Oct. 31, 1961 C. J. SCHMIDT 3,006,670

FRAME FOR SUPPORTING DOMED STRUCTURES

Filed June 2, 1959 2 Sheets-Sheet 1

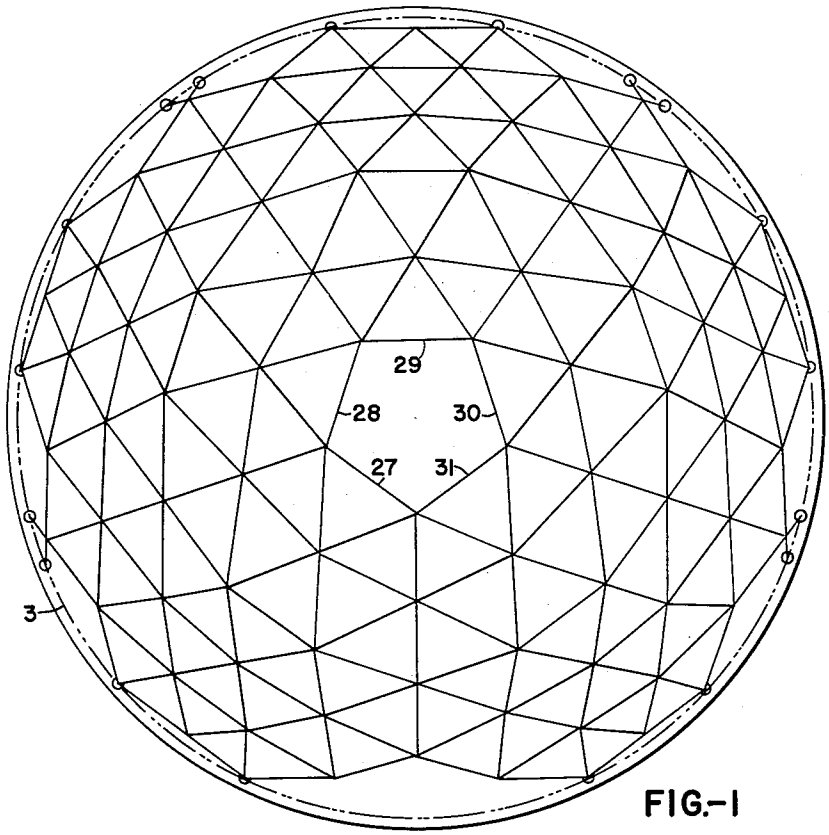

FIG.-1

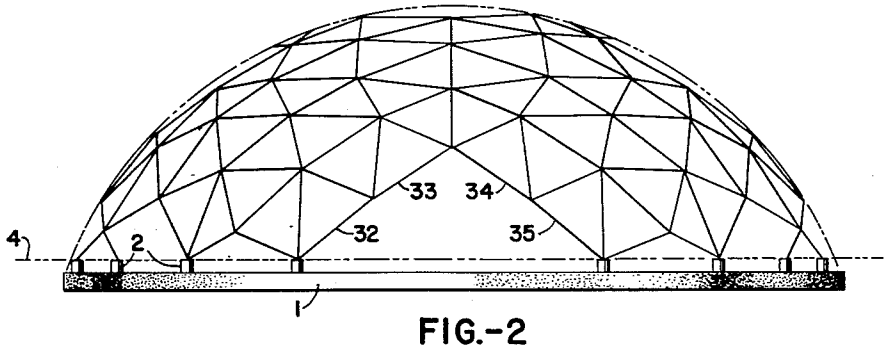

FIG.-2

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FRAME FOR SUPPORTING DOMED STRUCTURES

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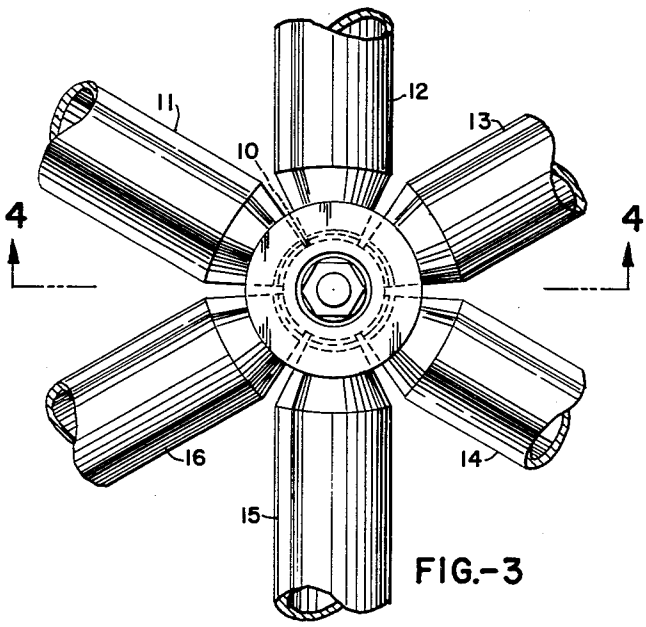

