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(54) An Improved Roofing Arrangement

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Description

[0001] The present invention relates to an improved roofing arrangement and in particular to an improved roofing arrangement for increasing habitable space in attics.

[0002] Traditionally, roofs are provided by using trussed rafters which significantly reduce the amount of habitable space in the attic, see Figures D, F, G and H. In order to increase the space in the attic, systems using purlins, see Figures C, E and H and rafter framing or alternatively modified plate trusses known as attic trusses are used. The use of purlins and framed rafters mean that skilled roofers have to carefully and accurately place the purlins before the overlying rafters are built into position. The purlins are heavy and awkward to work with which increases the health and safety risk on site. Even with the use of attic trusses, there is a requirement to provide a horizontal tying member see Figure F at the base of the rafters being a bottom chord or ceiling tie to restrain the horizontal thrust on the walls which would otherwise be imposed.

[0003] The load acting on the structural members of the roof is provided by wind load which gusts against the roof covering elements and is transferred into the roof rafters and onto the load bearing structures supporting the roof rafters. These load bearing structures are traditionally provided by load bearing masonry or timber framed walls. Another direct load occurs as a result of the weight of the roof covering elements bearing down on the rafters.

[0004] The result of these loads can be roof failure as a result of rafter bending B perpendicular to the rafter span, see Figures A, E and F and/or roof failure as a result of rafter thrust T along the line of the rafter span, see Figures A, B, C and D. The standard roof structures attempt to resolve these problems with increased rafter depth IRD as shown in Figure B although rafter thrust T is still a problem. The use of purlins P between the ends of the two inclined framed rafters are shown in Figure C which reduces the effective span of each rafter and this reduces the bending. However, rafter thrust T is still a problem. The use of web members W are shown in Figure D which reduces the effective span of the rafter and this reduces the bending. However, rafter thrust T is still a problem.

[0005] The use of an apex purlin AP along the apex of the two inclined framed rafters is shown in Figure E which resists the thrust of each rafter. However, bending B is still a problem. In Figure F, a chord or ceiling tie C is provided along the ceiling to resist the thrust of the rafter although bending B is still a problem. Figure G shows a W truss which resists both bending and thrust however there is no habitable space in the attic. The use of purlins P between the ends of the two inclined framed rafters as well as the use of apex purlin AP at the apex is shown in Figure H. This reduces the bending and thrust of each rafter although retains the problems with purlins already

mentioned above.

[0006] It is an object of the present invention to obviate or mitigate the problems of the existing systems for increasing habitable space in attics.

[0007] GB 2 430 946 A discloses a roofing arrangement according to the preamble of claim 1.

[0008] Accordingly, the present invention provides an improved roofing arrangement for a ridged roof comprising a roof apex reinforcing means, the roof apex reinforcing means comprising sloping planar reinforcing means tapering to or proximal to the apex of the ridged roof, the sloping planar reinforcing means being substantially parallel to a main plane of a sloping portion of the ridged roof, the planar reinforcing means extending along all or a substantial part of the length of the apex of the roof and extending along an upper region of at least one sloping portion of the ridged roof.

[0009] Advantageously, the roof apex reinforcing means is provided for resisting thrust of the rafters or roof members such as roof panels spanning between the eaves and a location at or about the apex or roof apex reinforcing means.

[0010] Ideally, the roof apex reinforcing means is extendable between and couplable to at least two end supports for supporting the roof apex reinforcing means down through a load bearing construction.

[0011] In one embodiment, the roof apex reinforcing means is provided by sheets fixed to the timber roof rafters on one or both sloping surfaces of the ridged roof proximal to the apex.

[0012] In this embodiment, the end sheets are mechanically couplable to the end supports.

[0013] According to the invention, the roof apex reinforcing means is provided by a reinforced apex beam having two sloping planar reinforcing members tapering to the apex of the reinforced apex beam, each sloping planar reinforcing member being substantially parallel to the main plane of the respective sloping portion of the ridged roof, the planar reinforcing members extending along all or a substantial part of the length of the reinforced apex beam.

[0014] In a preferred embodiment, the reinforced apex beam has web means extending between locations at or about the two spaced apart ends of the tapering planar reinforcing members. Advantageously, the web means reduces the effective length of the span of the roof rafters or roof members such as roof panels spanning between the eaves and a location at or about the lower ends of the reinforced apex beam. This reduces the effect of bending on the span of the roof rafters or the roof members such as roof panels.

[0015] Ideally, the end supports comprising two gable wall spandrel means.

[0016] Preferably, the improved roofing arrangement comprising a reinforced apex beam extendable between at least two end supports, the end supports comprising two gable wall spandrel means for supporting the entire weight of the reinforced apex beam down through a load

bearing construction on which the spandrel means is mountable.

[0017] Ideally, the reinforced apex beam having spaced apart web means extending between locations at or about the two spaced apart ends of the tapering planar reinforcing means.

[0018] Preferably, the planar reinforcing means form an outer part of an upper portion of a ridged roof and extend along all or a substantial part of the length of the reinforced apex beam.

[0019] Preferably, the web means extends between locations at or about the two lower ends of the planar reinforcing means.

[0020] Ideally, the end supports comprise two spandrel means for supporting and transferring the weight of the reinforced apex beam and the load carried thereon down through a load bearing construction on which the spandrel means is mountable.

[0021] Ideally, the spandrel means has insulation.

[0022] Preferably, the load bearing construction comprises at least two walls, most preferably gable walls.

[0023] Ideally, the web means comprising spaced apart strut/truss members spaced longitudinally along the length of the apex beam or between rafters.

[0024] Ideally, the planar reinforcing means extend down along and parallel to both sloping sides of the ridged roof in use.

[0025] According to the invention the apex beam is a reinforced triangular prism. Ideally, the cross-sectional shape of the reinforced apex beam is triangular or truncated triangular. Advantageously, this shape lends itself to the reinforced apex beam being placed atop the roofing arrangement so as to complete the generally ridged roof shape. Further advantageously, the generally triangular shape of the reinforced apex beam is equally strong in both vertical and horizontal directions and acts as a structurally efficient triangular prism. All internal supporting webs and/or purlin beams can be removed leaving clear habitable space.

[0026] Preferably, the ends of the reinforced apex beam are open. Advantageously, this allows the beam to fold and/or allows the support means to extend into the apex of the reinforced apex beam.

[0027] Ideally, the reinforced apex beam is torsional rigid.

[0028] Preferably, the reinforced apex beam forms the service void/storage within the roofing arrangement.

[0029] According to the invention, the roofing arrangement further comprising a plurality of bridging components extending between the base of the reinforced apex beam and a support structure on which the bridging components are mountable.

