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Structures

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Description

This invention concerns a roof structure.

Self-supporting roofs or roof sections are known which comprise a plurality of extruded plastics profile elements connected side-by-side, each element having at least one longitudinal chamber and coupling members by which neighbouring profile elements are interconnected, the adjacent coupling members of neighbouring profile elements engaging to form a duct.

In UK Patent Specification GB-A-1528874 the coupling of adjacent panels form together a duct through which is inserted a longitudinally elongate locking member, the locking member having at least two opposite longitudinal edges that are a sliding fit within said duct so as to prevent the locking member from twisting under load.

In UK Patent Specification GB-A-1511189 it was further proposed that the longitudinal chamber of each element has an internal partition substantially parallel to the outer surfaces of a building unit made up of said elements. That partition is principally to provide additional heat insulation.

Further proposals for such profile elements have been made in European Patent Specification No. 0070930A, in which multiple duct elements have main ducts and intermediate secondary ducts having internal partitions that are in line. Connection of elements to each other is as disclosed in UK Patent Specifications GB-A-1511189 and GB-A-1528874. The multiple duct elements were proposed mainly to reduce construction time of a roof as compared with using single duct elements.

A yet further proposal for such elements was made in UK Patent Specification No. GB-B-2147334, in which upper coupling members consist of cylindrical, slotted, downwardly open flanges of such dimensions that a flange of a first element can be snap locked to a flange of a second identical element, In addition the lower end of one side wall of an element is integrally connected to a guide member which is adapted to engage the anchoring member of an adjacent element so as to maintain the lower ends of two adjacent side walls in spaced relationship so as to form a tight connection between such elements.

Each of these elements has to be secured, usually by means of screws, before the next element can be connected, which can be time-consuming and does not readily permit later adjustments of element positions.

Furthermore, there is a limit to the reasonable span of such elements for strength purposes. Even multiple duct elements have a limited span because they have main ducts based on single duct elements which themselves have a structural limit on their width.

An object of this invention is to provide an improved building structure.

According to the invention there is provided a roof structure comprising hollow building elements of plastics material coupled together side by side, the elements comprising flat top and bottom walls, vertical end and intermediate walls and an intermediate wall between and parallel to the top and bottom walls to form a plurality of rectangular ducts in two layers one on top of the other, the elements further comprising integral coupling members extending from opposite sides, characterized in that the coupling members at least in part form a duct between adjacent panels in which is situated a stiffening beam and an upper coupling member comprises a flange forming a channel section which is engageable in a complementary channel section of a stiffening beam between the elements.

Preferably the intermediate wall of a building element used in the invention is of thinner section than its top or bottom walls.

Lower coupling members of building elements preferably comprise formations that interengage with formations of neighbouring elements and are held together by a stiffening beam.

The stiffening beam may be the same member having upper and lower formations for engagement with upper coupling members and for holding together lower coupling members respectively.

Preferred lower coupling members of building elements comprise a first member that is a horizontal channel into which a second member fits, the stiffening beam having a formation that fits over said engaged first and second members to hold them together.

For coupled building elements according to the invention it is preferable to provide a cap or cover over the area of the coupling to prevent water ingress. Preferably the cap or cover is securable to said stiffening beam. The cap or cover preferably has at its side edges sealing means in the form of flexible resilient material. The stiffening beam preferably has a formation engageable with a formation of the cap or cover to retain the cap or cover in place. The stiffening beam may have a channel formation into which one or more depending projections of the cap or cover locate. Preferably the cap or cover has two such projections shaped to engage complementary formations on inside surfaces of the channel of the stiffening beam. The projections are preferably resilient and angled away from each other, whereby they will tend to urge outwards when pressed together and so improve engagement in the channel formation.

The preferred structure of the invention may permit elements of greater width than hitherto to be made, possibly of the order of 0.5m. The earlier described building elements are generally only made to about 0.25m.

This invention will now be further described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is an end view of a building element for forming a structure according to the invention; and Figure 2 is an enlarged view showing detail of coupling elements of Figure 1.

Referring to the accompanying drawings, a building element 10 for forming building structures, such as roofs, is shown made of translucent plastics material, such as polycarbonate, by extrusion. The element 10 is generally hollow having relatively thin walls. The element 10 has a flat bottom wall 12, upstanding end walls 14, upstanding intermediate walls 16, a flat top wall 18 and an intermediate wall 20 parallel to and equidistant from the top and bottom walls 18 and 12 respectively. The intermediate wall 20 will probably be of thinner section than the top or bottom walls 18, 12 respectively. Thus, the building element 10 comprising a plurality of rectangular section ducts 22 arranged in two rows one on top of the other.

