June 1, 1965 O. L. SPAETH, JR 3,186,524

PANELIZED BUILDING CONSTRUCTION

Filed April 11, 1961 4 Sheets-Sheet 1

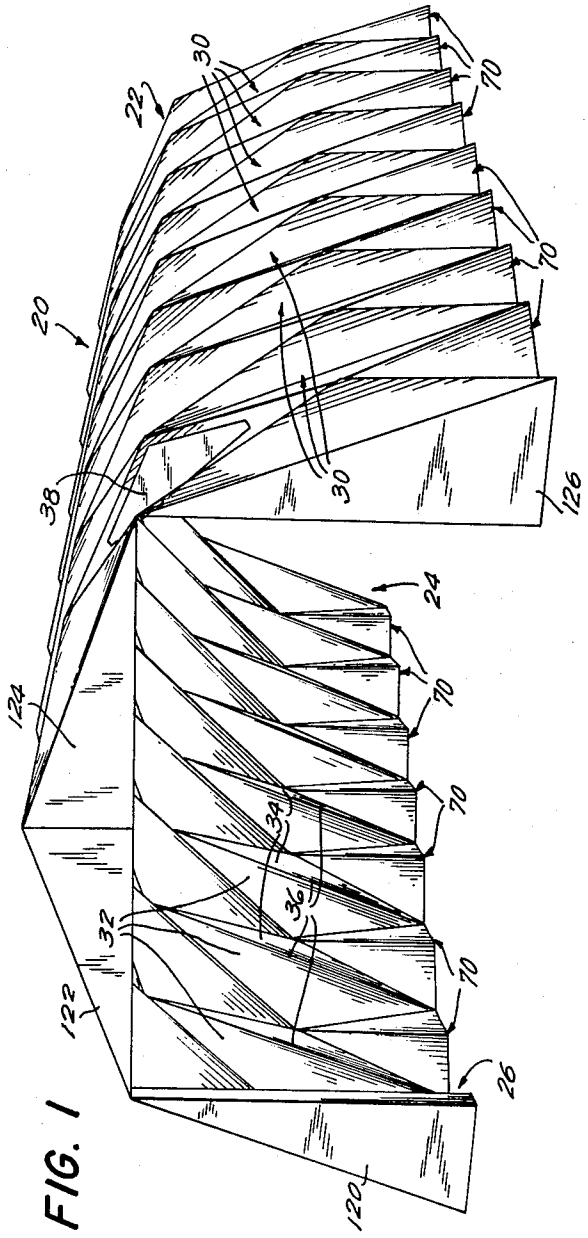
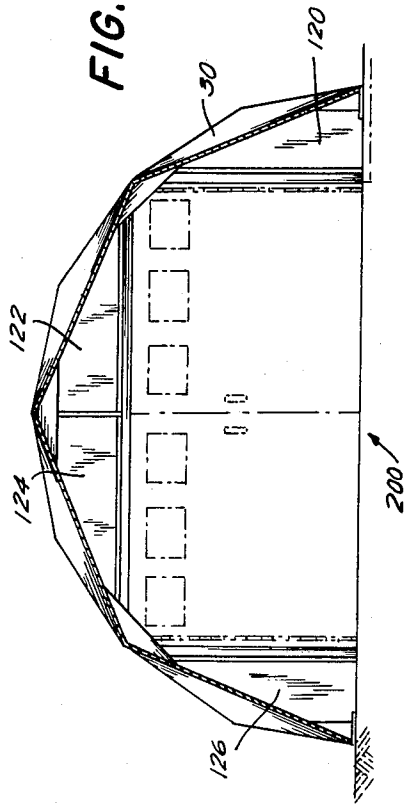


FIG. 1

FIG. 4



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PANELIZED BUILDING CONSTRUCTION

