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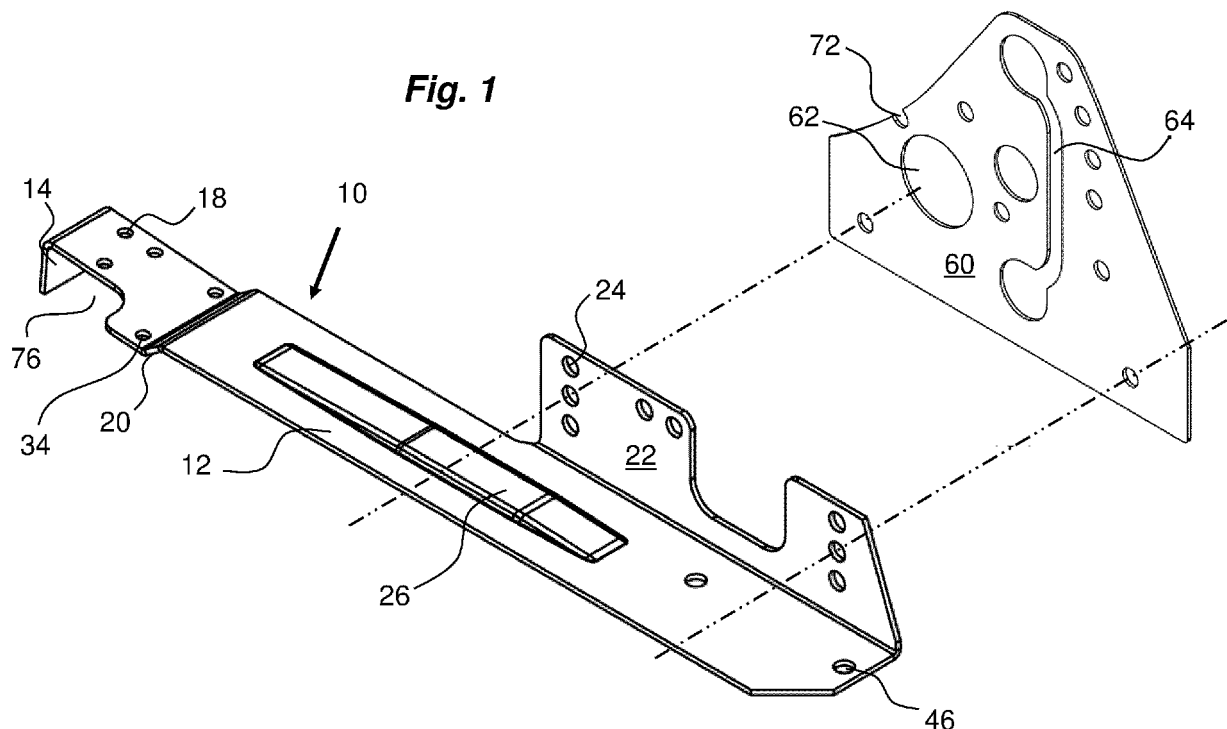
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(54) **ATTACHMENT DEVICE**

(57) The present invention relates to an attachment device (10) to be attached to a roof structure provided with overlapping generally flat tiles, comprising an elongated flat body (12), a first attachment element (14) in a first end of said body (12), for attachment to a fixed struc-

ture of the roof structure, a second attachment element (22, 60) in a second opposite end of said body (12), for attachment of equipment for access and safety of said roof structure, wherein said body, when attached, is placed between overlapping tiles.



Description

TECHNICAL AREA

[0001] The present invention relates to an attachment device to be used on roofs with tiles and in particular flat non-profiled tiles.

BACKGROUND OF INVENTION

[0002] Roof tiles are widely used for protecting the roof on buildings. Roof tiles are made in many different shapes and sizes. In some countries or geographic areas the roof tiles are curved and placed in rows so as to create channels generally in the direction of the slope of the roof. In other regions the tiles are generally flat and where the rows of tiles are placed offset with half a tile so as to cover the gap between adjacent tiles in a row that is generally transversal to the direction of the inclination of the roof.

