United States Patent [19]

O'Connell, Jr. et al.

[11] **3,925,940**

[45] **Dec. 16, 1975**

[54] **BUILDING**

[75] Inventors: **Harry P. O'Connell, Jr.; Eugene E. Hopster,** both of El Cajon, Calif.

[73] Assignee: **Donn H. Gross**

[22] Filed: **July 24, 1972**

[21] Appl. No.: **274,495**

[52] **U.S. Cl.** **52/81**

[51] **Int. Cl.**[2] **E04B 1/32**

[58] **Field of Search** 52/DIG. 10, 81, 80

[56] **References Cited**

UNITED STATES PATENTS

2,918,992	12/1959	Gelsavage	52/DIG. 10
3,694,933	10/1972	Busch	52/DIG. 10

OTHER PUBLICATIONS

Domebook 2, 1st printing, May 1971, by Pacific Domes, page 105.

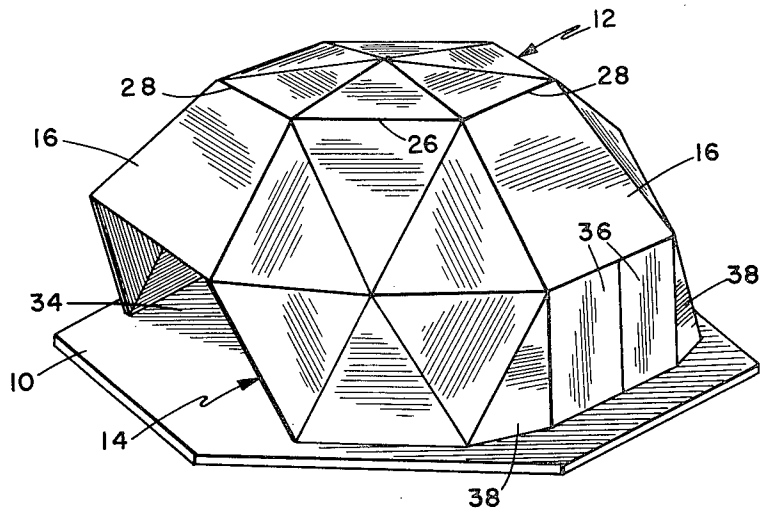
Primary Examiner—John E. Murtagh

Attorney, Agent, or Firm—Ralph S. Branscomb

[57] **ABSTRACT**

A building of geodesic type and comprised of four sub-assembly hexagonal units, one of which units constitutes a roof and the other three are disposed in tripod fashion to support the roof and together therewith constitute a generally hemispherical space capturing structure. The upper portions of the spaces between the three wall hexagonal units are closed by isosceles preformed panels which will ordinarily be flat and trapezoid in form and identical with each other, while all the hexagonal units are also identical with each other and each composed of six identical triangular panels. The triangular panels are isosceles and apices of the six triangles in each unit are at a common point removed from the common plane of the bases of the triangles so that the units are dished. All the panels are peripherally bevelled for ease and stability of interconnection and the building is completely prefabricated. From the foregoing it will be evident that the building is constructed from elements of only two basic shapes, namely, an isosceles triangle and an isosceles trapezoid, all the triangles being also identical.

