The present invention relates to a building construction and to certain subcombinations thereof.

It has become common practice for drive-in sandwich and soft drink chains to supply an identical or similar building configuration for each of the drive-in building units or outlets. This practice has a number of advantages in that the public comes to know a particular building configuration as identifying an outlet of a particular chain and also the parts for constructing the various outlets can be standardized. The present invention is particularly useful in the constructing of such drive-in outlets although not necessarily restricted to this use. It is a primary object of the present invention to provide an improved building construction and an improved roof construction both particularly adapted for use in drive-in buildings.

Another object of the invention is to provide a building construction the components of which are easily transported to the point of assembly on a truck or the like.

Still another object of the invention is to provide a building construction incorporating inexpensive components which can be easily maintained in stock and easily inventoried.

One embodiment of the present invention might include a building comprising a plurality of butterfly units, each of said units including a pair of triangular shaped panel sections connected to one another along a first side of each triangular shape to form a valley with a horizontal bottom, each of said triangular shaped panel sections extending upwardly from said valley bottom at the same angle, each of said triangular shaped panel sections having second and third sides of equal length, three of said butterfly units being secured to one another to form a peak defined by three joined triangular sections one from each of said butterfly units, a first of said three joined triangular sections having its second side secured to and coextensive with the third side of a second of said three joined triangular sections and having its third side secured to and coextensive with the second side of the third of said three joined triangular sections, the third of said three joined triangular sections having its third side secured to and coextensive with the second side of the second of said three joined triangular sections, three vertical posts supporting said butterfly units, the bottoms of said valleys defining a triangle, each of said posts being located at one of the corners of the valley-defined triangle and supporting two of said butterfly units at the respective corner.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

FIG. 1 is a top plan view of the building construction of the present invention.

FIG. 2 is a plan view of a triangular shaped panel section making up a part of the structure of FIGS. 1 and 1A and taken from the same direction as FIGS. 1 and 1A.

FIG. 3 is a fragmentary enlarged plan view similar to FIG. 1 with certain parts removed to illustrate certain roof supporting post features of the present invention.

FIG. 4 is a vertical section taken along the line 4—4 of FIG. 3 in the direction of the arrows.

FIG. 5 is a vertical section taken along the line 5—5 of FIG. 4 in the direction of the arrows.

FIG. 6 is an enlarged detail view of a valley or ridge connection forming a part of the structure of FIG. 5.

FIG. 7 is an enlarged section taken along the line 7—7 of FIG. 2 in the direction of the arrows.

FIG. 8 is a fragmentary vertical section of a side panel assembly making up a portion of the present invention.

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiment illustrated in the drawing and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring more particularly to the drawings, one important feature of the present invention is the roof construction shown in plan in FIGS. 1 and 1A. In FIG. 1, there is provided a plurality of butterfly units 10, each of said units including a pair of triangular shaped panel sections 11 (one such section being shown in FIG. 2) connected together at horizontal base sides 12 thereof. Each of the triangular shaped panel sections 11 has such a first or base side 12 which is horizontal in the roof construction of FIG. 1 and is connected to the identical side 12 of the other triangular panel section making up a respective butterfly unit. In each of the butterfly units of the roof construction illustrated in FIG. 1, the two triangular shaped panel sections 11 extend upwardly and outwardsly from the connection of their sides 12 to define a valley with the valley bottom horizontal and at the sides 12.

Each of the triangular panel sections 11 has a second side 15 and a third side 16, said second and third sides being of equal length. In the roof construction of FIG. 1, three of the butterfly units 10 are secured to one another to form a peak 20. Of course, this construction may be repeated many times throughout a particular roof so as to produce a number of peaks 20. Considering, for example, the roof construction of FIG. 1, there are four such peaks defined by butterfly units. In the roof construction of FIG. 1, there are also additional high points 21 at the same height as the peaks 20. However, these additional high points are not defined by three complete butterfly
units because the outer triangular panel sections such as 22 and 23 in the upper left-hand corner of FIG. 1 are not complete butterfly units but instead are only half thereof and therefore are a single triangular section.

The roof construction of FIG. 1A is identical to that of FIG. 1 with the exception that each butterfly unit is complete. Thus, the peak 25 of FIG. 1A is defined by three complete butterfly units. It has been found desirable in certain cases to support the outer triangular shape panel sections such as 22 and 23 in the upper left-hand corner of FIG. 1A by an additional supporting means which in the illustrated embodiment includes rods 30 and 31 connecting the peak 25 with the high points 32 and 35 of the outer triangular sections 26 and 27.

