may delimit the upper section 110 and the lower section 120 from each other. Thus, the first leg 124 and the second leg 126 extend downwards from the horizontal fold F in such embodiments. For simplifying the folding operation further, a vertical folding split or slit S may be punched before the folding operation for producing the legs. The vertical slit S may thus delimit the first leg 124 and the second leg 126 from each other in embodiments of the invention. In such cases the roof console 100 may be formed from a single piece of sheet metal e.g., by using a folding machine and therefore also have a substantially flat shape. This design implies a very cost-effective and low complex production method of roof consoles.

[0047] The roof console 100 may further have first guiding means 130, as shown in Fig. 3 and 4. The first guiding means 130 is configured to cooperate with corresponding second guiding means 230 of the fastening

device 200 for guiding the roof console 100 to a mounting/assembly position at the fastening device 200. The first guiding means 130 may be arranged at the lower section 120 of the roof console 100 and each leg 124, 126 comprises first guiding means 130 in examples of the invention. The first guiding means 130 may be a cut out and the second guiding means 230 may be a protrusion configured to fit into the cut out according to embodiments of the invention. The reverse case is also possible, i.e., the first guiding means 130 is a protrusion and the second guiding means 230 is a cut out in the sheet metal. The cooperation of the first 130 and second 230 guiding means will be described more in detail in the following disclosure with reference to Fig. 5 - 9.

[0048] Fig. 5 and 6 shows a fastening arrangement 300 according to embodiments of the invention in perspective view from two different sides, whilst Fig. 7 and 8 shows a fastening arrangement 300 in a side view, i.e., Fig. 7, and in a perspective view from above, i.e., Fig. 8.

[0049] With reference to Fig. 5 - 8, the fastening arrangement 300 for attaching roof equipment 400 at a roof 500 according to embodiments of the invention comprises at least one roof console 100. The fastening arrangement 300 further comprises at least one fastening device 200 having a fastening section 210 comprising third attachment means 212 for anchoring the fastening device 200 to a roof structure 510 of a roof 500. The fastening device 200 further has a raised section 220 extending outwards from the fastening section 210, and the raised section 220 comprises fourth attachment means 222 for attachment of the roof console 100 to the fastening device 200 by cooperating with the second attachment means 122. Also, the third attachment means 212 and the fourth attachment means 222 may be any type of suitable attachment means known in the art.

[0050] As may be noted from the Figs., the second side surface 226 of the raised section 220 may be arranged opposite to the first side surface 224 of the raised section 220 in embodiments of the invention. The first side surface 224 and the second side surface 226 extends outwards from the plane of the raised section 220. In this respect an inside surface 124' of the first leg 124 is configured to be attached to the first side surface 224 while an inside surface 126' of the second leg 126 is configured to be attached to the second side surface 226. Thus, in an example the inside surface 124' of the first leg 124 is configured to be at least partially in mechanical contact with the first side surface 224 and the inside surface 126' of the second leg 126 is configured to be at least partially in mechanical contact with the second side surface 226. This embodiment results in an even more robust fastening arrangement 300 being able to handle higher mechanical loads.

[0051] Furthermore, the first leg 124 and the second leg 126 may be (slightly) angled in relation to each other in relation to an extension plane P of the raised section 220 of the fastening device 200 in operation. The upper section 110 of the roof console 100 may however extend

in plane parallel to or along the extension plane (P) of the raised section 220 as shown in the Figs.

[0052] Moreover, the fastening section 210 of the fastening device 200 may be configured to extend along an inclination of the roof 500 in operation. The inclination is indicated with the black arrow in the Figs. and is therein denoted I. Further observations are that the fastening section 210 may have an elongated flat band shape and that the raised section 220 extends outwards perpendicularly in relation to the flat band shape of the fastening section 210 in operation. In this configuration, the raised section 220 may be arranged at an extension side of the fastening section 210 so as e.g., being arranged in a space between two adjacent roof tiles, which however is not shown in the Figs. Therefore, the raised section 220 of the fastening device 200 in such designs extends along an inclination of a roof 500 in operation. For improved strength, the fastening section 210 may also have one or more strengthening portions or stiffening ribs 218 which also may extend along the extension of the fastening section 210. In examples, the strengthening portion 218 may extend in the middle section of the fastening section 210 between a first end 214 and a second end 216 of the fastening section 210. The first end 214 is located vertically above the second end 216, in operation, when the roof 500 is inclined and the fastening section 210 extends along the inclination.

