United States Patent [19]

Kastner

[11] **3,839,832**

[45] **Oct. 8, 1974**

[54] **INSTALLATION PANEL FOR AN INFLATABLE DOME**

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[52] **U.S. Cl.** **52/2,** 52/204, 52/747

[51] **Int. Cl.** **E04b 1/345**

[58] **Field of Search** ..... 52/2, 86, 204, 63, 747; 135/1 R, 15 CF; 24/73 HS; 49/166

[56] **References Cited**

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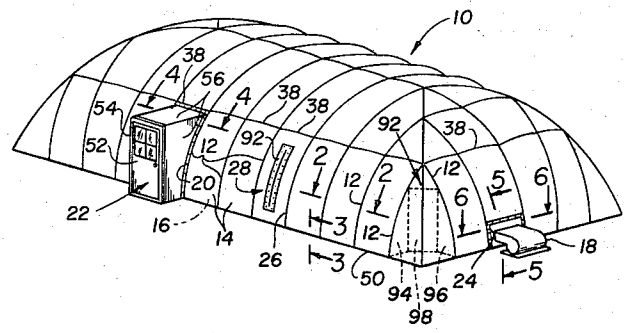
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Primary Examiner—Henry C. Sutherland
Assistant Examiner—Carl D. Friedman
Attorney, Agent, or Firm—Bauer and Amer

[57] **ABSTRACT**

For a dome-like structure used as protection over a pool or a similar site and internally supported by pressure air, an improved installation panel containing the access opening or door to the protected area which is readily incorporated at any selected location in the structure at said site, rather than at the factory where the dome is made, so that the location selected is assured of being optimum for the convenience and use requirements of the door.