Referring again to FIG. 1, and considering, for example, the three complete butterfly units in the upper left-hand portion of that figure, three triangular panel sections one from each of the three butterfly units are joined together by their sides 15 and 16 to form the respective peak 20. Thus, one side 15 of a first of the three triangular sections is joined to and is coextensive with a side 16 of a second of the three triangular sections and the side 16 of the first triangular section is joined to and is coextensive with the side 15 of the third triangular section. Also, the side 15 of the second triangular section is joined to and is coextensive with the side 16 of the third triangular section.

The above described construction is relatively strong even though relatively bulky beams are eliminated therefrom. Referring to FIG. 2, the edge 12 of the triangular section 11 is defined by a member 40, the cross section of which is shown in FIG. 3. As can be appreciated from FIGS. 4 and 5, the member 40, along with an associated member 49 of an adjoining panel section 11, acts as a beam with its opposite ends supported upon the plate assemblies 41 of posts 42. The second and third sides of the triangular section 11, that is the sides 15 and 16 defined by members 45 and 46, are not stressed entirely as beams but instead carry a certain amount of compressive stress along their lengths because they define the above explained peaks 20. The arched construction of the peaks causes the stresses within the members 45 and 46 to be compressive to a certain extent and because of the reduced amount of strain resulting from compressive stress as compared to bending stress, a substantial part of the bending load on the horizontal members 40 is borne by the members 45 and 46.

It should also be pointed out that the triangular section 11 of FIG. 2 is the same throughout the roof construction of FIGS. 1 and 1A. In other words, it is not necessary to provide a right-handed and a left-handed triangular section or to provide a pair of triangular sections which are the mirror image of one another. Thus, a further advantage of the roof construction of the present invention is that the panels 11 are standardized and identical even though they can be used to produce a number of attractive variations in roof constructions.

Referring again more particularly to FIG. 2, it will be noted that the triangular section 11 includes the above mentioned members 40, 45, and 46 which are welded to one another and to the cross members 50 and 51. A detail cross section of one of the cross member 50 is presented in FIG. 7. The panels 52, 53, 54 etc. making up the triangular section 11 are commercially available from suppliers and can be purchased, for example, from Alcoa. These panels include preferably outer aluminum faces and have an urethane core. The panels may be cemented to the extrusion members 45, 46, 40, 50 and 51 by means of commercially available adhesives such as, for example, that known by the trade name Thitek. It will be noted from FIG. 2 and from FIG. 5 that the members 40, 45 and 46 are provided with outer flanges 55, 56 and 57 which project past the body of the triangular sections 11 and which are at an angle relative to the body of the triangular sections, said angle being other than 90°. It is this particular arrangement together with the dimensions of the construction of the triangular sections 11 which permit them to be used interchangeably to form the peaks 20.

To secure the two triangular sections 11 of a respective butterfly unit together, a joint 10 is used to connect the mutually engaging flanges 55. Channels 61 which extend the complete length of the flanges 55 are then placed over the flanges to hold them together and to prevent leakage of water and the like between the flanges. In forming the various peaks 20, channel elements 62 similar to the channel element 61 are used to connect the flanges 56 and 57. Of course, the channel elements 62 are shorter than the channel elements 61.

FIG. 6 is an enlarged detail view of the connection of the flanges 55 showing their connection by a representative one of the channels 61. It will be noted that the channels 61 include inwardly projecting portions 65 which lock over outwardly projecting portions 66 on the flanges 55. The outwardly projecting portions 66 and the inwardly projecting portions 65 extend completely along the length of the members 55 and 61 and can be formed by the extrusion of these members.

As mentioned above, the butterfly units are supported upon the plate assemblies 41 of posts 42. The plate assemblies 41 include a circular plate 70 each of which is welded to a cylindrical element 71. Each cylindrical element 71 projects downwardly from its associated plate 70 and is received within the channel element 61. After plate assembly 41 has been placed upon the post 42 with its depending cylindrical member 71 received within the post, the post and plate 41 are welded together.

