

[54] WALL CONSTRUCTION FOR SPHERICAL STRUCTURES

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[22] Filed: Apr. 13, 1973

[21] Appl. No.: 351,035

[52] U.S. Cl. 52/81, 52/582, 52/584,

52/758

[51] Int. Cl. E04b 1/32

[58] Field of Search 52/81, 80, 665, 82, 86,
52/758 R, 758 H, 582, DIG. 10

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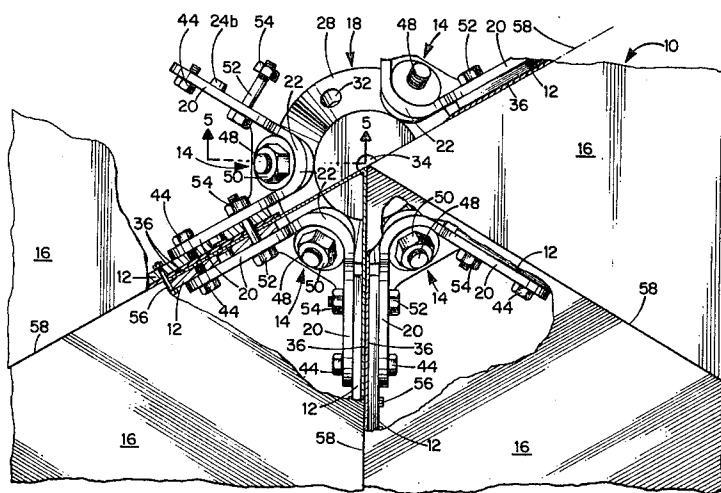
Geodesics, by Popka, Copyright 1968, by University of Detroit Press, FIGS. 35 & 36.

