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(54) **ROOF CONSOLE**

(57) The present invention relates to a Roof console (10) for attachment of roof access equipment like ladders, comprising an elongated body (14) to be placed on the roof generally transversal to the inclination of the roof, first attachment points (20, 26, 34) arranged on the console for attachment to attachment elements (40, 80, 100), which attachment elements are fixedly secured to the roof, second attachment points (30) arranged on the out-

er areas of the elongated body of the console for attachment of roof attachment equipment, wherein the first attachment points are positioned at a distance from the second attachment points; and deformation structures (22, 28, 140) arranged between the first and the second attachment points, wherein the console is deformed by the deformation structures when a force is exerted on attached roof access equipment.

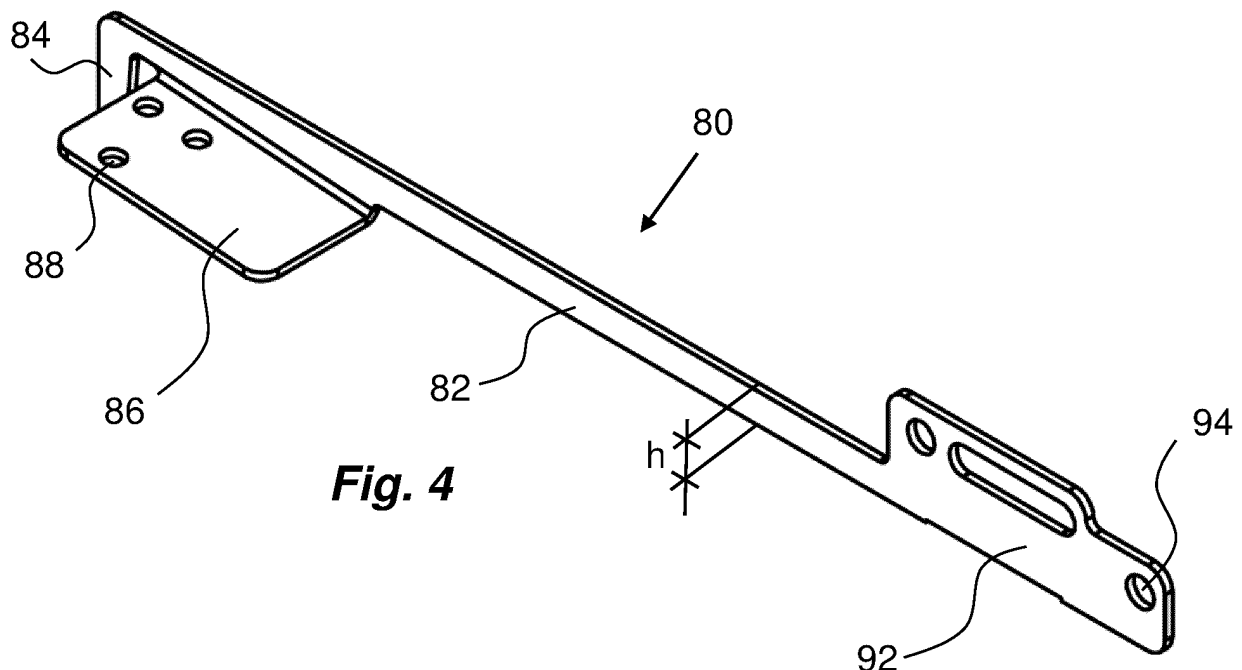


Fig. 4

Description

TECHNICAL AREA

[0001] The present invention relates to a roof console for attachment of roof access equipment such as ladders.

BACKGROUND OF INVENTION

[0002] Roof access equipment such as walkways and ladders are required on roofs where personnel are working. In order to have a secure workplace on the roof, personal fall protection should be used by the personnel. In this regard, the ladders used on the roof should be attached to the roof in such a manner that they can be used as anchoring points for the fall protection, and thus be able to withstand the forces from a fall.

[0003] Depending on the type of roof, different types of anchoring devices may be used for attaching and securing the ladder. For instance, a number of brackets may be used that extend generally transversal to the inclination of the roof and then also generally transversal to the extension of the ladder. The brackets are fixedly attached to rigid structures of the roof, such as to battens if roof tiles are used, or to folds of sheet roofs. Specially designed mounting elements are used between the structures of the roof and the brackets.

[0004] Even if the above solution provides a secure attachment for personal fall protection, they constitute a drawback since the solution is very rigid. This means that if an attached person falls off the roof, the impact is very sudden when the securing lanyard is fully extended. Some lanyard systems comprise a shock absorber, usually in the form of a compression spring extending due to the forces from a falling person, but the absorbing properties are not optimal.

[0005] Another solution that can be used is to provide an energy absorbing feature of roof equipment. For example, WO 2006049543 discloses a holder for roof equipment comprising a generally U-shape profile having outer attachment points for a ladder and a central attachment point for an L-shaped bracket that is to be attached to a roof. The holder is further arranged with a central yielding zone that is an interruption or as cut-out of an upper flange of the profile. When exposed to a force from a person falling off the roof and being attached to the ladder by personal fall arrest equipment, the bracket will deform at the central yielding zone, causing an energy absorbing function. The bracket will also deform due to the force.

[0006] The drawback with the solution of WO 2006049543 is that the bracket is not designed to handle different attachment elements to the roof. Further, the design of the profile with its central cut-out and the central attachment of the bracket to the profile means that the force is concentrated to a single central point, meaning that the force is not distributed, which in turn may lead to that the profile and the bracket cannot withstand the

forces at all instances and in particular not with the new regulations requiring handling of higher loads than earlier without breaking.

[0007] There is thus a need for development in the area of absorbing forces exerted on a person falling off a roof.

BRIEF DESCRIPTION OF INVENTION

[0008] The aim of the present invention is to provide a solution for handling forces as described above. This aim is solved with a roof console with the features of the independent patent claims. Preferable embodiments of the invention form the subject of the dependent patent claims.

[0009] According to a main aspect, a roof console for attachment of roof access equipment like ladders is provided, comprising an elongated body to be placed on a roof generally transversal to the inclination of the roof. The console may comprise first attachment points for attachment to attachment elements, which attachment elements are fixedly secured to the roof.

[0010] The console may further comprise second attachment points arranged on the outer areas of the elongated body of the console for attachment of roof attachment equipment, wherein the first attachment points are positioned at a distance from the second attachment points.

[0011] Preferably deformation structures are arranged between the first and the second attachment points, wherein the console is deformed by the deformation structures when a force is exerted on attached roof access equipment. The deformation provides a force dampening effect on for instance a person falling off the roof, being attached with personal fall protection equipment.

[0012] According to one aspect, the deformation structures may at least be arranged adjacent the first attachment points and may comprise first cut-outs in the body of the console. The position of the deformation structures provides a controlled deformation near the first attachment points where the attachment elements for the roof are attached, i.e. close to the fixation to the roof.

[0013] According to a further aspect, the first cut-outs may be designed to receive attachment elements for attachment thereto. The attachment elements may in this regard be band-shaped elements extending under or between tiles, having an upper end attached to the roof. Here the deformation structures have a dual function both providing deformation and for receiving the attachment elements.