At each end of the building element 10 are upper and lower coupling members. At one end, the lower coupling member 24 is an L-shaped extension of bottom wall 12 and at the other end lower coupling member 26 comprises an extension of the bottom wall 12 with a horizontal channel section 28 formed thereon into which the lower coupling member 24 of the other end of an adjacent building element can fit.

The upper coupling members 30 at each end of the building element comprise vertical extensions 31 of side walls 14 and downwardly open channel forming members 32 extending therefrom. The upper coupling members do not actually engage each other but engage a stiffening beam 40 inserted between building elements that are brought together end to end.

The stiffening beam 40, preferably extruded from aluminium, has upper and lower formations 42 and 44 respectively whereby adjacent building elements 10 are held together. The lower formation 44 comprises a downwardly opening channel 46 having a pair of opposed internal projections 48 that extend towards each other but do not meet. The formation 44 is sized so that when the lower coupling elements of adjacent building elements are brought together they fit between the projections 48 thereby holding them together.

The upper formation 42 of the beam 40 comprises an upwardly opening channel 50 having its internal side walls serrated. Extending outwards from opposite sides of the channel 50 in line with its base are L-shaped projections 52. The projections 52 are sized and shaped each to engage channel members 32 of upper coupling member 30, thereby holding adjacent elements 10 in a fixed relationship.

The connection between a pair of building elements 10 is covered by a capping 60. The capping 60 comprises a channel section extrusion having flexible edges 62 for forming seals with top walls 18 of the elements 10 and a pair of internal downwardly depending resilient projections 64. The projections 64 are angled apart and each has a lip 66 at its distal end to engage the serrations of the channel 50 of beam 40. Thus, when the cap is pressed downwards with the projections 64 inserted into the channel 50, the projections 64 are urged together but once the capping has reached its seating, the projections will tend to press outwards so that their lips 66 engage with the serrations of channel 50 to retain the capping in place with its sealing edges against the top walls 18 of the adjacent building elements.

To construct a roof using building elements 10, the elements are laid side-by-side on a structure providing support at opposite ends of the elements with their lower coupling elements engaged. A stiffening beam 40 is then slid into the space between the elements to fix the lower coupling members and engage the upper coupling members of the elements. Then a capping 60 is pressed into the beam 40 until it seats onto the adjacent elements sufficiently to form a seal between the edges of the capping and the top walls of the adjacent elements.

Attention is drawn to our copending patent application number GB 9613271.7 which has been divided from the present application.

Claims

1. A roof structure comprising hollow building elements (10) of plastics material coupled together side by side, the elements comprising flat top and bottom walls (18, 12 respectively), vertical end and intermediate walls (14, 16 respectively) and an intermediate wall (20) between and parallel to the top and bottom walls to form a plurality of rectangular ducts (22) in two layers one on top of the other, the elements further comprising integral coupling members (24, 26, 30) extending from opposite sides, characterized in that the coupling members at least in part form a duct between adjacent panels in which is situated a stiffening beam (40) and an upper coupling member (30) which comprises a flange (32) forming a channel section which is engageable in a complementary channel section (52) of a stiffening beam (40) between the elements.

2. A structure as claimed in claim 1, characterized in that the intermediate wall (20) of the building element is of thinner section than the top or bottom walls (18, 12 respectively) of the building elements (10).

3. A structure as claimed in claim 1 or 2, characterized in that lower coupling members (24, 26) of the building elements (10) comprise formations that interengage with formations of neighbouring elements (10) and are held together by a stiffening beam (40).

4. A structure as claimed in claim 3, characterized in that the stiffening beam (40) for the upper coupling members (30) and the stiffening beam for the lower coupling members (24, 26) is a single member having upper and lower formations (42, 44 respectively) for engagement with upper coupling members and for holding together lower coupling members re-

spectively.

5. A structure as claimed in any one of claims 1 to 4, characterized in that lower coupling members (24, 26) of a building element comprise a first member that is a horizontal channel (28) into which a second member (24) of an adjacent building element fits, the stiffening beam (40) having a formation (44) that fits over said engaged first and second members to hold them together.

6. A structure as claimed in any one of claims 1 to 5, characterized by having a cap or cover (60) over the area of coupling between adjacent elements (10).

7. A structure as claimed in claim 6, characterized in that the cap or cover (60) is securable to the stiffening beam (40).