FIG.-3

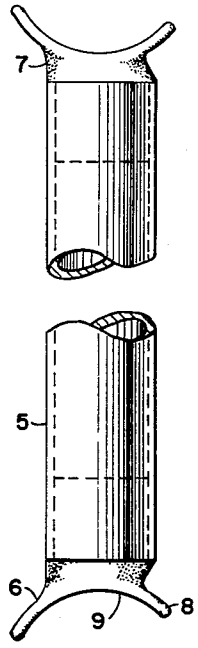

FIG.-5

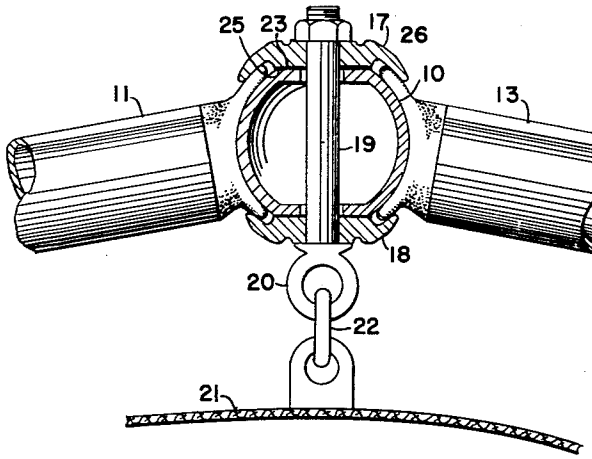

FIG.-4

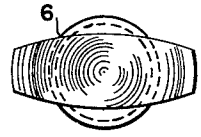

FIG.-6

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3,006,670

FRAME FOR SUPPORTING DOMED STRUCTURES

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Filed June 2, 1959, Ser. No. 817,588
2 Claims. (Cl. 287—54)

This invention relates to framework for supporting domed structures of pliable sheet material and is especially useful in the construction of domed shelters of fabric or sheet plastic materials.

It is an object of the present invention to provide a readily assembled framework to which a flexible enclosure would be secured for support.

Another object is to provide such a framework in which the frame members are of light weight tubing and are connected by interchangeable couplings.

A further object is to provide a structure in which a minimum number of lengths of frame members are required.

These and other objects will appear from the following description and the accompanying drawings forming a part hereof.

Of the drawings,

FIG. 1 is a diagrammatic plan view of the framework showing one embodiment of the invention.

FIG. 2 is a side elevation thereof.

FIG. 3 is a detail face view of the framework at one of the coupling members, other parts being broken away.

FIG. 4 is a cross-sectional view taken on line 4—4 of FIG. 3.

FIG. 5 is a detail side view of one of the frame members.

FIG. 6 is an end view of the frame member.

Referring to the drawings and first to FIGS. 1 and 2, these show a dome shaped structure of substantially spherical shape made up of frame members connected together only at their ends and defining triangular openings therebetween. Each frame member is shown diagrammatically as a single line. It has been found that a substantially spherical framework may be provided by projecting radially outward upon a spherical surface the points and lines comprising a pentagonal dodecahedron encompassed by the spherical surface and also lines resulting from division of each pentagonal face of the dodecahedron into five isosceles triangles having as bases the sides of the pentagon and having a common apex and providing frame members extending along and corresponding in position to the projected lines. Such a triangular division of a spherical surface makes it possible to provide a strong frame structure requiring the least number of lengths of frame members.

In the present structure, the enclosure is less than a hemisphere necessitating provision of such extra short or long frame members as are required to meet a single plane at the base of the structure.

Referring to FIG. 2 a foundation **1** is provided having anchor members **2** set therein and terminating in a circle **3** at a horizontal plane **4**. From these anchor members **2** a network of frame members extends in substantially spherical form, with the frame members having their ends secured to other frame members.