[0030] Ideally, the roofing arrangement further comprising a plurality of bridging components extending between the base of each planar reinforcing means of the reinforced apex beam and a support structure on which the bridging components are mountable.

[0031] Preferably, support members extend from the

lower ends of the planar reinforcing means of the reinforced apex beam for receiving the bridging members. The support members are provided by plate members extending downwards from the bottom of the reinforced apex beam for supporting bridging members.

[0032] Advantageously, the reinforced apex beam having planar reinforcing means extending down both sloping surfaces of the ridged roof provides a number of structural advantages for the new roofing arrangement. First of all, the length of the planar reinforcing means reduces the length of the span of the bridging roof component which extends between the reinforced apex beam and the eaves wall plate or similar support structure. This has the benefit of reducing the amount of the bend that the bridging roof component can encounter because of the shorter distance between the mounting points. This results in a reduced moment about the central point of the bridging component due to the shorter span. As a result the normal spreading effect encountered by normal full span rafters at the wall plate is significantly reduced. Furthermore, because the reinforced apex beam has both planar reinforcing members and reinforcing strut members acting between the spaced apart ends of the planar reinforcing members, the rigidity of the overall apex of the roof structure is significantly improved. There is a reduction in central downward bending of the reinforced apex beam especially towards the centre of the reinforced apex beam because of the planar and cross sectional reinforcing means.

[0033] Preferably, coupling means are provided between the lower ends of the planar reinforcing means and the upper ends of bridging members for mechanically coupling the reinforced apex beam to the bridging members.

[0034] Ideally, the outside main planar surface of the planar reinforcing means is in alignment with the outside main planar surface of the bridging components.

[0035] Preferably, the bridging components are provided by building panels.

[0036] Ideally, the bridging components comprise composite building panels.

[0037] Preferably, the composite building panels are structural insulated panels. These panels comprise a foam member sandwiched by two outer rigid planar board members. The board can be sheet metal, plywood, cement or oriented strand board (OSB) and the foam can be either expanded polystyrene foam (EPS), extruded polystyrene foam (XPS), polyisocyanurate foam, or polyurethane foam.

[0038] In an alternative arrangement, the bridging components can be roof rafters, most preferably timber roof rafters covered in the traditional way using battens, tiles or slates.

[0039] Preferably, at least one bridging component has one or more apertures. Advantageously, the one or more apertures are formed in the roof for receiving roof windows to allow natural lighting into the living space in the attic.

[0040] Ideally, the bridging components have insulation means.

[0041] Ideally, the structural panels have insulation means.

[0042] Preferably, the reinforced apex beam has insulation means.

[0043] Ideally, the reinforced apex beam has insulation means housed therein.

[0044] Preferably, the reinforced apex beam has insulation means housed therein at ceiling level.

[0045] Advantageously, the reinforced apex beam and the bridging components having insulation means allows the insulation to be installed in the factory to surpass strict building control regulations which can be monitored and supervised so that the products are sent out to site thermally efficient. This ensures that the thermal values of the assembled roofing arrangement can be accurately predetermined in the factory reducing the risk of human error or cost cutting by builders on site.

[0046] Preferably, the reinforced apex beam comprises a framework of longitudinally spaced apart rafters carrying planar reinforcing means along the outer surface of the rafters.

[0047] Alternatively, the reinforced apex beam comprises a means for coupling the planar reinforcing means together along the longitudinal length of the beam at or about the apex and strut/truss means extending between the lower spaced apart ends of the planar reinforcing means, preferably spaced apart along the longitudinal length of the reinforced apex beam.

[0048] Ideally, the means for coupling the planar reinforcing means together is a pivotal coupling arrangement. Advantageously, the pivotal coupling arrangement allows the apex beam to fold about the pivotal coupling arrangement for more compact storage and transport.

[0049] Preferably, the strut/truss means is detachably couplable between the lower spaced apart ends of the planar reinforcing means. Advantageously, the strut/truss means can be detached to allow the reinforced apex beam to fold for storage and transport.

[0050] According to the invention, the planar reinforcing means comprises panel member.

[0051] Preferably, the panel members comprise rigid planar board members.

[0052] Ideally, the board members are sheet metal, plywood, cement or oriented strand board (OSB) or any combination of these board members.

[0053] Alternatively, the panel members are structural insulated panels. These boards comprise a foam member sandwiched by two outer rigid planar boards members. The board can be sheet metal, plywood, cement or oriented strand board (OSB) and the foam can be either expanded polystyrene foam (EPS), extruded polystyrene foam (XPS), polyisocyanurate foam, or polyurethane foam.

[0054] Ideally, the planar reinforcing means extend a distance greater than 1/4 m from the apex of the ridged roof.

[0055] Preferably, the planar reinforcing means extend a distance greater than 1/2 m from the apex of the ridged roof.

[0056] Preferably, the planar reinforcing means extend a distance greater than 3/4 m from the apex of the ridged roof.

[0057] Ideally, the planar reinforcing means extend a distance approximately equal to 1 m from the apex of the ridged roof.

[0058] Ideally, the planar reinforcing means extend a distance less than 1 1/2 m from the apex of the ridged roof.

[0059] Preferably, the planar reinforcing means extend a distance less than 1 1/4 m from the apex of the ridged roof.

[0060] The invention will now be described with reference to the accompanying drawings which show by way of example only one embodiment of a roofing arrangement in accordance with the invention. In the drawings:-

Figures A-H show prior art roofing arrangements. Figure A is a schematic drawing of a simple two beam roof rafter;

Figure B is a schematic drawing of a simple increased rafter depth two beam roof rafter;

Figure C is a schematic drawing of a simple two beam roof rafter with purlins;

Figure D is a schematic drawing of a trussed roof rafter;

Figure E is a schematic drawing of a simple two beam roof rafter with an apex purlin;

Figure F is a schematic drawing of a simple two beam roof rafter with a ceiling tie;

Figure G is a schematic drawing of a W truss roof rafter;

Figure H is a schematic drawing of a simple two beam roof rafter with an apex purlin and two mid span purlins;

Figure 1 is an exploded perspective view of a first embodiment of roofing arrangement in accordance with the invention;

Figure 2 is a perspective view of an assembled roofing arrangement as shown in Figure 1;

Figure 3 is a detail schematic view of a first embodiment of reinforced apex beam;

Figure 4 is a detail schematic view of a second embodiment of reinforced apex beam;

Figure 5 is a schematic view of forces acting on the reinforced apex beam;

Figure 6 is a schematic view of the structural elements making up the roofing arrangement;

Figure 7 is a perspective view of a second embodiment of roofing arrangement not forming part of the invention;

Figure 8 is an end view of the second embodiment of roofing arrangement; and

Figure 9 is a schematic drawing showing the concept of the reinforced triangular prism created by the first or second embodiment of roofing arrangement.