4 Claims, 8 Drawing Figures



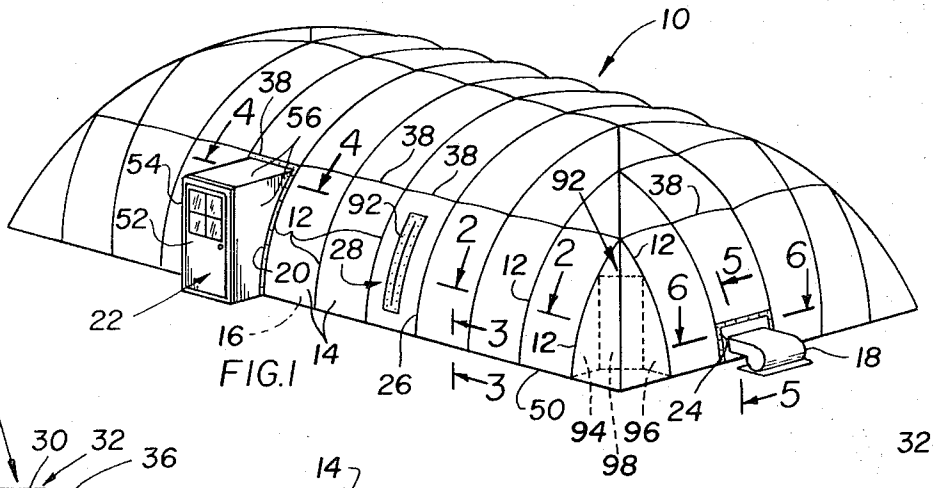


FIG. 1

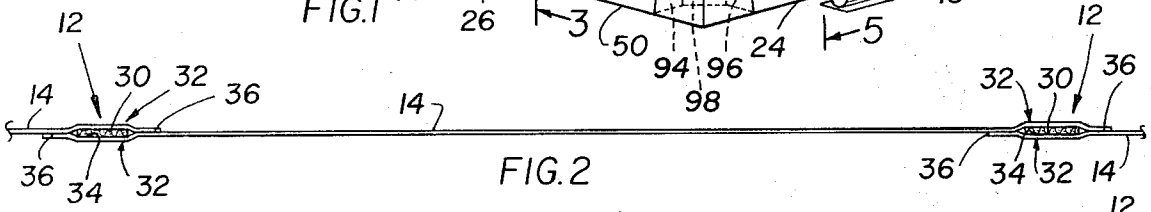


FIG. 2

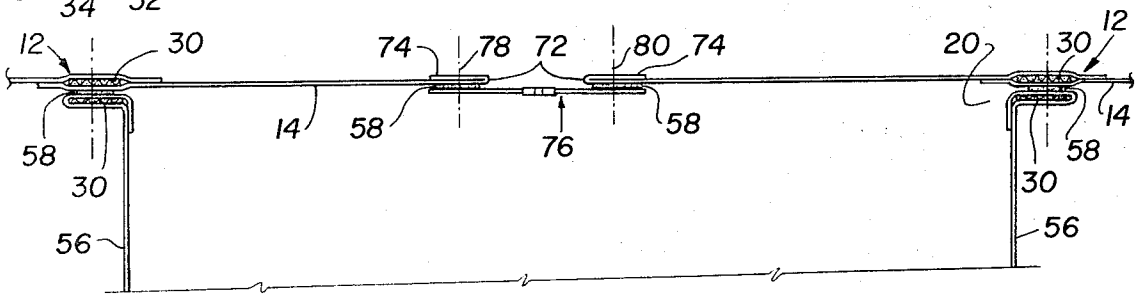


FIG. 4

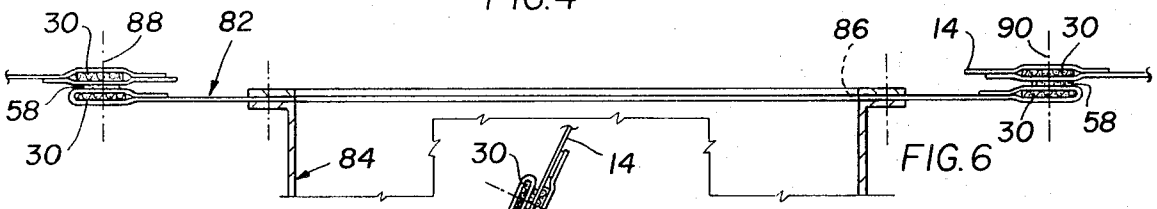


FIG. 6

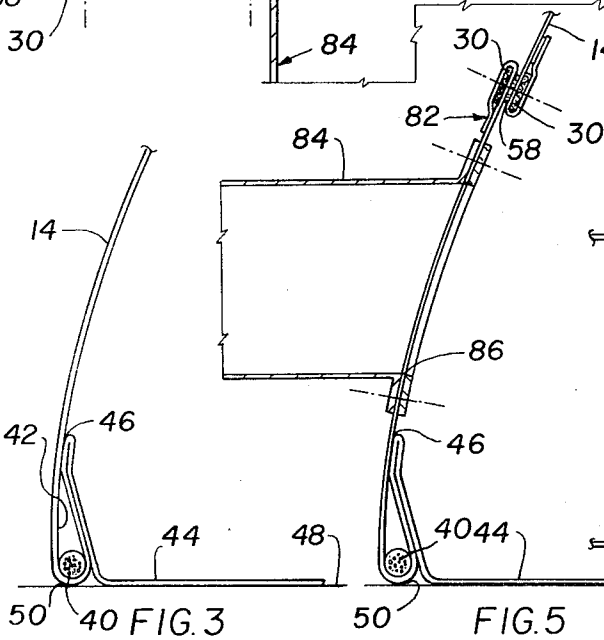


FIG. 3

FIG. 5

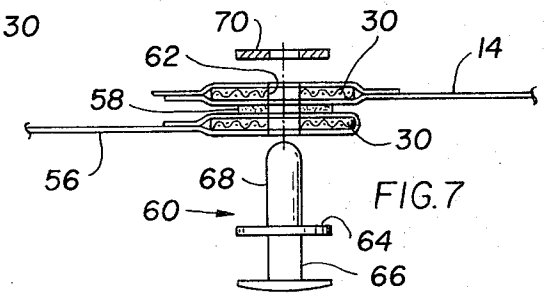


FIG. 7

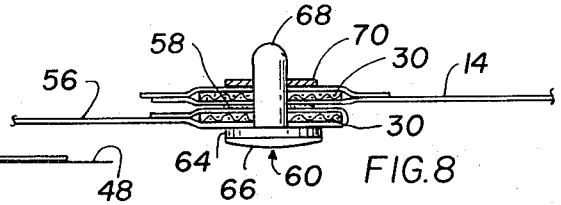


FIG. 8

INSTALLATION PANEL FOR AN INFLATABLE DOME

The present invention relates generally to improvements for an air-supported dome, and more particularly to a door or similar installation panel for this type of structure that is readily and effectively incorporated as an integral part thereof at the site of its use.