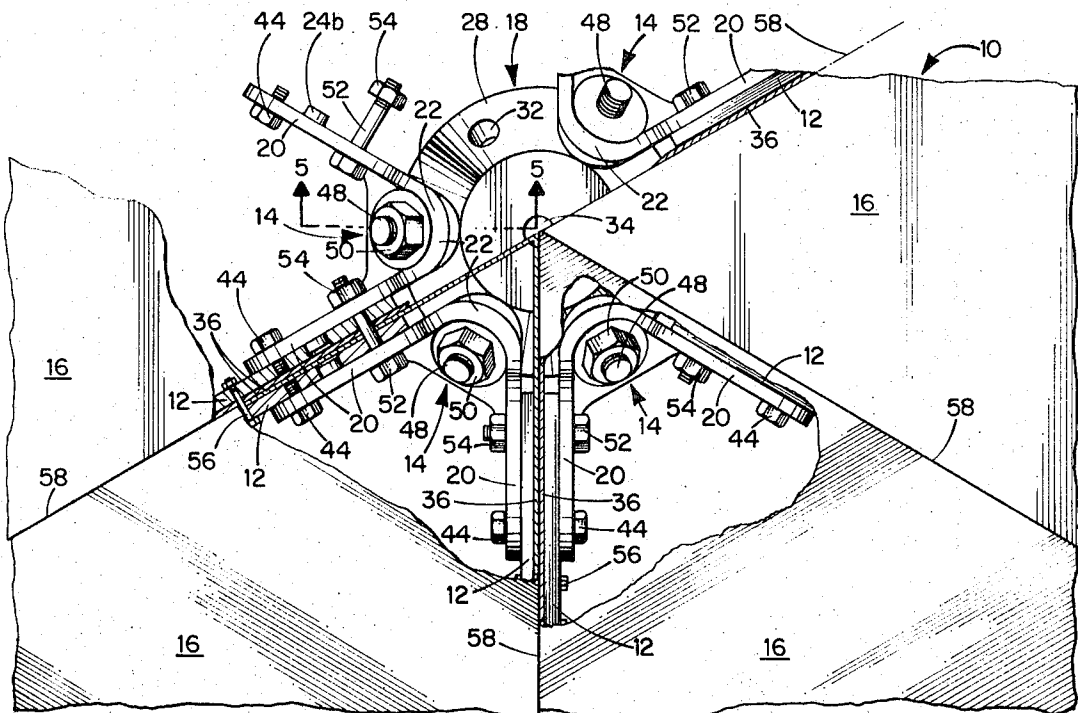
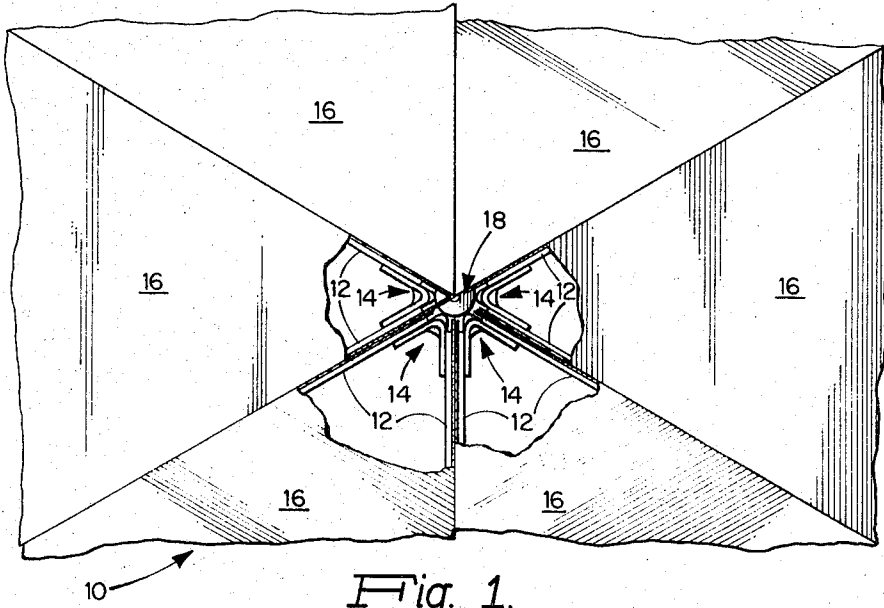
Primary Examiner—John E. Murtagh
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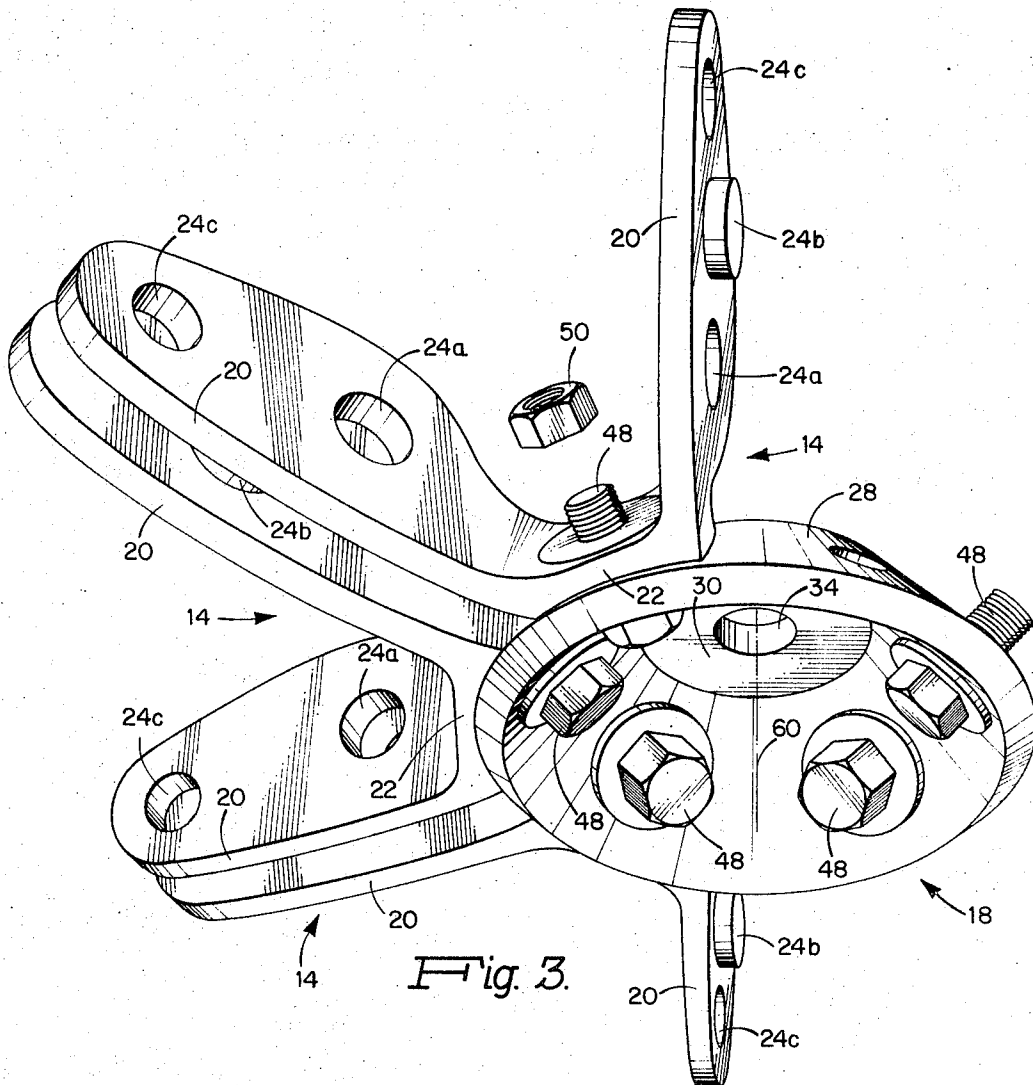
[57] ABSTRACT

