United States Patent [19]

Hall

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[54] **PANEL SECURING MEANS AND METHOD**

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[52] **U.S. Cl.** **52/224;** 52/80; 52/82; 52/90; 52/248; 52/593; 52/461; 52/741

[51] **Int. Cl.** **E04b 7/02**

[58] **Field of Search** 52/82, 237, 73, 80, 90, 52/593, 282, 224, 223, 248, 461, 741

[56] **References Cited**

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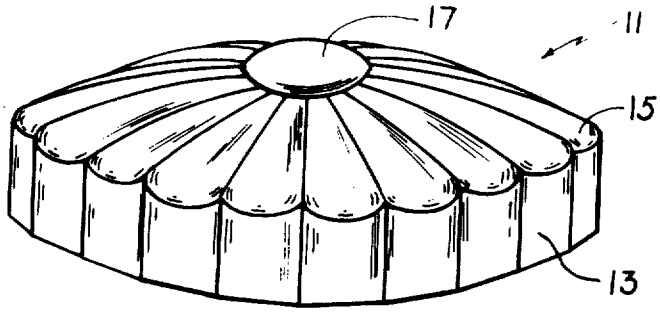
Primary Examiner—John E. Murtagh

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[57] **ABSTRACT**

A means and method for securing a plurality of panels together to form a rigid, self-supporting enclosure including a plurality of generally T-shaped cross-section exterior of columns supported in a vertical position around the periphery of a base. Side wall panels are inserted into and held in position between adjacent pairs of vertical columns and roofing elements having cast elements held in the corners thereof, are secured to the columns to form the rigid enclosure.