[0061] In Figures 1 to 6 of the drawings, there is shown a first embodiment of roofing arrangement indicated generally by the reference numeral 1 having a reinforced apex beam 2 extendable between two end supports 3. The reinforced apex beam 2 having planar reinforcing members 4 tapering towards the apex 13 of the reinforced apex beam 2. The planar reinforcing members 4 form an integral upper part of a ridged roof and extend along all of the length of the reinforced apex beam 2. The reinforced apex beam 2 has web members 5 acting as a strut/tie and extending between the planar reinforcing members 4. The web members 5 extends between locations at or about the two lower ends of the planar reinforcing members 4. The end supports 3 are two spandrel truncated triangular panels 3 for supporting and transferring the weight of the reinforced apex beam 2 and the load carried thereon down through a load bearing construction 6 on which the spandrel truncated triangular panels 3 are mounted. The spandrel truncated triangular panels 3 are insulated. The load bearing construction 6 is provided by two gable walls 6.

[0062] The web members 5 are provided by spaced apart truss members 7 spaced longitudinally along the length of the apex beam 2 as shown in Figures 3 and 4. The planar reinforcing members 4 extend partly down along and parallel to both sloping sides of the ridged roof in use. The cross-sectional shape of the reinforced apex beam 2 is generally triangular. Advantageously, this shape lends itself to the reinforced apex beam 2 being placed atop the roofing arrangement 1 so as to complete the generally ridged roof shape. Further advantageously, the generally triangular shape of the reinforced apex beam 2 is equally strong in both vertical and horizontal directions as illustrated in Figure 5. The reinforced apex beam 2 is torsional rigid. The reinforced apex beam 2 forms the service void/storage area 8 within the roofing arrangement 1.

[0063] The roofing arrangement 1 has five bridging components 11 extending between the base of the reinforced apex beam 2 and each load bearing wall 12 on which the roofing arrangement 1 is mounted, see especially Figure 2. The five bridging components 11 extend between the base of the planar reinforcing members 4 and the load bearing walls 12 on which the bridging components 11 are mounted. Support members, not shown, extend or protrude from the lower ends of the planar reinforcing members 4 of the reinforced apex beam 2 for receiving the bridging members 11. The support members are provided by plate members extending downwards from the bottom of the reinforced apex beam 2 for supporting bridging members 11. Advantageously, the reinforced apex beam 2 having planar reinforcing members 4 extending down both sloping surfaces of the ridged roof provides a number of structural advantages for the new roofing arrangement 1. First of all, the length of the planar reinforcing members 4 reduces the length of the span of the bridging roof components 11 which extends between the reinforced apex beam 2 and the eaves wall

plate or similar support structure. This has the benefit of reducing the amount of bend that the bridging roof components 11 can encounter because of the shorter distance between the mounting points. This results in a reduced moment about the central point of the bridging component 11 due to the shorter span. As a result the normal spreading effect encountered by normal full span rafters of traditional roof trusses at the wall plate is significantly reduced. Furthermore, because the reinforced apex beam 2 has both planar reinforcing members 4 and reinforcing strut/tie members 5 acting between the spaced apart ends of the planar reinforcing members 4, the rigidity of the overall apex of the roof arrangement 1 is significantly improved. There is a reduction in central downward bending of the reinforced apex beam 2 especially towards the centre of the reinforced apex beam 2 because of the planar and cross sectional reinforcing members 4, 5.

[0064] Coupling members, not shown, are provided between the lower ends of the planar reinforcing members 4 and the upper ends of bridging members 11 for mechanically coupling the reinforced apex beam 2 to the bridging members 11.

[0065] The outside main planar surface of the planar reinforcing member 4 is in alignment with the outside main planar surface of the bridging components 11. The bridging components 11 are provided by building panels, composite building panels being structural insulated panels. These panels comprise a foam member sandwiched by two outer rigid planar board members. The board can be sheet metal, plywood, cement or oriented strand board (OSB) and the foam can be either expanded polystyrene foam (EPS), extruded polystyrene foam (XPS), polyisocyanurate foam, or polyurethane foam.

[0066] One bridging component 11 has one aperture 21. Advantageously, the aperture 21 is formed in the roof arrangement 1 for receiving a roof window for example to allow natural lighting into the living space in the attic. The bridging components 11 have integrally formed insulation. The reinforced apex beam 2 has insulation housed therein at ceiling level. This avoids the requirement for insulation above this level. Advantageously, the reinforced apex beam 2 and the bridging components 11 having insulation allows the insulation to be installed in the factory to surpass strict building control regulations which can be monitored and supervised so that the components of the roofing arrangement 1 are sent out to site thermally efficient. This ensures that the thermal values of the assembled roofing arrangement 1 can be accurately predetermined in the factory reducing the risk of human error or cost cutting by builders on site.

[0067] Referring more particularly to Figure 4, the reinforced apex beam 2 has a framework of longitudinally spaced apart rafters 31 carrying planar reinforcing members 4 along the outer surface of the rafters 31. Alternatively, as shown in figure 3, the reinforced apex beam 2 has an elongate beam 33 for coupling the planar reinforcing members 4 together along the longitudinal length

of the apex beam 2 at or about the apex and strut/tie members 34 extending between the lower spaced apart ends of the planar reinforcing members 4 spaced apart along the longitudinal length of the reinforced apex beam 2. The elongate beam 33 for coupling the planar reinforcing members 4 together is a pivotal coupling arrangement. Advantageously, the pivotal coupling arrangement allows the apex beam 2 to fold about the pivotal coupling arrangement for more compact storage and transport. In this particular embodiment, the strut/tie members 5 are detachably couplable between the lower spaced apart ends of the planar reinforcing members 4. Advantageously, the strut/tie members 5 can be detached to allow the reinforced apex beam 2 to fold for storage and transport. The planar reinforcing members 4 are panel member having rigid planar board members. The board members are sheet metal, plywood, cement or oriented strand board (OSB) or any combination of these board members.

[0068] Alternatively, the panel members are structural insulated panels. These boards comprise a foam member sandwiched by two outer rigid planar boards members. The board can be sheet metal, plywood, cement or oriented strand board (OSB) and the foam can be either expanded polystyrene foam (EPS), extruded polystyrene foam (XPS), polyisocyanurate foam, or polyurethane foam.

[0069] All or a part of the outside surface of the apex beam and the bridging elements have a roof covering material formed thereon in the factory such as a pre-formed cladding or panels. Alternatively, all or a part of the outside surface of the apex beam and the bridging elements have a traditional roof covering material applied. The planar reinforcing means extend a distance in a range from $\frac{1}{4}$ m from the apex of the ridge to a distance less than $1\frac{3}{4}$ m from the apex of the ridge. Although it will of course be appreciated that the reinforced apex beam can be designed to have any desired depth to accommodate the specific load bearing requirements for any dimension of roof configuration.