Plastic dome-like coverings or structures are being widely used as weather barriers about pools, tennis courts, and the like. A typical dome is economically factory-produced using heat sealing techniques and is readily installed at the site without supporting structure because it is capable of being held in an elevated condition by an internal pressure which exceeds ambient pressure. Although the requisite level of internal pressure can be effectively maintained despite some leakage or loss thereof through the dome, there cannot be any excessive leakage or loss. Thus, the access opening or door to the area enclosed by the dome typically has a zipper closure. The panel containing said opening or door typically also is installed at the factory during the construction of the dome so that said panel, similar to the other structure panels, is appropriately connected or incorporated into the whole by hermetic heat seals or in other ways so as to minimize pressure loss.

Broadly, it is an object of the present invention to provide an improved installation door or similar panel for an air-supported dome which is readily installed at the site of use, thereby overcoming the shortcomings of the prior art. Specifically, it is an object to provide a dome which is constructed in accordance with economical mass production techniques and nevertheless has structural features which cooperate with features on the installation panel hereof to enable on-site installation while maintaining the hermetic quality of the dome.

An installation according to the present invention includes webbing in a peripheral location that, during installation thereof, is in facing relation to stratgically located structural webbing provided throughout the dome. Thus, the on-site installation procedure contemplates an installation of any desired length, and if required, an air-tight, adhesive securement of the webbings, and rivets to prevent their inadvertent detachment.

The above brief description, as well as further objects, features and advantages of the present invention, will be more fully appreciated by reference to the following detailed description of a presently preferred, but nonetheless illustrative embodiment in accordance with the present invention, when taken in conjunction with the accompanying drawings, wherein:

FIG. **1** is a perspective view of an exemplary dome-like structure using installation panels according to the present invention which are advantageously installed at the site where the structure is used;

FIG. **2** is a side elevational view, on an enlarged scale and in section taken on line **2—2** of FIG. **1,** illustrating structural features of the individual panels making up the structure;

FIG. **3** is a vertical sectional view, taken along lines **3—3** of FIG. **1,** illustrating structural features of the anchoring cable for the structure;

FIG. **4** is a horizontal elevational view, in section taken on line **4—4** of FIG. **1,** illustrating the structural features of an emergency exit for the structure;

FIG. **5** is a vertical sectional view, taken along lines **5—5** of FIG. **1,** illustrating structural details for an air duct communicating with the interior of the structure;

FIG. **6** is a horizontal elevational view, taken along lines **6—6** of FIG. **1,** showing further structural details of the air duct of FIG. **5**; and

FIGS. **7** and **8** are related sectional views illustrating the manner of installing rivets during placement of the installation panels of the present invention.

Reference is made to FIG. **1** wherein there is shown a dome-like structure, generally designated **10,** of the type that is used for weather barrier protection about a pool, tennis court or the like. As generally understood, the structure **10** is formed by heat sealing together, as at the junctions **12,** a plurality of generally rectangular plastic panels, herein individually and collectively designated **14,** so that said structure panels **14** cooperate to bound an internal, closed area **16** about the pool, tennis court, or whatever other facility the structure **10** is used to provide weather protection for. In accordance with present practice, not only are the panels **14** fabricated of heat sealable plastic to facilitate their interconnection at the locations **12,** but the weight of the plastic is also easily supported by a differential internal pressure, i.e., a greater pressure within the enclosure **16** than outside of it, which pressure differential is supplied by a conventional electric squirrel cage blower **18** or the like in communication with the enclosure **16.**

Despite its obvious disadvantageous consequences, the prior art practice contemplated providing all access openings for the enclosed area **16** to be provided in the structure **10** at the factory where the structure is manufactured, presumably so that the heat sealing technique used at locations **12** to interconnect the panels **14** can also be used to render air-tight said access openings to the enclosure. Thus, such openings as the opening **20** for the emergency door structure **22,** opening **24** for the previously noted blower **18,** and most important opening **26** for the frequently used door **28** of the structure **10,** all were installed at the factory and thus at locations based on information transmitted to the manufacturer. On numerous occasions, the information provided is erroneous, resulting in one or more of the openings **20, 24** and **26** being improperly or inconveniently located in the structure. Naturally, the aforesaid is totally avoided for all practical purposes if said openings **20, 24** and **26** are made at the site where the structure **10** is used. However, this requires being able to readily close these openings with panels containing the components belonging therein in a manner which is airtight and thus compatible with supporting the structure **10** with internal pressure.