10 Claims, 8 Drawing Figures



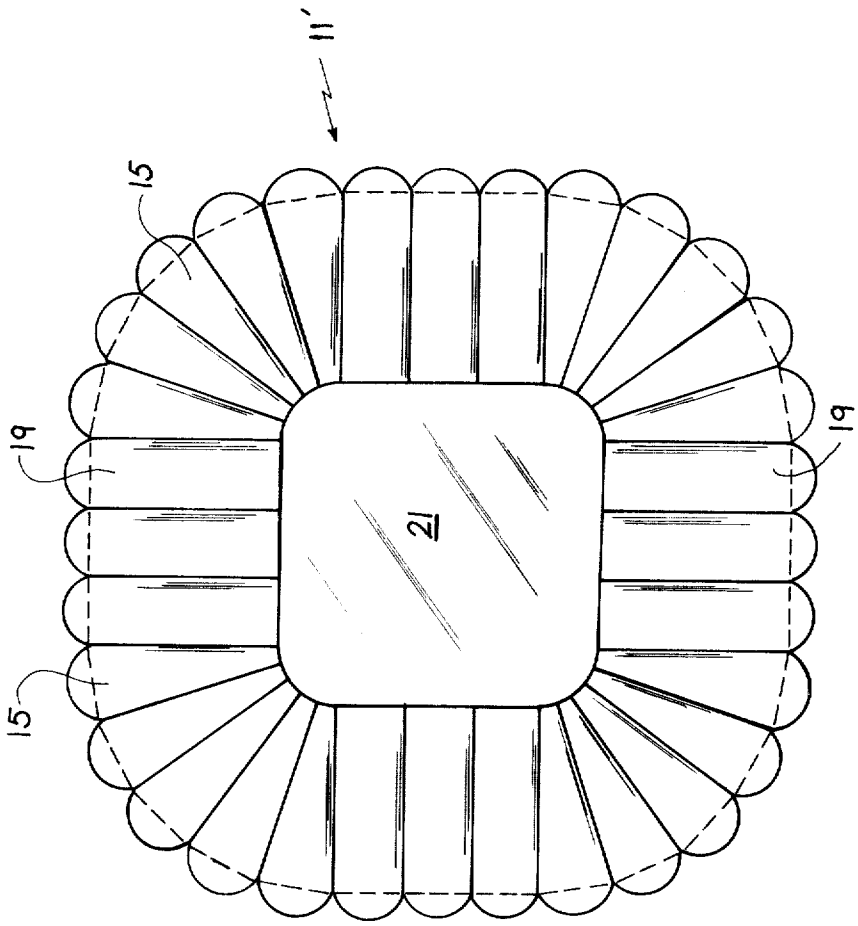


Fig - 3

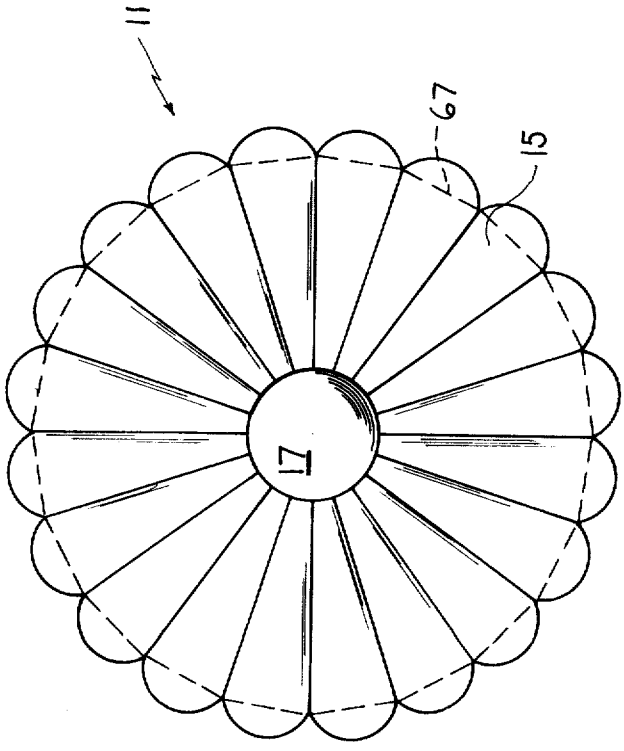


Fig - 2

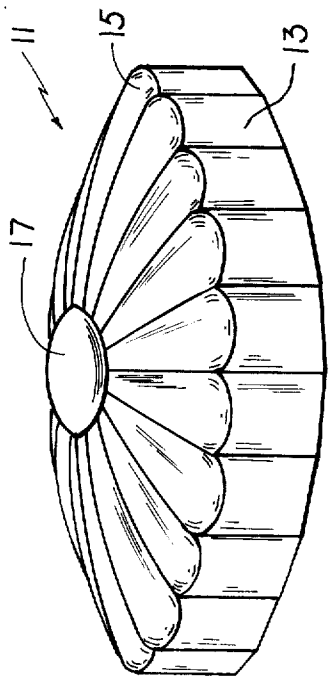


Fig - 1

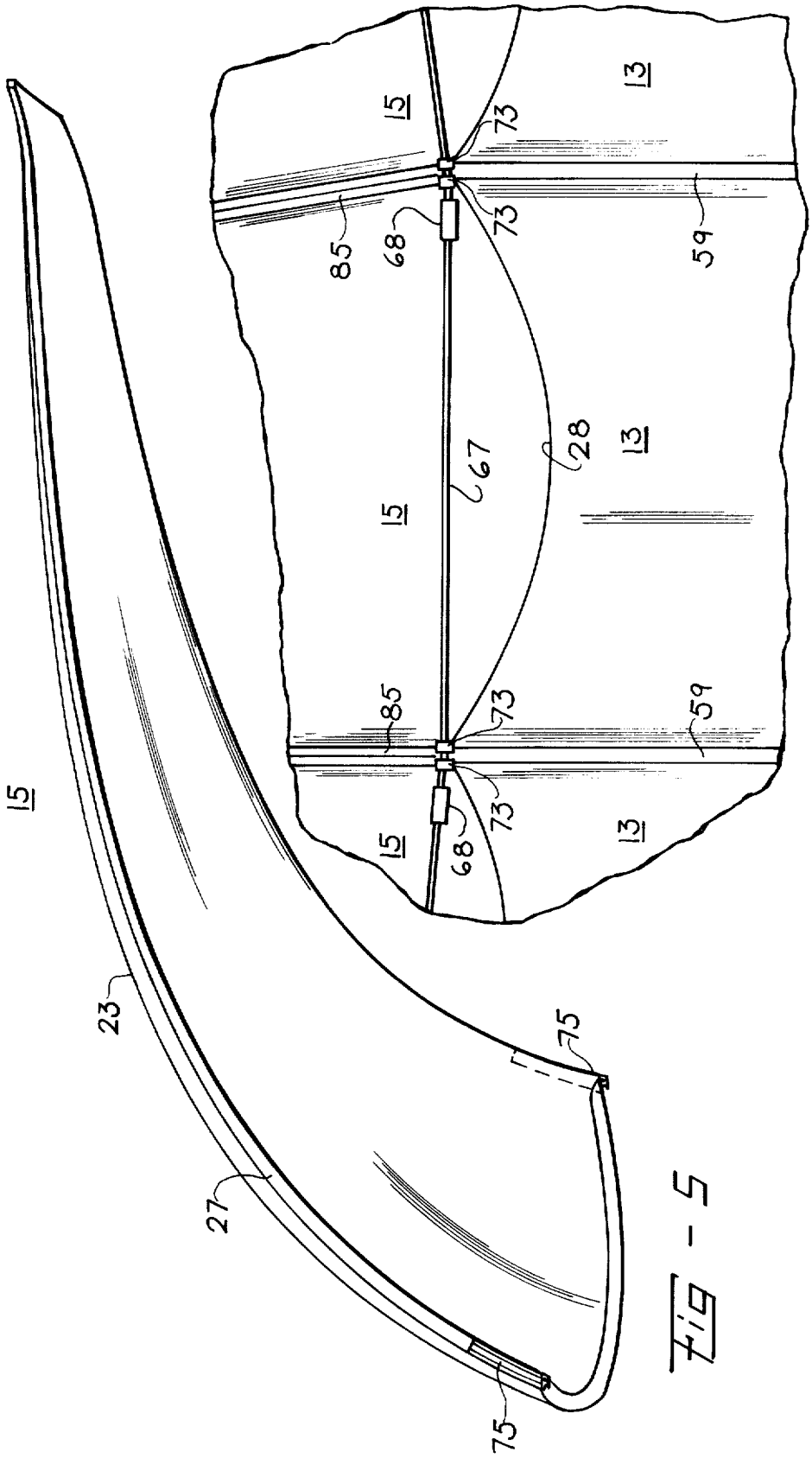


Fig - 4

Fig - 5

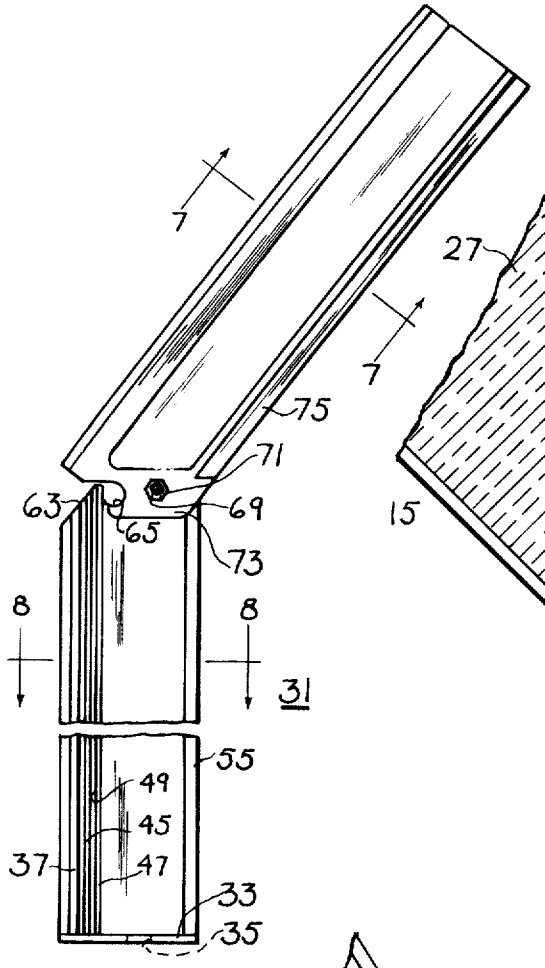


Fig - 6