[0070] In a second embodiment of roofing arrangement, shown in Figures 7 and 8 of the drawings, the bridging components can be roof rafters 41 with the roof apex reinforcing arrangement provided by sheets 42 fixed to the timber roof rafters 41 on one or both sloping surfaces 43 of the ridged roof proximal to the apex 44. In this embodiment, the ends of the sheets 42 are mechanically coupled to the end supports. As shown in Figure 8, struts/ties 45 are provided between the rafters 41 to reduce bending B by reducing the effective length of the span of the rafters 41.

[0071] Referring to Figure 9, the cross-sectional shape of the reinforced apex beam 2 of the first roofing arrangement or the planar reinforcing members 41 and strut/tie members 45 of the second embodiment of roofing arrangement is triangular. Advantageously, the generally triangular shape of the reinforced apex beam 2 or the planar reinforcing members 41 and strut/tie members 45

are equally strong in both vertical and horizontal directions and acts as a structurally efficient triangular prism. All internal supporting webs and/or purlin beams can be removed leaving clear habitable space. The remainder of the roof space is infilled with rafters 41 or prefabricated panels 11.

Claims

1. A roofing arrangement (1) for a ridged roof comprising a roof apex reinforcing means (2), the roof apex reinforcing means (2) comprising sloping planar reinforcing means (4) tapering to or proximal to the apex of the ridged roof, the sloping planar reinforcing means (4) being substantially parallel to a main plane of a sloping portion of the ridged roof, the planar reinforcing means (4) extending along all or a substantial part of the length of the apex of the roof and extending along an upper region of at least one sloping portion of the ridged roof, wherein the roof apex reinforcing means (2) is provided by a reinforced apex beam (2), said beam (2) being a reinforced triangular prism (2) having two sloping planar reinforcing members (4) defining said planar reinforcing means (4) and tapering to the apex (13) of the reinforced apex beam (2), each sloping planar reinforcing member (4) being substantially parallel to the main plane of the respective sloping portion of the ridged roof, the planar reinforcing members (4) extending along all or a substantial part of the length of the reinforced apex beam (2), wherein the roofing arrangement further comprises a plurality of bridging components (11) situated below and along said apex beam, where they extend transversally to said apex beam from the base of the reinforced apex beam (2) to a support structure on which the bridging components are mountable, wherein the planar reinforcing members (4) comprise panel members, **characterised in that** the outside main planar surface of the panel member of each planar reinforcing member (4) is in alignment with the outside main planar surface of the bridging components (11).
2. A roofing arrangement as claimed in claim 1, wherein the roof apex reinforcing means (2) is extendable between and couplable to at least two end supports (3) for supporting the roof apex reinforcing means (2) down through a load bearing construction.
3. A roofing arrangement as claimed in claim 1 or claim 2, wherein the reinforced apex beam has spaced apart web means extending between locations at or about the two spaced apart ends of the tapering planar reinforcing members.
4. A roofing arrangement as claimed in claim 2, wherein the end supports comprising two gable wall spandrel

means (3).

5. A roofing arrangement as claimed in claim 4, wherein the spandrel means (3) has insulation.
6. A roofing arrangement as claimed in any one of the preceding claims, wherein the planar reinforcing means (4) form an outer part of an upper portion of a ridged roof and extend along all or a substantial part of the length of the reinforced apex beam (2).
7. A roofing arrangement as claimed in claim 3, wherein the web means comprising spaced apart strut/truss members spaced longitudinally along the length of the apex beam.
8. A roofing arrangement as claimed in any one of the preceding claims, wherein the cross-sectional shape of the reinforced apex beam is triangular or truncated triangular.
9. A roofing arrangement as claimed in any one of the preceding claims, wherein the ends of the reinforced apex beam are open allowing the beam to fold.
10. A roofing arrangement as claimed in any one of the preceding claims, wherein the reinforced apex beam (2) is torsional rigid.
11. A roofing arrangement as claimed in any one of the preceding claims, wherein the reinforced apex beam (2) forms the service void/storage (8) within the roofing arrangement.
12. A roofing arrangement as claimed in any one of the preceding claims, wherein support members extend from the lower ends of the planar reinforcing means (4) of the reinforced apex beam (2) for receiving the bridging components (11).
13. A roofing arrangement as claimed in any one of the preceding claims, wherein the bridging components (11) and/or the reinforced apex beam (2) have insulation means.
14. A roofing arrangement as claimed in any one of the preceding claims, wherein the reinforced apex beam (2) comprises a means for coupling (33) the planar reinforcing means (4) together along the longitudinal length of the reinforced apex beam (2), the means for coupling (33) the planar reinforcing means (4) together is a pivotal arrangement (33), the pivotal coupling arrangement (33) allows the reinforced apex beam (2) to fold about the pivotal coupling arrangement (33).
15. A roofing arrangement as claimed in claim 14, wherein the means for coupling (33) the planar re-

inforcing means (4) together couples the planar reinforcing means (4) together along the longitudinal length of the reinforced apex beam (2) at or about the apex.

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Patentansprüche

1. Dachanordnung (1) für ein Firstdach, das ein Dachscheitel-Verstärkungsmittel (2) umfasst, wobei das Dachscheitel-Verstärkungsmittel (2) geneigte flache Verstärkungsmittel (4) umfasst, die zum Scheitel des Firstdachs hin oder in Nähe davon abgeschrägt sind, wobei das geneigte flache Verstärkungsmittel (4) im Wesentlichen parallel zur Hauptebene eines geneigten Abschnitts des Firstdachs verläuft, wobei sich das flache Verstärkungsmittel (4) entlang eines gesamten oder eines wesentlichen Teils der Länge des Dachscheitels erstreckt und sich entlang eines oberen Bereichs mindestens eines geneigten Abschnitts des Firstdachs erstreckt, wobei das Dachscheitel-Verstärkungsmittel (2) durch einen verstärkten Scheitelbalken (2) bereitgestellt wird, wobei der Balken (2) ein verstärktes dreieckiges Prisma (2) ist, das zwei geneigte flache Verstärkungselemente (4) aufweist, welche das flache Verstärkungsmittel (4) definieren und zum Scheitel (13) des Verstärkungsscheitel-Balkens (2) abgeschrägt sind, wobei jedes geneigte flache Verstärkungselement (4) im Wesentlichen parallel zur Hauptebene des zugehörigen geneigten Abschnitts des Firstdachs verläuft, wobei sich die flachen Verstärkungselemente (4) entlang des gesamten oder eines wesentlichen Teils der Länge des verstärkten Scheitelbalkens (2) erstrecken, wobei die Dachanordnung ferner eine Mehrzahl von Überbrückungskomponenten (11) umfasst, die unterhalb und entlang des Scheitelbalkens angeordnet ist, wo sie sich quer zum Scheitelbalken von der Basis des verstärkten Scheitelbalkens (2) zu einer Abstützstruktur erstrecken, an der die Überbrückungselemente montierbar sind, wobei die flachen Verstärkungselemente (4) Plattenelemente umfassen, **dadurch gekennzeichnet, dass** die flache Hauptaußenseitenoberfläche des Plattenelements jedes flachen Verstärkungselements (4) mit der flachen Hauptaußenseitenoberfläche der Überbrückungskomponenten (11) ausgerichtet ist.
2. Dachanordnung nach Anspruch 1, wobei die Dachscheitelverstärkung (2) zwischen mindestens zwei Endstützen (3) zum Abstützen des Dachscheitel-Verstärkungsmittels (2) nach unten durch eine Lasttragkonstruktion ausfahrbar und damit koppelbar ist.
3. Dachanordnung nach Anspruch 1 oder Anspruch 2, wobei der verstärkte Scheitelbalken voneinander beabstandete Bahnenmittel aufweist, die sich zwischen Stellen an oder um zwei beabstandete Enden

