PREFABRICATED ALL WEATHER DOME-TYPE SHELTER

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ABSTRACT

A prefabricated dome shaped shelter comprised of a plurality of spherical segments having spaced apart ribs thereon which are joined together to form a self-supporting structure.

The individual panels are made of composite sandwich type construction, with layers of bonded fiberglass forming the convex side of each of the panels and with polyurethane foam being affixed to the concave side of the panels.

The spherical structure provides maximum living space relative to the area of the enclosure means, as well as an all weather, portable lightweight construction suitable for all environmental living conditions.

1 Claim, 13 Drawing Figures
PREFABRICATED ALL WEATHER DOME-TYPE SHELTER

BACKGROUND OF THE INVENTION

Inexpensive prefabricated shelters suitable for human occupancy form an entire field of endeavor in our modern affluent society. Accordingly, the prior art suggests many diverse structures such as exemplified by Walters et al., U.S. Pat. Nos. 3,284,969; Schultz, 3,172,392; and Suits, 2,649,101.

A dome-type living accommodation made of segmented self-supporting panels is desirable from a structural, economical, and artistic viewpoint. A hemispherical structure having self-supporting walls presents a small frontal area to wind forces, and further provides a structure which inherently supports a tremendous load because of its geometry. Moreover, such a structure offers the maximum usable floor area for a given size enclosure.

Accumulation of snow and other materials on the structure is minimized because of its hemispherical shape. Heat energy absorption into and radiation therefrom is minimized because of the relatively small exposed surface area as compared to more conventional type buildings.

Hemispherical structures have heretofore been considered impractical because the ordinary workman historically has been provided with materials of construction which do not readily lend themselves to being formed into curves, but instead, the prior art is accustomed to building with straight angles. Modern technology in the field of plastics has opened the door so to speak, for an entirely new concept in building by providing materials that easily can be formed into any desired geometrical configuration, including a dome.

SUMMARY OF THE INVENTION

This invention encompasses a new concept in prefabricated buildings, and specifically relates to construction of a novel dome-like structure. The structure is attached to a floor and forms an upwardly and inwardly depending circumferentially extending hemispheric shell. The self-supporting wall is made up of several adjacent fastened segments or panels. Each individual panel is fabricated of a lightweight laminated plastic, with fiberglass on the convex or outside wall surface and plastic foam on the concave or inside wall surface. An erected structure is made up of a plurality of panels that are joined together along a flanged edge portion by a special clip and split tube arrangement. This constructional feature enables the structure to be easily disassembled, transported to another site and reassembled with a minimum of effort. The similarity of each individual panel reduces the construction cost and simplifies packaging and storage of the dismantled shelter.

Therefore, a primary object of the present invention is to provide a portable shelter having self-supporting walls which may be readily assembled, disassembled, transported, or stored.

Another object of the present invention is to provide a portable dome-like structure made of adjacent connectable similarly shaped panels which can be stacked one within the other for storage or transportation.

A further object of the present invention is the provision of a dome-like prefabricated shelter constructed of laminated plastic materials that provide a structure of great strength, excellent thermal characteristics, and an attractive, durable non-weathering exterior.

A still further object of this invention is to provide a segmented dome-like enclosure comprised of self-supporting wall segments or panels made of sandwiched plastic construction.

The above objects are attained in accordance with the present invention by the provision of apparatus fabricated in a manner substantially as described in the above abstract and summary.