Referring to FIGS. 3 to 6, each frame member comprises a tube **5** of metal, preferably of a light metal alloy such as aluminum or magnesium alloy, and a pair of spherically flanged end members **6, 7** having cylindrical shanks secured in the ends of the tube or socketed therein. The flange **8** is interrupted and has a concave spherical end face **9**. It extends beyond the tube **5** only slightly in a direction radial of the spherical structure and only in one direction normal to the axis of the tube

with the flange extending a greater distance from the axis of the tube at one side than at the opposite side of the tube as shown in FIG. 6. In the assembly, from four to six frame and/or anchor members are assembled as shown in FIGS. 3 and 4 with their ends radially abutting a hollow spherical collar **10**, the frame members being numbered **11, 12, 13, 14, 15, 16**. A pair of clamp collars **17, 18** of similar construction each has an annularly spherically concave margin which extends over the spherical flanges of the frame members at opposite sides of the spherical collar **10** and a bolt **19** extends through the three collars to clamp the frame members in place. The bolt **19** is preferably an eye-bolt having an eye **20** whereby a pliable tent-like enclosure **21** may be suspended therefrom as at **22**. As an eye-bolt is present at each coupling position the tent-like enclosure may be suspended therefrom at each eye-bolt. In an embodiment of the invention of approximately sixty-three feet diameter at the foundation and approximately twenty-two feet elevation, the frame members would each be from seven to nine feet long and would support the flexible enclosure at similar spacing. Ninety couplings would be required in such an embodiment. As can be seen in FIG. 3 the provision of the interrupted spherical flange only at opposite positions and the tapering of the end members **6, 7** therebetween at an included angle of about sixty degrees permits clamping of as many as six frame members to a single coupling. As seen in FIG. 4, clearance space is provided between the spherical flanges **8** and the annular channels of the clamp collars for angular adjustment in the plane of the section of FIG. 4. This is to accommodate axial inclination of the frame members to one another at different positions of the same structure and also to provide for expansion and contraction.

The spherical collars **10** are each preferably flattened at the poles as at **23** about a clearance opening **24** for receiving the eye-bolt **19**. The collars **17, 18** each has on its clamping face a central flat circular area **25** which is normally spaced slightly from the flat surface **23** when clamped, and this is surrounded by an annular groove **26** having an outer spherical face for engaging the flange **8**.

In the embodiment shown in FIGS. 1 and 2, a central area of pentagonal shape defined by frame members **27, 28, 29, 30** and **31** is left uncovered and no frame members extend across that area while an opening of that size and shape is provided in the flexible enclosure to provide a loading hopper or a ventilating area. Also, a triangular area defined by frame members **32, 33, 34** and **35** is left uncovered as a door opening adjacent the base of the structure.

The anchor members **2** may be similar to the frame members and may be of similar tubing with one spherically flanged end portion, the anchor members being set vertically about the base and connected to the frame members by the same type of coupling members.

In constructing the structure, the anchor members are first placed at the proper positions about a circle and may then be embedded in cement or other material; frame members are then coupled to the anchor members. Other frame members are added and coupled until the top is reached. The pliable enclosure is then drawn into place and tied to the eye-bolts at intervals.

Thus it will be seen that the objects of the invention have been accomplished and that the frame may be assembled from a small number of lengths of tubing having end flanges and a plurality of coupling members of one size and shape.

While a certain representative embodiment and details have been shown for the purpose of illustrating the invention, it will be apparent to those skilled in the art that

various changes and modifications may be made therein without departing from the spirit or scope of the invention.

What is claimed is:

1. A domed frame comprising a multiplicity of frame members each having at an end thereof a spherical retaining flange with a concave spherical face exposed axially outward, a ball having a spherical surface against which the spherical retaining flanges are seated, a pair of clamping collars each having an annular grooved face outwardly surrounded by a concave peripheral flange, said flange having a spherical surface engaging over said retaining flanges, said ball and said clamping collars having aligned openings and having their spherical surfaces concentric, and a bolt extending through the aligned openings of said clamping collars and said ball for positively clamping said frame members against relative movement in a plurality of angular positions.

2. A domed frame comprising a spherical clamping body having an axial opening therethrough, a multiplicity of frame members each having at an end thereof a concave seat of equal radius to said clamping body and formed by a spherical flange concentric therewith, a pair of clamping collars each having a spherical peripheral flange slidably engaging over the spherical flanges of said frame members to retain them in outwardly radiating relation from the center of said spherical clamping body, and a bolt extending through said clamping collars and the axial opening in said spherical clamping body for positively clamping the frame members in adjusted angular positions with respect to two axes at right angles to each other on the body.

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