The butterfly units 10 are secured to the plate assembly 41 by means of angles 75 through the vertical leg of which extend the bolts 60. The horizontal legs 76 of the angle 75 are fixed to the plate assembly 41 by bolts 77 which extend through bores 80 in the plate 70. The lower ends of the posts 42 are set in conventional manner preferably in a concrete floor 100 (FIG. 8). In the situation where the valley of the butterfly unit is to be directly above an outer wall of the building construction, the lower channel 61 of FIG. 5 is replaced by the member 101 which includes two oppositely opening channel portions 102 and 103. The depending portions of the flanges 55 are received within the channel portion 102 as illustrated in FIG. 10 and the side wall panel 105 is moved into position. The side wall panel 105 may include, for example, an outer porcelain wall 106, foam urethane insulation core 107 and aluminum sheet 110 on the inside of the wall. The panel 105 is moved into position after first inserting the upper end 111 of a truss into the like. It will also be evident that the improved building construction of the present in-
vention eliminates heavy beams and trusses from building construction. It should be understood that the various structural concepts described above are usable in wood as well as aluminum and other materials. Also, the panels 52, 53 and 54 need not necessarily be aluminum and urethane but can be any solid or insulated material. Also, drive-in buildings are certainly not the only application for the present invention, one further application being, for example, very economical pole barns or animal shelters for use on the farm.

With the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the invention and the scope of the claims are also desired to be protected.

The invention claimed is:

1. A roof construction for a building comprising a plurality of butterfly units, each of said units including a pair of triangular shaped panel sections connected to one another along a first side of each triangular shape to form a valley with a horizontal bottom, each of said triangular shaped panel sections extending upwardly from said valley bottom at the same angle, each of said triangular shaped panel sections having second and third sides of equal length, a plurality of triangular frames bordering the respective panel sections at the three sides thereof, three of said butterfly units being secured to one another to form a peak defined by three joined triangular panel sections one from each of said butterfly units, a first of said three joined triangular sections having its second side secured to and coextensive with the third side of a second of said three joined triangular sections and having its third side secured to and coextensive with the second side of the third of said three joined triangular sections, the third of said three joined triangular sections having its third side secured to and coextensive with the second side of a second of said triangular sections and having its second side secured to and coextensive with the third side of a first of said triangular sections, said first sides defining a triangle, a plurality of triangular frames bordering the respective panel sections, three vertical posts supporting said butterfly units, the bottoms of said valleys defining a triangle, each of said posts being located at one of the corners of the valley-defined triangle and supporting two of said butterfly units at the one corner.

2. A roof construction for a building comprising a plurality of butterfly units, each of said units including a pair of triangular shaped panel sections connected to one another along a first side of each triangular shape to form a valley with a horizontal bottom, each of said triangular shaped panel sections having second and third sides of equal length, a plurality of triangular frames bordering the respective panel sections at the three sides thereof, three of said butterfly units being secured to one another to form a peak defined by three joined triangular panel sections one from each of said butterfly units, a first of said three joined triangular sections having its second side secured to and coextensive with the third side of a second of said three joined triangular sections and having its third side secured to and coextensive with the second side of the third of said three joined triangular sections, the third of said three joined triangular sections having its third side secured to and coextensive with the second side of a second of said triangular sections and having its second side secured to and coextensive with the third side of a first of said triangular sections, said first sides defining a triangle, a plurality of triangular frames bordering the respective panel sections at the three sides thereof, each of said panel sections having vertically projecting flanges extending completely along each of its three sides, three channel members one of which straddles and holds together the flanges of the second side of said first section and the third side of the second section, a second of which straddles and holds together the flanges of the third side of said first section and the second side of the second section and a third of which holds together the flanges of the third side of the third section and the second side of the second section.

3. A roof construction for a building comprising a plurality of butterfly units, each of said units including a pair of triangular shaped panel sections connected to one another along a first side of each triangular shape, three of said butterfly units being secured to one another to form a peak defined by three joined triangular panel sections one from each of said butterfly units, said first sides defining a triangle, a plurality of triangular frames bordering the respective panel sections, three vertical posts supporting said butterfly units, the bottoms of said valleys defining a triangle, each of said posts being located at one of the corners of the valley-defined triangle.
the second side of the second of said three joined triangular sections, three vertical posts supporting said roof construction, said three first sides defining a triangle, each of said posts being located at one of the corners of said triangle and supporting two of said panel sections.

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