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FIG. 2

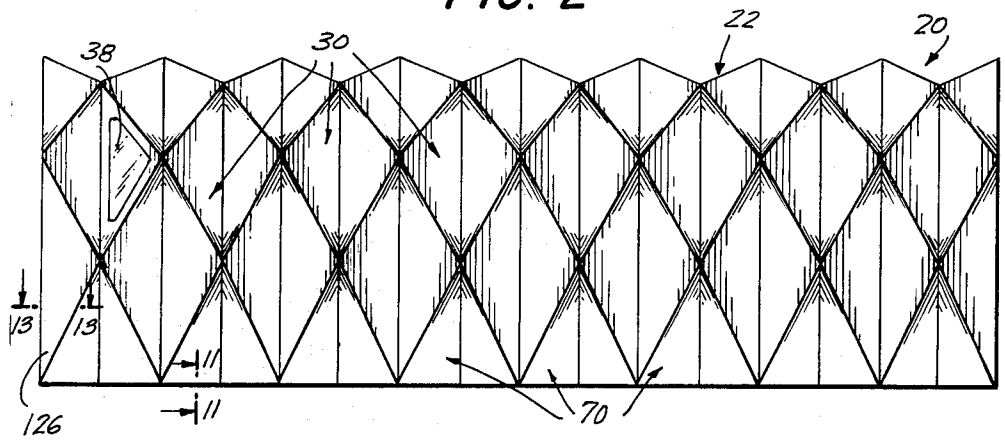
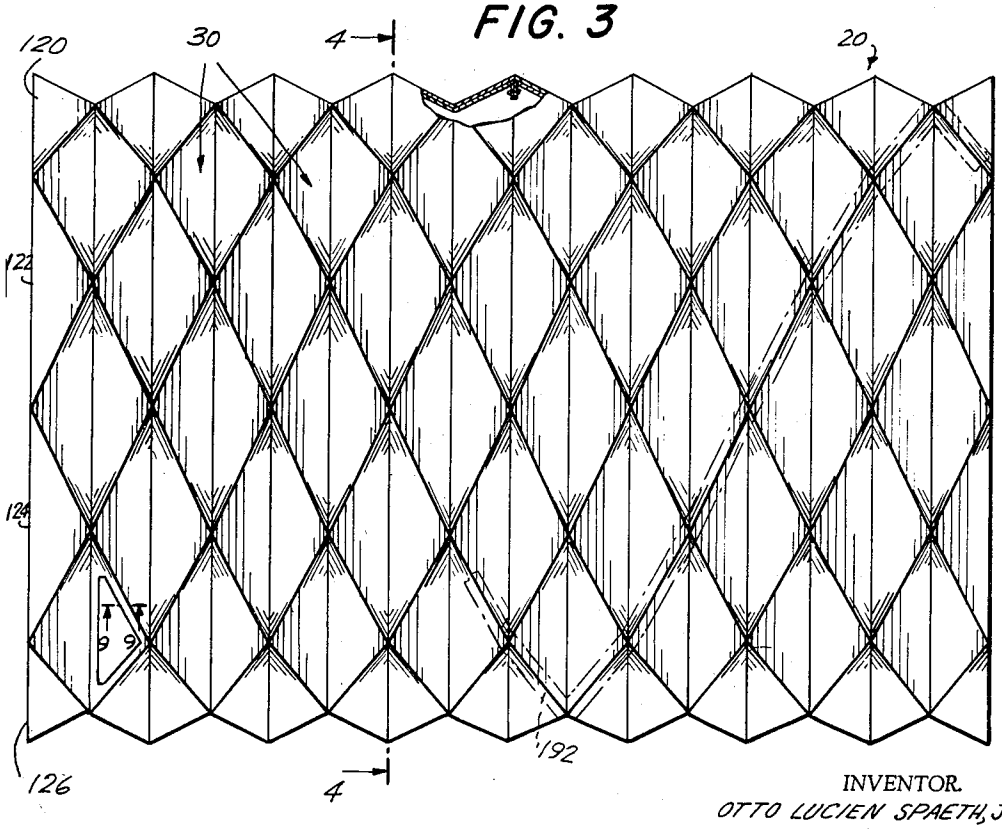


FIG. 3



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PANELIZED BUILDING CONSTRUCTION

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FIG. 5A

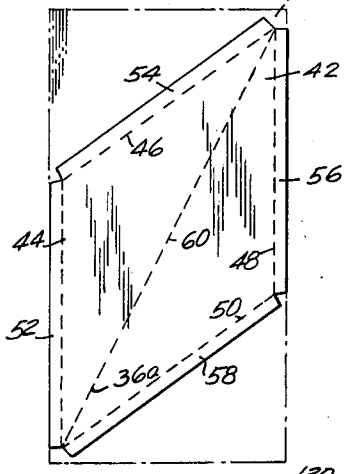


FIG. 5B

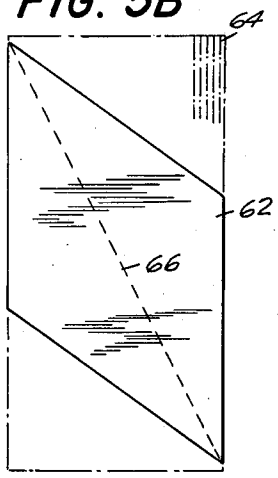
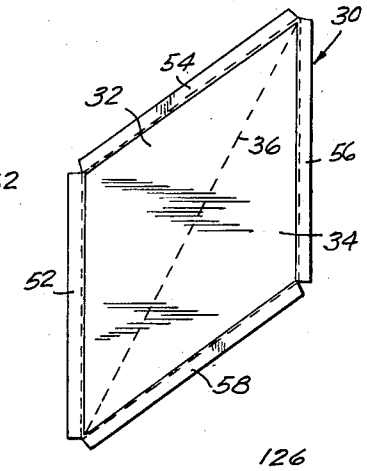