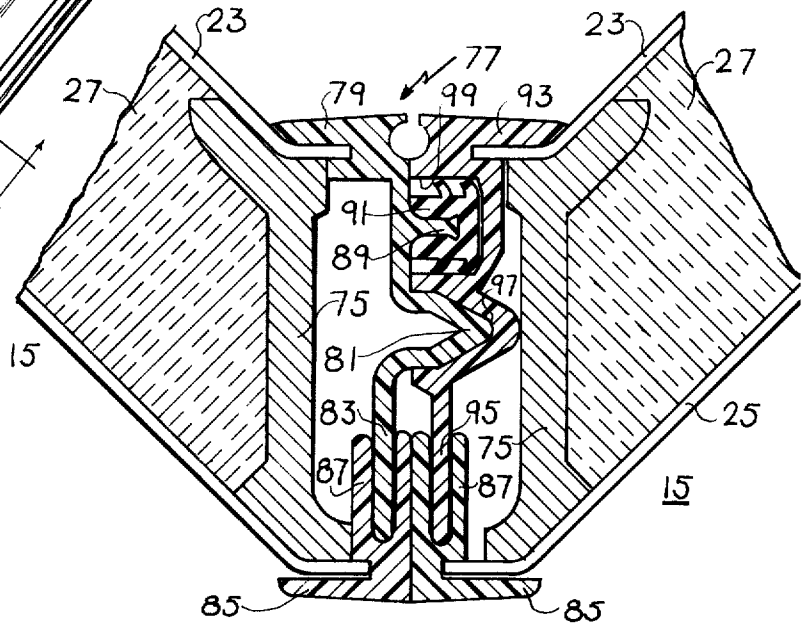


Fig - 7

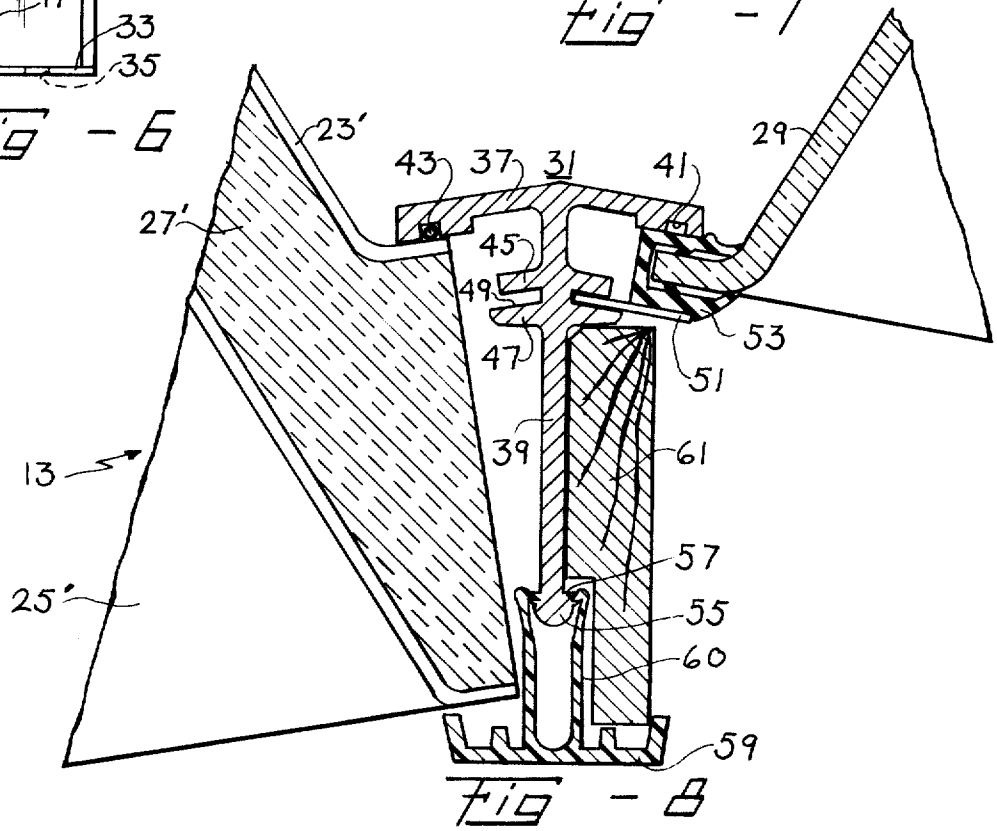


Fig - 8

PANEL SECURING MEANS AND METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is related to applicant's U.S. Design Pat. No. 223,486, issued on Apr. 25, 1972, and to applicant's copending U.S. Pat. application Ser. No. 268,564, filed July 3, 1972, for SECTIONAL ELEMENT.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to the securing together of sectional elements, and, more particularly, to a novel means and method for securing sectional elements together to form a rigid self-supporting enclosure.