7 Claims, 11 Drawing Figures



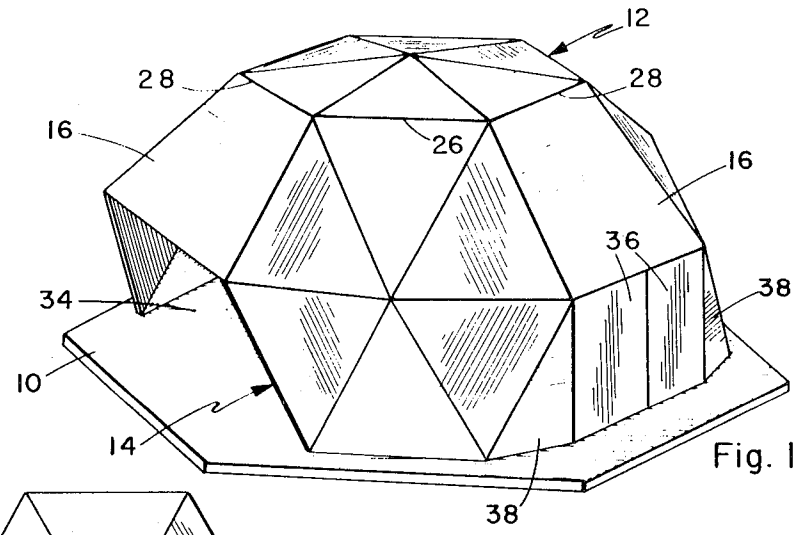


Fig. 1

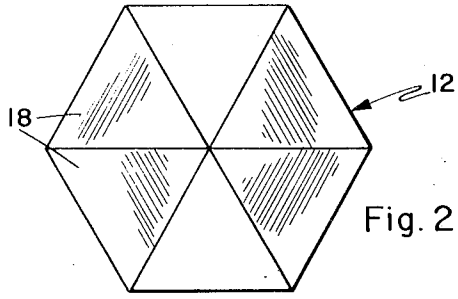


Fig. 2

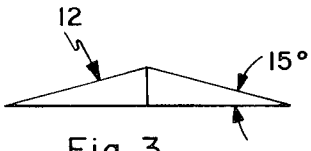


Fig. 3

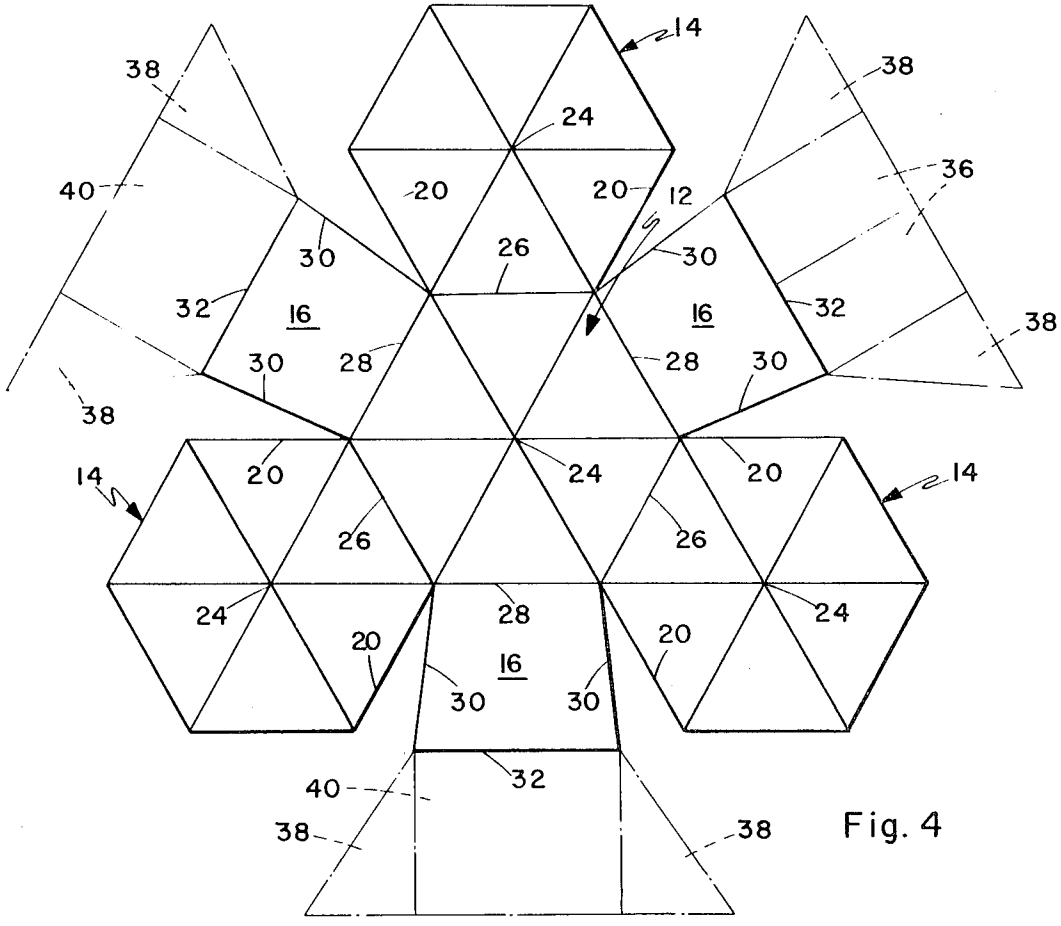


Fig. 4

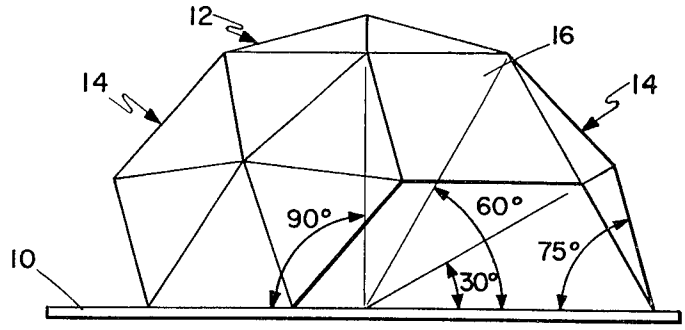


Fig. 5

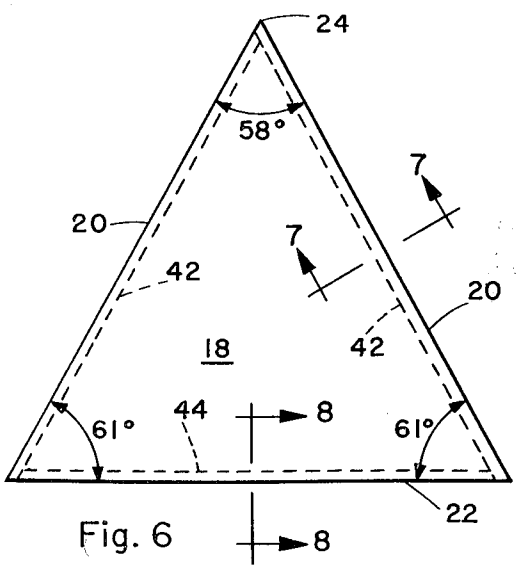


Fig. 6

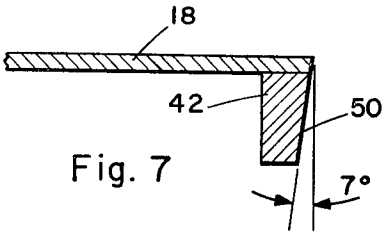


Fig. 7

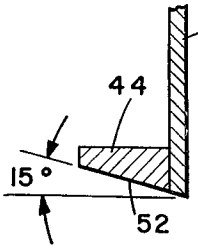


Fig. 8

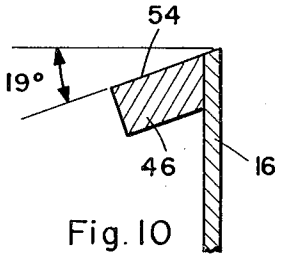


Fig. 10

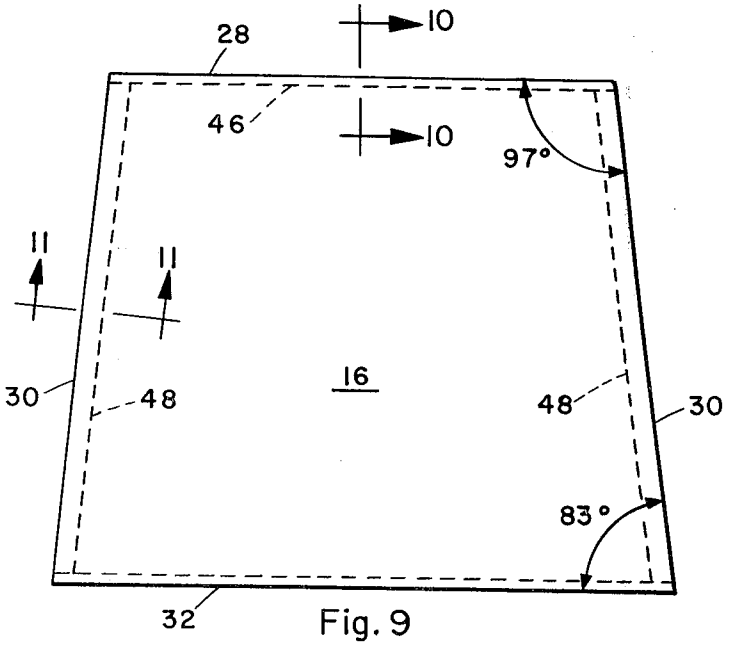


Fig. 9

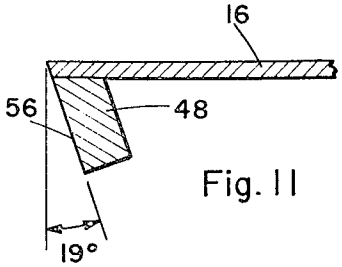


Fig. 11

BUILDING

BACKGROUND OF THE INVENTION

Many geodesic buildings have been developed and a considerable number have been patented. These prior art structures include self-supporting walls and domes, so this broad concept is recognized as not novel. The concepts of prefabrication and modular design as such are also notoriously old. The broad concept of bevelling the edges of the element and the bolting of the component parts together is old in the art. There exists a need, however, for an even simpler construction, involving the minimum number of basic elements of identical shape and size, involving minimal cost of labor in prefabrication of the elements and on-the-job assembly and erection of the building, together with aesthetic and utilitarian design in the completed assembly with some emphasis on provision of easily engineered access-openings for the building.