8. A structure as claimed in claim 6 or 7, characterized in that wherein the cap or cover (60) has at its side edges sealing means (62) in the form of flexible resilient material.

9. A structure as claimed in claim 8, characterized in that the stiffening beam (40) has a formation (50) engageable with a formation (64) of the cap or cover (60) to retain the cap or cover in place.

10. A structure as claimed in claim 9, characterized in that the stiffening beam (40) has a channel formation (50) into which one or more depending projections (64) of the cap or cover (60) locate.

11. A structure as claimed in claim 10, characterized in that the cap or cover (60) has two such projections (64) shaped to engage complementary formations on inside surfaces of the channel (50) of the stiffening beam (40).

12. A structure as claimed in claim 11, characterized in that the projections (64) are resilient and angled away from each other, whereby they will tend to urge outwards when pressed together and so improve engagement in the channel formation (50).

Patentansprüche

1. Dachstruktur mit hohlen Bauelementen (10) aus Kunststoff, welche Seite an Seite miteinander verbunden sind, wobei die Elemente flache Ober- und Unterwände (18 bzw. 12), senkrechte End- und Zwischenwände (14 bzw. 16) und eine Zwischenwand (20) zwischen und parallel zu den Ober- und Unterwänden aufweisen, um eine Vielzahl an rechteckigen Kanälen (22) in zwei Schichten eine über der anderen auszuformen, wobei die Elemente desweiteren innere Kopplungsglieder (24, 26, 30) umfassen, welche sich von gegenüberliegenden Seiten aus erstrecken, dadurch gekennzeichnet, dass die Kopplungsglieder zumindest teilweise einen Kanal zwischen benachbarten Tafeln bilden, in welchem ein Versteifungsträger (40) und ein oberes Kopplungsglied (30) positioniert ist, welches einen Flansch (32) umfasst, der einen Kanalabschnitt bildet, welcher in einen komplementären Kanalabschnitt (52) eines Versteifungsträgers (40) zwischen den Elementen einsetzbar ist.

2. Struktur nach Anspruch 1, dadurch gekennzeichnet, dass die Zwischenwand (20) des Bauelementes einen dünneren Querschnitt aufweist, als die Ober- oder Unterwände (18 bzw. 12) der Bauelemente (10).

3. Struktur nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass die unteren Kopplungsglieder (24, 26) der Bauelemente (10) Ausgestaltungen aufweisen, welche mit Ausgestaltungen der angrenzenden Elemente (10) zusammenwirken und durch einen Versteifungsträger (40) zusammengehalten werden.

4. Struktur nach Anspruch 3, dadurch gekennzeichnet, dass der Versteifungsträger (40) für die oberen Kopplungsglieder (30) und der Versteifungsträger für die unteren Kopplungsglieder (24, 26) ein einziges Element ist, welches obere und untere Ausgestaltungen (42 bzw. 44) für ein Zusammenwirken mit den oberen Kopplungsgliedern bzw. zum Zusammenhalten der unteren Kopplungsglieder aufweist.

5. Struktur nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, dass die unteren Kopplungsglieder (24, 26) eines Bauelementes ein erstes Glied umfassen, welches ein horizontaler Kanal (28) ist, in welchen ein zweites Glied (24) eines benachbarten Bauelementes passt, wobei der Versteifungsträger (40) eine Ausgestaltung (44) aufweist, welche über die in Eingriff stehenden ersten und zweiten Glieder passt, um sie zusammenzuhalten.

6. Struktur nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, dass sie eine Kappe oder Bedekkung (60) über dem Bereich der Kopplung zwischen benachbarten Elementen (10) aufweist.

7. Struktur nach Anspruch 6, dadurch gekennzeichnet, dass die Kappe oder Bedeckung (60) an dem Versteifungsträger (40) befestigbar ist.

8. Struktur nach Anspruch 6 oder 7, dadurch gekennzeichnet, dass die Kappe oder Bedeckung (60) an

ihren Seitenkanten Dichtungselemente (62) aus einem flexiblen, eslastischen Werkstoff aufweist.

9. Struktur nach Anspruch 8, dadurch gekennzeichnet, dass der Versteifungsträger (40) eine Ausgestaltung (50) aufweist, welche mit einer Ausgestaltung (64) der Kappe oder Bedeckung (60) in Eingriff steht, um die Kappe oder Bedeckung an ihrem Platz zu halten.

10. Struktur nach Anspruch 9, dadurch gekennzeichnet, dass der Versteifungsträger (40) eine Kanalausgestaltung (50) aufweist, in welche ein oder mehrere von der Kappe oder Bedeckung (60) abragende Vorsprünge angeordnet sind.