FIG. 5C



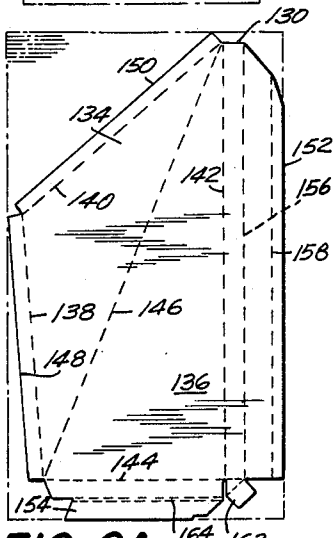


FIG. 6A

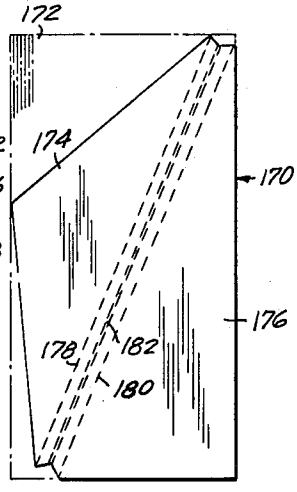


FIG. 6B

FIG. 6C

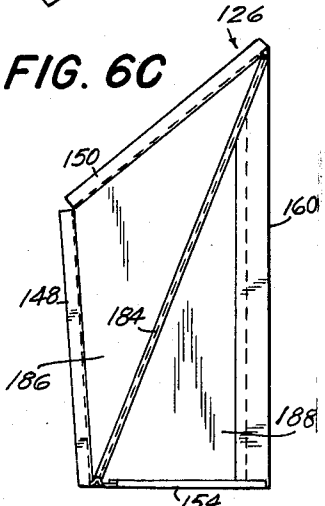


FIG. 7A

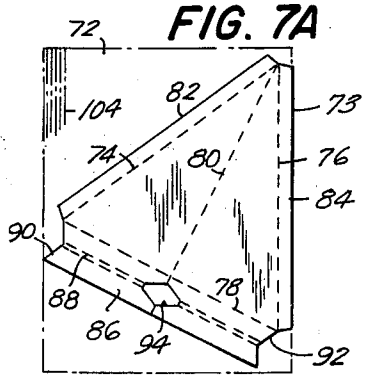


FIG. 7B

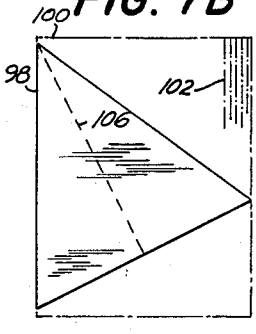
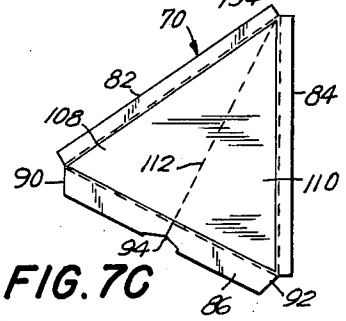


FIG. 7C



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PANELIZED BUILDING CONSTRUCTION

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FIG. 8

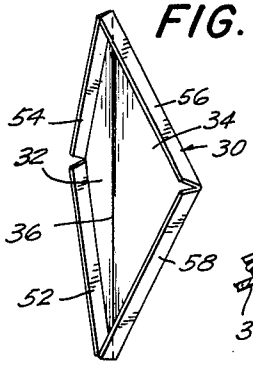


FIG. 9

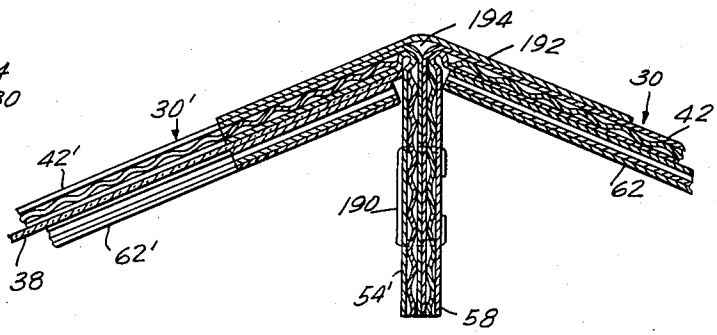


FIG. 10

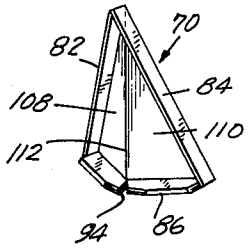


FIG. 11

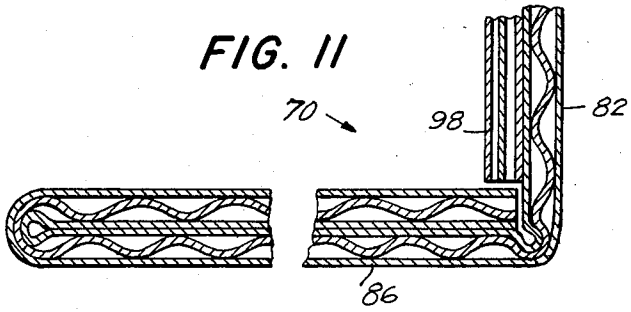


FIG. 12

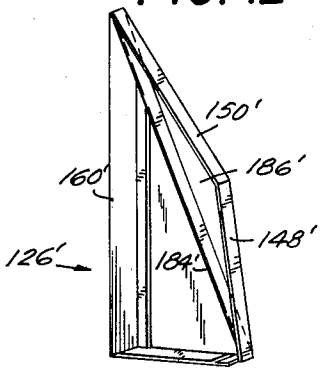
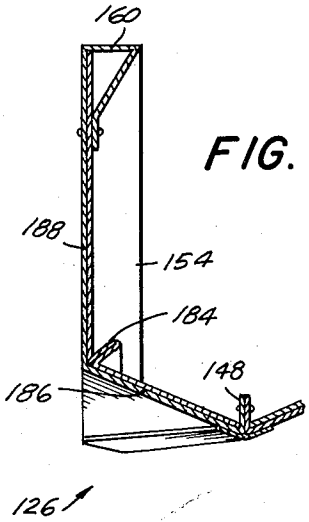


FIG. 13



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United States Patent Office

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Patented June 1, 1965

3,186,524

PANELIZED BUILDING CONSTRUCTION

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Filed Apr. 11, 1961, Ser. No. 102,226
2 Claims. (Cl. 189—2)

This invention relates to a panelized system for building construction, and more particularly, to such a structural system requiring a minimum number of structural members, while at the same time stressing simplicity, lightness of weight, ease and speed of erection without sacrificing building soundness and strength, thereby satisfying the most stringent applicable conditions, requirements, regulations, as well as specifications.

With this in mind, the present invention provides a concept in the area of building construction by rendering a panelized system feasible, on a commercial scale, for shelter fabrication and erection, thusly broadening the effective means for protection of human beings or their respective properties. Other needs, accordingly satisfied, may be classified as commercial, not to mention possible military applications. To this end, a rectangular ground plan is employed of any desired length relative to width so that the available space requirements can be most effectively utilized.