[0053] Regarding the relationship between the first attachment means 212 and the raised section 220 of the fastening device 200 it has been realised that the third attachment means 212 may be arranged at the first end 214 of the fastening section 210 while the raised section 220 is arranged at the second end 216 of the fastening section 210. The third attachment means 212 may have a hook portion extending downwards from the main extension of the fastening section 210. The purpose of the hook portion is to hook around roof ridge side of a batten of a roof structure for more secure anchoring of the fastening device 200 at a roof 500. The hook portion may be located at a part of the first end 214 which arranged horizontally lower than the second end 216 of the fastening section 210 and being downwards angled thereof.

[0054] Fig. 9 shows a detail of a fastening device 200 according to embodiments of the invention when the fastening device 200 comprises second guiding means 230 configured to cooperate with the previously mentioned first guiding means 130 of the roof console 100. Thereby, the roof console 100 is easily guided to a correct mounting position at the fastening device 200. This will reduce the time for installing the roof console 100 substantially hence also reducing the cost of installing roof equipment 400 at a roof 500. The detailed view of the fastening device 200 in Fig. 9 shows an interface section 240 located between the fastening section 210 and the raised section 220 in the form of a bent or folded section where the fastening section 210 and the raised section 220 meet. The second guiding means 230 may be arranged in the interface section 240 and the second guiding means 230

may be a protrusion extending in the interface section 240 as shown in Fig. 9. The protrusion may also act as a strengthening portion, i.e., as a stiffening rib, increasing the strength of the fastening device 200 when a load is applied and thus also the general strength of the entire fastening arrangement 300. The protrusion may be formed by punching in the bent or folded section of the fastening device 200.

[0055] Fig. 10 illustrates a roof 500 of a house on which a roof equipment 400 is fastened with a fastening arrangement 300 according to embodiments of the invention. The roof 500 of the house has a roof ridge 510 and a roof eve 520 and a roof surface having an inclination I directed from the roof ridge 510 to the roof eve 520. The roof 500 may be formed by a roof structure having battens or being of any other roof design. The roof equipment 400 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.

[0056] 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 roof console (100) for fastening roof equipment (400) at a roof (500), the roof console (100) comprising:
 - an upper section (110) comprising first attachment means (112) for attaching a roof equipment (400) to the roof console (100) in operation;
 - a lower section (120) comprising second attachment means (122) for attaching the roof console (100) to a fastening device (200) in operation, the fastening device (200) being configured to be anchored to a roof structure (510) of the roof (500), wherein the lower section (120) comprises a first leg (124) configured to be attached to a first side surface (224) of a raised section (220) of the fastening device (200) and at least one second leg (126) configured to be attached to a second side surface (226) of the raised section (220).
2. The roof console (100) according to claim 1, wherein the first side surface (224) of the raised section (220) is arranged opposite to the second side surface (226) of the raised section (220).
3. The roof console (100) according to claim 2, wherein an inside surface (124') of the first leg (124) is configured to be attached to the first side surface (224) and an inside surface (126') of the second leg (126) is configured to be attached to the second side surface