11. Struktur nach Anspruch 10, dadurch gekennzeichnet, dass die Kappe oder Bedeckung (60) zwei solcher Vorsprünge (64) aufweist, die so geformt sind, um mit komplementären Formationen auf der inneren Fläche des Kanals (50) des Versteifungsträgers (40) in Eingriff zu stehen.

12. Struktur nach Anspruch 11, dadurch gekennzeichnet, dass die Vorsprünge (64) elastisch und voneinander abgewinkelt sind, wobei sie dazu neigen, nach aussen zu drücken, wenn sie zusammengepresst werden und damit das Eingreifen in die Kanalausgestaltung (50) verbessern.

Revendications

1. Une structure de toit comprenant des éléments de construction creux (10) en matière plastique accouplés ensemble côte à côte, les éléments comprenant des parois planes supérieure et inférieure (18, 12 respectivement), des parois verticales d'extrémités et intermédiaires (14, 16 respectivement) et une paroi intermédiaire (20) entre les, et parallèle aux, parois supérieure et inférieure pour former une pluralité de conduits rectangulaires (22) en deux couches l'une sur l'autre, les éléments comprenant en outre des organes d'accouplement (24, 26, 30) d'une seule pièce s'étendant depuis des faces opposées,
caractérisée en ce que les organes d'accouplement forment au moins en partie un conduit entre des panneaux adjacents, dans lequel est située une poutre de renforcement (40), et un organe d'accouplement supérieur (30) qui comprend un bord (32) formant une section de canal qui peut être engagée dans une section de canal (52) complémentaire d'une poutre de renforcement (40) entre les éléments.

2. Une structure telle que revendiquée dans la revendication 1,
caractérisée en ce que la paroi intermédiaire (20) de l'élément de construction a une section plus mince que les parois supérieures ou inférieures (18, 12 respectivement) des éléments de construction (10).

3. Une structure telle que revendiquée dans la revendication 1 ou 2,
caractérisée en ce que les éléments d'accouplement (24, 26) inférieurs des éléments de construction (10) comprennent des conformations qui interpénètrent avec des conformations d'éléments (10) voisins et sont maintenues ensemble par une poutre de renforcement (40).

4. Une structure telle que revendiquée dans la revendication 3,
caractérisée en ce que la poutre de renforcement (40) pour les organes d'accouplement (30) supérieurs et la poutre de renforcement (40) pour les organes d'accouplement inférieurs (24, 26) sont un organe unique ayant des conformations supérieure et inférieure (42, 44 respectivement) pour s'engager respectivement sur des organes d'accouplement supérieurs et pour maintenir ensemble des organes d'accouplement inférieurs.

5. Une structure telle que revendiquée dans l'une quelconque des revendications 1 à 4,
caractérisée en ce que des organes d'accouplement (24, 26) inférieurs d'un élément de construction comprennent un premier organe qui est un canal horizontal (28) dans lequel s'ajuste un second organe (24) d'un élément de construction adjacent, la poutre de renforcement (40) ayant une conformation (44) qui s'ajuste au-dessus desdits premier et second organes engagés pour les maintenir ensemble.

6. Une structure telle que revendiquée dans l'une quelconque des revendications 1 à 5,
caractérisée en ce qu'elle a une coiffe ou un couvercle (60) sur la surface d'accouplement entre deux éléments (10) adjacents.

7. Une structure telle que revendiquée dans la revendication 6,
caractérisée en ce que la coiffe ou le couvercle (60) peut être fixé à la poutre de renforcement (40).

8. Une structure telle que revendiquée dans la revendication 6 ou 7,
caractérisée en ce que la coiffe ou le couvercle (60) a, à ses bords latéraux, des moyens d'étanchéité (62) sous forme d'un matériau souple élastique.

9. Une structure telle que revendiquée dans la revendication 8,
caractérisée en ce que la poutre de renforcement

(40) a une conformation (50) pouvant être engagée sur une conformation (64) de la coiffe ou du couvercle (60) pour maintenir en place la coiffe ou le couvercle.

10. Une structure telle que revendiquée dans la revendication 9,
caractérisée en ce que la poutre de renforcement (40) a une conformation de canal (50) dans laquelle sont logées une ou plusieurs saillies (64) dépendantes de la coiffe ou du couvercle (60).

