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[54] PLANETARIUM PROJECTION DOME
6 Claims, 6 Drawing Figs.

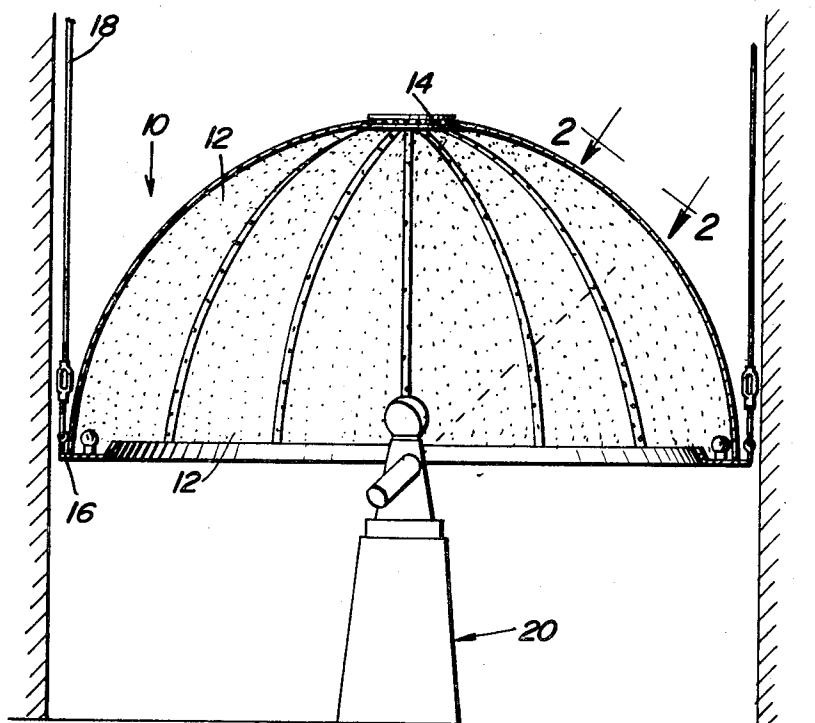
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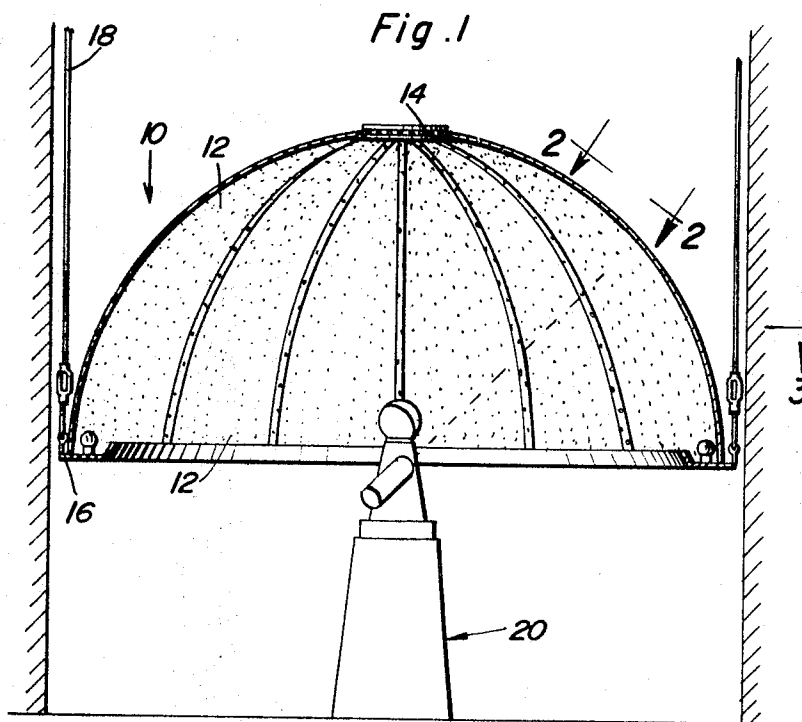