der abgeschrägten flachen Verstärkungselemente erstrecken.

4. Dachanordnung nach Anspruch 2, wobei die Endstützen zwei Giebelwand-Fassadenmittel (3) umfassen. 5
5. Dachanordnung nach Anspruch 4, wobei das Fassadenmittel (3) gedämmt ist. 10
6. Dachanordnung nach einem der vorhergehenden Ansprüche, wobei das flache Verstärkungsmittel (4) einen äußeren Teil eines oberen Abschnitts eines Firstdachs bildet und sich entlang des gesamten oder eines wesentlichen Teils der Länge des verstärkten Scheitelbalkens (2) erstreckt. 15
7. Dachanordnung nach Anspruch 3, wobei das Bahnenmittel beabstandete Verstrebungs-/Trägerelemente umfasst, die längs entlang der Länge des Scheitelbalkens beabstandet sind. 20
8. Dachanordnung nach einem der vorhergehenden Ansprüche, wobei die Querschnittsform des verstärkten Scheitelbalkens ein Dreieck oder ein gekapptes Dreieck ist. 25
9. Dachanordnung nach einem der vorhergehenden Ansprüche, wobei die Enden des verstärkten Scheitelbalkens offen sind, damit der Balken zusammengeklappt werden kann. 30
10. Dachanordnung nach einem der vorhergehenden Ansprüche, wobei der verstärkte Scheitelbalken (2) drehsteif ist. 35
11. Dachanordnung nach einem der vorhergehenden Ansprüche, wobei der verstärkte Scheitelbalken (2) den Diensthohlraum/das Lager (8) innerhalb der Dachanordnung bildet. 40
12. Dachanordnung nach einem der vorhergehenden Ansprüche, wobei sich die Stützelemente von den unteren Enden des flachen Verstärkungsmittels (4) des verstärkten Scheitelbalkens (2) zum Aufnehmen der Überbrückungskomponenten (11) erstrecken. 45
13. Dachanordnung nach einem der vorhergehenden Ansprüche, wobei die Überbrückungskomponenten (11) und/oder der verstärkte Scheitelbalken (2) Dämmittel aufweisen. 50
14. Dachanordnung nach einem der vorhergehenden Ansprüche, wobei der verstärkte Scheitelbalken (2) ein Mittel zum Zusammenkoppeln (33) des flachen Verstärkungsmittels (4) entlang der längs verlaufenden Länge des verstärkten Scheitelbalkens (2) umfasst, wobei das Mittel zum Zusammenkoppeln (33) 55

des flachen Verstärkungsmittels (4) eine Schwenkanordnung (33) ist, wobei die Schwenkkopplungsanordnung (33) dem verstärkten Scheitelbalken (2) ermöglicht, an der Schwenkkopplungsanordnung (33) zusammengeklappt zu werden.

15. Dachanordnung nach Anspruch 14, wobei das Mittel zum Zusammenkoppeln (33) der flachen Verstärkungsmittel (4) die flachen Verstärkungsmittel (4) entlang der längs verlaufenden Länge des verstärkten Scheitelbalkens (2) an oder um den Scheitel zusammenkoppelt.

Revendications

1. Agencement de toiture (1) pour une toiture à double pente comprenant un moyen de renforcement d'un faîte de toit (2), le moyen de renforcement du faîte de toit (2) comprenant des moyens de renforcement plans en pente (4) s'effilant vers ou à proximité du faîte de la toiture à double pente, les moyens de renforcement plans en pente (4) étant sensiblement parallèles à un plan principal d'une partie en pente de la toiture à double pente, les moyens de renforcement plans (4) s'étendant le long de la totalité ou d'une majeure partie de la longueur du faîte du toit et s'étendant le long d'une région supérieure d'au moins une partie en pente de la toiture à double pente, le moyen de renforcement du faîte de toit (2) étant réalisé par une poutre de faîte renforcée (2), ladite poutre (2) étant un prisme triangulaire renforcé (2) ayant deux organes de renforcement plans en pente (4) définissant lesdits moyens de renforcement plans (4) et s'effilant vers le faîte (13) de la poutre de faîte renforcée (2), chaque organe de renforcement plans en pente (4) étant sensiblement parallèle au plan principal de la partie respective en pente de la toiture à double pente, les organes de renforcement plans (4) s'étendant le long de la totalité ou de la majeure partie de la longueur de la poutre de faîte renforcée (2), l'agencement de toiture comprenant en outre une pluralité de composants de pontage (11) situés en dessous et le long de ladite poutre de faîte, où ils s'étendent transversalement jusqu'à la poutre de faîte depuis la base de la poutre de faîte renforcée (2) jusqu'à une structure de support sur laquelle les éléments de pontage peuvent être montés, les organes de renforcement plans (4) comprenant des organes de panneau, **caractérisé en ce que** la surface plane principale extérieure de l'organe de panneau de chaque organe de renforcement plan (4) est alignée avec la surface plane principale extérieure des composants de pontage (11).
2. Agencement de toiture selon la revendication 1, dans lequel le moyen de renforcement du faîte de toit (2) peut s'étendre entre, et être accouplé à, au

moins deux supports d'extrémité (3) pour supporter le moyen de renforcement du faîte de toit (2) vers le bas par une construction de support de charge.