These and various other objects and advantages of this invention will become readily apparent to those skilled in the art upon reading the following detailed description and claims, and by referring to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 presents a diagrammatical view of a dome-shaped structure made in accordance with the teachings of the present invention;

FIG. 2 is a top plan view of the structure seen in FIG. 1;

FIG. 3 is a top plan view of the floor of the hut seen in the foregoing figures;

FIG. 4 is a cross-sectional view taken along line 4--4 of FIG. 3;

FIG. 5 is a cross-sectional view taken along line 5--5 of FIG. 2;

FIG. 6 is a fragmentary, part diagrammatical representation of a portion of the structure seen in FIG. 1 and 2;

FIG. 7 is an enlarged, fragmentary, cross-sectional representation of a part of the structure of FIGS. 1 and 2;

FIG. 8 is a view similar to FIG. 7 but which illustrates the ventilator dome in a different position;

FIGS. 9, 10, and 10b are enlarged, cross-sectional views taken along line 10---10 of FIG. 2; and

FIGS. 11 and 12 are diagrammatical representations which set forth one of the teachings of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

FIGS. 1, 2, and 3 disclose a prefabricated dome-like hut or shelter 15 having a base or floor 16 and an outwardly opening entrance in the form of a ramada 17. A walkway 18 lead under the ramada, through the illustrated doorway, and into the interior of the structure. Preferably, at least a portion of the walkway forms an integral part of the base 16.

The structure is comprised of individual panels or segments 19, 20 which form a self-supporting wall. Window 21 forms an integral part of panel 19, while the entrance and doorway structure form an integral part of another panel.

An adjustable ventilation cap 22 is centrally located above and attached to the apex of the dome. A series of split tubular elements 23 are radially spaced apart and forced over the clipped together segment flanges to help secure one panel to another, weatherproof the seams and enhance the over all appearance of the hut.

As illustrated in FIG. 5, edge portion 27 of each panel continues as a curved plane at the lower extremity and is bolted or otherwise suitably attached to a lower circumferentially extending reinforcing base ring 33. The base ring preferably is imbedded into the concrete foundation as illustrated. The concrete base can
be extended at 34 to provide a circumferentially extending walkway. The walkway should be constructed at a slightly lower elevation than the inside floor level of the hut.

It is unnecessary to place cement at 32 unless such an expedient is deemed desirable for the reason that the foamed plastic applied to the inside wall will amply fill the annulus formed between the right angled circumferentially extending base ring 33 and the illustrated step to which it is attached.

As best seen in FIGS. 6, 7, and 8 the top edge portion of each panel is upwardly turned into a vertical circumferentially extending flange 26. An upper metal ring 32 is bolted or otherwise attached to flange portion 26 to provide a reinforced aperture at the apex of the dome. Ventilation cap 22 is removably attached to the reinforcing upper ring 32 by means of the spaced apart links 35 which are journaled at the extremities thereof to the cap and to the ring. Clockwise rotation of the cap lowers it into the position of FIG. 8 while counterclockwise rotation returns the cap into the elevated position seen in FIG. 7.

FIGS. 9 and 10 show a marginal edge portion of panel 19 turned laterally outward to form flange 24. A flange extends from the top to the bottom and defines spaced apart side portions of each panel. Adjacent panels 19, 20 are placed side by side with flanges 24, 25 abutting each other in aligned relationship.

Adjacent flanges 24, 25 are maintained in the relative position of FIGS. 9 and 10 by a series of spaced apart clips 28. The clips preferably are made of spring steel and have sufficient compressive force when placed over the flanges on about 10 inch centers to secure and maintain the adjacent flanges rigidly affixed to one another. Split plastic tube 23 forced over the flange to encapsulate clip 28 in the manner illustrated in FIG. 10b, thereby contributing to the structural integrity, weather proofing, and appearance of the structure.

The concave side of each panel is provided with a layer of insulation in the form of polyurethane foamed plastic 29 which preferably is sprayed onto the laminated fiberglass panel shell 30. The application of polyurethane to the fiberglass inherently forms a bond therebetween. Preferably the fiberglass shell is built up of several layers of glass cloth by applying one of the several liquid plastic resin compositions suitable for this purpose, as is known to those skilled in the art. The interface 31 between adjacent panels requires no subsequent filling or caulking because when assembled, the edge portions of the foamed plastic will abut each other in a suitable manner to provide an air tight seal therebetween.

