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Description

The invention relates to a roof element comprising at least substantially channel-section beams extending in the direction of length of the roof element and being made from sheet material and cover members fastened to said beams whereby the limbs of channel-section beam are upwardly inclined away from one another and away from a flat web interconnecting the limbs and lying on the underside of the beam and at the free ends of their limbs the channel-section beams are provided with bent-over flanges which are fastened with the aid of nails or bolts to cover members of sheet material directly bearing on said flanges and defining corrugations extending transverse to the longitudinal direction of the beams.

Such a roof structure is known from US—A—3,218,773. In said known structure the cover members are formed also by channel-section beams having a cross-section quite similar to the cross-section of the beams extending in the direction of length of the roof element, so that said roof structure is relatively heavy and has a relatively great height. For supporting such a roof element it is proposed to provide columns below the beams extending in the direction of length of the roof element. So the length of said beam has to be so that the beams not only span the space between the supports for supporting the roof element, however extend also over said supports.

Now according to the invention each cover member is formed by a corrugated plate, each plate comprising various relatively parallel upper and lower parts located at different levels and interconnected with the aid of tie parts upwardly inclined away from the lower flat parts and away from one another whereby the lower flat parts of the corrugated plates bear on the flanges of the beams and near the ends of the roof element there have been provided supporting beams protruding beyond the beams, each supporting beam having a more or less W-shaped cross-section and being fastened by a flat central part to a corrugated plate, whilst the outermost parts of a supporting beam are in engagement with the inner sides of the limbs of a channel-section beam and are fastened to said limbs.

By using the structure according to the invention there can be used a favourable combination of beams and corrugated plates having a relatively small height, whilst the roof element can be supported on joist or the like forming part of a building by means of the supporting beams which could have also a relatively small height whereby joining the roof element to the remainder of the building can be made in a simple way.

Also the total height of the building wherein the inventive roof elements are used can be smaller as in a structure wherein the beams are resting on the joist, so that also with respect thereto the costs of the building will be lower as usual.

It is noted that US—A—3,579,937 shows a panel comprising truss members embedded in foam plastic bearing plates, secured to diagonal bars of said truss members protrude at the ends of the panels for supporting said panels. The general structure of said panel is however quite different from the structure of the roof element according to the invention.

The invention will now be described more fully with reference to an embodiment of the construction in accordance with the invention shown in the accompanying Figures.

Fig. 1 is a plan view of a roof element embodying the invention.

Fig. 2 is a sectional view taken on the line II—II in Fig. 1.

Fig. 3 is an enlarged sectional view taken on the line III—III in Fig. 1 with the support on a roof joist.

Fig. 4 is a sectional view taken on the line IV—IV in Fig. 3, the longitudinal beams of the roof element being omitted.

The roof element shown in the Figures comprises two relatively parallel longitudinal beams 1 and 2, each having an at least substantially U-shaped cross-section. Each longitudinal beam is made from thin, folded sheet material having a thickness of 1 to 2 mm in accordance with the length of the longitudinal beam concerned. Fig. 2, in particular, shows the longitudinal beam has a lower flat web 3 interconnecting the two limbs 4 and 5 of the beam concerned, said limbs being upwardly inclined away from one another and from the web 3. At the top ends the limbs 4 and 5 terminate in flanges 6 and 7 lying in the same plane and being outwardly bent over with respect to the limbs 4 and 5, the outer edges 8 and 9 of said flanges being bent over downwardly. The arrangement is so that the height of the channel-section beam 1 is greater as its width.

On the coplanar flanges 6 and 7 of the two longitudinal beams 1 and 2 are bearing corrugated plates 10 also of thin sheet material, the cross-section of which comprises lower, flat parts 11 forming the valleys and flat parts 12 forming the peaks and lying between the former, viewed on plan, the flat parts 11 and 12 being interconnected by tie parts 13 upwardly inclined away from the flat parts 11 and away from one another. The height of the corrugations is less as $\frac{1}{4}$ of the height of the channel section beam 1. From Fig. 3 it will be apparent that the arrangement is such that the corrugations of the plate 10 are perpendicular to the direction of length of the beams 1 and 2.

The flat parts 11 of the corrugated plate 10 are directly bearing on the flanges 6 and 7 of the beams 1 and 2 are secured to said flanges with the aid of bolts or nails 14 shown schematically. This mode of connection between the corrugated plate 10 and the flanges of the beams 1 and 2 prevents the limbs 4 and 5 of the beams 1 and 2 from relatively shifting in place due to loads or the like.