3. Agencement de toiture selon la revendication 1 ou la revendication 2, dans lequel la poutre de faîte renforcée présente des moyens de membrure espacés s'étendant entre des emplacements au niveau ou aux environs des deux extrémités espacées des organes de renforcement plans effilés. 5
4. Agencement de toiture selon la revendication 2, dans lequel les supports d'extrémité comprennent deux moyens de tympan (3) de mur pignon. 10
5. Agencement de toiture selon la revendication 4, dans lequel le moyen de tympan (3) présente une isolation. 15
6. Agencement de toiture selon l'une quelconque des revendications précédentes, dans lesquelles les moyens de renforcement plans (4) forment une partie extérieure d'une partie supérieure d'une toiture à double pente et s'étendent le long de la totalité ou d'une majeure partie de la longueur de la poutre de faîte renforcée (2). 20 25
7. Agencement de toiture selon la revendication 3, dans lequel le moyen de membrure comprend des organes d'entretoise/de ferme espacés longitudinalement le long de la longueur de la poutre de faîte. 30
8. Agencement de toiture selon l'une quelconque des revendications précédentes, dans lequel la forme en section transversale de la poutre de faîte renforcée est triangulaire ou triangulaire tronquée. 35
9. Agencement de toiture selon l'une quelconque des revendications précédentes, dans lequel les extrémités de la poutre de faîte renforcée sont ouvertes, ce qui permet à la poutre de plier. 40
10. Agencement de toiture selon l'une quelconque des revendications précédentes, dans lequel la poutre de faîte renforcée (2) est rigide en torsion. 45
11. Agencement de toiture selon l'une quelconque des revendications précédentes, dans lequel la poutre de faîte renforcée (2) forme le vide de service/l'espace de stockage (8) à l'intérieur de l'agencement de toiture. 50
12. Agencement de toiture selon l'une quelconque des revendications précédentes, dans lequel des organes de support s'étendent depuis les extrémités inférieures des moyens de renforcement plans (4) de la poutre de faîte renforcée (2) pour recevoir les composants de pontage (11). 55

13. Agencement de toiture selon l'une quelconque des revendications précédentes, dans lequel les composants de pontage (11) et/ou la poutre de faîte renforcée (2) présentent des moyens d'isolation.

14. Agencement de toiture selon l'une quelconque des revendications précédentes, dans lequel la poutre de faîte renforcée (2) comprend un moyen pour accoupler (33) les moyens de renforcement plans (4) les uns aux autres le long de la longueur longitudinale de la poutre de faîte renforcée (2), le moyen pour accoupler (33) les moyens de renforcement plans (14) les uns aux autres étant un agencement pivotant (33), l'agencement d'accouplement pivotant (33) permettant à la poutre de faîte renforcée (2) de plier autour de l'agencement d'accouplement pivotant (33).

15. Agencement de toiture selon la revendication 14, dans lequel le moyen pour accoupler (33) les moyens de renforcements plans (4) les uns aux autres accouple les moyens de renforcements plans (4) les uns aux autres le long de la longueur longitudinale de la poutre de faîte renforcée (2) au niveau ou aux environs du faîte.