[0014] Further, the deformation structures may comprise second cut-outs adjacent said first cut-outs, wherein said second cut-outs are designed to receive attachment elements for attachment thereto.

[0015] In addition, the first cut-outs may be designed to receive folds of a folded sheet metal roof, further adding to the functionality of the console and the deformation structures. In this regard, one solution is that there are further deformation structures arranged in the body be-

tween the first and the second attachment points and in that regard, the further deformation structures may comprise cut-outs and/or holes.

[0016] A further aspect is an attachment element that may comprise an elongated plate-shaped body, having a generally perpendicular orientation in relation to a roof plane when attached to a roof structure, intended to be positioned between two adjacent roof tiles of said roof structure. With this solution, with planar roof tiles, the tiles are affected in a very minor way and the attachment element does not affect the appearance of the roof. For instance, there is no need for an attachment element under or between overlapping tiles, which otherwise would lift individual tiles nor is there a need for drilling of the tiles in order to attach equipment on the roof.

[0017] Preferably the height of the body in the generally perpendicular direction is equal or less than the thickness of adjacent roof tiles so as to allow overlapping tiles to be placed without being lifted. Further, the attachment element may comprise a first attachment structure at an end area thereof for attachment to the roof structure, which end area is to be positioned higher up as seen in a direction of inclination of said roof structure. In this regard, the roof structure may comprise battens and the attachment structure may comprise a bracket that is placed in contact with a side surface of the batten facing towards the ridge of the roof. This type of attachment element may further comprise a second attachment structure at the opposite end area thereof, for attachment to roof access equipment.

[0018] These and other aspects and advantages of the present invention will become apparent from the following detailed description and from the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0019] In the following detailed description of the invention, reference will be made to the accompanying drawings, of which

Fig. 1 is a perspective view of a console according to the application to be used on a roof,

Fig. 2 is a side view of the console of Fig. 1,

Figs. 3 and 4 are perspective views of attachment elements to which the console of Fig. 1 is to be attached,

Fig. 5 shows a perspective view of a console attached to a roof with curved roof tiles,

Fig. 6 shows a perspective view of attachment elements attached to a roof with flat so-called biber-schwanz tiles,

Fig. 7 shows a view similar to Fig. 6 with tiles removed

and with attached console,

Fig. 8 shows a perspective view of a console with an attachment element designed for folded sheet metal roofs,

Fig. 9 shows another perspective view of the arrangement of Fig. 8,

Fig. 10 shows a perspective view of a number of attachment elements according to Fig. 4 to which consoles according to Fig. 1 have been attached and with a roof ladder attached to the consoles, and

Fig. 11 shows a detailed view of a console with further deformation structures,

Fig. 12 shows a variant of the console of Fig. 1,

Figs. 13-14 show the console of Fig. 12 attached to a folded sheet metal roof.

DETAILED DESCRIPTION OF THE INVENTION

[0020] One embodiment of a roof console is shown in Fig. 1. The roof console 10 has an elongated body 12 that has a general C-shape as seen in a cross-section with a central section 14, an upper section 16 and a lower section 18. The central section 14 of the console 10 is arranged with a row of attachment holes 20, constituting first attachment points. The central section has two generally rectangular first cut-outs 22, where each first cut-out 22 runs through the lower section 18, transversal to the longitudinal direction of the console, the function of which will be explained below. Each first cut-out 22 is further arranged with a bracket 24 on a side surface thereof, extending generally transversal to the longitudinal direction of the console 10. Each bracket 24 is arranged with first attachment points that in the embodiment comprises holes 26. Two second cut-outs 28, generally rectangular, are arranged on the central section 14 above the first cut-outs 22 and adjacent the upper section 16.

[0021] The upper section 16 of the console 10 is further arranged with second attachment points in the form of a number of attachment holes 30 at an outer area 32 of the console, for attachment of for example a ladder, where there is provided a certain distance D between the cut-outs 22, 28 and the attachment points 30. Further, first attachment points in the form of holes 34 are arranged on the upper section 16 above the first and second cut-outs 22, 28. Also, the lower section 18 may be arranged with holes 36 such that cushioning elements 38 can be attached on the underside of the lower section 18, see Fig. 5.

[0022] The roof console 10 is intended to be placed onto a surface of a roof such as roof tiles or folded sheet metal. In this regard, the console 10 is preferably positioned such that the central section 14 is higher up to-

wards the ridge of the roof than the upper and lower sections 16, 18 as seen in Figs. 5 and 7. This reduces the amount of snow, leaves and other debris that may get stuck, which otherwise would collect inside the profile of the console. The console 10 is attached to the roof by appropriate attachment means. If the roof is provided with curved roof tiles that are mounted on transversal battens, an attachment element 40 as shown in Fig. 3 may be used. It comprises a band-shaped elongated body 42. A first end of the body 42 is arranged with a bracket 46 extending generally 90 degrees in relation to the extension of the body 42. The bracket 46 is arranged with a hole 48. Further, the area of the body 42 adjacent the first end is arranged with a number of holes 50. A second end of the body 42 is arranged with a console element 52 extending generally 90 degrees in relation to the extension of the body 42. The transition between the body 42 and the console element 52 is provided with a bending initiator in the form of a hole 54. The console element 52 is arranged with a plurality of holes 56 that are placed both horizontally and vertically on the console element 52 in relation to a plane of a roof.

[0023] The attachment element 40 is placed on the roof such that the body 42 is placed on roofing battens 60, Fig. 5, of a roof such that the bracket 46 is in contact with a side surface facing upwards of one roofing batten 60. The body is then attached to the roofing batten 60 by appropriate fastening elements such as screws 62 in the hole 48 of the bracket 46 and the holes 50 on the upper section of the body 42. In this regard, the holes 50 on the upper section of the body 42 are positioned such that the screws 62 will not affect the same fibres if a wooden batten is used. The lower section of the body 42 is positioned in the valley of a lower tile 64, and an upper tile 66 may be placed covering the body 42. The length of the body 42 is such that the console element 52 is below the upper tile 66 and is extending generally perpendicular to the plane of the roof.

[0024] The console 10 is then placed on top of the tiles and has a length such that it rests with the cushioning elements 38 of the lower section 18 on the ridges of three adjacent tiles as seen in a transversal direction. The central section 14 of the console 10 is placed in contact with the console element 52. The console 10 is then adjusted somewhat in the transversal direction so that one of the holes 56 of the console element 52 is aligned with one of the holes 20 of the first attachment points of the central section 14 of the console 10 adjacent the cut-outs 22, 28 as seen in Fig. 5. Appropriate attachment elements, such as bolts and nuts 68 are then used in the holes to firmly attach the console 10 to the attachment element 40. Even though only one attachment 40 is shown in Fig. 5, it is to be understood that a second attachment element may also be used, anchored to the roof as described above and attached to the console 10 adjacent the other first and second cut-outs 22, 28.