SUMMARY OF THE INVENTION

The building as herein claimed satisfies the above mentioned need. The self-supporting shell is generally hemispherical, being comprised of a hexagonal subassembly roof unit supported by three wall sub-assembly units and disposed in tripod arrangement with the upper edges of these wall units secured to alternate edges of the roof unit and the lower edges of the wall units being coplanar and defining the base plane of the building which is normally supported on a flat slab. The spaces between the tripod arranged wall units are closed at the top by three identical isosceles preformed panels, ordinarily trapezoid, while the lower portions of these spaces define access openings for the building which may be closed as required by conventional door structures. Each hexagonal unit is constructed of six identical isosceles triangular panels and these panels as well as the trapezoid panels are peripherally bevelled for ease and stability in erection and securement together. The triangular panels are dimensioned so that the perpendiculars of the triangles subtend equal angles at the central base point of the building and this is accomplished by a critical dimensioning of the triangles dictated further by the elevation of the common apices of the triangles to effect a dishing of the hexagonal units so that the structure is self-supporting.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a building structure constructed according to this invention;

FIG. **2** is a top plan view of a hexagonal subassembly unit;

FIG. **3** is a side elevation view of the sub-assembly unit of FIG. **2**;

FIG. **4** is a top plan view of the structure flattened out as a planar layout to illustrate the combinations of standard panels;

FIG. **5** is a side elevation view of the building structure;

FIG. **6** is an enlarged view of a typical triangular panel used in the hexagonal sub-assembly unit;

FIG. **7** is an enlarged sectional view taken on line 7—7 of FIG. **6**;

FIG. **8** is an enlarged sectional view taken on line 8—8 of FIG. **6**;

FIG. **9** is an enlarged view of a typical trapezoidal panel;

FIG. **10** is an enlarged sectional view taken on line 10—10 of FIG. **9**; and

FIG. **11** is an enlarged sectional view taken on line 11—11 of FIG. **9**.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

As illustrated the building is of geodesic type, a self-supporting shell or dome of generally hemispherical shape and will ordinarily be supported on and secured to a slab **10** or equivalent flat base. Ignoring for the moment the closure means for the access openings, shown in dash line in FIG. **4**, the building is constructed of four identical hexagonal sub-assembly units, namely, the roof unit **12** and the three wall units **14**, and three identical isosceles preformed panels **16** which are shown as trapezoidal.