- (226).
4. The roof console (100) according to claim 3, wherein the inside surface (124') of the first leg (124) is configured to be at least partially in mechanical contact with the first side surface (224) and the inside surface (126') of the second leg (126) is configured to be at least partially in mechanical contact with the second side surface (226). 5
 5. The roof console (100) according to any one of the preceding claims, wherein the first leg (124) and the second leg (126) are angled in relation to each other in relation to an extension plane (P) of the raised section (220) of the fastening device (200) in operation. 10
 6. The roof console (100) according to any one of the preceding claims, wherein the upper section (110) extends in plane parallel to or along the extension plane (P) of the raised section (220). 15
 7. The roof console (100) according to any one of the preceding claims, comprising a horizontal fold (F) delimiting the upper section (110) and the lower section (120) from each other. 20
 8. The roof console (100) according to claim 7, wherein the first leg (124) and the second leg (126) extend downwards from the horizontal fold (F). 25
 9. The roof console (100) according to any one of the preceding claims, comprising a vertical slit (S) delimiting the first leg (124) and the second leg (126) from each other. 30
 10. The roof console (100) according to any one of the preceding claims, comprising first guiding means (130) configured to cooperate with second guiding means (230) of the fastening device (200) for guiding the roof console (100) to a mounting position at the fastening device (200). 35
 11. The roof console (100) according to claim 10, wherein the first guiding means (130) is a cut out and the second guiding means (230) is a protrusion and/or the first guiding means (130) is/are arranged at the lower section (120) of the roof console (100). 40
 12. The roof console (100) according to any one of the preceding claims, wherein the roof console (100) is formed from a single piece of sheet metal and/or the roof console (100) has a substantially flat shape. 45
 13. The roof console (100) according to any one of the preceding claims, wherein a common surface area of the first leg (124) and the second leg (126) is larger than half a surface area of the upper section (110) and/or the common surface area of the first leg (124) and the second leg (126) is larger than or equal to a surface area of the raised section (220). 50
 14. The roof console (100) according to any one of the preceding claims, wherein the second attachment means (122) are through holes. 55
 15. A fastening arrangement (300) for attaching roof equipment (400) at a roof (500), the fastening arrangement (300) comprising:
at least one roof console (100) according to any one of the preceding claims; and at least one fastening device (200) comprising a fastening section (210) comprising third attachment means (212) for anchoring the fastening device (200) to a roof structure (510) of the roof (500) and a raised section (220) extending outwards from the fastening section (210), the raised section (220) comprising fourth attachment means (222) for attachment of the roof console (100) to the fastening device (200).