[0003] The latter type of tiles can pose a challenge when access and safety equipment are to be attached to the roof. Either the tiles have to be drilled in order to attach suitable brackets to fixed roof structures under the tiles, which requires sealing of the drilled holes, or one or several tiles are removed and replaced with fastening brackets. In either case, the appearance of the roof is affected and the risk of breaking tiles or water entering under the tiles can cause problems.

[0004] Some attempts have been made to provide solutions for attaching equipment on roofs with generally flat roof tiles. CH 377515 A discloses a device to be attached to a roof provided with means for preventing snow from sliding off the roof. The device comprises an elongated flat body that is placed between overlapping tiles. The device is however not suited for attachment of personal fall protection equipment and the high forces from a falling person. Rather, the device of CH 377515 A is designed for much more moderate forces from snow on the roof. There is thus room for solutions that are capable of handling much larger forces.

BRIEF DESCRIPTION OF INVENTION

[0005] The aim of the present invention is to remedy the drawbacks of the state of the art solutions for attaching access and safety equipment on roofs with flat tiles. This aim is solved with an attachment device according to the features of the independent patent claim. Preferable embodiments of the invention form the subject of the dependent patent claims.

[0006] According to a major aspect, an attachment device is provided to be attached to a roof structure provided with overlapping generally flat tiles. The attachment device may comprise an elongated flat body, a first attachment element in a first end of said body, for attachment to a fixed structure of the roof structure, a second attachment element in a second opposite end of said body, for

attachment of equipment for access and safety of said roof structure, wherein said body, when attached, is placed between overlapping tiles. With this solution a good attachment point is obtained for access and safety equipment on roofs with generally flat tiles without having to manipulate or remove any tiles since the flat body of the attachment device is positioned between overlapping tiles and only in a minor way affects the tiles due to the flat design of the body.

[0007] Preferably the first attachment element may comprise a downwardly extending bracket arranged to be in contact with a side surface of a batten facing towards a ridge of the roof structure. With this solution, a very sturdy attachment of the attachment device is obtained since it is anchored in a batten. Also, if the attachment element is exposed to forces directed in the direction of the inclination of the roof, these forces will in a minor way affect the tiles. In order to further secure the attachment device, the first attachment element may comprise a number of holes for attachment to battens with appropriate screws.

[0008] Further, the first end of the body may be arranged with a reduced width for accommodating attachment points of tiles placed over the device. In this regard, the body may be provided with a step for accommodating a tile under the body when attached to the roof structure.

[0009] In order to further strengthen the attachment device, the body may be arranged with stiffening elements. The stiffening elements may comprise protrusions extending in the direction of the elongated body. as an alternative, the stiffening elements may comprise forming the body to a concave or convex shape as seen in a cross-section. According to another aspect, the second attachment element may comprise a bracket to which access and safety equipment are attached. In this regard, the bracket may be arranged with a breakage initiator. This will enable controlled deformation and breakage of the attachment device should it be exposed to forces from a person falling off the roof and will thereby provide a dampening effect. The breakage initiator is preferably placed on the edge of the bracket facing towards the ridge of the roof, which will be generally in the opposite direction to the direction of the force on the attachment device.

[0010] These and other aspects of and advantages with the present invention will become clear from the following detailed description and from the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0011] 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 attachment device according to the application,

Fig. 2 is an end view of the attachment device of Fig. 1,

Fig. 3 is a perspective view of a variant of the attachment device according to the application,

Fig. 4 is a perspective view of a part of a roof arranged with the attachment device of Fig. 1,

Fig. 5 a-c show different equipment that can be attached to the attachment device of Fig. 1 or Fig. 3, and

Fig. 6 is a view from below showing the interaction between the attachment device and tiles attached to a roof.

DETAILED DESCRIPTION OF THE INVENTION

[0012] One embodiment of an attachment device 10 is shown in Fig. 1. It comprises an elongated plate-shaped body 12. A first, upper end of the body 12 is arranged with a downwardly directed ledge or end plate 14, which is arranged with a central hole 16, Fig. 2, to be used for attachment. The area of the body adjacent the end plate 14 is further arranged with a number of holes 18 that also are to be used for attachment as will be described. Adjacent the area with holes, the body may have an elevation 20 that provides a step as will be described. At the lower end of the body 12, a generally vertical attachment plate 22 is arranged. The attachment plate 22 is arranged with a number of holes 24 for attachment.