On the top side of the corrugated plate is arranged a plate 15 of insulating material. The

width of this plate is slightly smaller than that of the corrugated plate 10, as will be seen from Fig. 2. The insulating material 15 is covered with strips of roofing material 16, which overlap one another, as is shown in Fig. 2, in order to obtain water-tight coverings.

In order to obtain an effective support for the roof element described two profile beams 17 may be arranged at each end of the roof element as is shown in Figs. 3 and 4. Each beam 17 is located by part of its length between the limbs 4 and 5 of a beam 1 and 2 respectively, whereas the remaining part of the beam 17 concerned protrudes out of the beam 1 and 2 respectively. This protruding end of the beam 17 may be used for supporting the roof element on a girder 18 of the steel or concrete structure of a building to be provided with a roof composed of roof elements of the type described above.

It will in particular be apparent from Fig. 4 that each beam 17 has a more or less W-shaped cross-section having a flat central part fastened with the aid of nails or bolts 19 to the corrugated plate 10. The outer limbs of the beams 17 are secured by nails or bolts 20 to the limbs 4 and 5 of the beams 1 and 2 respectively (not shown in Fig. 4). The height of the supporting beam 17 is smaller than one fifth of the height of the channel section beam.

Fig. 3 furthermore shows that the ends of the beams 17 extending beyond the beams 1 and 2 may be covered with the aid of a covering plate 21 adjoining the end of the corrugated plate 10 and supporting, in addition the end of the insulating plate 15.

If desired, a ceiling board 22 may be fastened to the underside of the parts 3 of the beams 1 and 2 in the manner shown at Figure 2.

The roof element described above can be fully prefabricated in a factory or the like. With regard to transport purposes the width of the roof element is preferably about 24 cm. The length of the roof element depends of the size of the span to be covered and may vary, for example, between 8 and 17 metres. As stated above, the thickness of the metal sheet used to form the beams 1 and 2 and the corrugated plate will be chosen in accordance with the size of the span and it will usually vary between about 0.63 mm and 2.5 mm.

In assembling a roof a plurality of the roof elements depicted above are arranged side by side in a manner such that the parts of the corrugated plates protruding beyond the insulating material at least partly overlap one another. These overlapping parts of the corrugated plates can be fastened to one another with the aid of bolts or nails passed through the lower parts 11 of the corrugated plates. Subsequently the gaps formed between the covering layers of insulating material can be filled out with insulating material, after which in the areas of the junctions of the roof elements further roofing material is arranged in order to complete the roof in a water-tight manner.

In this way a light-weight, firm roof can be formed, in which the corrugated plates 10 not only ensure that the beams 1 and 2, even when loaded, will not deform, but also provide sufficient strength of the roof to permit of walking thereon. The roof elements thus formed are particularly rigid so that in a building provided with a roof formed by such roof elements wind resisting jointing may usually be fully dispensed with. Owing the mode of supporting the roof elements described above and illustrated in Figs. 3 and 4 the beams 1 and 2 of the roof elements are located between the joists 18 forming part of the skeleton of the building, which contributes to a reduction of the structural height of the building and hence to a reduction of building costs.

From the foregoing it will be obvious that by using a roof element embodying the invention a particularly light-weight and compact structure can be obtained, which can have a high, cost-saving effect.

The figures used in the claims are only meant to explain more clearly the intention of the invention and are not supposed to be any restriction concerning the interpretation of the invention which is determined by the terms of the claims.

Claims

1. A roof element comprising at least substantially channel-section beams (1) extending in the direction of length of the roof element and being made from sheet material and cover members (10) fastened to said beams (1) whereby the limbs (4, 5) of a channel-section beam (1) are upwardly inclined away from one another and away from a flat web (3) interconnecting the limbs (4, 5) and lying on the underside of the beam (1) and at the free ends of their limbs (4, 5) the channel-section beams are provided with bent-over flanges (6, 7) which are fastened with the aid of nails or bolts (14) to cover members (10) of sheet material directly bearing on said flanges (6, 7) and defining corrugations extending transverse to the longitudinal direction of the beams (1), characterised in that each cover member is formed by a corrugated plate, each plate comprising various relatively parallel upper (12) and lower (11) parts located at different levels and interconnected with the aid of tie parts (13) upwardly inclined away from the lower flat parts (11) and away from one another whereby the lower flat parts (11) of the corrugated plates (10) bear on the flanges (6, 7) of the beams (1) and near the ends of the roof element there have been provided supporting beams (17) protruding beyond the beams (1) each supporting beam (17) having a more or less W-shaped cross-section and being fastened by a flat central part to a corrugated plate (10), whilst the outermost parts of a supporting beam (17) are in engagement with the inner sides of the limbs (4, 5) of a channel-section beam (1) and are fastened to said limbs (4, 5).