[0025] Figs. 4 and 6-7 show a variant of an attachment element 80 for a roof having flat tiles, for example so

called biberschwanz-tiles 81. The attachment element 80 according to the variant has a body 82 that is elongated and band-shaped sheet metal. However, in contrast to the previous attachment element, the body 82 has a vertical orientation as seen in Fig. 4, so as to fit between adjacent tiles. The height h of the body 82 is in this regard preferably not higher than the thickness of the tiles so as to not interfere with tiles placed above the body and overlapping lower tiles as seen in Fig. 6. The upper end of the body 82 is arranged with a downwardly extending bracket 84 that is to be in contact with a side surface of a batten 60, Fig. 7 facing the ridge of the roof. Adjacent the bracket 84 an attachment plate 86 is attached to or made integral with the body 82 with an orientation generally 90 degrees in relation to the body 82. The attachment plate 86 is provided with a number of holes 88. The attachment plate 86 will rest on an upper surface of a batten and will be fastened thereto by appropriate screws 90 in the holes 88 of the attachment plate 86. In this regard, the holes 88 are preferably oriented such that the screws 90 will not affect the same fibres of a wooden batten 60. An end section 92 of the body 82 of the attachment element 80 is provided with attachment structures 94 such as holes, which may be both round and elongated.

[0026] When the attachment elements 80 have been attached to the roof and the tiles have been placed, the end section 92 of the attachment element 80 with the attachment structures 94 are accessible on the roof as seen in Fig. 6. The console 10 may now be attached wherein the end section 92 of the attachment element 80 is placed in the first cut-out 22 of the console 10 and is orientated so that the attachment structure 94 of the attachment element 80 is aligned with the attachment points 26 of the bracket 24. Appropriate fastening elements such as bolts and nuts 96 are then used to attach the console to the attachment element, Fig. 7.

[0027] Figure 8 shows a further variant of attachment element 100 for attaching the console 10. This attachment element 100 is designed for folded sheet metal roofs. They are made of flat sheet metal elements that are joined to each other by generally perpendicular folds 102, which folds usually run in the direction of the inclination of the roof. The attachment element 100 comprises a clamping bracket 104 having a first generally vertical plate-shaped section 106 having one side that is to be in contact with a side surface of the fold 102. The first section 106 transforms into an upper, generally plate-shaped second section 108, wherein the second section 108 has a longer extension in both directions than the first section as seen in the direction of the fold, forming tongues 110 in both directions. Each tongue 110 is provided with attachment structures in the form of holes 112.

[0028] The first section 106 is further arranged with bolts 114 extending generally perpendicular from the contact side and positioned above the fold 102 when the attachment element 100 is placed on the fold, Fig. 9. An L-shaped bracket 116 is connected to each bolt 114 by

holes through which the bolts extend, wherein the L-shaped brackets 116 are positioned on the opposite side of the fold when the attachment element 100 is placed on the fold. The L-shaped brackets 116 are pressed against the fold by nuts 118, wherein the L-shaped brackets 116 grip under a fold edge 120 as seen in Fig. 9, preventing lifting of the attachment element 100 from the fold when exposed to forces. In this regard, the attachment element 100 can be turned 180 degrees in relation to the fold depending on which side of the fold the fold edge 120 is.

[0029] In order to place the console 10 properly on the roof surface, the two first cut-outs 22 are designed and positioned along the console such that the folds 102 are placed in the cut-outs. Fig. 8 shows only one fold for sake of simplicity, but it is to be understood that another fold may be placed in the now empty cut-out 22. The console is positioned in relation to the attachment elements 100 such that a tongue 110 of the attachment element 100 is inserted into the second cut-out 28 of the console 10, above the first cut-out 22 containing the fold 102. The hole 112 of the tongue is then aligned with the hole 34 on the upper section 16 of the console 10 above the second cut-out 28, and the console 10 is attached to the attachment element by appropriate attachment elements such as bolts and nuts 124.

[0030] For all variants, a number of different equipment may be attached to the console. In particular, the console is suitable for ladders 130 for personnel working on a roof such as the one shown in Fig. 10. When used for a ladder, at least two consoles are arranged on the roof in accordance with above and as seen in Fig. 10 several consoles may be attached to a number of attachment elements 80. When attaching a ladder, the holes 30 of the second attachment points on the outer areas 32 of the upper section 16 are used. As can be noticed from the figures, these holes 30 are positioned outside of the first and second cut-outs 22, 28.

[0031] In addition to providing access to different parts of the roof, a ladder 130 attached to the console or consoles 10 also act as anchoring points for personal fall arrest equipment, wherein a safety lanyard may be attached to different parts of the ladder. Regarding the safety aspect, if a person attached to a ladder falls off the roof, the console 10 according to the invention is provided with deformation structures that are designed to provide dampening effects on the falling person. As mentioned above, the console 10 is arranged with the first and second cut-outs 22, 28 at the first attachment point(-s) and a ladder is attached to the outer areas 32 of the console 10 at the second attachment point. A force from a falling person on the ladder, will transmit to the outer areas of the console via the attachment of the ladder. Since the force is generally in line with the ladder and thus perpendicular to the extension of the console, the outer ends will be exposed to a bending action, wherein the major bending point is the first attachment point(-s) 20, 26, 34 of the attachment elements 40, 80, 100 to the console

10 and wherein the distance D will act as a leverage. Due to the presence of the first and second cut-outs 22, 28 in the area of the first attachment point, a very controlled bending is obtained and thereby a controlled dampening of the fall due to the controlled deformation of the console in this area. In order to provide further dampening functionality, the outer area of the console may be provided with further deformation structures. These may comprise cut-outs 140 as shown in Fig. 11, arrays of holes on the central, upper and/or lower sections of the console. The main aspect is that the console will deform in a controlled fashion, thereby providing a force dampening effect.

[0032] Figure 12 shows a variant of the console 10 described above. Here the console is arranged with an added first cut-out 22 as well as second cut-out 28 positioned generally centrally along the extension of the console. This is an advantage for sheet metal roofs, Figs. 1 and 14, that have folds placed more narrowly than most conventional sheet metal roofs. As an alternative, the console may be attached centrally providing an even distribution of the loads on the console if only one attachment element 100 is used as seen in Fig. 13. This is also an advantage regarding deformation in that the central cut-outs provide a further deformation structure wherein the console may bend at three points when subjected to forces as described above.

[0033] Some of the embodiments shown and described above are provided with two attachment elements for one console, as seen for instance in Fig. 6. It is however to be understood that only one attachment element may be used for each console, such as is shown in Figs. 5, 13 and 14, still providing the sturdiness and force handling properties necessary for a safe attachment to a roof. In this case, the distance between the first attachment point and the second attachment point is generally the same on one side of the console, while the distance between the first attachment point and the second attachment point at the other end of the console is considerably longer. In any event, a controlled bending and deformation is obtained also with only one attachment element.

[0034] It is to be understood that the embodiment described above and shown in the drawings is to be regarded only as a non-limiting example of the invention and that it may be modified in many ways within the scope of the patent claims.