[0013] The body may further be arranged with a reinforcement or stiffening element along a section of its length. The stiffening element may be in the form of an elongated protrusion 26. As an alternative, the stiffening element may be in the form of shaping the body. For instance, the body 12 may be somewhat concave as seen in a cross-section, Fig. 3. As an alternative, the body may be somewhat convex. This will add to the bending strength of the body. Generally, the device may preferably be made from a steel sheet plate, such as by stamping. The stamping may be done in a single step, with both forming the profile of the device and providing the holes. As an alternative, the stamping of the profile and the holes may be done in subsequent steps. Further, the stamped profile is then formed to the final shape by bending of the end plate, the attachment plate and the step. Also, the protrusion or the forming into concave or convex shape may be performed in any of the above steps or in further steps of manufacture.

[0014] In use the attachment device 10 is placed on a fixed structure like a roof provided with roofing battens 30, Fig. 4. The end plate 14 is then placed in contact with an upper side surface of a batten 30 wherein the holes 18 adjacent the end plate 14 are positioned on an upper surface of the batten 30. The attachment device is then anchored to the batten with appropriate screws 32. The

upper holes 18 may in that regard be positioned offset to each other as seen transversal the extension of the batten such that the screws 32 will not affect the same fibres of the batten, if the batten is made of wood. In order to reduce the risk of the attachment device of pivoting around the attachment points of the upper part of the body, a second set of holes 34 are provided, through which screws may be fastened in the batten. Depending on the width of the batten used, a second batten 34 may be arranged below the first batten 30 as seen along the inclination of the roof, Fig. 4.

[0015] Further, the step 20 of the body 12 is provided so that the free part of the body 12 is elevated in relation to the attachment section, enabling a tile 40 to be placed under the device, wherein the lower part of the body is resting on, and is parallel with, a tile 40 underneath, as seen in Fig. 4. The lower area of the free part of the body may further be arranged with a cushioning element 42 on its underside such as a strip of rubber between the body 12 and the tile on which it rests. The cushioning device 42 may in that regard be arranged with attachment elements 44 that pass through holes 46 in the free section of the device. The length of the body 12 and the extension of the attachment plate 22 are such that the attachment plate 22 will be positioned below a tile that covers the body as seen in Fig. 4. Thus, only the lower part of the device and its attachment plate 22 are visible when the tiles have been placed. In this regard, the thickness of the body is chosen such that a tile placed on the body is lifted as little as possible. The width of the body is then chosen such that the attachment device fulfils the regulations applicable for different countries and regions regarding withstanding forces applied to the attachment device when used as anchoring points for personal fall protection equipment.

[0016] On the attachment plate 22, a number of safety and roof elements may be attached. For example, a bracket 60 may be attached with for example bolts and nuts to the attachment plate 22 via its holes 24. The bracket 60 in turn may be arranged with holes, both round 62 and profiled 64, through which different safety and roof elements may be inserted. Figs. 5a — d show different types of elements that may be used. Fig. 5a shows a walkway 66 to be attached to the attachment plate. Fig. 5b shows a profiled plate 68 that fits in the profiled holes 64 of the bracket 60 and functions as a snow fence. Fig. 5c shows a ridge and roof rail system 70 that functions as anchor points for personal fall protection. In this regard, the bracket 60 may be provided with a breakage initiator in the form of a cut-out 72, Fig. 1, in an edge of the bracket 60 facing towards the ridge of the roof.

[0017] If a person connected to the fixture via the above mentioned safety elements should fall off the roof, the force will provide a controlled breakage of the fixture at the breakage initiator 72 and a controlled collapse of the fixture, which creates a dampening effect on the fall and thus on the person, instead of a sudden stop of the fall. In the embodiment shown in Fig. 1, the fixture is arranged

as a separate component, but it is to be understood that the bracket 60 could be an integral part of the device, replacing the attachment plate 22.