2. Description of the Prior Art

Sectional elements which are now employed in the construction of housing or other enclosures generally utilize nails, glue, clips or other fastening means to sealingly secure the elements together. One such fastening and sealing means is shown in U.S. Pat. No. 3,562,975 to Moss, and comprises a plurality of flexible joints fitted between adjacent panels, which flexible joints are usually formed as extruded strips having generally H-shaped cross sections. The sectional or wall elements are inserted into each side of the extruded strips and are held or biased into position by the use of toggle clamps connected between adjacent elements.

Numerous other means are used to fasten and seal other sectional elements together. However, each fastening means appears to be entirely different and usable only in a particular situation in order to meet the different standards and means of constructing and maintaining an erected enclosure in position. None of the known fastening and sealing means appears to give the necessary sealing qualities, strength and rigidity to the structure to enable the complete structure to maintain its position and weatherproofing in all adverse conditions, nor do any of these fastening and sealing means have the necessary flexibility to be used in other and varying situations.

Applicant's present invention comprises a means and method for erecting and sealing sectional elements together, which means and method provide great strength, and durability, and which will maintain a seal between sectional elements having different configurations and shapes during all weather conditions.

SUMMARY OF THE INVENTION

A means for securing a plurality of panels together to form an enclosure, comprising a base with a plurality of T-shaped cross-section columns supported in a vertical position around the periphery of the base. A plurality of wall elements are secured between adjacent pairs of columns, and means are provided for fixing roof elements over the wall elements and to the supporting columns. Sealing means extend along the mating surfaces of adjacent roof elements to provide a sealed enclosure.

The invention also includes a method for constructing an enclosure utilizing a plurality of vertical columns having wall panels and roof panels connected to the vertical columns to form a rigid structure.

OBJECTS OF THE INVENTION

It is therefore an object of the present invention to provide a securing means for attaching a plurality of sectional elements together to form a rigid enclosure.

It is a further object of the invention to provide a securing means for attaching a plurality of sectional elements together which is rigid and has a generally T-shaped cross section.

It is another object of the instant invention to provide securing means to which both wall panels and roof panels may be secured.

It is still a further object of the present invention to provide a method for securing a plurality of sectional elements together to form a rigid enclosure.

And it is still another object of the invention to provide an enclosure having mating sealing means formed along the surfaces of adjacent sectional elements.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of one form of an enclosure which may be constructed in accordance with the present invention;

FIG. 2 is a top plan view of FIG. 1;

FIG. 3 is a further embodiment of an enclosure which may be constructed in accordance with the teaching of the present invention;

FIG. 4 is a partial interior view of an enclosure in accordance with FIGS. 1 through 3, showing adjoining wall and roof elements sealingly fixed together with tensioning means mounted therebetween;

FIG. 5 is a perspective view of a preferred form of the sectional element used as a roof element;

FIG. 6 is a partial side elevational view of a vertical column fixed to a pair of roof castings held in the corners of the roof sections used in the present invention;

FIG. 7 is a cross section taken along line 7-7 of FIG. 6; and

FIG. 8 is a cross section taken along line 8—8 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is a means and method for sealingly securing together a plurality of side walls and roof elements to form a rigid, self-supporting enclosure, such as a house, a cabin, or the like. One type of this structure is shown in applicant's U.S. Design Pat. No. 223,486 issued on Apr. 25, 1972. To maintain the structure in the assembled position, the present invention utilizes a plurality of vertical columns supported around the periphery of a base and held together by adjustable tension rods. The ends of wall segments or sections are sealingly inserted between adjacent pairs of vertical columns and attaching means fixed to the top of each vertical column and to roof elements to rigidly secure the segments and elements together. Sealing elements are inserted between adjacent roof sections to form a weather-tight enclosure.