2. A roof element as claimed in claim 1, charac-

terised in that the height of a supporting beam (17) is smaller than one fifth of the height of the channel-section beam (1).

3. A roof element as claimed in claim 1 or 2, characterised in that the height of the channel-section beam (1) is greater as its width.

4. A roof element as claimed in any preceding claim characterised in that the height of the corrugations of the cover plates (10) is less as $\frac{1}{4}$ of the height of the channel section beam (1).

Patentansprüche

1. Dachelement umfassend Träger (1) mit mindestens im wesentlichen kanalförmigem Querschnitt, welche sich in Längsrichtung des Dachelementes erstrecken und aus flächigem Material gefertigt sind und Abdeckungsbauteile (10), welche an den Trägern (1) befestigt sind, wobei die Schenkel (4, 5) eines Trägers (1) mit kanalförmigem Querschnitt aufwärts voneinander weg geneigt sind und weg von einem flachen Verbindungssteg (3), welcher die Schenkel (4, 5) verbindet Verbindungssteg (3), welcher die Schenkel (4, 5) verbindet und an der Unterseite des Trägers (1) liegt, und wobei die Träger mit kanalförmigem Querschnitt an den freien Enden ihrer Schenkel (4, 5) mit umgebogenen Bördelungen versehen sind, welche mit Hilfe von Nägeln oder Bolzen (14) an Abdeckungsbauteilen (10) aus flächigem Material befestigt sind, das direkt auf den Bördelungen (6, 7) aufliegt und eine Wellung aufweist, die sich transversal bezüglich der Längsrichtung der Träger (1) erstreckt, dadurch gekennzeichnet, daß jedes Abdeckungsbauteil durch eine gewellte Platte gebildet wird, wobei jede Platte verschiedene, zueinander in paralleler Beziehung stehende obere (12) und untere (11) Teile aufweist, die in unterschiedlicher Höhe angeordnet sind und mit Hilfe von Verbindungssteilen (13) verbunden sind, die sich aufwärts geneigt weg von den unteren, flachen Teilen (11) und weg voneinander erstrecken, wobei die unteren flachen Teile (11) der gewellten Platten (10) auf den Bördelungen (6, 7) der Träger (1) aufliegen und in der Nähe der Enden des Dachelementes Stützträger (17) vorgesehen sind, welche sich über die Träger (1) hinauserstrecken, wobei jeder Stützträger (17) einen mehr oder weniger W-förmigen Querschnitt aufweist und über einen flachen, zentralen Teil an einer gewellten Platte (10) befestigt ist, während die äußersten Teile eines Stützträgers (17) mit den Innenseiten der Schenkel (4, 5) des Balkens (1) mit kanalförmigem Querschnitt in Eingriff stehen und an den Schenkeln (4, 5) befestigt sind.

2. Dachelement gemäß Anspruch 1, dadurch gekennzeichnet, daß die Höhe eines Stützträgers (17) kleiner ist als ein Fünftel der Höhe des Trägers (1) mit kanalförmigem Querschnitt.

3. Dachelement gemäß Anspruch 1 oder 2,

dadurch gekennzeichnet, daß die Höhe des Trägers (1) mit kanalförmigem Querschnitt größer ist als seine Breite.

4. Dachelement gemäß einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß die Höhe der Wellungen der Abdeckplatten (10) kleiner ist als ein Viertel der Höhe des Trägers (1) mit kanalförmigem Querschnitt.