Generally speaking, the invention considers a sophisticated manner of placing triangles in juxtaposition so that together they are effective in forming a three-dimensional pattern resulting in a three-dimensional distribution of forces creating optimum qualities of strength and superior utilization of structural members. With this in mind, the variety of such members however, is significantly maintained at a minimum, with the basic building component being in effect an isosceles triangle which is defined by broadly stating a contemplated structural unit. The basic construction unit, when assembled and incorporated into the erected building, is essentially a pair of such isosceles triangles coupled base to base along an interposed scored fold line. In this connection, the size and shape of these triangles determines that of the erected building unit. The length of the building on the other hand, is further determined by the angle of the fold which the pair of isosceles triangles cooperate to form, not to mention the selected number of triangles determining also the length of span.

Of prime importance, is the fact that the same basic units can be utilized as both structure and covering by serving as structural frame, wall and roof. Sheet material is advantageously resorted to for the various structural members, and consequently facilitates the incorporation of superior weather sealing, calking, coating, insulation, sound control, etc. into the ultimate structure. The material preferably utilized is conducive to collapsible, knocked down and ready to assemble constructions; whereby the basic structural units may be unfolded or collapsed into relatively flat members that may be stacked, and accordingly, easily shipped or stored. Portability, expendability and ease of erection are thus attained with the selected materials being sufficiently suitable in satisfying rigidity requirements, exposures to extreme temperature and weather conditions, while still maintaining minimum weight characteristics. Materials suitable for such purposes suggestedly are resin-impregnated corrugated paper, or on the other hand, light weight metals, as for example, aluminum.

With respect to ease of erection, the present invention contemplates the employment of minimum manpower such that when buildings in the order of 30 feet long when compared to similarly sized tents for example, will reduce the erection crew to approximately one-third of that ordinarily required.

The present invention being thusly in the nature of a prefabricated construction, may be supplied in rather compact, lightweight kits for ultimate erection at the desired place of assembly. As will become obvious, corresponding compactness will be the case when it is desired to disassemble or remove the building from such site and either store or relocate it, as the case may be.

The manner of construction is advantageously adapted to be combined with most any desirable type of foundation down to the bare ground. Naturally, a firmly anchored foundation would be desirable when adverse weather conditions are expected and contemplated.

Ventilation and lighting is achieved by simply providing for such means as part of the triangular units. It is also of significance, that suitable access and egress through selective entrances and exits respectively, form part of the building construction of the present invention.

Although the prefabricated, collapsible type of construction has needlessly been relegated to a stature of being an inferior product, it should be understood that design quality and characteristics contemplated herein are in every way superior, possessing optimum visual attractiveness and a decorative function, without mentioning one of the primary considerations of efficient storage prior to assembly and even after it has been disassembled pending further use. The mode of design of the instant building renders the construction sufficiently versatile to fulfill the desired functions of storage and utility in most any commercial field, from tents to garages or the like, whether of a temporary or permanent nature. The design appearance is such that finish can be employed that will appeal to the desires of the contemporary or traditional surroundings or stringent demands of the military. Above all, these designs are all within the general confines of the existing market pricing structure applicable to such units.

Construction criteria resulting in the most expeditious and efficient manufacture of such units are dependent upon a design encompassing a system engineered for easy assembly. Accordingly, the present invention contemplates the utilization of a controlled number of engineered parts of uniform construction, while at the same time being a flexible assembly system such that utility of the ultimately erected unit can be taken into consideration. In addition in an effort to minimize costs and still maintain versatility and flexibility in design characteristics and outward visual effects and appearances, a number of standardized parts constitute by building construction, notwithstanding the type of application and utilization selected. In this connection, height width and length modulation is considered so that various dimensional proportions of building construction are attainable.

In general, a building unit prefabricated and constructed in accordance with my invention possesses a basic panelized system with the individual components thereof prearranged and supported by means of a selected base structure. The panelized system will include a preformed panel defining across its face substantially a parallelogram, other than a rectangle, in which the longer diagonal is defined by a score line for purposes of dividing the panel into two separate triangles which are preferably isosceles. Adjacent panel fastening means in the form of flanges to be eventually fastened to one another may form integral extensions of the sides of the parallelogram. These flanges are distinguishable by means of score lines which also serve to permit folding of the flanges with respect to the associated side or leg of the isosceles triangle. The diagonally extending score line of the parallelogram facilities the folding of the triangles toward one another and at a particular angle which may extend between 0 and 180°, but most contemplated applications will dictate an angle above 90° and in the neighborhood of about 120°.

For purposes of finishing or completing the base of the building construction, a standardized part is provided which is in essence the above-described parallelogram and projecting flanges servered in two along the shorter diagonal. However, in an effort to provide an anchoring means for the building construction to the chosen foundation suitable score lines may be provided for purposes of defining a projection from the cut, diagonally extending side so that an attachment flange may thusly become effective.

It is further contemplated by the present invention that an end-forming unit be provided having as a part thereof, a triangular panel substantially identical to the isosceles triangle panel of the foregoing basic panel unit.

Thus, the present invention provides a design for a building that can be erected in a relatively short period of time with a minimum of manpower and equipment which under the circumstances, would necessitate only the services of two men and a commercial stapler as essential items together with seam tape or calking material.