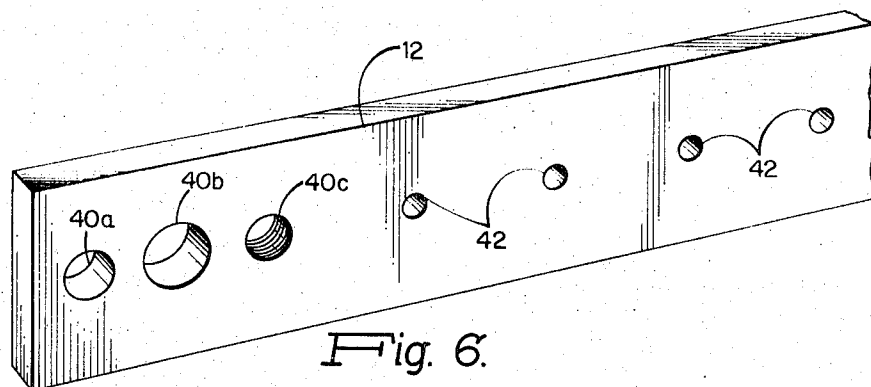
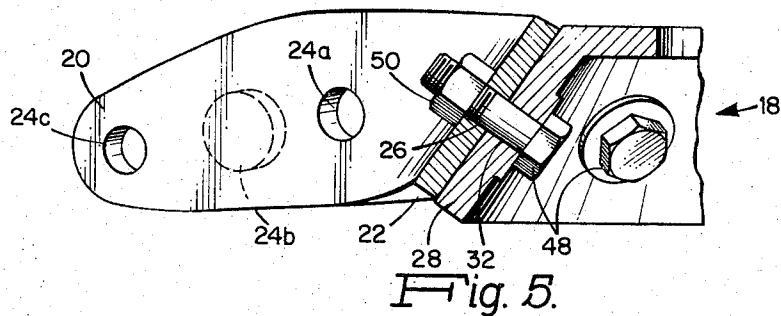
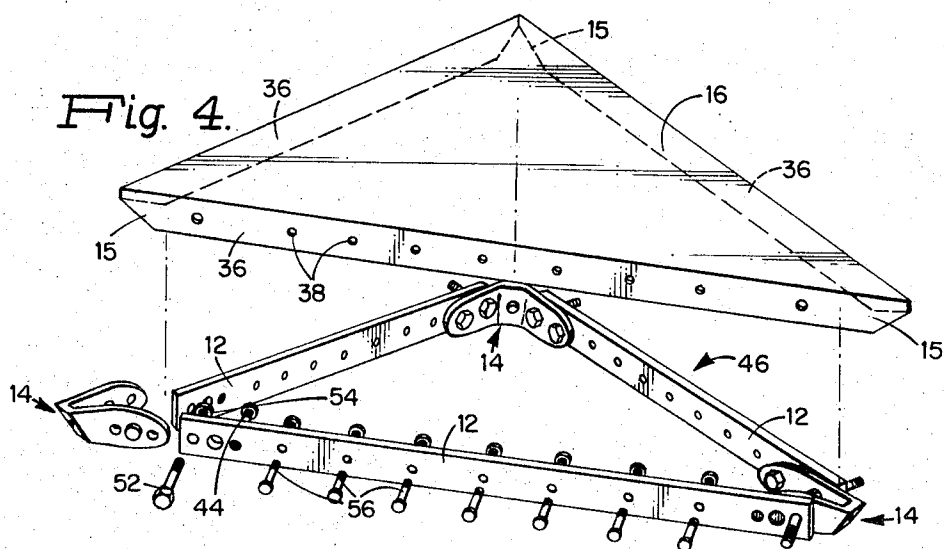
A wall construction for a spherical structure which includes elongated frame members subassembled at their ends by first apex connecting elements to form triangular frames. The subassembled frames are covered by triangular panels and interconnected to form the spherical structure by using second vertex connecting elements against which the first apex connecting elements are affixed.