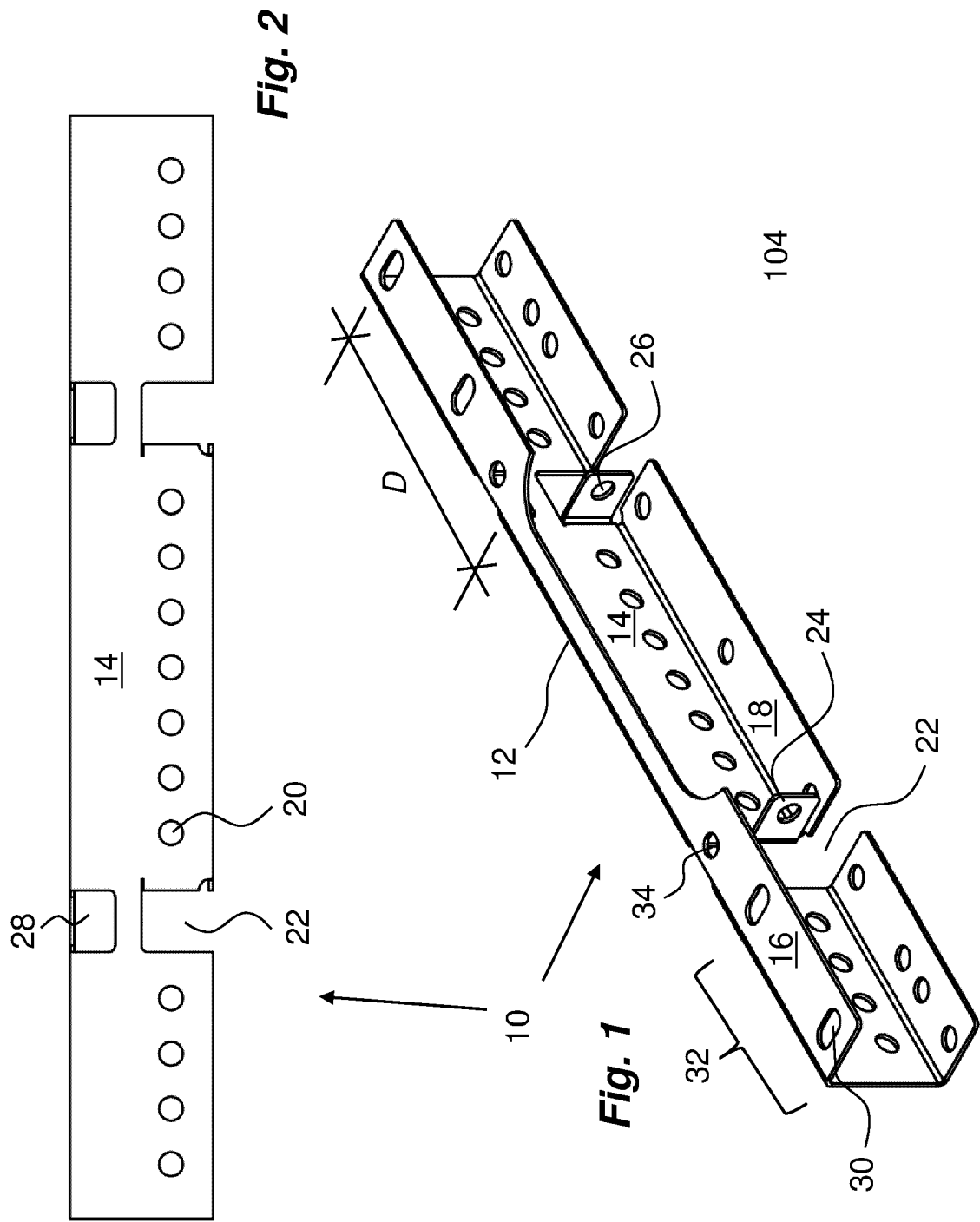
Claims

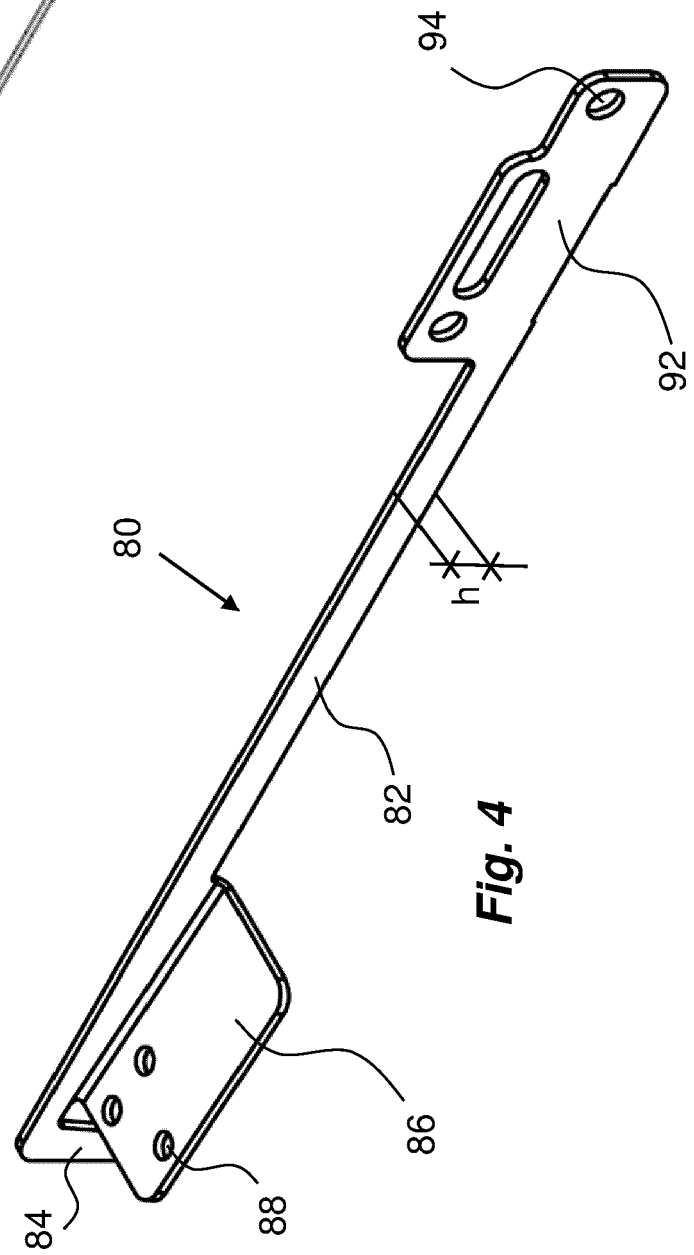
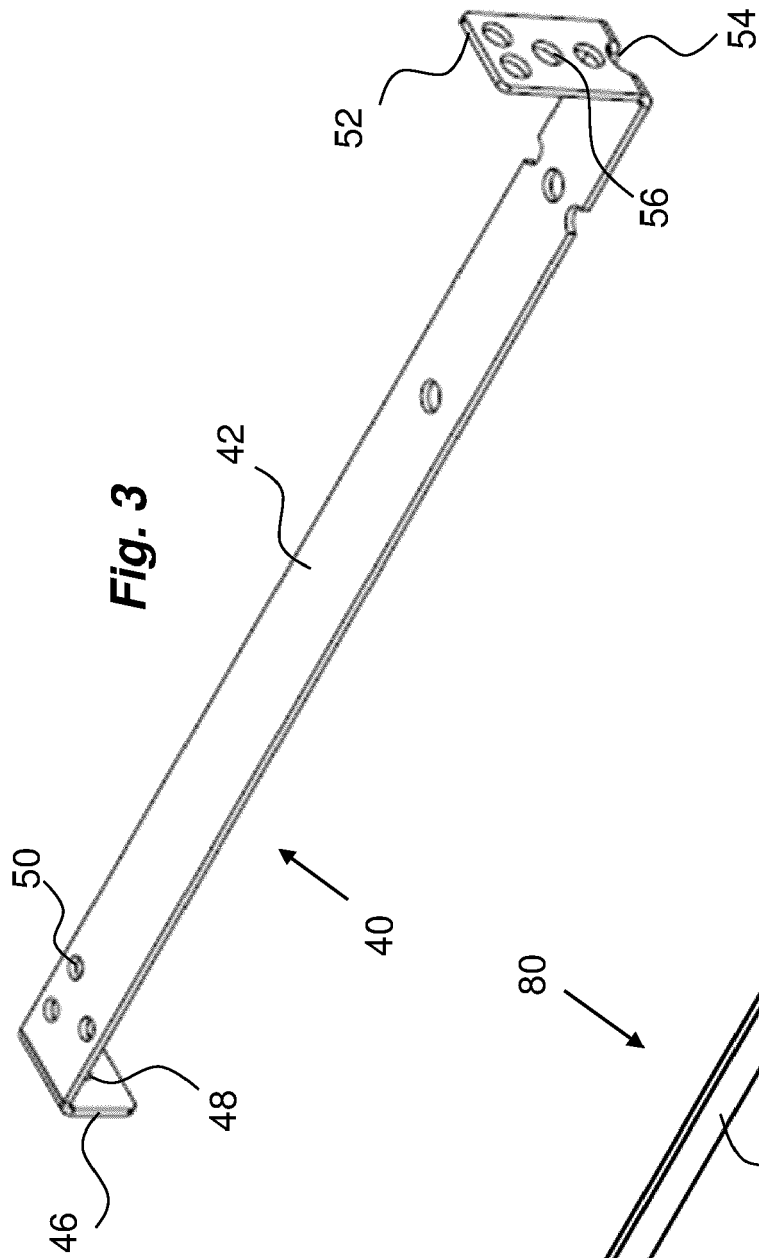
1. Attachment element (80) for a roof console or a roof access equipment, the attachment element (80) comprising an elongated plate-shaped body (82) having a generally perpendicular orientation in relation to a roof plane when attached to a roof structure, intended to be positioned between two adjacent roof tiles of said roof structure.