Revendications

1. Élément de toiture comprenant des poutres (1) au moins essentiellement de section générale en U, s'étendant dans la direction de la longueur de l'élément de toiture et constitué d'une matière en tôle et d'éléments de couverture (10) fixés à ces poutres (11) de sorte que les ailes (4, 5) d'une poutre de section en U (1) sont inclinées vers le haut à l'écart l'une de l'autre et à l'écart d'une âme plane (3) reliant les ailes (4, 5) et se situant du côté inférieur de la poutre (1), et, aux extrémités libres de leurs ailes (4, 5), les poutres de section en U sont pourvues de rebords inclinés (6, 7) qui sont attachés à l'aide de dous ou de boulons (14) aux éléments de couverture (10) de la matière en tôle s'appuyant directement sur ces rebords (6, 7) et définissant des ondulations s'étendant transversalement à la direction longitudinale des poutres (1), caractérisé en ce que chaque éléments de couverture est formé par une plaque ondulée, chaque plaque comprenant diverses parties supérieures (12) et inférieures (11) relativement parallèles, localisées à différents niveaux et reliées entre elles grâce à des tirants (13) inclinés vers le haut à l'écart des parties planes inférieures (11) et à l'écart l'un de l'autre, de sorte que les parties planes inférieures (11) des plaques ondulées (10) s'appuyent sur les rebords (6, 7) des poutres (1), des poutres de support (17) faisant saillie au-delà des poutres (1) étant prévues au voisinage des extrémités de l'élément de toiture, chaque poutre de support (17) présentant une section transversale plus ou moins en forme de W et étant attachée par une partie centrale plane à une plaque ondulée (10), tandis que les parties externes d'une poutre de support (17) sont en coopération avec les côtés internes des ailes (4, 5) d'une poutre de section en U (1) et sont fixées à ces ailes (4, 5).

2. Élément de toiture suivant la revendication 1, caractérisé en ce que la hauteur d'une poutre de support (17) est inférieure à un cinquième de la hauteur de la poutre de section en U (1).

3. Élément de toiture suivant la revendication 1 ou 2, caractérisé en ce que la hauteur de la poutre de section en U (1) est supérieure à sa largeur.

4. Élément de toiture suivant l'une quelconque des revendications précédentes, caractérisé en ce que la hauteur des ondulations des plaques de couverture (10) est inférieure à un quart de la hauteur de la poutre de section en U (1).

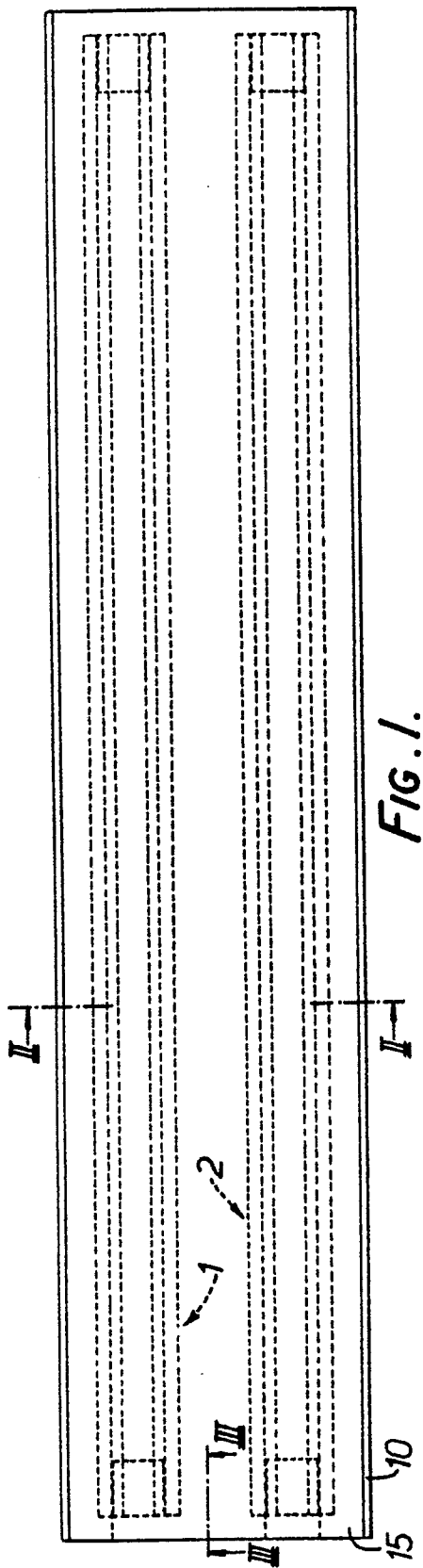


FIG. 1.