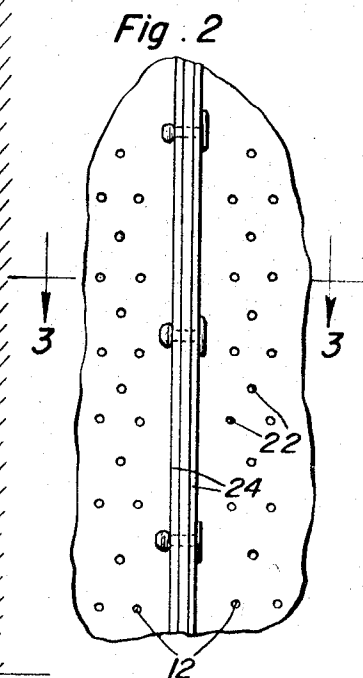
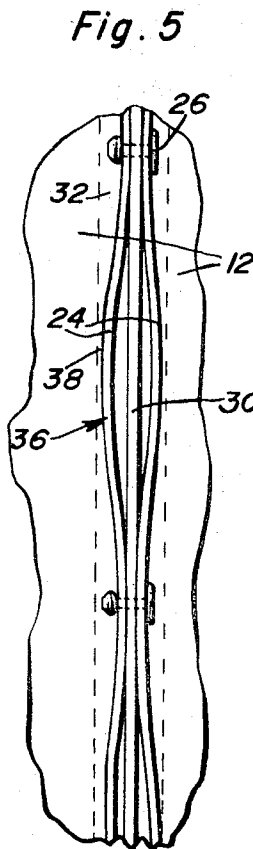
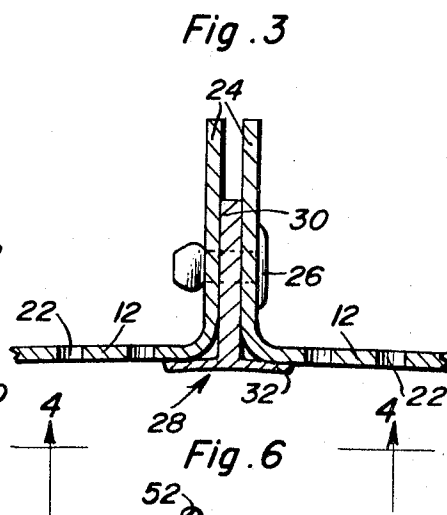
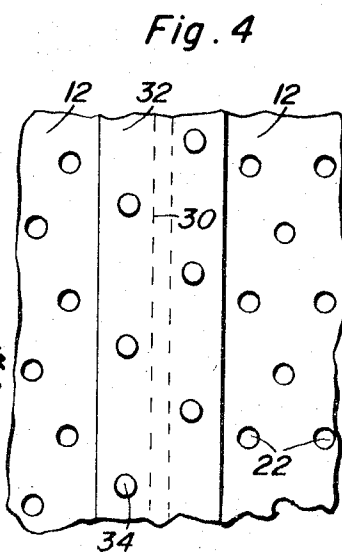
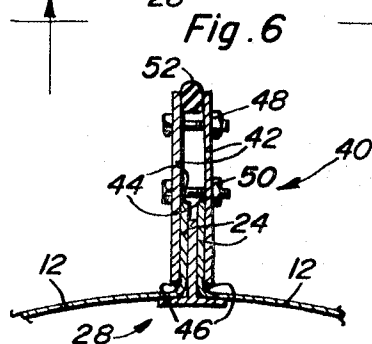
[51] Int. Cl. E04b 1/32,
E04d 13/03, G09b 27/00