2. Attachment element (80) according to claim 1, wherein the height (h) of the body in the generally perpendicular direction is equal or less than the thickness of adjacent roof tiles. 5
3. Attachment element (80) according to claim 1 or 2, comprising a first attachment structure (84, 88) at an upper end area thereof for attachment to the roof structure, which upper end area is to be positioned higher up as seen in a direction of inclination of said roof structure. 10
4. Attachment element (80) according to claim 3, comprising a bracket (84) arranged to be in contact with a side surface of a batten facing a ridge of the roof. 15
5. Attachment element (80) according to claim 4, wherein the bracket (84) is downwardly extending.
6. Attachment element (80) according to any one of claims 3 to 5, comprising an attachment plate (86) attached to or made integral with the body (82) with an orientation generally 90 degrees in relation to the body (82). 20
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7. Attachment element (80) according to claim 6, wherein the attachment plate (86) is arranged to rest on an upper surface of a batten.
8. Attachment element (80) according to claim 7, wherein the attachment plate (86) is arranged adjacent to the bracket (84). 30
9. Attachment element (80) according to claim 7 or 8, wherein the attachment plate (86) comprises a number of holes (88). 35
10. Attachment element (80) according to any one of claims 3 to 9, comprising a second attachment structure (94) at the opposite end section (92) thereof for attachment to a roof console or a roof access equipment. 40
11. Attachment element (80) according to any one of the preceding claims, wherein the attachment element (80) is fixedly secured to the roof. 45

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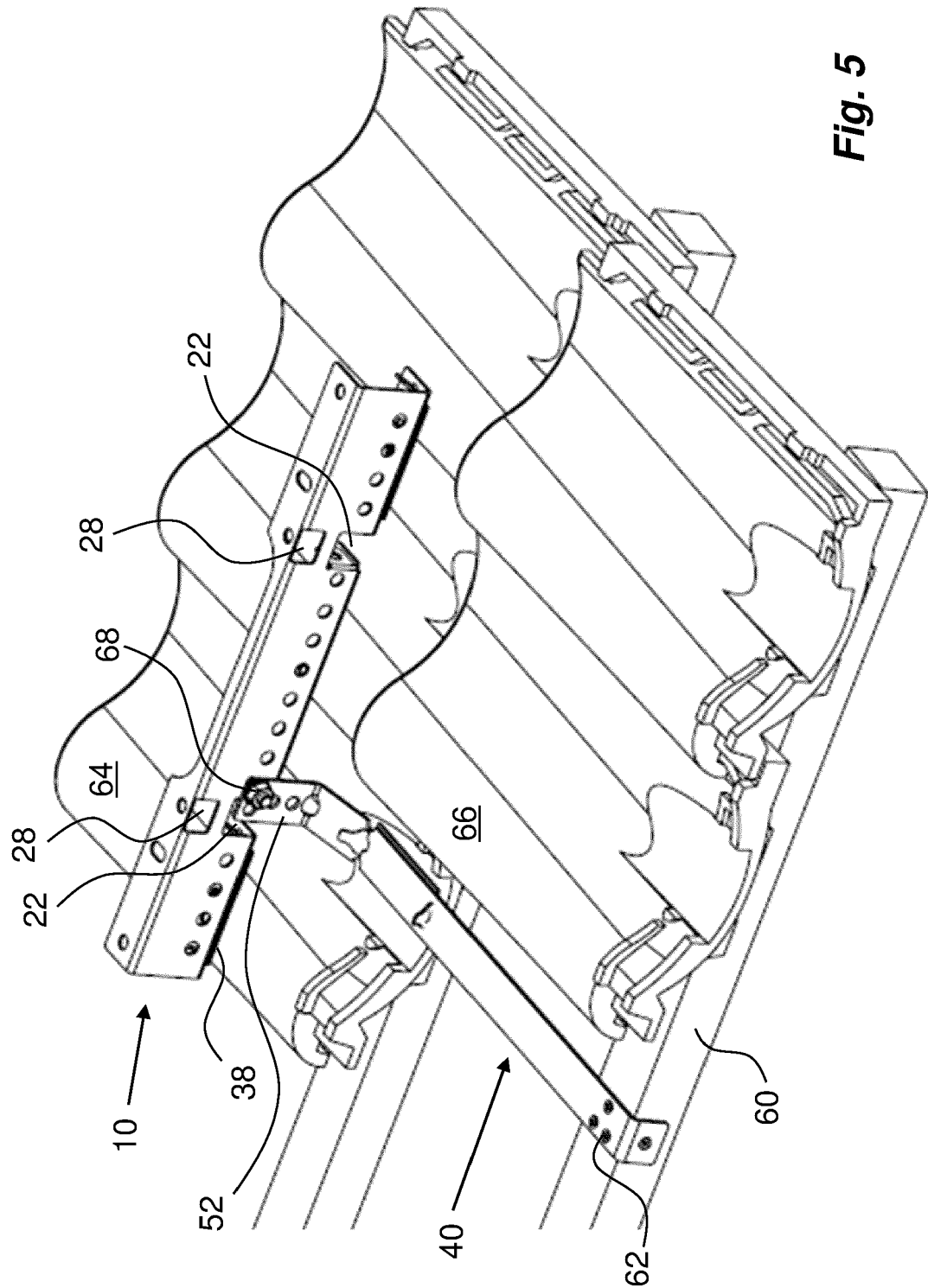