Other objects and advantages will become apparent from the following detailed description thereof, which is to be taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of an assembled building construction erected in accordance with the present invention and incorporating therein construction and techniques of my design and inventive contributions with any particular end ingress-egress means removed for purposes of clarity;

FIG. 2 is a side view of the construction illustrated in FIG. 1;

FIG. 3 is a top plan view, with certain parts broken away and removed;

FIG. 4 is an elevational sectional view taken along the line 4—4 of FIG. 3 with provisions for a door illustrated in phantom;

FIGS. *5a–5c* illustrate the formation of the typical basic panel ready for shipment or storage as employed by the present invention when it is formed from sheet material and prior to folding for erection purposes;

FIGS. *6a*, *6b* and *6c* similarly depict the formation of an end panel unit as it is fabricated from sheet material to the desired unfolded end product;

FIGS. *7a*, *7b* and *7c* likewise show the formation from sheet material of a specimen, in flattened state, of a bottom array of panels coupling the building construction of the present invention to the selected foundation;

FIG. 8 is a perspective view of the folded basic panel unit of FIGS. *5a*, *5b* and *5c* ready for incorporation into my building construction;

FIG. 9 is an enlarged sectional and fragmentary view illustrating a junction at which the basic panel unit of FIG. 8 is attached, specifically taken along the line 9—9 of FIG. 3;

FIG. 10 is a perspective view of the bottom panel unit of FIGS. *7a*, *7b* and *7c* in its folded state ready for mounting;

FIG. 11 is an enlarged fragmentary sectional view of the support of the bottom panel unit of FIG. 10 on the selected foundation, and more specifically, at the location designated by line 11—11 of FIG. 2;

FIG. 12 is a perspective view of the folded end panel unit of FIGS. *6a*, *6b* and *6c* prior to its erection; and

FIG. 13 is a fragmentary sectional view taken of line 13—13 of FIG. 2, with certain parts removed, illustrating the placement of the end panel unit of FIG. 12, its folded state and manner in which it is secured in place.

In the drawings I have illustrated a mode of construction depicting my proposed concept of building design utilizing a panelized-type of system. This illustrated panelized system is exemplary of my contribution to the art, but is in some respects a preferred embodiment, particularly the individual panel units and their suggested modification. Thus, a building or shelter 20 designed and fabricated in accordance with my invention will include a substantially semi-cylindrical outer shell 22, and in addition, selected functional members at both of its ends 24 and 26.

As stated in the above, the contemplated building construction 20 includes a minimum of structural parts in which is included a predominant, basic panel unit 30 of my design. In this connection, such units will include in their assembled stage a pair of isosceles triangles 32 and 34 having a common hypotenuse along fold line 36. The angle at this fold between the triangles 32 and 34 can obviously be varied depending upon conditions and requirements. Under such circumstances, a relatively small angle can be present between the triangles at such time as increased loads are expected to be placed upon the exterior of the building construction 20. On the other hand, a larger angle, up to but excluding 180°, will minimize the ability of the shell 22 to support appreciable loads. This angle however, will determine the number of panel units of a particular dimension which are required to form a shell 22 substantially semi-circular in section; and at the same time it will establish the effective longitudinal length of building for the specified number of panel units 30 extending across its width.

If desired, one or both of the triangles 32 and 34 may include a vent or window 38 strategically located along the length of the shell 22 depending upon the end to be attained.

Referring now to details of the panel unit 30, reference should be made to FIGS. *5a*, *5b* and *5c* together with FIG. 8. At the outset, it should be understood that although a multiple-ply panel unit is disclosed, it should be understood that only individual sheets need be utilized in a number of situations depending upon the contemplated use and abuse of the structure 20 and relative strength and rigidity of its constituent material. In this connection, I contemplate the employment of sheet aluminum, resin such as fiberglass, plywood or the like in satisfying certain construction requirements. Also propose using a sandwich panel having a pair of spaced sheets of kraft paper with a plastic foam core therebetween and being commercially available under the trade name Fome Core and supplied by the Fome-Core Corporation of Springfield, Mass. Corrugated paper and cardboard in specific instances has been found to serve adequately and its use in the present embodiment will be assumed. In fabricating a panel unit 32, a blank 40 of the selected sheet material is properly cut and scored to provide the outer panel piece 42 which will include a diagonally extending score line 60 along with the peripheral flange defining score lines 44, 46, 48 and 50. The flanges thus outlined will include flanges 52, 54, 56 and 58. If the sheet material employed for purposes of fabricating the basic panel unit 42 includes a corrugated laminate the fluting of the sheet blank should extend in a direction along the longer length of the sheet, as illustrated in phantom in FIG. *5a*.

In an effort to rigidify the basic panel 42, its effective thickness is increased by providing inner panel 62 formed from a sheet 64 of the selected corrugated material in such a manner that the direction of fluting runs across the longer dimension of the sheet 64, as shown. It has been found that in some instances the incorporation of a liner or application of a coating creates a tendency for the sheet material to warp or distort. Accordingly, I contemplate arranging the corrugations of the laminated sheets in such a manner that the stresses thus induced to be cancelled as effectively as possible. To this end, the fluting of sheet 64 extends along the longer dimension as compared to the shorter of sheet 40. Needless to say I can thereby take advantage of the strength characteristics afforded along the longitudinal fluting dimension. The inner panel 62 is similarly provided with a score line 66 extending diagonally across the panel such that in the assembled panel unit 30, it will be aligned with the score line 60 of the outer panel 42. Thus, through the employment of a suitable adhesive or glue, panels 42

and 62 are conveniently united to assume the form and configuration illustrated in FIG. 5c, constituting equal isosceles triangles 32 and 34. The overlapped or aligned score lines 60 and 66 combine to form the previously described fold line 36. This unit 30 may conveniently be shipped in a substantially flat, unfolded condition to be subsequently folded along the score line 36 for purposes of providing the desired angle between the surfaces of the triangles 32 and 34. If desired for a particular building, the fold line 36 may be rather fixedly set during the manufacture of the basic panel unit 30 for shipment in this condition to the building site so that there it need not be unfolded, thereby lessening labor required for assembling the structure.