In accordance with the present invention, the aforesaid openings **20, 26** and **24** are readily closed with a unique installation panel in an airtight fashion, said installation panel appropriately embodying either the emergency door construction **22,** the air duct for the blower **18,** or the access door **28.** This is achieved, in part, using to advantage nonextensible webbing **30** which in turn is advantageously located as horizontal and vertically oriented structural members throughout the structure **10.** That is, as generally understood, webbing **30,** being non-extensible, is strategically located in substantially vertically oriented fashion at the spaced junctures **12** where the adjacent panels **14** are intercon-

nected to each other and, as a consequence, prevent over-inflation and distortion of the structure **10.**

Specifically, in FIG. **2,** there is illustrated an exemplary manner in which the webbing **30** is incorporated between adjacent panels **14** at the junctures **12.** The peripheral portions **32** of the adjacent panel are placed in overlapping relation, thereby defining a compartment **34** therebetween in which the webbing **30** is placed and the compartment is then completed by the application of a heat seal **36** on opposite sides. It will also be understood that the webbing **30** is strategically located in a substantially horizontal orientation at the location **38,** also for the purpose of preventing overinflation and distortion in the structure **10,** as well as providing structural stability to the structure. Although not shown, it will be understood that the webbing **30** at the location **38** is also heat sealed in interposed position between peripheral edges **32** of adjacent panels **14** in the manner already described in connection with FIG. **2.** It will soon be apparent how the installed webbing **30** is utilized in achieving airtight on-site installation of the installation panels of the present invention. It is suffice at this point, however, to note that the webbing **30** by virtue of being strategically located at each of the vertical locations **12** as well as the horizontal location **38** affords the selection of the location for the installation panel at almost any location throughout the dome structure **10.** This, in an obvious manner, facilitates the on-site selection of the location of the installation panel without any special factory preparation of the factory-manufactured dome **10.**

In addition to the strategically located webbing **30,** conventional construction of the dome **10** also includes, as is perhaps best illustrated in FIG. **3,** the use of a cable **40** which is threaded through a bottom compartment **42** formed using the bottom peripheral portion **44** of the interconnected panels **14** which are heat sealed at **46** and otherwise unattached so as to function as an air flap which is pressed by the internal pressure against a support surface **48** to thereby minimize leakage of the pressure air beneath the bottom edge **50** of the dome **10.**

Reference is now made to the additional FIGS. **4–8,** inclusive, which illustrate the facilitated manner of making an on-site, airtight installation of an installation panel of the present invention. As exemplary of the foregoing, reference should be had to the emergency door structure **22** which, as illustrated in FIG. **1,** has at an external end a door **52** mounted for opening and closing movements within a supporting jamb **54.** Peripherally connected to extend from the jamb **54** are plastic panels **56** which cooperate to define a passageway which serves as a closure for the previously noted opening **20** which communicates with the dome enclosed area **16.** The selection of the opening **20** as the location for the emergency door structure **22** will be understood to have been done at the site that the structure **10** is used and thus is optimum from the point of view of convenience, safety and other such factors. The airtight connection that is achieved for the opening **20,** as will now be described, can best be understood in connection with FIG. **4.**

As illustrated in FIG. **4,** opening **20** is, in effect, the area coextensive with a selected structural panel **14.** Said selected panel **14** has, as previously noted, webbing **20** at opposite vertical locations **12,** as well as webbing **30** along the horizontal location **38** which coincides with the top of the emergency door structure **22.** The first step after the selection of the panel **14** that will underlie the emergency door structure **22** is the placement of adhesive tape **58,** both opposite sides of which are coated with adhesive, along the bounding webbing lengths **30** or, in other words, over the rectangular pattern of webbing **30** which bounds the rectangular opening of the passageway **56.** Next, the free ends of the passageway panels **56** which, as illustrated in FIG. **4,** are also finished with heat-sealed webbing **30,** are pressed into adhesive contact against the adhesive tape **58** and thus the facing webbings **30** are adhesively secured to each other.