[50] Field of Search 52/80, 81,
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ABSTRACT: A self-supporting planetarium projection dome constructed of a plurality of segments connected together to form a hemispherical dome. The segments include oppositely disposed marginal flanges which are connected together to form circumferentially extending joints. Arcuate cover strips in the form of T-shaped members are clamped between the marginal flanges of the joints to cover the joints and present a continuous interior dome surface for realistically reflecting projected celestial images.





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PLANETARIUM PROJECTION DOME

The present invention relates to hemispherical domes and more particularly to the construction of planetarium projection domes.

Planetarium domes of the general nature described are frequently provided with an exteriorly disposed skeletal structure to which a hemispherical shell is rigidly secured. Although this type of construction results in a dome of high structural strength it will nevertheless be appreciated that such a mode of construction is time consuming, relatively expensive and unduly heavy. Excessive weight is undesirable because special requirements for supporting the dome must be met. Further, because most dome structures are fabricated from adjacent positioned arcuate segments, circumferentially extending joints are formed which create lines through reflected celestial images, thereby detracting from the realism of that image.

The present invention includes a lightweight dome construction where arcuate segments include outwardly extending upright marginal flanges which are connected together to effect hemispherical construction. Further, peripheral cover strips are clamped between mating marginal flanges so that a smooth interior dome surface can be realized.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a sectional view illustrating the interior of a projection dome disposed above a planetarium projector.

FIG. 2 is a fragmentary view taken at an angle along a plane passing through line 2-2 of FIG. 1.

FIG. 3 is a fragmentary transverse sectional view taken along a plane passing through section line 3-3 of FIG. 2.

FIG. 4 is a fragmentary radial view taken along a plane passing through line 4-4 of FIG. 3.

FIG. 5 is a view similar to that illustrated in FIG. 2 with the marginal flanges of adjacently positioned arcuate segments being shown as buckling.

FIG. 6 is a partial sectional view illustrating a modified construction of the present invention.

Referring to the figures and more particularly FIG. 1 thereof, the present planetarium dome is generally indicated by reference numeral 10 and is seen to be comprised of adjacently positioned arcuate panels or segments 12 which may be characterized as gores having mutually connected apex portions secured by a connector ring 14.

The lower edges of the gores are coplanar. Mounting flanges forming a tension ring 16 are connected to the lower edge of the hemispherical body so that it may be suspended from cables 18 with the dome being completely self-supporting when suspended or mounted at its lower end on a load-bearing wall. The lower tension ring 16 rigidifies the lower end of the dome to enable it to be self-supporting. A planetarium projector 20 is disposed vertically below ring 14 in the usual manner.

It is also contemplated that the dome can be fabricated in the form of a geodesic body having interconnected triangular-shaped segments, geodesic in nature, or any other shape component which may be used to construct a hemispherical dome.

Referring to FIG. 2, the arcuate segments 12 are seen to include small-sized apertures or perforations 22 therein for rendering the dome structure lightweight and to improve acoustical properties thereof. However, it will be noted that the apertures are of sufficiently small size so that they do not become visually apparent when an image is projected on the interior surface of the dome.

FIG. 2 illustrates the ideal disposition of adjacently positioned marginal flanges 24 associated with mating segments 12. The flanges are more clearly illustrated in FIG. 3 wherein

the flanges are shown to be upright and radially outwardly extending. The flanges are retained in parallel-spaced relation to permit the insertion of a cover strip 28 therebetween for purposes to be made more clear hereinafter. The connection between the flanges 24 in FIG. 3 create a joint or seam which if left uncovered would present an undesirable line through a reflected projector image on the inner surface of the dome as previously explained.

In order to cover the joints created by the connected marginal flanges, the cover strip 28 is used to effect a continuous interior dome surface which is preferably coated with a flat paint or the like to diffuse incident light while retaining a high reflectance capacity. In more detail, the cover strip 28 includes an elongated arcuate web portion 30 which is disposed between the parallel-spaced marginal flanges 24. The web portion 30 is clamped between the marginal flanges 24 by a suitable number of regularly spaced rivets or like fasteners 36 thereby eliminating fastener heads or rivet heads exposed to the interior of the dome. The cover strip 28 is seen to further include elongated head portion 32 perpendicularly and integrally attached to the web portion 30. The head portion 32 is normally disposed to contact the inward surface of the dome along lateral areas immediately adjacent the joint formed by the marginal flanges 24. Thus, it is the head portion 32 which covers the joint. As seen in FIG. 4, in actual fabrication of the cover strip 28, the head portion 32 includes apertures 34 therein of the same size as the apertures 22 in the arcuate segments. These apertures make the dome appear virtually seamless.