The basic panel unit 30 will be coupled with base-securing bottom panel units 70 which will, for all practical purposes, be half of the basic panel unit 30 bisected across its shorter diagonal, but preferably including along such line means for securing the shell 22 to the selected foundation. In this connection, a sheet blank 72 is suitably cut and scored to provide the outer panel 73 with peripherally extending score lines 74, 76 and 78 together with the diagonally extending score line 80. Under the circumstances, flanges 82 and 84 are defined together with a foundation or base attaching strip or flange 86. In this connection, the strip 86 is bisected longitudinally by a double score line 88. In addition, the respective ends 90 and 92 of the strip 86 are formed by a convergent cut, whereas the central sector of the strip will include a central slit and an aligning opening 94 substantially as shown. It will be evident shortly that these removed and cut sectors of the strip 86 facilitate the folding of panel unit 70 particularly at the strip 86 and accurate placement thereof on the foundation.

In a similar effort to rigidify and strengthen the ultimately formed base or bottom panel unit 70, an inner panel 98 may be utilized effectively in superimposed relationship interiorly of the peripherally extending score lines 74, 76 and 78. The inner panel 98 may be suitably cut from a sheet 100 of the selected material such that its fluting 102 may be substantially offset with respect to the fluting 104 of the sheet 72 employed in fabricating the outer panel 73 for the purposes described in the above. The bisecting score line 106 is accordingly adapted to overlie the score line 80 of the outer panel 70 in the eventually formed bottom panel 70.

Thus, the inner panel 98 is suitably bonded or secured to the outer panel 70 in accordance with the foregoing, such that a pair of equal right triangles 108 and 110 are defined. A central fold 112 is defined between these two right angles 108 ad 110 corresponding substantially with that fold line 36. At such time as the correct angle is formed between the triangles 108 and 110 the strip 86 may be folded to provide an effective securing means in attaching the base panel 70 to the selected foundation, substantially as depicted in FIG. 10.

The present invention contemplates enclosures of a number of varieties the design characteristics of which will depend upon the selected utility and application of the shell 22. A number of structures may conveniently incorporate with advantage, structure embodying the end panel units 120, 122, 124 and 126, all of which include the same constituent parts but depending on their intended placement in the shell 22, certain end panel units may be complementary in nature and specifically mirror images of the others. Thus, end panels 120 and 126 are complementary, whereas end panels 122 and 124 are likewise complementary.

As was the case with panel units 30, an end panel unit will include an outer panel 130 formed from a length of the selected sheet material 132 having its fluting extend substantially normal to the longer dimension. The sheet material is suitably cut and scored in providing the outer panel 130 so that triangles 134 and 136 are defined, with triangle 134 approximating in dimensions the previously described triangles 32 and 34. To this end, peripheral score lines 138, 140, 142 and 144 cooperate with the diagonally extending score line 146. Flanges 148 and 150 are thus advantageously provided together with a tube-forming strip 152 and an attachment strip 154.

The tube-forming strip 152 will include a spaced pair of score lines 156 and 158 outwardly disposed with respect to score line 142 which serves as a fold line for eventually forming a column 160 defining substantially a right triangle in cross-section, as illustrated in FIG. 13. The cut and perforated projection 162 may serve to close off the bottom end of the column 160 with the outer hinged flap being disposed interiorly thereof.

The attachment strip 154 is formed with a double score line 164 located outwardly of the peripheral score line 144. These score lines permit the strip 154 to be folded upon itself to thereby provide a flange hinged at the score line 144, and adapted to rest on the selected foundation. Needless to say, this flange will facilitate anchoring the particular panel unit through the employment of suitable fastening means.

The end panel unit is also provided with an inner panel 170 which is suitably scored and cut from a length of sheet material 172 to ultimately be placed in superimposed relationship with respect to the outer panel 130. The direction of the fluting in this case will be opposite that of outer panel sheet 132. Thus, the inner panel 170 will include triangles 174 and 176 corresponding to triangles 134 and 136, respectively. Interposed between the triangles 174 and 176 are spaced score lines 178 and 180 surrounding the double score line 182, all of which cooperate in providing the diagonally extending strengthening rib 184 in the finished panel unit. To this end, the triangles 174 and 176 are placed upon their mating triangles 134 and 136 respectively, and suitably secured thereto, as for example, by the interposition of a befitting bonding agent. In forming the column 160, it will be noted that the terminal edge of the strip 152 is placed into face-to-face contact or engagement with the inner surface of the triangle 176, as more clearly illustrated in FIG. 13.

Thus, the assembled end panel unit will include the isosceles triangle 186 and right angle 188 with interposed strengthening rib 184; and along the longer leg of the right triangle 188, the strengthening and rigidifying column or tube 160. Since the end panel units 120 and 124 constitute mirror images of the end panel units 122 and 126, heretofore described in detail, the parts of the former will be given identical but primed numeral designations. It should be fully understood that one of the more important aspects of my invention resides in the creation of a strengthening truss by the interconnection of the end panel units 122 and 124.

It will be understood that the heretofore described flanges of the basic panel unit 30, bottom panel unit 70 and end panel unit 120 to 126 are for attachment purposes with adjacent flanges of neighboring panel units. Since ease and rapidity in erection of the basic components to the final assembly is within the purview of the present invention, the securement of adjacent flanges should be readily accomplished. In this connection, reference is now made to FIG. 9 in which such a connection is shown. Since a window-bearing panel unit is illustrated in association with the basic panel unit 30, its like parts will be designated by corresponding prime numerals. The associated flages or flaps 54' and 58 may include in their juncture a suitable adhesive or bonding agent. However, most of the contemplated applications of this invention will include a suitable number of strategically located staples 190. Naturally, one of the above securing means can be used one without the other or in combination and should impart sufficient strength at the particular joint to resist the contemplated stresses and strains incident to the applied loads so that such means will not be the zone of rupture or failure if this is ever to occur. In other words, this should not be the weakest link in the

ultimately-constructed building, because the extent of fastening can be increased many fold and without any substantial restrictions.