The aforesaid adhesive securement of the facing webbings **30** will be understood to be airtight, but the same is obviously vulnerable to inadvertent detachment. Thus, according to the present invention, said adhesive securement is supplemented by rivets **60** disposed in holding relation at spaced intervals along the facing, adhesively secured together webbings **30,** all as may be readily understood by progressive examination of FIGS. **7** and **8.** Specifically, each rivet **60** is projected through a hole **62** which is made through the webbing in any appropriate manner, as for example with a soldering iron. The rivet is of the type which has a flange **64** which engages the structure which bounds the entrance opening of the holes **62** and thus enables the rivet heat portion **66** to be pushed within the rivet nose structure **68** causing expansion of the same. Expansion of the rivet nose **60** contemplates frictional engagement of the nose with a washer **70** located on the opposite side of the materials being riveted together by the rivet **60.** In this manner, inadvertent disengagement of the adhesively secured together webbings **30** is prevented, and thus the airtight connection of the passageway opening **56** about the opening **20** is maintained.

Returning to FIG. **4,** which illustrates the final step, the construction panel **14** is then provided with a central, longitudinally oriented opening **72** by severing the plastic and reinforcing the edges bounding this opening with the adjacent folded-over constructions **74.** Again using double-adhesive tape **58,** a zipper **76** is connected in spanning relation across the opening **72** and the previously described rivets **60** applied at spaced intervals at the locations **78** and **80.**

In FIG. **6,** an exemplary manner is illustrated of accommodating the blower **18** using an installation panel **82** which includes, in a central location, an air duct construction **84** which, at one end, communicates with the outlet of the blower **18** and at the other end, as at **86,** with the enclosed area **16** of the dome structure **10.** Here also, an airtight connection is made with a selected underlying panel **14** by establishing an adhesive securement between facing webbings **30** and supplementing that with strategically applied rivets **60** at the locations **88** and **90,** which prevent inadvertent disengagement of this adhesive securement. After installation of the rivets, the portion of the underlying panels **14** between the rivet connections **88** and **90** is cut away as unnecessary.

FIG. **5** illustrates further structural details connected with the field installation of the air duct **84,** and in particular illustrates that the installation panel **82** also includes an air flap **44** heat sealed at **46** to provide a compartment **42** for the dome anchoring cable **40.** If the cable **40** is threaded through the compartment **42** before installation of the panel **82,** it is a simple matter to

merely sever the cable **40** to provide an end which can then be threaded through the compartment **42** and retied to the remaining length of the cable.

For brevity's sake, the description of the installation of the zipper panel **28** has been dispensed with, since the same can readily be understood and appreciated from the description that has already been provided regarding the on-site installation of installation panel **82.** It will suffice to note that panel **28** is readily installed as a closure for the opening **26** using the already described field joints at the two spaced apart verticle junctures **12** and the upper horizontal juncture **38.** Moreover, the panel **28** includes the previously described cable-accommodating structure with its air flap **44.** Still further, as in the case of the air duct **84,** after installation panel **28** has been installed, the body of the underlying construction panel **14** is cut away and removed so that panel **28** is the only panel occupying the opening **26.** To permit passage into and out of the dome structure **10,** panel **28** includes a centrally located, vertically oriented zipper **92.**

Throughout the application reference is made to an airtight connection or joint that is afforded by the double-sided adhesive tape **58.** Although such a joint is oftentimes helpful and nice to have, it is not always necessary, and often inflatable dome structures will be substantially airtight without the provision of the adhesive means **58.** When the structure is inflated, the overlapping panels are caused to contact each other along the adjacent surfaces and thus form an airtight connection. However, if the added protection of the adhesive means **58** is desired, the same may be provided in accordance with the teaching of this invention.

By utilizing the teaching of the present invention, it is possible to make the structure **10** of any desired length. Thus, in accordance with the teaching of the invention, the dome structure **10** may be increased in length simply by adding to the structure additional panels **14.** The insert panels **14** will include the compartments **34** along the sides thereof to which such insert panels are to be secured to the remaining panels **14** of the existing dome structure. Obviously, the compartments **34** will contain within them the inextensible webbing members **30.** The compartmented sides of the insert panels **14** are then secured and connected to the next adjacent already existing panels **14** of the dome structure by the application of the securing means **60** passing through the compartments **62.**

The application of aligned holes in each of the underlying compartments will be performed in accordance wtih the teaching of the invention. Similarly, the insert panels **14** that may be added to the dome structure **10** to extend the length thereof will be made to include, of course, the same cable-accommodating structure with the air flaps **44** in the same manner as the other panels **14** are disclosed to be constructed.