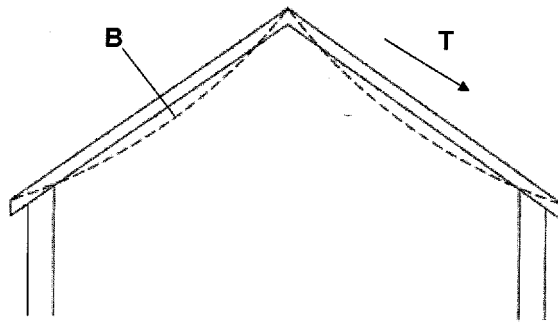


Figure. A

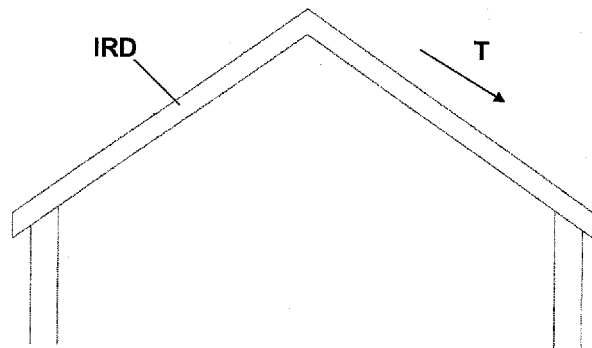


Figure. B

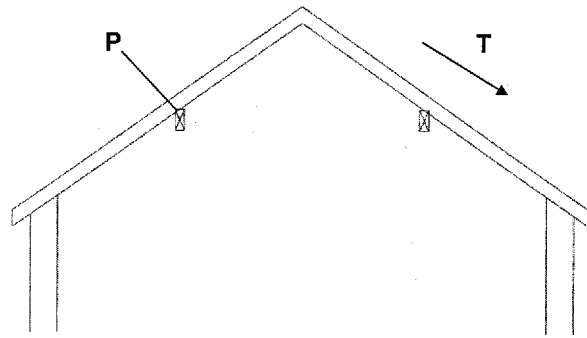


Figure. C

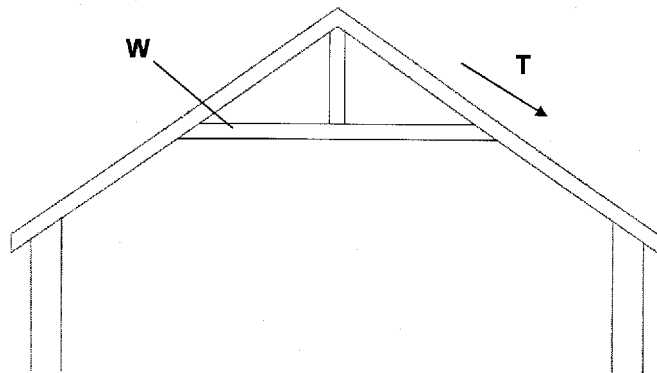


Figure. D

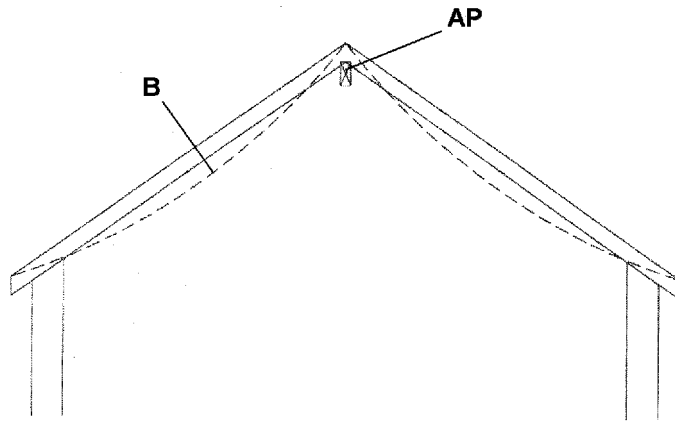


Figure. E

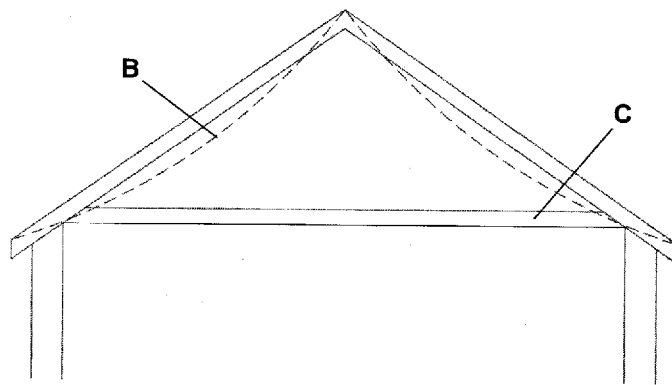


Figure. F

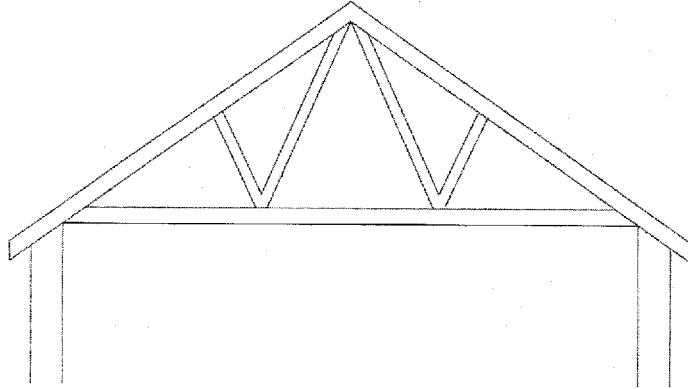


Figure. G

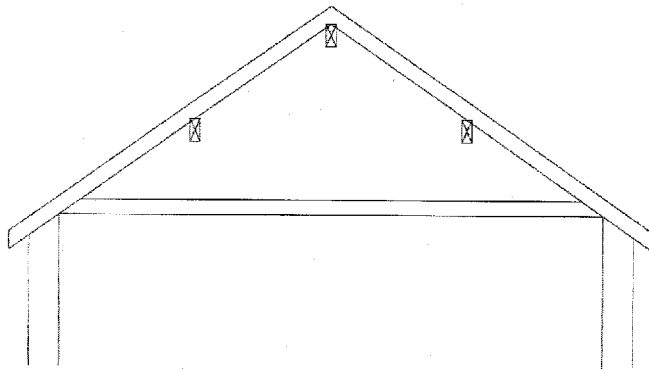


Figure. H

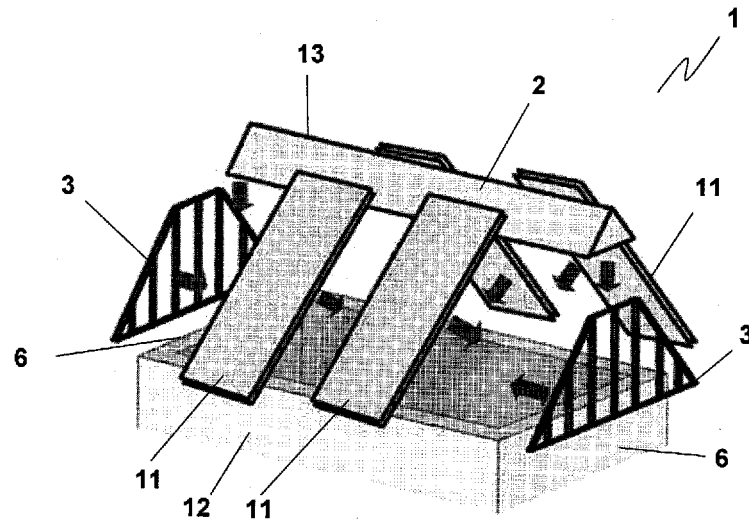


Figure. 1

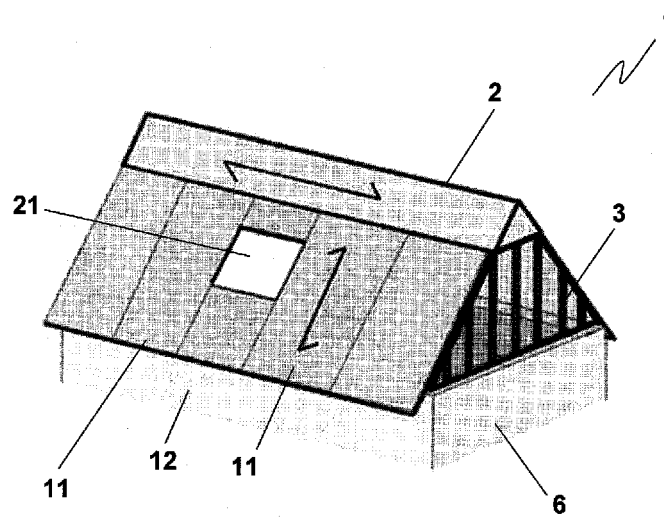