[0018] For most types of tiles, protrusions 74 are provided on the underside of the tiles, which protrusions will be in contact with upper side surfaces of the battens when the tiles are placed on the roof. For some tiles, the distance between the protrusions is such that the anchoring device may interfere with the space for the protrusions. In this regard, the upper end of the body may be provided with a reduced width such as a cutaway section 76, providing room for one of the protrusions 74 as seen in Fig. 6, while the rest of the body has the required width as mentioned above.

[0019] 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, wherein the body is provided with a step (20) for accommodating a tile under the body when attached to the roof structure.

- 5 5. Attachment device according to claim 1, wherein the stiffening elements comprise protrusions (26) extending in the direction of the elongated body.
- 10 6. Attachment device according to claim 1, wherein the stiffening elements comprise forming the body to a concave or convex shape as seen in a cross-section.
- 15 7. Attachment device according to claim 1, wherein said bracket (60) is arranged with a breakage initiator (72).

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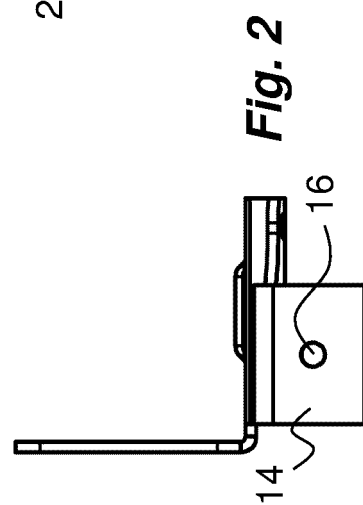
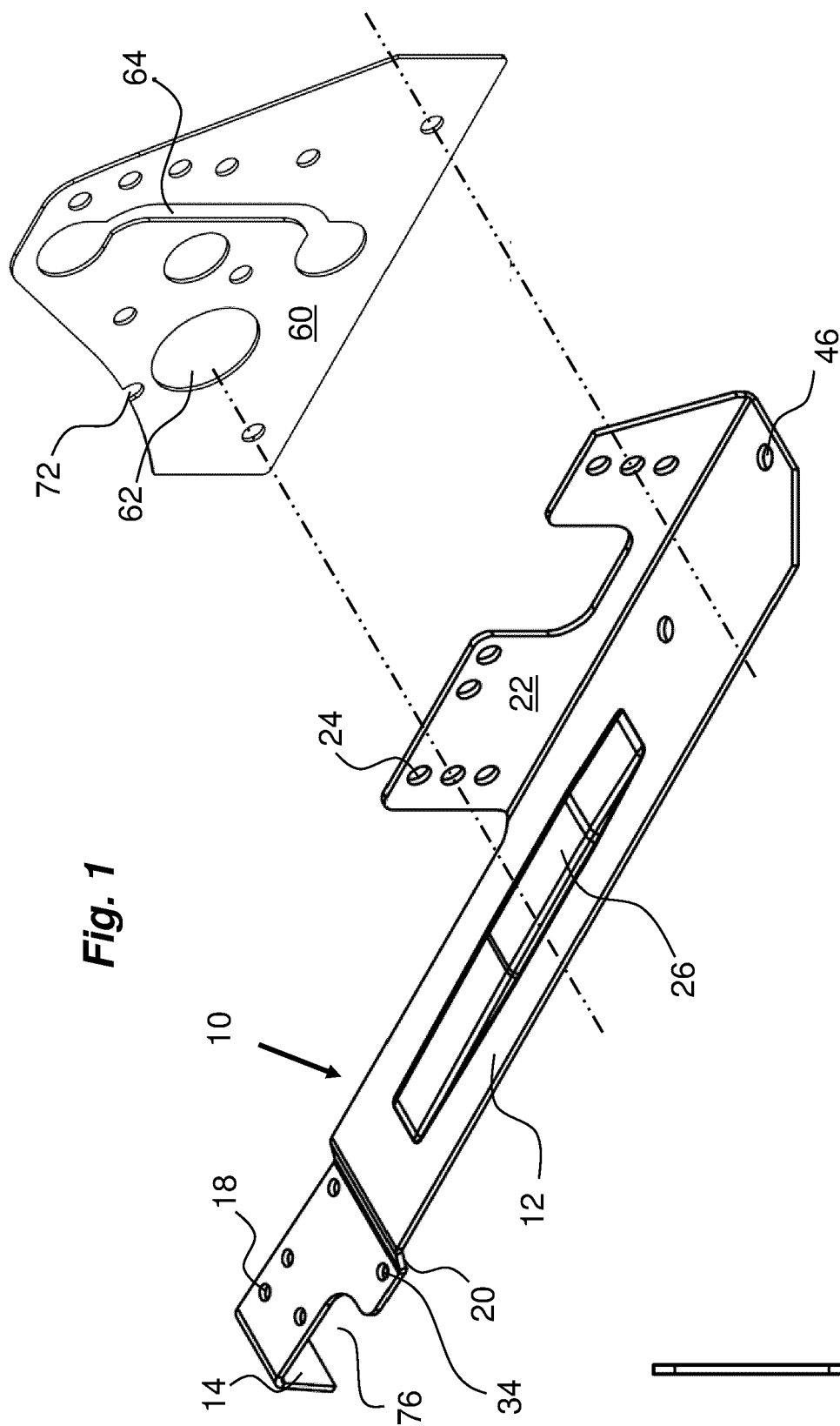
Claims