FIG. 2 illustrates the disposition of the marginal flanges 24 under ideal conditions. However, in actual construction of the device, due to the deformation or buckling of sheet metal material as it undergoes fabrication, the marginal flanges 24 will buckle outwardly from one another between the points of connection and others as indicated by 36 in FIG. 5. Thus, the head portion 32 of cover strip 28 must be of sufficient width to cover the vertical inaccuracies of fitting of the marginal flanges.

Although the discussion up to this point has been directed to a dome structure fabricated at the plant of manufacture it would be desirable in a great number of instances to be able to construct the dome from a prefabricated assembly at the point of destination. Such a field assembly is illustrated in FIG. 6 and indicated by 40 wherein there is shown two adjacently positioned arcuate segments 12 having upright and confronting marginal flanges 24 identical to those previously described. Elongated arcuate plate members 42 are suitably attached to respective flanges 24 along the edge of intersection 46 between each marginal flange 24 and a respective segment 12. Further attachment is provided along the outward edge 44 of each marginal flange 24. The attachment of the plate members to the flanges is provided during fabrication of the segments. Two parallel-spaced rows of apertures are formed in the plate member 2 to permit the passage of appropriate bolt fasteners 48 and 50 therethrough. It will be noted that the dual row of apertures are formed during fabrication so that all that is required at the point of assembly is to position the arcuate segments 12 adjacent one another for permitting passage of the bolt fasteners 48 and 50 through appropriate aligned apertures. Before securing the bolt fasteners, a cover strip 28 is inserted between the marginal flanges 24 and upon the tightening of the bolt fasteners, the cover strip is secured therebetween.

The outward ends of the connected plate members 42 are parallel and spaced with respect to one another. In order to effect a spacer between the plate members 42, a shim 52 is inserted therebetween prior to the fastener of the bolts 48 and 50, the shim being secured upon the tightening of the fasteners.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and

operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What I claim as new is as follows:

1. A substantially hemispherical projection dome comprising a plurality of adjacently positioned segments having a plurality of small apertures, each segment having exteriorly disposed upstanding marginal flanges, each marginal flange disposed in parallel-spaced relation to a flange of an adjacent segment to form a joint, an elongated cover strip serving to form a continuous interior surface across the joints thereby enhancing the reflecting characteristics of the interior dome surface, each cover strip having a web portion clamped between mating parallel flanges of each joint, each cover strip also having a thin head portion for bridging the joint and including a plurality of apertures the same size as the apertures in the segments to effect formation of the continuous interior dome surface which is virtually seamless in appearance under low lighting conditions when a projector projects an image onto the inner surface of the dome, and means for fastening the web portion between associated marginal flanges.

2. The structure as defined in claim 1 wherein said means for fastening the web portion includes plate means attached to the exterior surface of each marginal flange at each joint, the plate members being disposed in spaced parallel relation, and fastener means connected between associated plate members for effecting the clamping of the web portion of the cover strip between the marginal flanges.

3. The structure as defined in claim 2 wherein the plate

members having outwardly disposed edges, defining a void therebetween and shim means in the void to retain the outer edges of the plates spaced apart.

4. The structure as defined in claim 1 wherein said fastener means includes a plurality of fasteners extending through the flanges and web portion of the cover strip thereby retaining the interior surface of the dome free of fasteners.

5. A planetarium dome comprising a plurality of interconnected panels forming a substantially hemispherical dome, and cover strips overlying and concealing the joints between adjacent panels, said panels and cover strips having a plurality of small apertures distributed throughout the area thereof to provide a virtually seamless appearance on the interior surface of the dome.

6. The planetarium dome defined in claim 5 wherein the inner surface of each of said panels and the inner surface of the cover strip is provided with a flat paint coating to diffuse incident light while retaining a high reflectance capacity to facilitate observation of an image projected onto the interior surface by a projector, each of said panels and cover strips being perforated in the same pattern with the perforations being small whereby they do not become visually apparent when observing an image projected onto the inner surface of the dome by a projector thereby providing an inner surface for the dome which appears to be virtually seamless when observing an image projected onto the inner surface of the dome by under low lighting conditions.

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