Fig. 5

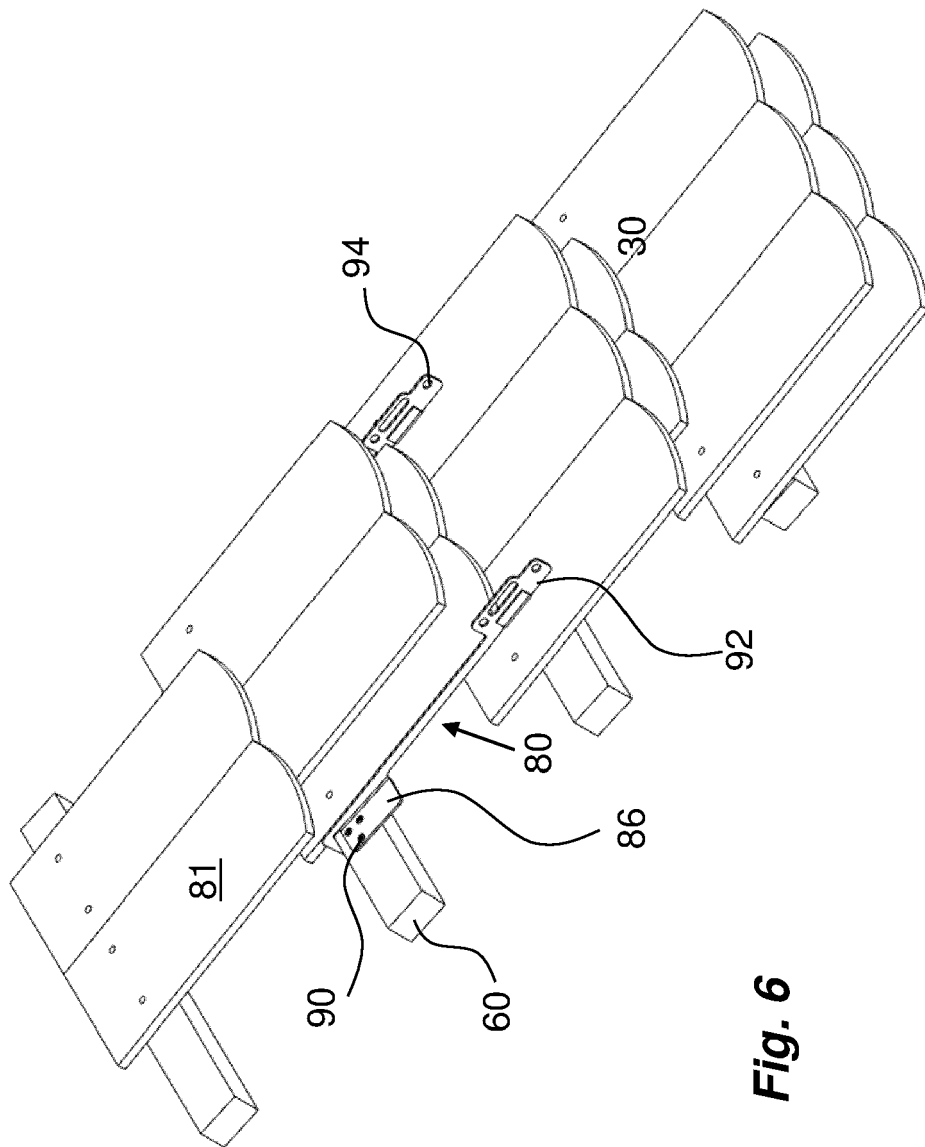


Fig. 6

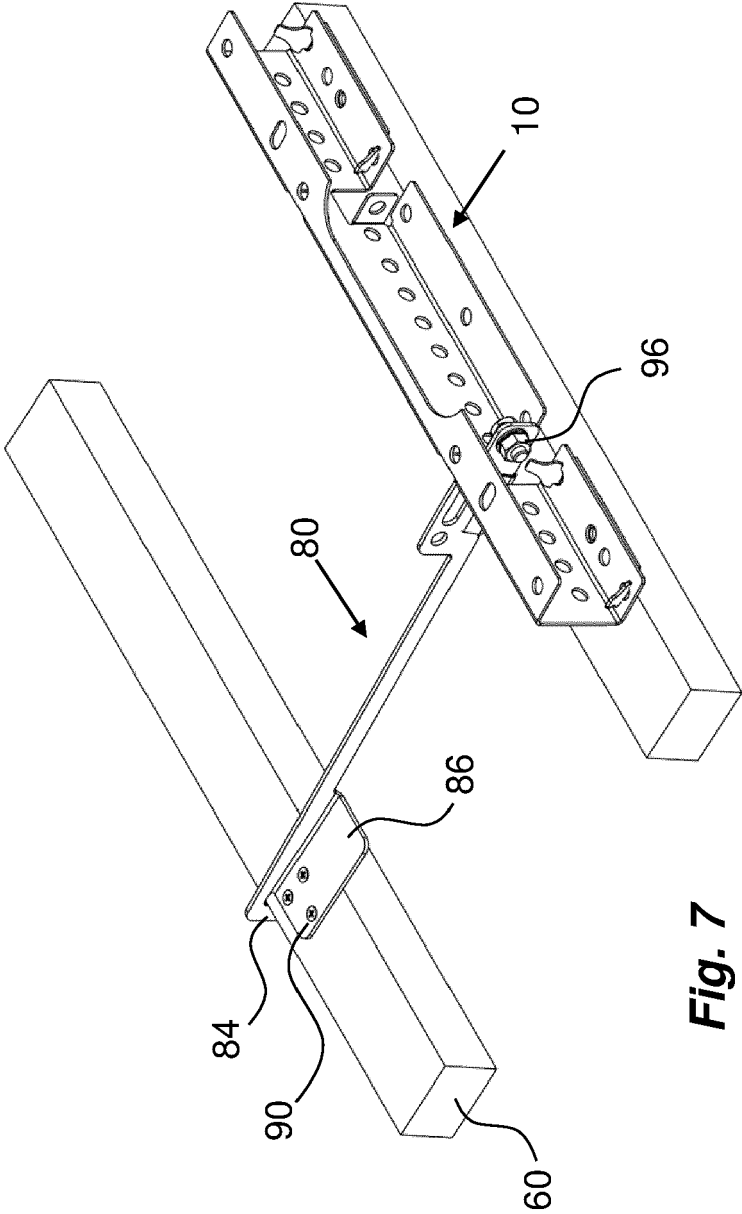


Fig. 7

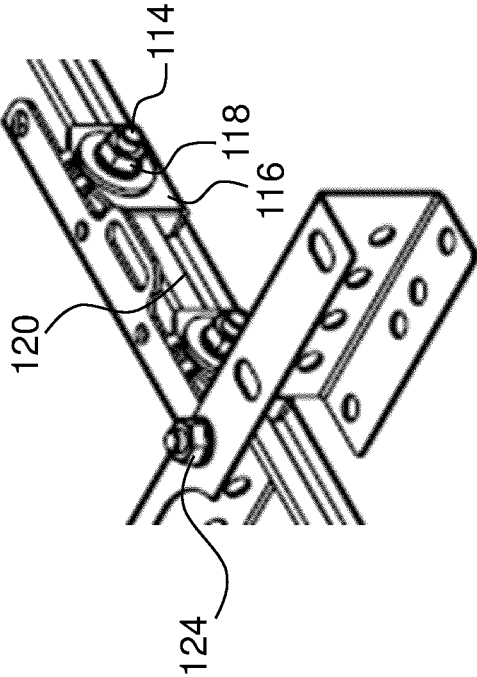


Fig. 9

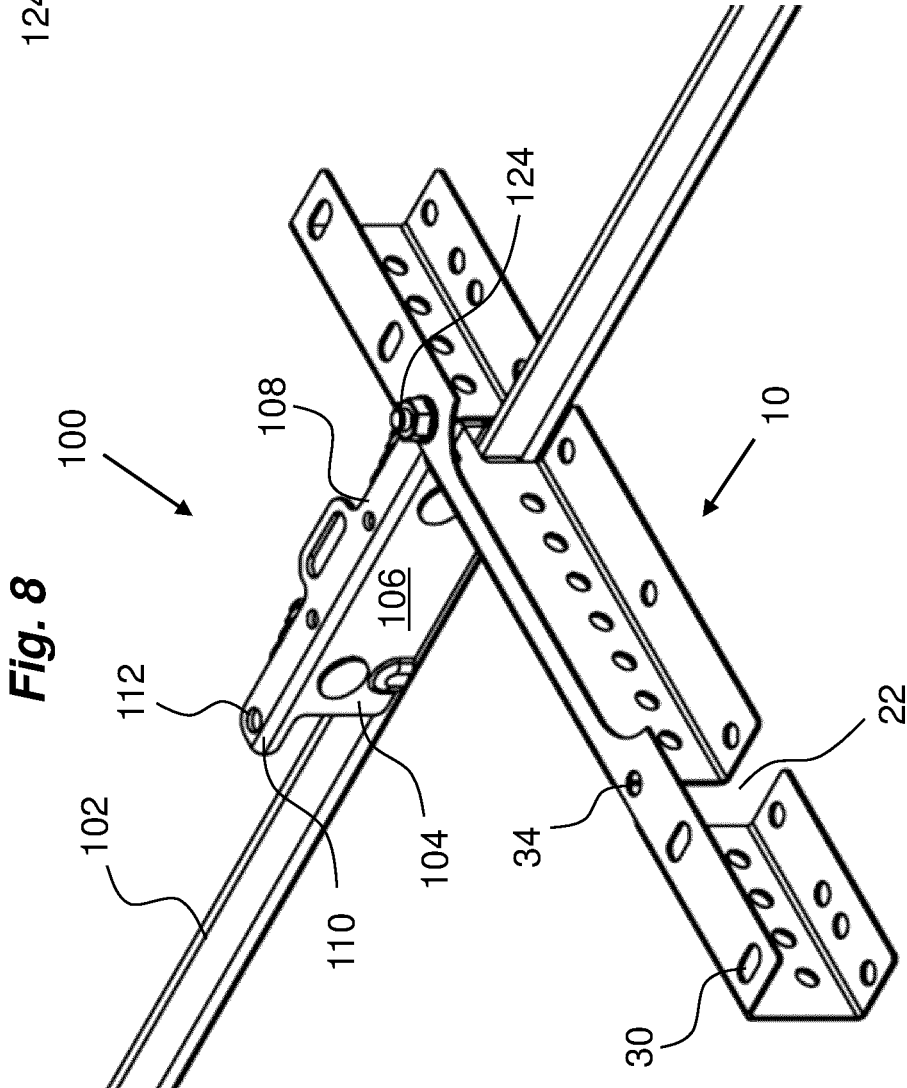


Fig. 8

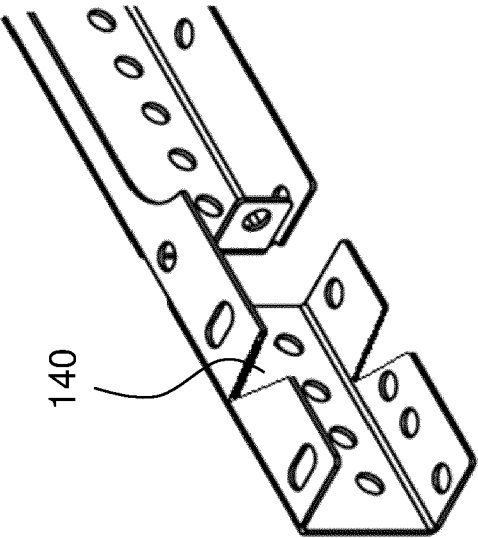


Fig. 11

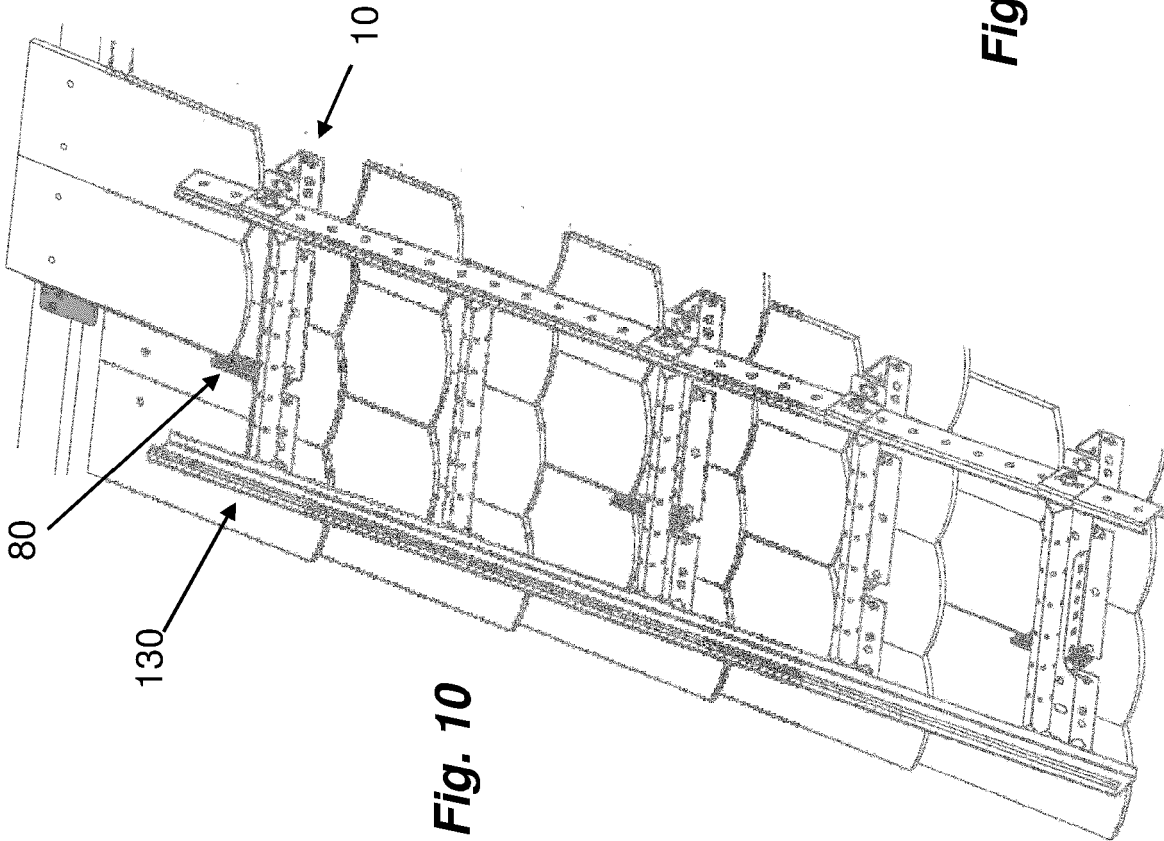


Fig. 10

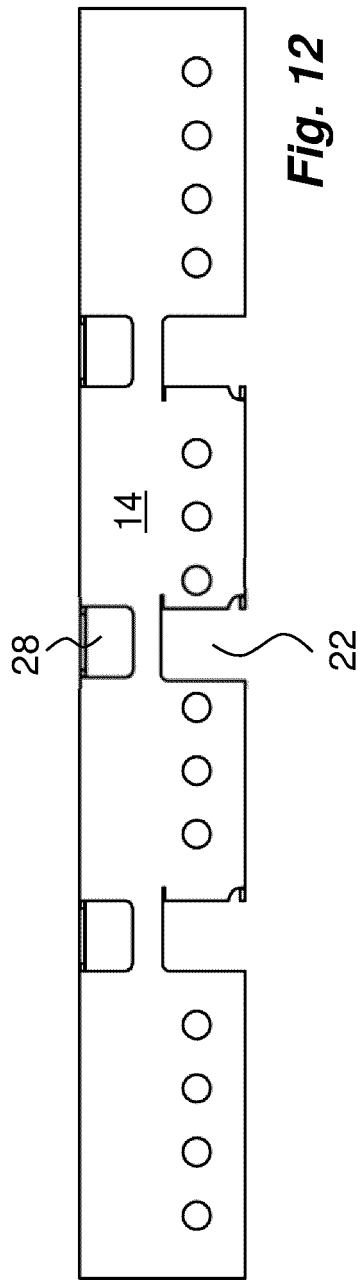


Fig. 12