Figure. 2

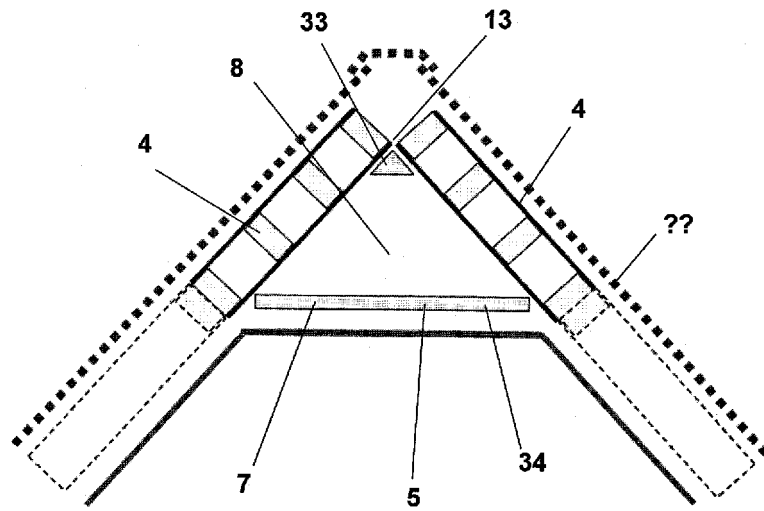


Figure. 3

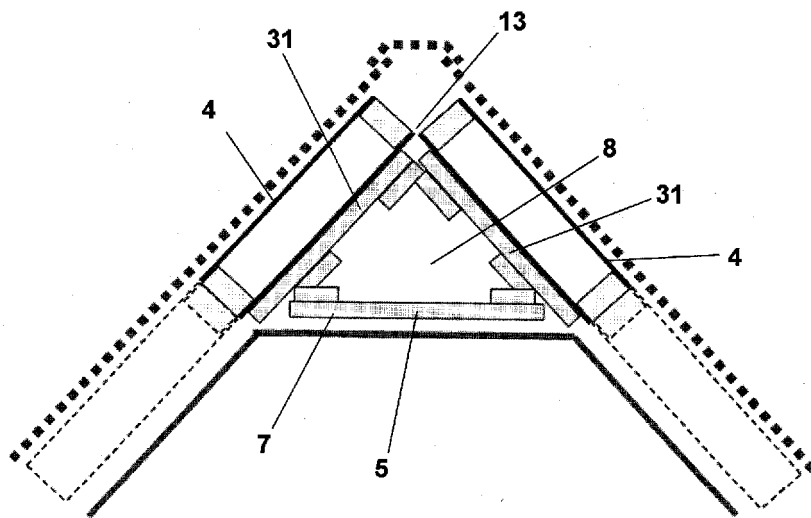


Figure. 4

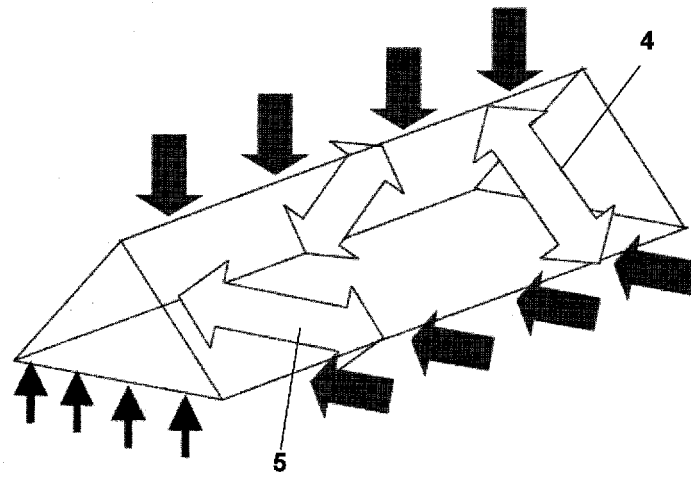


Figure. 5

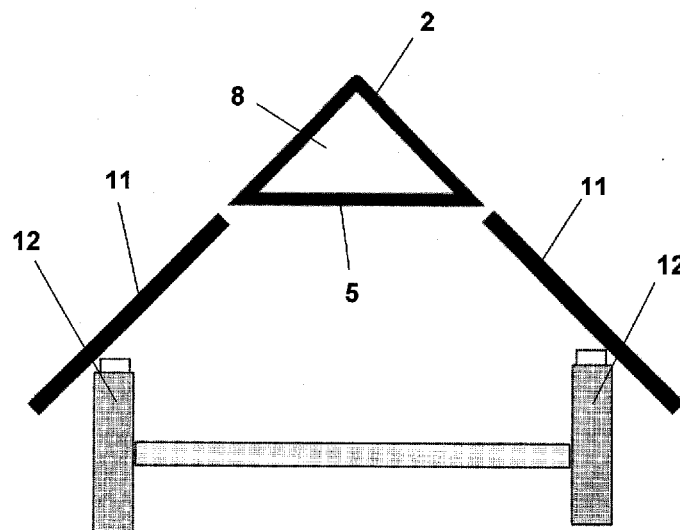


Figure. 6

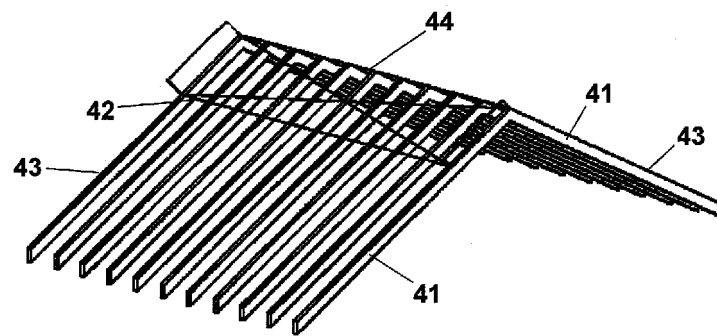


Figure. 7

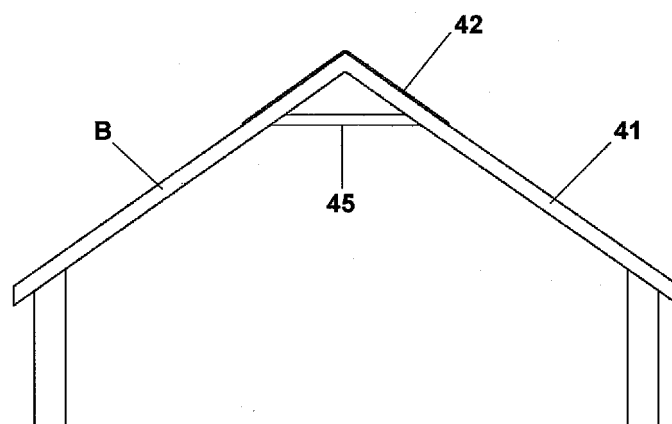


Figure. 8

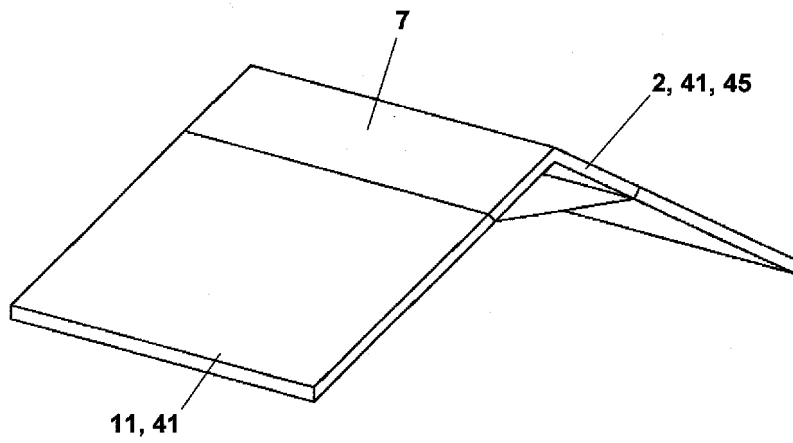


Figure. 9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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