Reference is now made to the drawings for a detailed description of a preferred embodiment of the invention. There shown in FIGS. 1 and 2 is an enclosure 11 similar to the type depicted in applicant's above set forth design patent. This enclosure comprises a plurality of shaped side wall elements 13 fixed between pairs of adjacent vertical columns, and a plurality of roof elements or sections 15 supported by the walls 13. The

roof elements are sealingly secured to each other and to the wall sections in a manner explained more fully hereinafter.

The completed enclosure is preferably provided with a translucent roof dome **17**, prepared in any convenient manner. The free end of each roof element extends to the dome, and is preferably sealingly supported in a compression ring (not shown) surrounding the dome.

FIG. **3** shows a modified enclosure comprising a plurality of wall sections **13**, supporting a plurality of roofing elements **15** and **19**, of the type more clearly explained in applicant's copending U.S. patent application, filed concurrently herewith. As shown, rectangular roofing elements **19** and triangular roofing elements **15** are grouped together to form a building which may be termed to be substantially rectangular in shape. A rectangular opening is provided in the center thereof, any may be provided with a dome **21**. If the interior space provided within the enclosure is sufficiently large, the dome may be eliminated and the central portion may be left open to provide an inner courtyard, or the like.

It is to be understood that the enclosures pictured in FIGS. **1–3** are for illustrative purposes only and that the present invention is applicable to any shaped structure, of as many stories or any elevation desired, which may be constructed from wall elements and/or roof sections of the type disclosed.

FIG. **4** of the drawings shows a partial interior view of one complete wall section **13** connected to two partial wall sections and to a plurality of partial roof sections. A preferred type of roof panel **15**, having a double arched configuration extending both in cross section and along the length thereof, is shown in perspective in FIG. **5**, and described more clearly in applicant's copending and concurrently filed application. As described in this copending application, the roofing section includes inner and outer rigid skins **23, 25** spaced apart a predetermined distance by foam **27** injected therebetween. The side wall elements **13** may be formed in a manner similar to that of the roof elements so as to have approximately the same thickness, and to include inner and outer rigid skins **23'**, **25'** with foam **27'** injected therebetween (see FIG. **8**).

As shown, each wall member **13**, preferably curves outwardly at **28** adjacent the top thereof. This curvature conforms to the semicircular base or end portion of the sectional roof elements **15**, and **19**.

Adjacent pairs of wall elements, or if desired, an acrylic window element **29** having substantially the same shape as a wall unit, but comprising only one transparent rigid skin are inserted into the opposite sides of a rigid vertical column **31**, shown more clearly in FIGS. **6** and **8**. A plurality of these vertical columns, spaced apart predetermined distances, depending on the width of the wall or the window elements, are secured to a base platform which will form the floor of the enclosure. Each of the vertical columns may be of any desired height, and is preferably, substantially T-shaped in cross section, as more clearly shown in FIG. **8**.

Each vertical column is provided with a base portion **33** of any convenient shape, to which the column is secured, as by welding. The base is provided with at least two holes **35** extending therethrough to enable the column to be base.

As shown in FIG. **2**, a substantially circular building having **20** roof sections and the same number of wall sections or equivalent windows and/or door elements, may be assembled together by utilizing one less vertical column, that is, **19**. It is, of course, understood that any number of roofing elements may be utilized, depending upon the size of the structure, and the desired esthetic effect to be obtained.

Each T-shaped column **31** includes a top bar **37**, which may be termed horizontal, but which, in effect, includes two separate side portions extending away from a vertical leg **39** at slight angles. What may be termed the inner portion of the distant or unattached end of each of the angled portions of the top bar are provided with recessed portions **41**, formed in any convenient manner, for the receipt of beads or other sealing means **43** to enable a weatherproof joint to be formed when a wall or the like is inserted therein. The horizontal top bar **37** is preferably positioned so as to have its outer surface face toward the outside of the enclosure.

The vertical leg **39** includes a pair of spaced apart arms **45, 47** formed integrally therewith. These arms extend from each side of the leg, and are preferably positioned adjacent to the horizontal top bar **37**. As shown, each arm extends outwardly from the leg for a different distance varying from approximately one-fourth to one-third of the distance each side portion of the horizontal top bar extends from the vertical leg. Sealing means (not shown) may be inserted in a space **49** formed between these arms, or plate means **41** may be inserted therein to enable the end portion of the acrylic window **29** to be sealingly held between the plate and a U-shaped sealing means **53** slipped over the edge or end of the window, along its entire length.