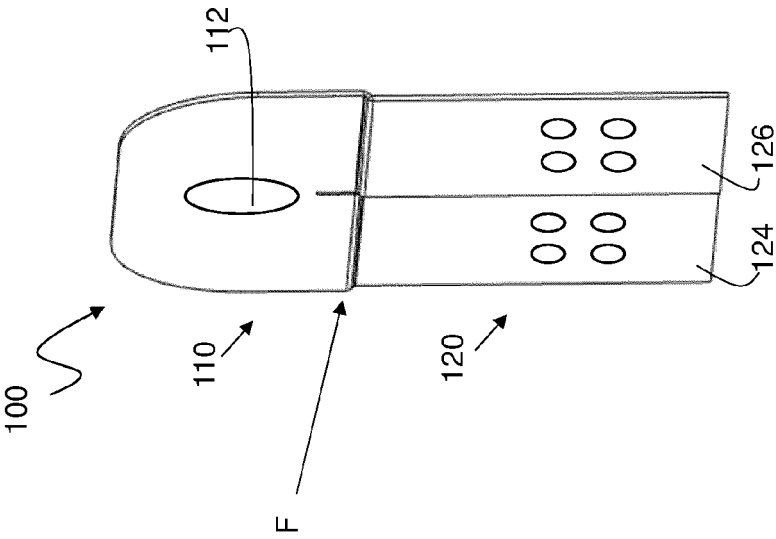


Fig. 2

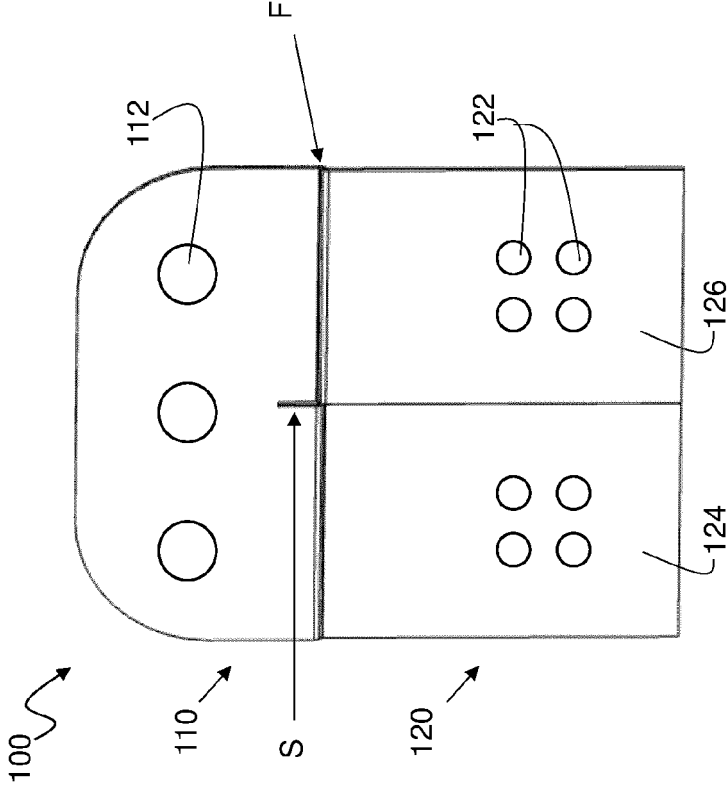


Fig. 1



Fig. 3

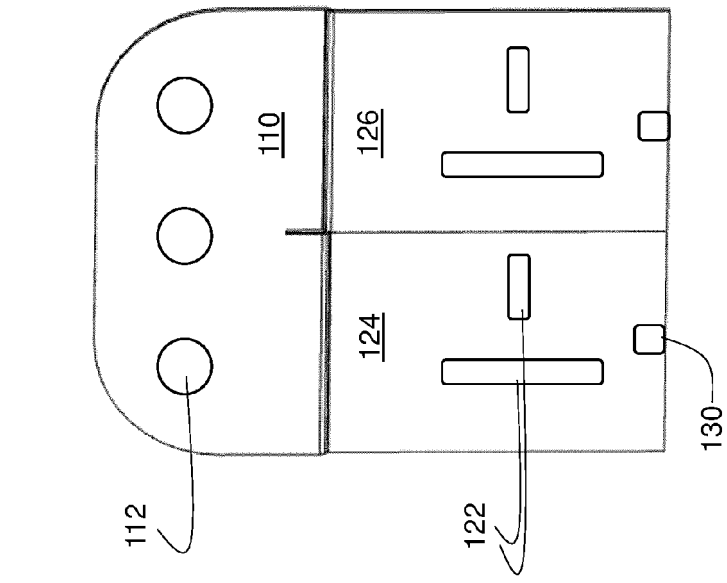