Each of said hexagonal units is a sub-assembly of six identical triangular panels **18** and the triangular shapes have equal sides **20**, bases **22** and apices **24** at a common point removed from the common plane of the bases **22** so that the hexagonal units are dished. The bases **22** will be referred to therein alternatively as the edges of the hexagonal units and with this in mind it will be noted that the upper edges of the wall units **14** are secured to alternate edges of the roof unit **12** as at **26**. Likewise, the trapezoid panels **16** have what may be considered their upper edges **28**, each of a length equal to the bases **22**, secured to the intervening edges of the roof unit **12**, and the sides **30** of the trapezoids are equal in length with the sides **20** of the triangular panels, enabling the interconnection of the sides **20** and **30**. The lower edges **32** of the trapezoids **16** define headers for possible access openings **34** for the building, best illustrated in FIG. **1** and these openings may alternatively be closed as by doors **36** which may be sliding or hinged as desired and flanked by any suitable wall panels **38**. The doors and wall panels, if required, are conceived as ordinarilly vertical and may vary considerably while remaining complementary to the general tripod arrangement of the hexagonal sub-assembly wall units **14**. Of course the openings can be treated to accomodate windows or be closed for non-access solid panels such as that diagrammatically indicated at **40** in FIG. **4**. Again, such engineering treatment of the openings **34** is conceived as complementary rather than elemental in relation to the instant invention.

The edges of the triangular and trapezoid panels **18** and **16** are illustrated in FIGS. **7**, **8**, **10** and **11** as bevelled for interfitting with adjacent panels and as illustrated edge members **42–48**, preferably of lengths substantially equal to the edges of the panels, and preferably also of considerable cross-sectional size, are secured to the respective panels by adhesive, nailing or otherwise. The edge members are ordinarily of wood but the material feature of this invention, as illustrated, these edge members have surfaces **50**, **52**, **54** and **56** inclined to interfit with the adjacent panels. Securement of the abutting edge members may be by adhesives, bolting, bracketing, nailing or otherwise, the techniques for such securement being old and well known.

The angulation of the surfaces **50** is quite important and as illustrated the edge members **44** have inclined surfaces **52** at an angle of **15** degrees from the plane of the triangular panels **18** and when the wall sub-assembly units **14** are secured, by hold-down bolts or otherwise, to the slab **10**, the **15** degree inclination of the

lowermost triangular panel of each unit **14** results in this same triangular panel subtending an angle of **30** degrees at the center of the base of the building as indicated in FIG. **5.** The opposite triangular panel in the same hexagonal wall unit, and the adjacent triangular panel of the roof unit **12,** also each subtend an angle of **30** degrees at the center of the base of the building, this uniformity and standarization further accentuating the truly modular character of the structure and facilitating the prefabrication, installation and easy shifting of partitions and other structural elements within the building. When the foregoing angulation of the edge members is used the corresponding angular relationship of the panels **16** and **18** as indicated in the drawings provide for perfect interfitting and abutment of the prefabricated elements so that erection of the building is facilitated.

We claim:

1. A geodesic type building having a self-supporting shell, said shell comprising:

an equilateral hexagonal roof sub-assembly unit having the peripheral edges thereof horizontal, and

three hexagonal wall sub-assembly units in upstanding tripod arrangement, the lowermost edges thereof being coplanar and horizontal and together defining the base plane of the building, and the upper edges thereof being secured to alternate edges of said roof sub-assembly unit; and

three trapezoidal panels each having one edge secured to an edge of said roof sub-assembly unit between two of said wall sub-assemblies and having two opposing edges secured to adjacent edges of said two wall sub-assembly units;

all of said units being of identical planform.

2. A building according to claim **1** wherein said units are identical.

3. A building according to claim **1** wherein each of said units consists of six identical triangular panels.

4. A building according to claim **3** wherein each unit is dished, the outside edges of each unit being in a common plane and the apices of the triangular of each unit being of a common point removed from said plane, the totality of said points lying in a projected hemisphere.

5. A building according to claim **3** wherein each triangular panel is isosceles with the base slightly shorter than the sides.

6. A building according to claim **1** wherein the trapezoid panels are identical isosceles trapezoids with the longest sides disposed downwardly as a header for a wall opening of a width dimension greater than the length dimension of the base of one of said triangular panels.

7. A building according to claim **1** wherein each of said units consists of six identical isosceles triangular panels with the apices thereof at a common point and the bases of the triangles constituting said edges of said units, and the perpendiculars of said triangular panels subtending angles of 30° at the center of said base plane of the building.

* * * * *