5 Claims, 6 Drawing Figures









WALL CONSTRUCTION FOR SPHERICAL STRUCTURES

DESCRIPTION OF THE INVENTION

This invention relates generally to spherical structures, for example the type commonly referred to as "radomes," which are employed to enclose electronic apparatus such as radar units, radio or television transmitting and/or receiving equipment, etc. The invention is particularly concerned with the provision of a novel and improved wall construction for such structures.

Experience has indicated that the conventional spherical structures of the above-mentioned type which have been employed in the past have suffered from the disadvantage of having a high electrical antenna aperture blockage. This is due to the design and arrangement of the supporting framework for such structures. This disadvantage is compounded where the supporting framework must of necessity be made heavier in order to withstand high winds. Attempts at decreasing the electrical aperture blockage by lightening the supporting framework have not been successful because of the accompanying reductions in structural strength.

It is accordingly a general object of the present invention to provide a novel and improved wall construction for spherical structures which obviates the problems outlined above. More specific objects of the present invention include the provision of a wall construction which has markedly reduced electrical antenna aperture blockage, as compared to known prior art arrangements. Other objects of the present invention include the provision of a wall construction for spherical structures which may be quickly and easily assembled at the construction site.

These and other objects and advantages of the present invention will become more apparent as the description proceeds with the aid of the accompanying drawings wherein:

FIG. 1 is an exterior view of a wall construction for a spherical structure embodying the concepts of the present invention, with portions of the triangular panels cut away in order to illustrate details of the underlying framework;

FIG. 2 is an enlarged exterior view of the wall construction shown in FIG. 1, with portions broken away in order to further facilitate illustration of structural details;

FIG. 3 is a greatly enlarged bottom perspective view of several connecting elements; 1

FIG. 4 is a perspective view of a triangular frame and its associated panel;

FIG. 5 is a sectional view taken along line 5—5 of FIG. 2; and,

FIG. 6 is a perspective view of one end of a typical elongated frame member.

Referring now to the drawings, there is shown at 10 a wall construction in accordance with the present invention. The wall construction includes the following basic components; elongated frame member 12; first apex connecting elements 14; triangular panels 16; and second vertex connecting elements 18.

As can best be seen in FIGS. 2 and 3, each apex connecting element includes a pair of angularly disposed legs 20 joined by a nose section 22. Each leg 20 is suitably drilled as at 24a and 24c, and may be further provided with a laterally extending boss 24b. The nose sec-

tion is provided with a front face which is inclined inwardly (see FIG. 5) and is drilled as at 26.

The vertex connecting elements 18 each include a truncated conical wall 28 preferably reinforced by a top wall or plate 30. The wall 28 is suitably drilled at intervals as at 32, and the top wall 30 is also preferably drilled centrally as at 34.

The panel members 16 are triangular in shape, and each is provided with downturned flaps 36 which are suitably drilled as at 38. The panel members 16 and their respective flaps 36 may be adapted to lie flat for ease of packaging and shipping, and the flaps may thereafter be arranged in their downturned position immediately prior to the panel members being assembled as part of the wall construction.

As can be seen in FIG. 6, the elongated frame members 12 are provided at opposite ends with holes 40a, 40b and 40c, and along their lengths between the ends with additional appropriately spaced holes 42. The holes 40c may be threaded.

The wall construction 10 of the present invention is assembled in the following manner: each elongated frame member 12 is attached initially at opposite ends to the inside surface of a leg 20 on an apex connecting element 14. This is accomplished by seating the laterally extending boss 24b in hole 40b, which in turn assists initially in aligning the holes 24a and 24c in the leg 20 with the holes 40a and 40c in the end of the frame member 12. Thereafter, a connecting screw 44 is passed through hole 24c and threaded in hole 40c. In this manner, the legs 20 of three apex connecting elements 14 are attached to the ends of three elongated frame member 12 to thus produce a triangular frame generally indicated at 46 (see FIG. 4) wherein the legs of the triangle are defined by the frame member 12 and the apexes of the triangle are defined by the apex connecting elements 14.