The outer free end of the vertical leg **39** is preferably formed as an enlarged bulbous base **55** having serrated edge portions **57** on each side thereof. A T-shaped cap or sealer strip **59**, having flexible legs **60** is slipped over and held in position on the base **55**. The entire strip **57** is preferably made from a flexible plastic, so that the ends of the leg **60** may be pushed inwardly beyond the serrated edge portion **57**, to adjust the cap strip with respect to the vertical leg **39**. In this manner, wall panels of different thickness may be accommodated between the top bar **37** and the cap strip **59**, or, a filler block, such as a block **61**, may be inserted between the cap strip and one of the arms **47**, when a window is inserted between an adjacent pair of columns.

As shown more clearly in FIG. **6**, the outer free end of each of the vertical columns is formed so as to include a diagonally removed portion **63**, facing toward the outer or exterior portion of the vertical column. The roofing elements are preferably formed to extend downwardly over this removed portion and the wall sections to form a seal therebetween.

The outer free end of each column is also provided with a semicircular opening or removed portion **65** in the free end of the vertical leg portion thereof. A horizontal tensioning rod **67** (see FIG. **4**), is placed in each opening and extends between two adjacent columns around the periphery of the enclosure for securing the columns in their vertical position. Each of the tensioning rods is preferably provided with an adjusting collar **69** to take up any slack between adjacent columns.

Adjacent the semicircular opening **65**, each of the rigid columns is provided with a hole or opening (not

shown) through which a securing means, such as a bolt **69**, may be passed and held in position by a nut **71**. The bolt passes through flanged portions **73** of roof castings **75**. The castings are preferably preformed elements made from aluminum or the like, and are of a predetermined length, such as approximately 18 inches or more. The castings are securely held or formed in the semicircular base portion on either side of the roofing elements **15** (FIG. **5**). That is, a casting is held in position at the meeting point of the side walls and base portion of each roof element so as to enable the roof elements to be securely held to and between adjacent pairs of vertical columns. In this manner, with the roof elements in position, the extending flange portion **73** of two adjacent roofing elements may be secured to each side of a vertical column by the bolt **69** passing through all three elements and the nut **71** threaded over the end of the bolt.

When a plurality of roof elements are assembled so as to form a complete building or a roof of the type shown in FIGS. **1–3**, some type of sealing means must be placed between adjacent roofing elements so as to seal the same against the elements. A preferred embodiment of such a sealing element **77** is shown in FIG. **7** of the drawings, and includes a pair of adjustable, mating members **79, 93**. These members include a male element **79** secured along the side edge of one of the roof elements, preferably along the left hand side of each element, as shown in the drawings. The male element includes a protruding portion **81** and an extending tail portion **83**. An adjustable slip-on member **85** having prongs **87** is slidably held on tail portion **83**. The outer edge portions of the male member **79** and the slip-on element **85** are provided with overlapping edges for sealingly receiving the rigid skins **23, 25** of each roofing section **15**. It should be pointed out that the male element extends along the entire side edge portion of a roof element including the castings **75**, to thereby cover the entire surface thereof. In addition, the element **79** is provided with an extending portion **89** for receipt of a U-shaped sealing member **91**.

The opposed or right hand side edge of an adjacent roofing element is provided with a female element **93** having a slip-on element **85** mounted on its tail end **93**. The female element includes a formed or mating portion **97** for sealing receipt of the protruding portion **81** of the male element **79**. In addition, the female element includes a U-shaped opening **99** into which the seal **91** is inserted. A circular opening **101** is formed between mating semicircular outer cavities formed on each of the male and female elements for receipt of a further sealing strip (not shown) at the outer edge thereof. In this manner, the mating or opposed edges of adjacent roofing elements are sealed together along the entire length thereof in a plurality of positions to prevent water or the like from passing therethrough.

The outwardly extending finger portions of the slip-on members **85** may have cap strip placed thereover for the receipt of electrical wiring, plumbing or the like within the enclosure.