A number of applications of the foregoing building construction will indeed require optimum weatherproofing techniques. Accordingly, the sheet material employed for forming the various panel units may be themselves weatherproofed, as for example, by impregnating an oil or resin based solution into the corrugated paper or cardboard so as to render them impervious to water, and at the same time, render them capable of withstanding the elements. Needless to say, the dead-air space incident to the use of the corrugated material provides cells possessing superior insulating qualities. This certainly lends itself to the provision for sophisticated lighting and other interior fixtures. Furthermore, a moisture barrier may be incorporated into the board itself during its manufacture. For example, a layer of asphalt or the like may be interposed between the sheets of kraft paper composing the walls of the board.

Other alternatives for weatherproofing of the material from which the basic panel units are formed can include the bonding of aluminum foil to the contemplated corrugated board which is itself, made with waterproof adhesives or glues. On the other hand, the exposed surfaces of the panel units may be otherwise coated or precoated for that matter, as for example, by spraying plastic thereon or merely painting the individual panel units or dipping them in a waterproofing solution. This also has the effect of providing the desirable outward visual appearance. As a further alternative, the entire building subsequent to erection may be covered with a plastic film or sheet tailored to fit over the building after erection.

In accordance with further aspects of my invention, weatherproofing of the joints between and incident to the attachment of adjacent panel units is expected. In this connection, a strip of suitable waterproof tape **192** is preferably applied along the outer exposed surfaces of the connected panel units adjacent the particular joint. Thus, as illustrated in FIG. 9, the strip of tape **192** covers and protects the selected joint from moisture and can be conveniently applied during erection of the building **20**. In this connection, an analysis of the various figures, particularly FIGS. 2 and 3, will reveal that a web of tape **192** can extend entirely across the web of the shell **22** for purposes of covering the aligned and continuously located joints extending substantially diagonally with respect to the longitudinal axis of the shell **22**. To this end, piecemeal sealing of joints between adjacent panels can be avoided, inasmuch as a continuous length of the selected tape can be extended diagonally across a continuous joint and then directed in the other diagonal direction to cover the continuous joint communicated, as represented by phantom lines in FIG. 3.

The foregoing tape **192** can be used alone or together with a strip of calking compound **194** (FIG. 9) suitably applied in the groove formed by the joint. In passing, situations may dictate the elimination of the tape altogether. Under such circumstances, the calking material is either available in the form of coiled ropes, strips of calking compound or through the deployment of a standard calking gun having, if desired, a disposable compound container feature.

As stated in the foregoing, for purposes of disclosing a specific embodiment of the invention, the selected foundation is taken to be earth or ground which has proved to be entirely satisfactory for certain applications of the invention. In an extreme emergency, whether a foundation of other sorts is used or not, especially during unusual storms or wind conditions, a temporary expedient in the form of a supplemental attachment would be advisable. This can be accomplished by simply throwing several lines of sufficient strength over the building **20** and staking or otherwise fixing their respective ends to the ground a few feet from the sides of the building.

Certain conditions may dictate that the building **20** need only be affixed directly to the ground by means of stakes or ground anchors applied at points rendering it convenient to suitably attach such means to the base panels **70**. In this connection, if ground conditions are satisfactory, as for example, in arctic or regions where permafrost conditions exist, it is possible to affix the base panels **70** directly to the ground with spikes by passing the latter through the base strip **86**. Since the building possesses a degree of flexibility, it is enabled to conform to irregularities in ground conformation without undue distortion and creation of undesirable stresses or strains.

If it is at all possible, a foundation of wood, cement block, bricks, concrete or any such material should be used to support the bottom edges of the building **20**. For example, it has been found desirable in certain instances to attach the bottom strips **86** of the base panel **70** to suitably dimensioned wood planks as an intermediate base. By maintaining the angle between triangles **108** and **110** of the base panel **70** within prescribed limits, it has been possible to use 1 x 10 inch wood planks extending in a rather straight line, as compared to a staggered or bellows fold, for purposes of receiving the bottom strips **86** secured directly thereto by nailing. The wood planks are then secured to other foundations (or ground as in FIG. 4) by bolts, stakes, ties or other suitable means. It is contemplated that suitable wood planking, in pre-measured units, may be supplied as part of the shipping container for the components constituting the building **20**.

It should be understood that a variety of methods can be employed in adequately closing the ends **24**, and **26** of the shell **22**, if desired or necessary in an effort to satisfy particular requirements. Thus, depending upon the selected use of the building **20**, a closure **200** of a flexible nature can be incorporated by adopting the use of suitable fabrics or plastic material, such as canvas or rubber-coated nylon cloth. Sheets of such material would preferably be formed with openings or attachments for access illumination or ventilation designed according to the requirements of the user. The fabrics or cloths could be securely fastened to the end pieces **120**, **122**, **124** and **126** by interconnecting them respectively along adjacent surfaces of the columns **160** and **160'**. If desired, the selected fabric or cloth for this closure **200** can be supplied in two pieces and shipped as part of the pre-fabricated kit which would include four pieces for a single building, two being at each end **24** and **26**. The fabric or cloth pieces at each end would be attached to one another after erection by conventional snaps, zippers, buttons or similar techniques.