Fig. 4

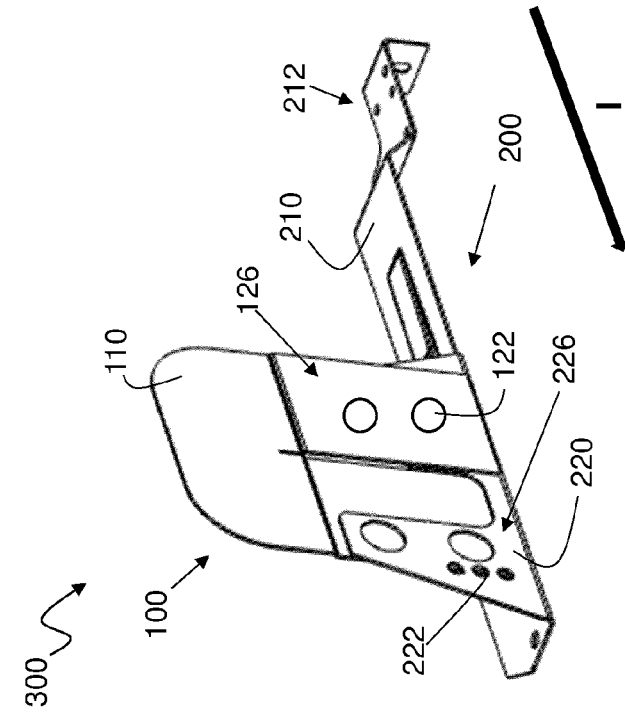


Fig. 5

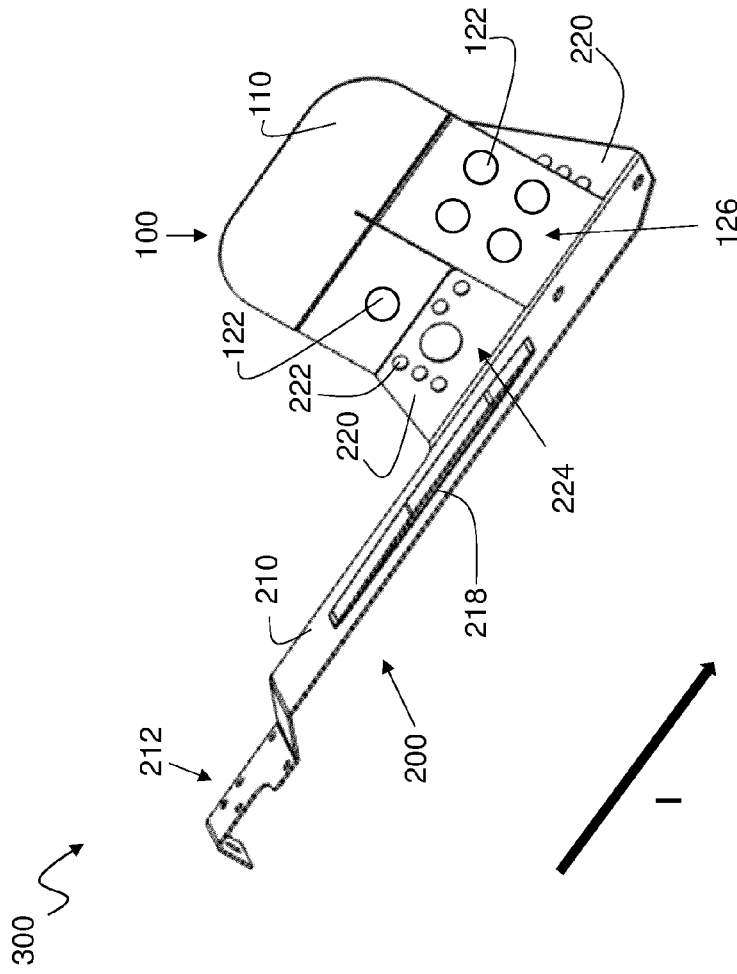


Fig. 6