1. Attachment device (10) to be attached to a roof structure provided with overlapping generally flat tiles, comprising 25

- an elongated flat body (12),
- a first attachment element (14) in a first end of said body (12), for attachment to a fixed structure of the roof structure, 30
- a second attachment element (22, 60) in a second opposite end of said body (12), for attachment of equipment for access and safety of said roof structure, 35

wherein said body, when attached, is placed between overlapping tiles, **characterised in that** said first attachment element comprises a downwardly extending bracket (14) arranged to be in contact with a side surface of a batten facing towards a ridge of the roof structure, that said second attachment element comprises a bracket (60) to which access and safety equipment are attached, and **in that** the flat body (12) is arranged with stiffening elements (26) along at least a section of its length. 40 45

2. Attachment device according to claim 1, wherein said first attachment element comprises a number of holes (18, 34) for attachment to battens with appropriate screws. 50
3. Attachment device according to any of the claims 1 to 2, wherein the first end of the body is arranged with a reduced width (76) for accommodating attachment points of tiles placed over the device. 55
4. Attachment device according to any of the preceding



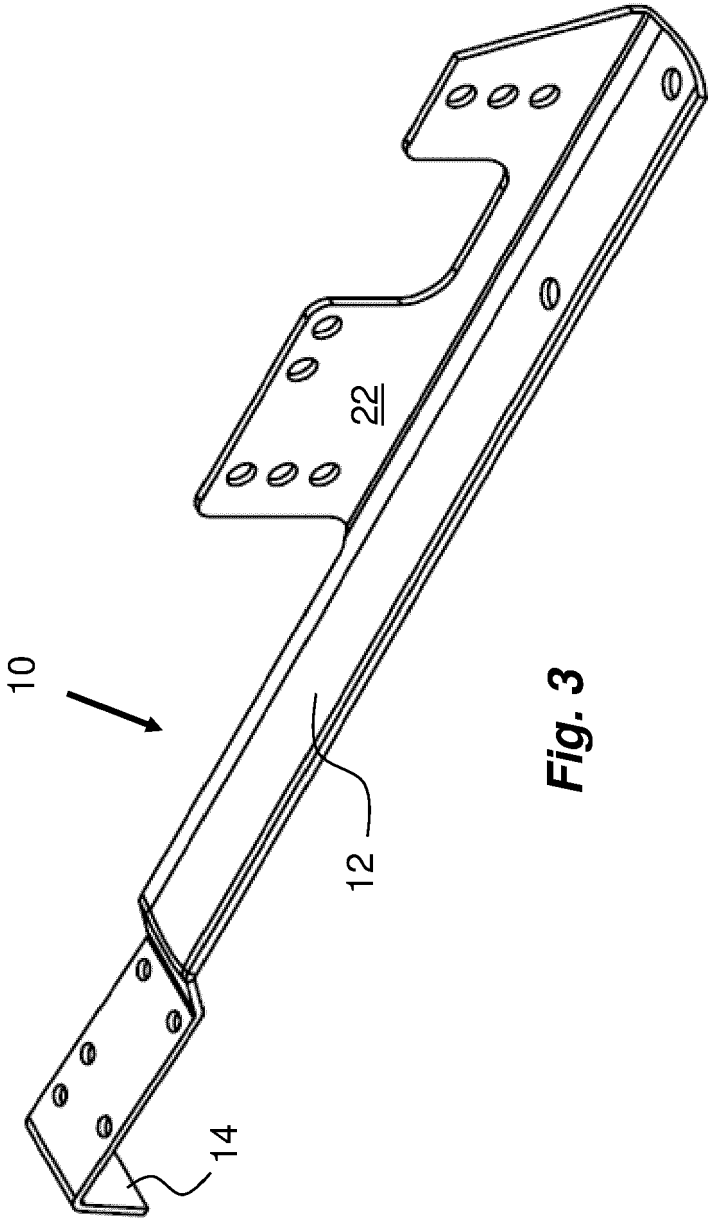
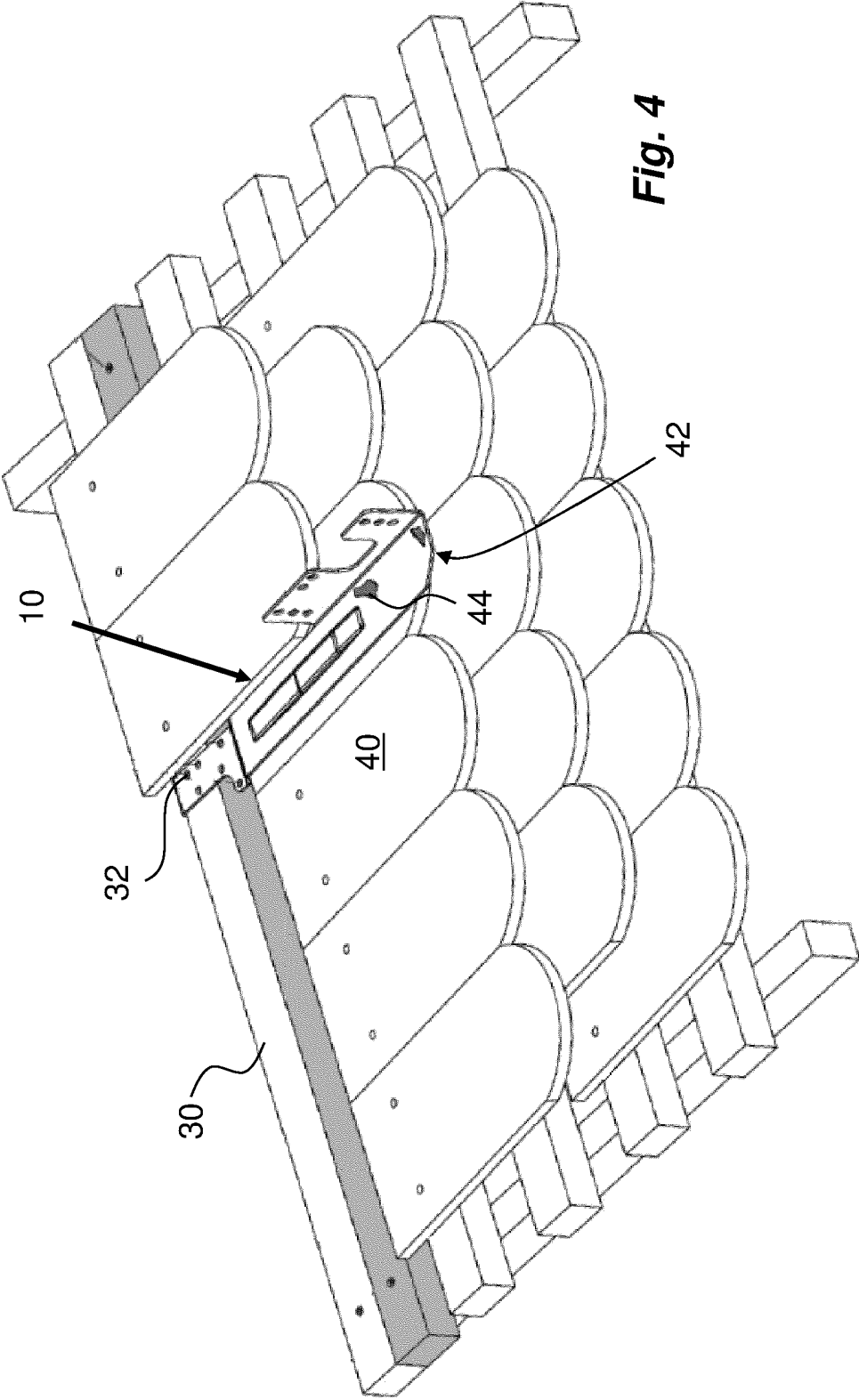
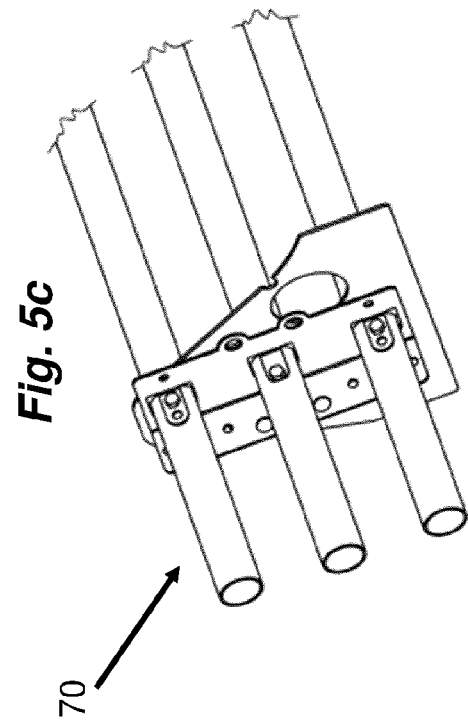
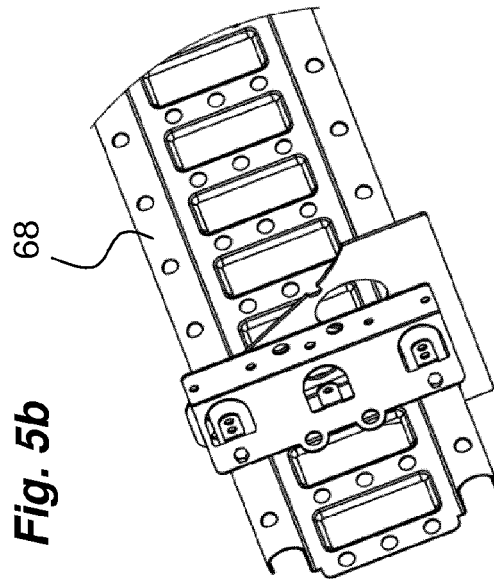
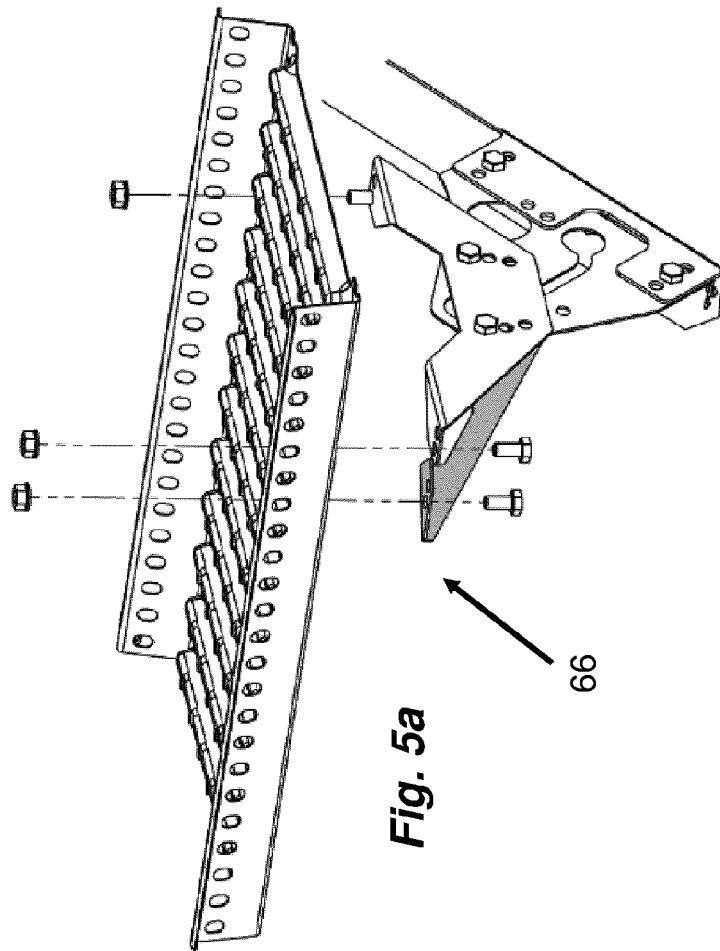