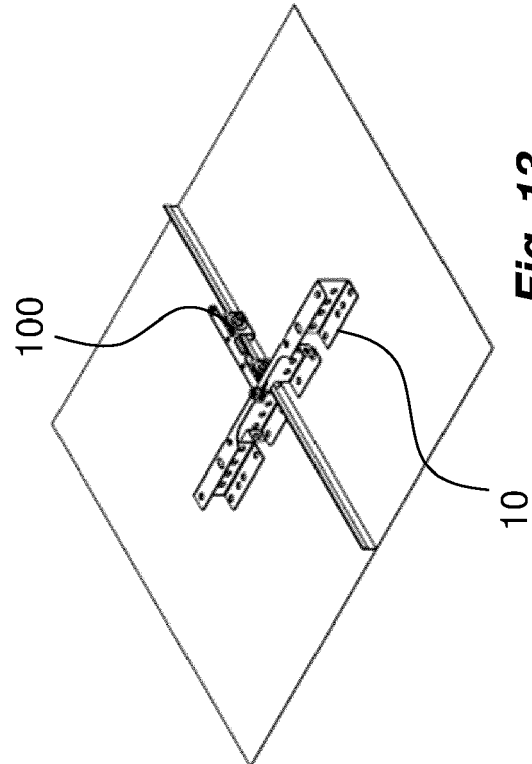


Fig. 13

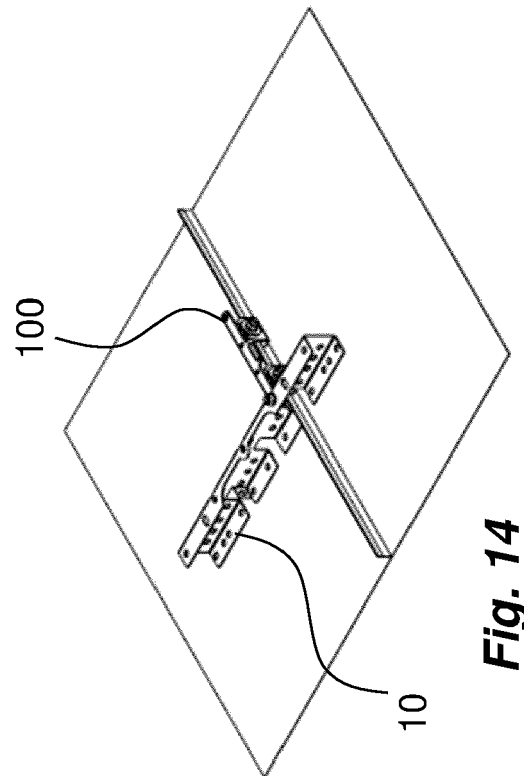


Fig. 14



EUROPEAN SEARCH REPORT

Application Number

EP 22 17 7010

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EPO FORM 1503 03.82 (P04C01)

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E	EP 3 967 824 A1 (CWL PATENT AB [SE]) 16 March 2022 (2022-03-16) * figures 1-15 * -----	1-11	TECHNICAL FIELDS SEARCHED (IPC) E06C E04D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 11 August 2022	Examiner Petrinja, Etjel
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	

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

EP 22 17 7010

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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