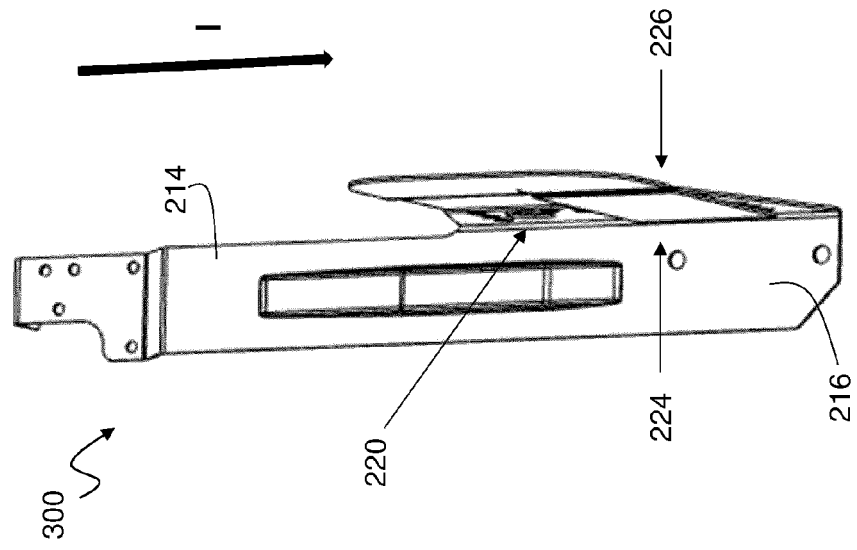


Fig. 8

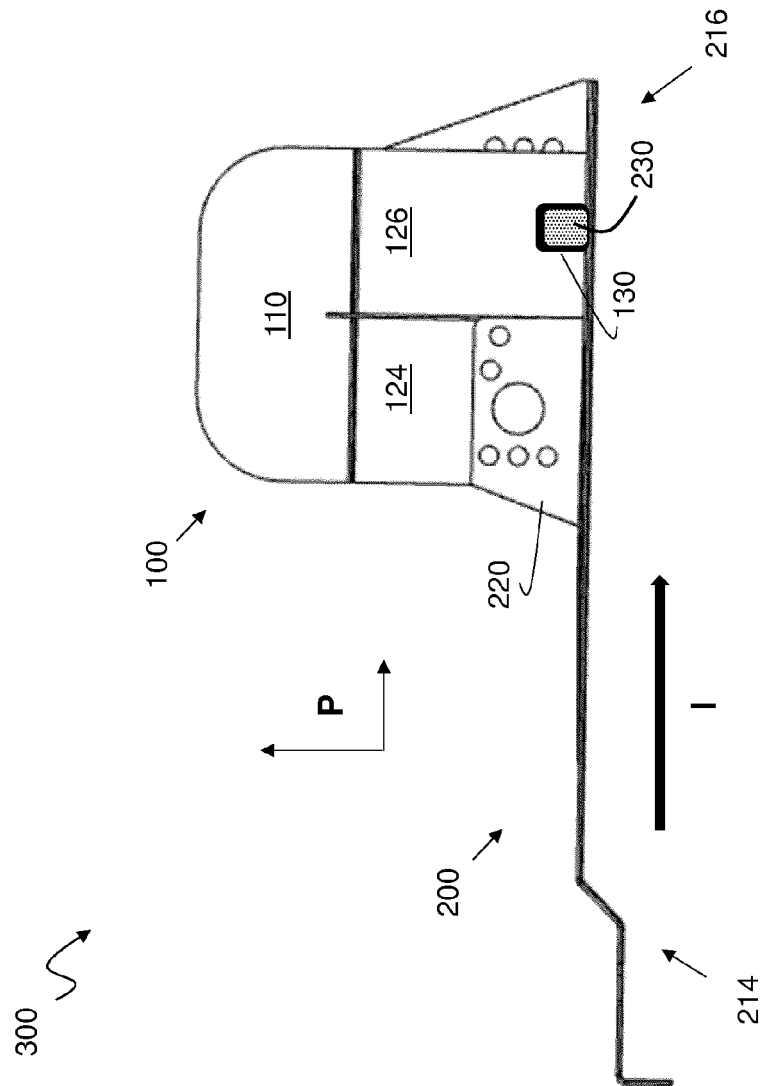
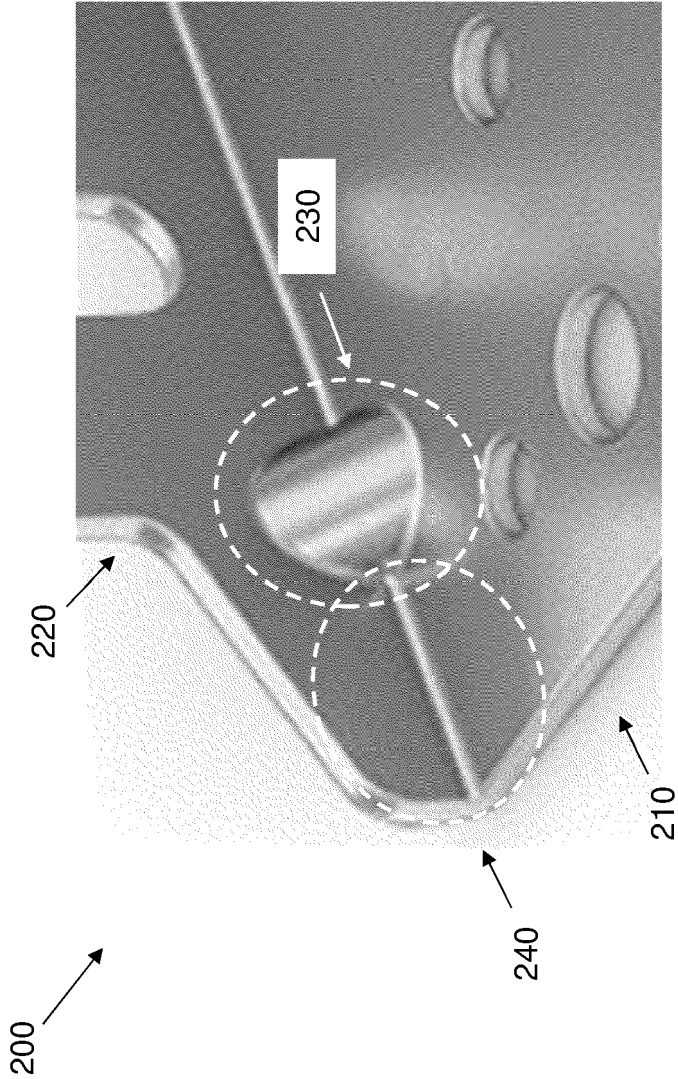