11. Une structure telle que revendiquée dans la revendication 10,
caractérisée en ce que la coiffe ou le couvercle (60) a deux telles saillies (64) de forme propre à s'engager sur des conformations complémentaires sur des surfaces intérieures du canal (50) de la poutre de renforcement (40).

12. Une structure telle que revendiquée à la revendication 11,
caractérisée en ce que les saillies (64) sont élastiques et à angles les écartant l'une de l'autre, grâce à quoi elles tendront à pousser vers l'extérieur lorsqu'elle sont pressées ensemble et améliorer ainsi l'engagement dans la conformation de canal (50).

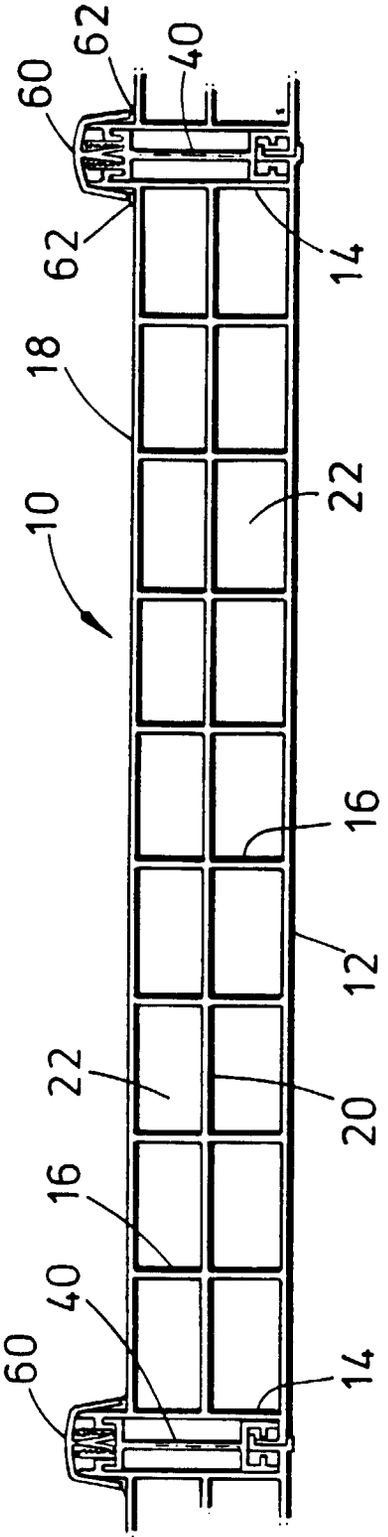

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FIG. 1

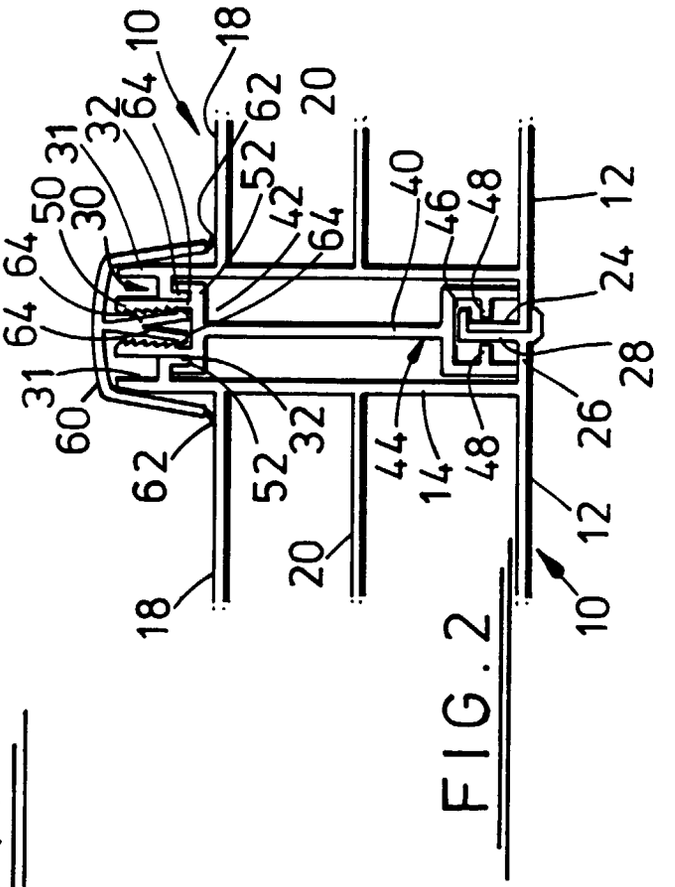

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FIG. 2