Once this has been accomplished, the triangular panel members 16 are applied to the frame 46, with the down turned flaps 36 overlapping the exterior surface of the frame, and with the holes 38 aligned with the holes 40 and 42 in the frame members.

The panel-frame assemblies are then interconnected in the following manner: bolts 52 are passed through the aligned holes 24a, 40a and 38 of the sandwiched combinations made up of parallel legs 20, elongated frame members 12 and abutting flaps 36. Nuts 54 are threaded onto the ends of the bolts 52. A plurality of smaller bolts 56 are then passed through the aligned holes 38 of abutting flaps and the holes 42 in the frame members 12 overlapped thereby. Thereafter, the apexes of the panel-frame assemblies are interconnected through the use of the apex connecting elements 18. This is accomplished by abutting the nose section 22 of the apex connecting elements 14 against the truncated conical wall 28 of a vertex connecting element 18, with the hole 26 in each nose section aligned with the hole 32 in the wall 28. Heavy bolts 48 and nuts 50 are then employed to affix the apex connecting elements 14 to the second connecting elements 18. The ends of the panel flaps 36 are cut away as at 15 (see FIG. 4) so as to enable the apexes of the panel members to overlap the vertex connecting elements 18, as shown in FIG. 1. The foregoing procedure is repeated as adjacent panel-frame combinations are connected one to the other to gradually build the wall structure 10.

In light of the above, it will now be evident that the flaps 36 of adjacent panel-frame combinations will abut along planes 58 which extend radially from the central axis of 60 of each connecting element 18. The forces (compression and tension) to which the frame members 12 are exposed will be transmitted via the bosses 24b, bolts 52 and machine screws 44 to the legs 20 of the first connecting elements 14. These forces will be concentrated at the nose sections 22 and will then be transferred through bolts 48 to the centrally located vertex connecting element 18. Since the bolts 48 extend radially from the central axis 60 of the connecting element 18, all forces, either compression or tension, will thus be transferred across the vertex connecting elements 18. The combined shear strength of the bosses 24b and the machine screws 44 and bolts 52 is designed to be adequate to handle the forces to which the frame members are exposed. Likewise, the tensile and shear strength of the bolts 48 is designed to be adequate to handle the forces being transmitted from the apex connecting elements 14 to the vertex connecting elements 18. The concentration of forces within the vertex connecting elements 18 reduces dangerous twisting and bending movements, and thus provides a highly efficient structure. The vertex design is such that it creates a small area of blockage to electro-magnetic transmission. Consequently, electrical antenna aperture blockage is reduced significantly (a 50 percent reduction in vertex blockage is possible as compared to conventional radome vertex assemblies). The wall construction of the present invention may also be assembled quickly and easily, without the need of special tools and highly trained technicians.

It is my intention to cover all changes and modifications of the embodiment herein chosen for purposes of disclosure which do not depart from the spirit and scope of the invention

I claim:

1. A wall construction for a spherical wall structure, comprising in combination: elongated frame members; first connecting elements, each of which is provided

with angularly disposed legs joined by a nose section; first means for attaching said frame members to the legs of said first connecting elements to form triangular frames wherein the legs and apexes of said frames are defined respectively by said frame members and said first connecting elements; triangular panel members overlying said frames, said panel members having peripheral flaps overlapping the exterior sides of said frame members; second connecting elements, each having a truncated conical wall; and second means for attaching the nose sections of said first connecting elements to the walls of said second connecting elements, the positions of said first connecting elements when thus attached being such that the peripheral flaps of adjacent panel members will abut along planes extending radially from the centers of said second connecting elements with the ends of said flaps being cut away to thereby permit the apexes of said triangular panel members to overlie said second connecting elements.

2. The wall construction as claimed in claim 1 wherein said first means is comprised of bolts, the axes of which converge at the centers of said truncated conical walls.

3. The wall construction as claimed in claim 1 wherein the angularly disposed legs of said first connecting elements are provided with laterally extending bosses which are received in apertures in the elongated frame members attached to the said legs.

4. The wall construction as claimed in claim 1 wherein each of said second connecting elements is further characterized by a reinforcing plate extending across the upper end of said truncated conical wall in a plane perpendicular to the central axis of said wall.

5. The wall construction as claimed in claim 1 further characterized by fasteners extending laterally through adjacent elongated frame members and the legs of the first connecting elements attached thereto.

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