On the other hand, the columns **160** and **160'** can be adapted to advantageously present a rigid closure on the order of a hinged garage door. Under the circumstances, mere rectangular panels can be employed for purposes of providing man-sized openings, bearing in mind the practical limits incident to shipping of the pre-fabricated kit. In addition, corrugated board panels in a variety of shapes could be provided for an end closure. One system found to work satisfactorily for a number of reasons is a repetition of the triangular module already present as part of the building's end panels **120**, **122**, **124** and **126**, notably the triangular module established by triangles **138** and **138'**. As a further hastry expedient, suitable self-supporting ends can be made of materials indigent to the building site, such as mud bricks, ice or snow blocks.

The design of the building constructed in accordance with my invention, is such that it can be erected in a relatively short time employing a minimum of manpower and equipment. In fact, no more than two men are essential; and the only requisite equipment needed is a plier-stapler which is readily available commercially. A stapler and sufficient staples, as well as tape and/or calking material with suitable applicator if desired, would be supplied as a component part of the pre-fabrication kit.

The method of erection of the building **20** may differ slightly when the base is or is not utilized, but as a general proposition is essentially the same. In either case, it is important that the bottom or base panels **70** be bent and fixed such that their triangles **108** and **110** will define the proper angle therebetween to which subsequently applied panels will tend to conform. This angle is ascertainable, depending upon the dimensional characteristics of the building selected to be assembled and erected at a particular site. A base to which bottom panel **70** can be affixed as stated is desirable, but not necessary, as long as the proper angle is attained and maintained for a sufficient period of time during erection.

Assuming the aforementioned wooden plank is employed; the erecting crew could initially nail three bottom panels **70** to the wooden base, which would not at this time be affixed as yet to the selected foundation so that the resultant unit can be tilted to facilitate coupling of a number of the panel units. Two of the basic diamond-shaped panel units **30** are now inserted between and stapled to a pair of the secured base panels **70**. In the same manner, three more of the diamond-shaped panel units **30** are fastened to the pair of secured panel units **30**. The partially assembled structure will now tend to fall downwardly and inwardly; and this is permitted so that access to the upper flanges of the basic panel units **30** (in the present instance, flanges **54** and **56**) is permissible directly from the ground. The structure can be held at a suitable angle by one of the erectors or by one or more poles. The next row of two panels is then attached, followed by a similar securement of the fourth row of three panels. The fifth and sixth row of panels can now be installed. If poles are being used, they should preferably be moved further toward the middle of the building. At this point the upper end panels **122** and **124** can also be attached, thereby forming a truss. If the number of rows of panels correspond to that disclosed in the various figures which represent a workable embodiment of the present invention, the building can then be raised to its final position. Accordingly, the remaining row of basic diamond-shaped panel units **30** together with bottom panel units **70** are positioned and suitably stapled into proper supporting relationship with the previously erected panel units **30**. At such time, the remaining end panels **120** and **126** can be attached.

A section of the building **20** having a determinable length already renders erection of the remaining part a relatively easy task. If desired at this stage, the base of the building can be fixed to the ground or selected foundation. This erected section is of sufficient rigidity to adequately support the remaining panels which are stapled directly to such structure until it is complete. In this connection, the use of a ladder or platform for the erection personnel for purposes of having access to the higher or elevated portions of the building may prove to be necessary, particularly in reaching the upper joints; as for example, for purposes of applying a suitable caulking material or weatherproofing tape or both. As an alternative, the entire building **20** can be erected from one side to the other as previously discussed. However, this is slightly more difficult since additional men or supports may be needed to hold the completed span in a working position.

As will be evident, the end panel units **120**, **122**, **124** and **126**, either alone or together with a suitable structure for completing the closure, can be utilized as a room divider. The building construction can then be contined longitudinally, with the joint thus formed extending substantially normal to the longitudinal axis of the shell **22**.

It should be obvious to those skilled in the art that my invention has versatility in application and that potential resides in the area of field construction of the semi-

permanent expendable type of structure, possessing substantial lightness in weight and capabilities of immediate erection with a minimum of manpower and equipment. Needless to say it is a most satisfactory replacement for the well known pup tent and, with its most advantageous rectangular floor plan, has application to other buildings and shelter, as for example, airplane hangers. Indeed, a collapsed building is revisable and an erected building capable of being relocated by my invention with selective ease and efficiency.

Thus, the aforementioned objects and advantages are most effectively attained. It should be understood, however, that my invention is in no sense limited by the several preferred embodiments disclosed herein, but is to be taken as that of the scope defined by the appended claims.

I claim:

1. A building structure having a generally cylindrical curved portion and a substantially planar end substantially normal thereto, said curved portion comprising a plurality of discrete uniformly shaped wall sections of generally diamond-shape and having opposite apices at the ends of a straight longitudinal center line formed by a sharp fold therein, each of the wall sections having extending side edges, interconnecting means interconnecting the wall sections along the side edges, said wall sections being mutually interconnected along side edges thereof in a pattern of arcs defined by a plurality of equally spaced parallel planes oblique to the axis of the cylindrical curved portion and a plurality of equally spaced parallel planes oblique to said axis with the angles of the first oblique planes relative to the axis being equal and opposite to the angles of the second oblique planes relative to the axis, said center lines being contained in a plurality of equally spaced parallel transverse planes perpendicular to said axis and defining with said oblique planes isosceles triangles arranged in sets of two for each diamond-shaped wall section, and at least one further wall section at the end of the building structure including a pair of panels, one of which defines another of said isosceles triangles and the other defines a right triangle forming part of an end of the building and being disposed in the plane of such end, the triangles of the further wall section having a common side defined by a fold in the wall section such that the pair of panels of the further wall section are divergent from their common side.

2. The invention in accordance with claim **1** wherein at least two of said further wall sections extend across an end of the building structure with a leg of the right triangle of each of said two of said further wall sections being in confronting relationship, the right triangle of each of said two of said further panels being substantially coplanar such that they provide a stabilizing truss as part of said building structure.

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