Fig. 7

Fig. 9



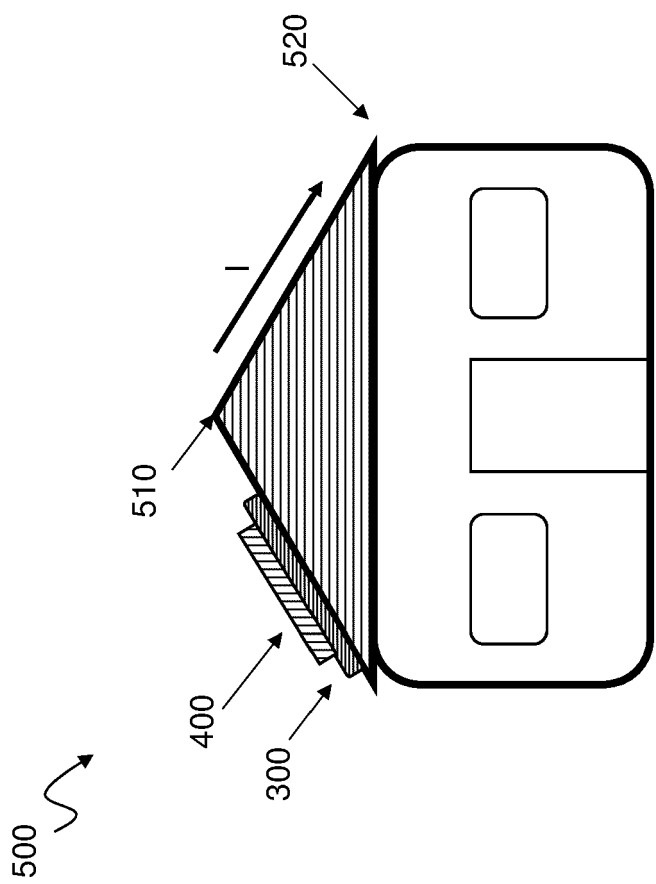


Fig. 10



EUROPEAN SEARCH REPORT

Application Number

EP 23 17 6581

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			E04D E04G F24S H01Q A62B E06C E04B F16B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		16 January 2024	Leroux, Corentine
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 17 6581

5 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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