Fig. 3





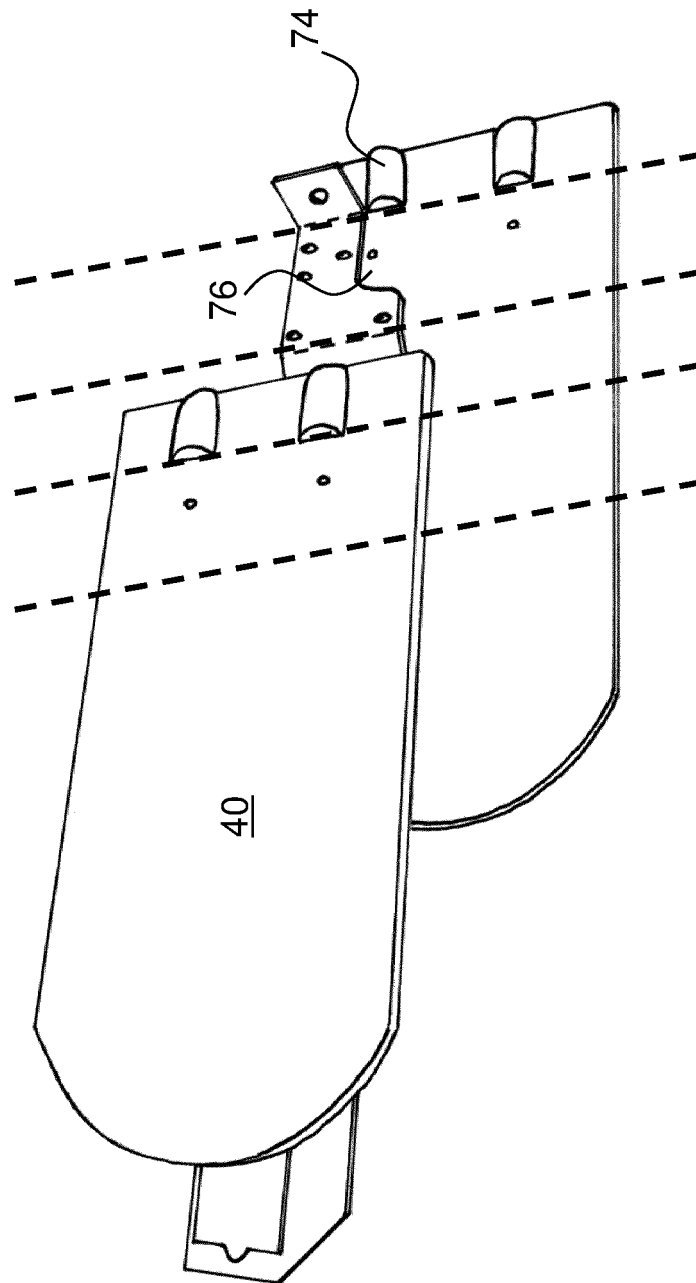


Fig. 6



EUROPEAN SEARCH REPORT

Application Number

EP 21 19 8543

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EPO FORM 1503 03.82 (P04C01)

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 25 February 2022	Examiner Tryfonas, N
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