Referring to FIG. **1,** it will be noted that a cabana enclosure may be included in the present dome structure **10** by utilizing the teaching of the invention. In this connection, the cabana enclosure is generally identified by the numeral **92** and may be placed conveniently along any wall or in any corner of the dome structure **10** such as is shown in FIG. **1.** There it will be noted that the cabana enclosure has been conveniently shown as having two sides **94** and **96,** each of which is connected to a respective junction **12.** Each of the panels or sides **94** and **96** is provided with the compartment **34** which includes the inextensible webbing member **30.** The compartment **34** or peripheral portion **32** of the sides **94** and **96** is placed in overlying relation with the corner junctions **12** as shown in FIG. **1** of the drawing and there secured together by passing the securing means **60** through aligned holes **62** of the compartments of both the sides **94** or **96** and the junctions **12** to which they are to be connected. Inasmuch as the sides **94** and **96** are interior and non-load bearing walls, the use of adhesive means such as the double-sided tape **58** or any other form of adhesive means is unnecessary. However, the same may be utilized if desired.

In practice, it has been found that by leaving the tops of the cabana **92** open, air inflating the dome **10** may enter the top of the cabana **92** and thus circulate throughout the same and in the same manner cause the sides **94** and **96** to space themselves from the walls of the dome to which they are connected. For this reason, the walls **94** and **96** after being connected to the junctions **12** as shown, merely hang down from their top connections with the junctions **12** and thus form a flat wall **98** which may have a zipper or snaps to facilitate the opening and closing of such wall when a person intends to utilize the cabana arrangement.

It will be recognized that the teaching of the present invention enables the placement and utilization of the cabana **92** at any convenient corner of the dome structure. Naturally, more elaborate cabana arrangements may be provided at any other portion of the dome structure by introducing multi-sided walls. It is interesting to note that in the event the dome structure **10** is to be deflated for any reason whatever, it is important to obviate the presence of any rigidifying structural elements from the interior of the dome which might tend to pierce or damage the dome cover. By utilizing the broad teaching of the present invention for the inclusion of the cabana enclosure within the dome **10,** all damaging obstructions are avoided.

Quite obviously, any tears in the dome **10** are easily and quickly repaired simply by replacing the panel in which the same occurs merely by utilizing the teaching of this invention. In the past such damaged portions were repaired in a makeshift manner by the application of adhesives which were unsightly and often short lasting. With the teaching of the present invention, whole portions of the dome **10** may be replaced without affecting the appearance or functional integrity of the resultant structure.

What is claimed is:

1. In an inflation structure having a plurality of interconnected panels, an insert panel for insertion into and removal from the structure comprising, a closed compartment formed along the side of the insert panel to be inserted into the structure adjacent one of said plurality of interconnected panels, a closed compartment formed along the respective side of said one adjacent panel, an inextensible member contained and movable within and along the length of the confines of each of said compartments, said compartments of each of said panels being positioned in overlying surface engaging relationship and securing means securing said compartments of said insert panel and said one adjacent panel together with one of said compartments overlying the other of said compartments, said securing means extending through each of said overlying compartments and their respective inextensible members to secure said compartments and inextensible members together

such that the surfaces of the overlying compartments are air-tightly engaged when the structure is inflated.

2. In an inflatable structure as in claim **1,** an adhesive means extending along and between each of said overlying compartments to additionally secure said compartments airtight to each other.

3. The method of connecting together panels of an inflatable structure comprising forming a compartment along the sides of the panels to be connected together, movably containing an inextensible member within each of the compartments, placing the compartments of the panels to be connected together in overlying air-tight engaging relationship, providing aligned holes through each of the overlying compartments and their contained inextensible members, and positioning securing means through the aligned holes and securing the overlying compartments and contained members together with the compartments being in air-tight engaging relationship when the structure is inflated.

4. The method of connecting together panels of an inflatable structure as in claim **3,** airtightly adhering the overlying compartments together by interposing an adhesive therebetween.

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