It therefore can be seen that a new and novel means and method for securing and holding a plurality of unique wall and roof elements together to form an enclosure without the addition of further supporting structure has been disclosed. Each of the elements may be easily assembled together or broken apart for storage or transportation to a new building site.

With the securing means of the present invention, an esthetically pleasing, lightweight, highly mobile building may be assembled in final condition in a short period of time, requiring an absolute minimum of tools, and utilizing the services of only two persons.

While the invention has been described in considerable detail, it is not to be limited to such details as have been set forth except as may be necessitated by the appended claims.

I claim:

1. An enclosure constructed by securing a plurality of panels together comprising

a base,

a plurality of generally T-shaped cross-section vertical columns fixed in predetermined positions around the periphery of said base, the upper free end of each of said columns including an opening formed therein,

a tensioning rod extending between adjacent pairs of vertical columns and extending around the periphery of said enclosure,

a plurality of wall elements insertable between vertical columns and sealingly held therebetween

a plurality of roof elements corresponding to said wall elements and having a casting securely held in the lower outer corners of each of said roofing elements and arranged with the castings of adjacent panels disposed on opposite sides of the vertical columns, said elements being supported by said wall panels and said vertical columns,

holding means extending through the top portion of each of said vertical columns for securing the pair of castings of adjacent roof panels to said columns,

a compression member interconnecting the inner free ends of the roof elements, and

sealing means extending along the entire length of the opposed side edges of adjacent roof elements, said sealing elements comprising mating male and female elements secured to the opposed side edges whereby, when said roof elements are fixedly secured to said column by the securing means passing through said column and said corner castings, said sealing means are firmly in contact with each other, and a rigid self-supporting, integrated, weatherproof enclosure will be formed.

2. Means for securing a plurality of panels together to form an enclosure comprising

a base,

a plurality of T-shaped cross-section columns supported in a vertical position around the periphery of said base and having enlarged bulbous vertical base portions, said columns also including an opening formed at the free top portion thereof for receipt of a tensioning rod extending between adjacent columns for maintaining said columns in position,

a plurality of wall elements secured between adjacent pairs of columns,

a cap releasably secured to the bulbous vertical base portions of said columns to seal the joints between said wall sections,

a plurality of roof elements corresponding to said wall elements secured to said supporting columns,

a casting securely held in the lower outer corners of each of said roofing elements and having a securing means passing through the castings of adjacent cor-

ners of said roof elements for securing said roof elements to said T-shaped exterior columns, and

sealing means extending from opposed side surfaces of adjacent roof elements to provide a sealed enclosure.

3. The enclosure of claim **2** wherein said opposed side surfaces of said adjacent roof elements are provided with elongated sealing means extending along the entire length of the adjacent edges thereof.

4. The enclosure of claim **3** wherein said elongated sealing means comprises separate female and male members mounted on said opposed faces whereby, when said roof elements are brought into contact, said mating elements will be securely and sealingly fixed together.

5. The enclosure of claim **4** wherein said female and male members are adjustable in width to accommodate roof elements of different thicknesses.

6. The enclosure of claim **5** including a structural element interconnecting the inner free ends of the roof elements whereby they are self-supporting and require no internal vertical support.

7. A method for constructing an enclosure comprising:

a. forming a base;

b. securing a plurality of generally T-shaped cross-section columns vertically around the periphery of said base;

c. inserting a vertical cap strip over the free base portion of the leg of each T-shaped column;

d. inserting a wall panel into one side of each column and extending between adjacent columns;

e. fixing a corner casting of a perdetermined shape into the two bottom corners of a roofing element;

f. securing a casting from an adjacent pair of roof panels to the top of each column; and

g. providing mating sealing means between the opposed side surfaces of the said roof element whereby, when all of said roof elements and said wall elements are in position, and forced into mating contact with each other, said enclosure will be self-supporting, integrated and weatherproof.

8. The method of claim **7** wherein adjacent pairs of vertical columns are secured together at their top portions by tension rods extending between and secured to adjacent vertical columns.

9. The method of claim **7** wherein said mating sealing members are placed on said opposed side edges of adjacent roof elements before said roof elements are placed in position in said enclosure.

10. The method of claim **9** wherein said roof elements stop short of the center of the roof formed thereby and are supported by a tensioning ring further supporting a dome within the center of said roof.

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