Alternatively, where deemed desirable, the complete outer shell 30 can be assembled and the foamed plastic 29 applied to the entire inside of the shell by spraying or gunniting, as is known to those skilled in the art. Interface 31 can be cut with a common saw should it be desired to disassemble the hut at a subsequent time.

By bolting reinforcing ring 35 to diametrically opposed panels in the manner of FIG. 11, the assemblage can be rotated into the position of FIG. 12 where a lower edge portion of the panels at 27 can be bolted to a lower circumferentially extending reinforcing base ring 33.

While the shelter may be fabricated from any suitable number of individual panels, eight or 12 have proven satisfactory, with one having a door enclosed by the illustrated ramada, and at least one other panel having a window formed therein.

Each panel is fabricated in the form of a spherical segment with the upper edge portion defining a marginal part of a small equatorial circumference at the apex while the lower edge portion of each panel defines a marginal part of a larger equatorial circumference as seen at 33. The spaced apart flange portions 24 radially extend about a major circumference of the structure and converge toward one another to form a vent in the apex at the geometrical center of the structure.

The clip means 28 which secures one flange portion to another can take on several different forms; but preferably are about one-half inch in longitudinal length and have a cross sectional configuration as set forth in either FIGS. 10 or 10b. The longitudinally extending split tube should have an internal diameter of a size to permit the encapsulation of both the clip and the flange therewithin when the edge portions of the tube lay adjacent to the convex surface of the panel in the illustrated manner of FIG. 10b.

The present invention provides an all weather dome-like structure inherently capable of withstanding a high wind loading, yet is lightweight enough for easy handling, is inexpensive to fabricate, and simple to erect. The hut is suitable for all environmental living conditions and provides the maximum living space relative to the square feet of material required to fabricate the wall surface. The materials of construction are selected from the standpoint of thermal efficiency, strength, and cost. The composite sandwich type construction provides great strength as well as insulation against the elements. The fiberglass impregnated plastic forming the outer shell will withstand the deleterious effects of the elements for an indeterminate time, and years of weathering merely effects a slight fading in the color of the exterior finish. Because of the unique construction of the prefabricated panels, tws men can erect the shell of a twenty foot diameter structure in less than one working day.

I claim:

1. A prefabricated shelter comprising a plurality of self supporting panels, each in the form of a spherical segment;

   each panel having a concave inside wall surface and a convex outside wall surface bound by spaced part top and bottom edge portions, and spaced apart side edge portions; each said panel being made up of fiberglass impregnated with a plastic resin, and a layer of foamed plastic superimposed on one surface of said fiberglass panel, with the foamed plastic forming the concave surface of the panel while the fiberglass shell forms the convex side of the panel; an anchor ring; said anchor ring circumferentially extending about the base of said shelter; means by which said bottom edge portion of each panel is attached to said anchor ring;

   said bottom edge portion of each panel defining a marginal part of a relatively large equatorial circumference, said top edge portion of each panel being turned vertically upward to define a marginal part of a relatively small equatorial circumference, said side edge portions converging towards a common apex and terminating at said top and bottom edge portions;
an upper ring, means for attaching said top edge portion of each panel to said upper ring to thereby provide an apex of the shelter;
a ventilation cap, spaced apart links, said links having journal means at each opposed end portion thereof with one end portion being journaled to an edge portion of said cap and the remaining end portion being journaled to said ring;
each said side edge portion of said panels being in the form of a radial flange formed by turning a marginal edge portion of the panel laterally to the surface area of the panel; each adjacent panel being joined together by adjacent said radial flanges which abut one another; means for holding the adjacent flanges together including a metal clip; said clip having spaced legs biased towards one another; each said leg adapted to engage a flange so as to force the flanges together; a longitudinally extending split tube encapsulating the last said means and said flange, and extending along the side edge portions; and means forming a doorway in at least one said panel.

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