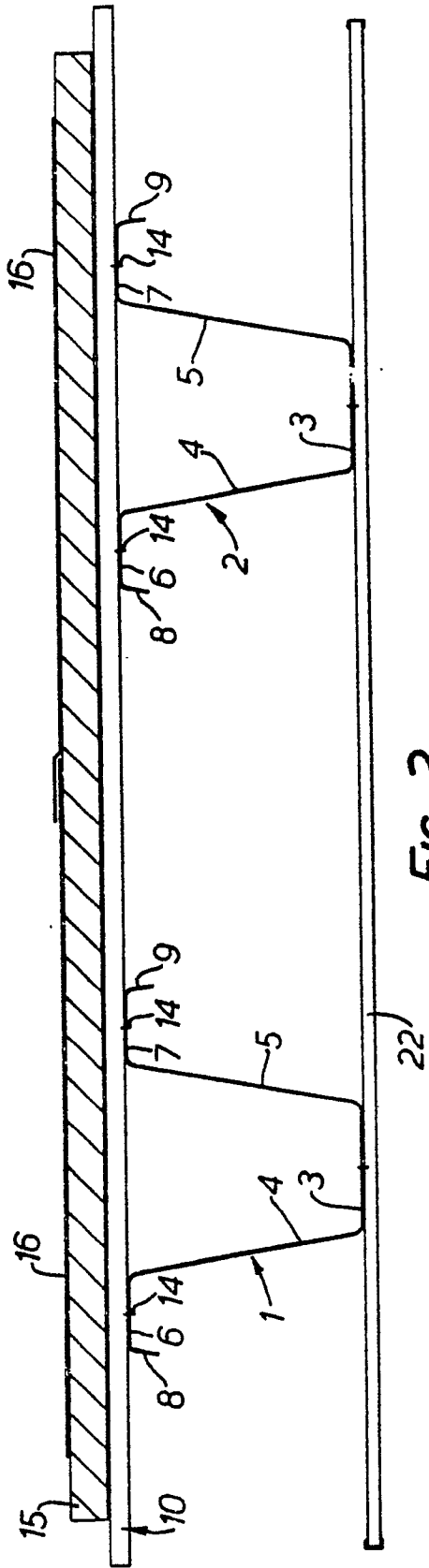


FIG. 2.

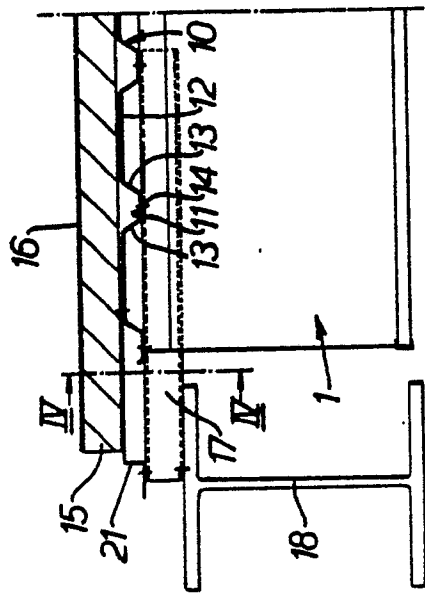


FIG. 3.

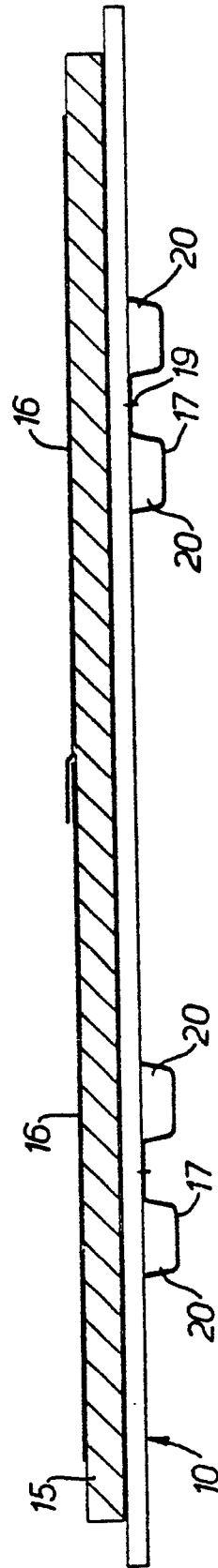


FIG. 4.