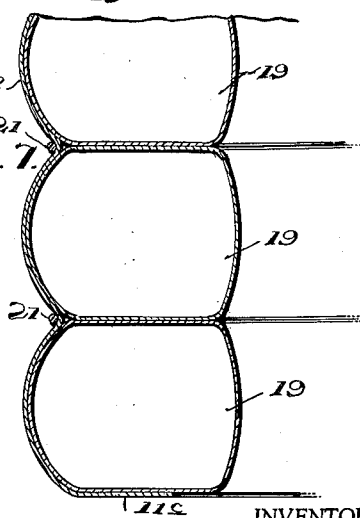
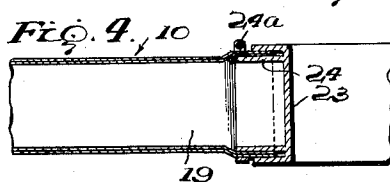
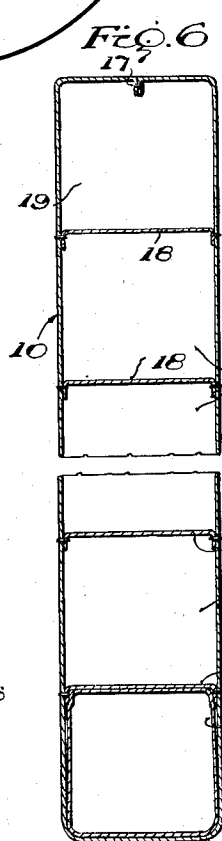
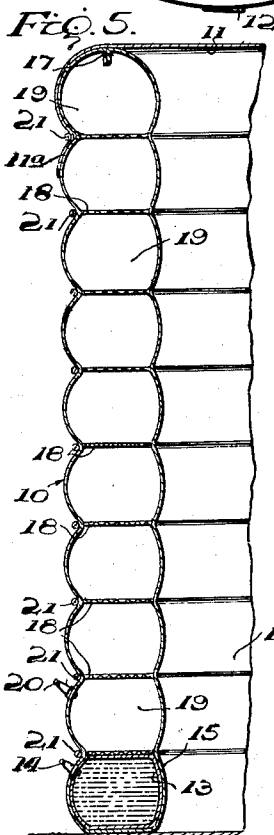
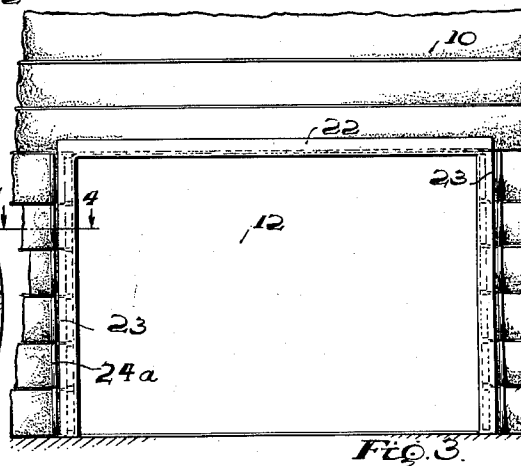
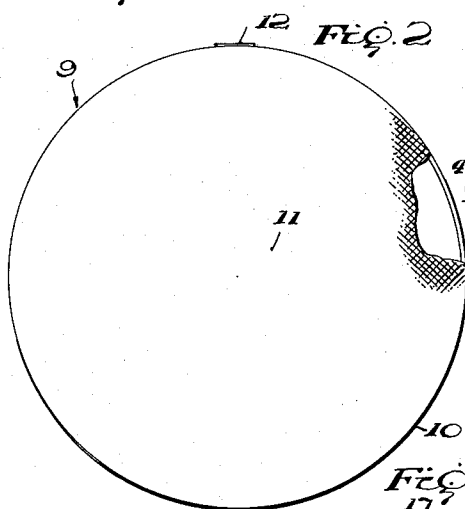
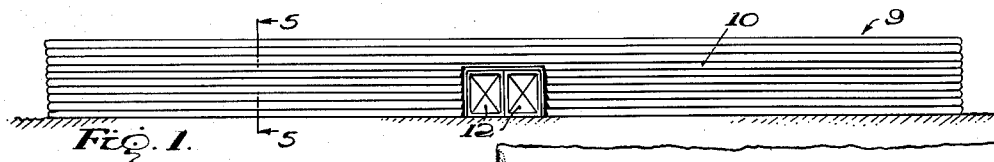


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W. W. CUSHMAN
INFLATABLE STRUCTURE
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2,990,837



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2,990,837

INFLATABLE STRUCTURE

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The invention described herein, if patented, may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The present invention relates to an inflatable structure. It has to do particularly, although not exclusively, with an inflatable structure having an upright wall formed from tube-like air-inflated sections or compartments stacked one upon another and having means at spaced intervals throughout at least a portion of its height to resist outward expansion when inflated and maintain a straight, or substantially straight, wall line.

One of the objects of the present invention is to provide a knock down, easily constructed inflatable building or structure of the foregoing nature having a straight upright circular or annular wall and a non-inflated flat roof, and one having removable means to maintain the upright wall straight.

Another object is to provide a structure as aforesaid which is capable of being erected or constructed on uneven ground surfaces while maintaining its wall straight and upright.

A further object of the invention is to provide an inflatable structure in which the roof thereof is a separate unit and is held in position by the inflation of the upright wall; another object being to provide an inflatable structure which, when deflated, is capable of being stored flat to conserve storage space.

The foregoing and other objects and advantages of the invention will appear from the following description and appended claims when considered in conjunction with the accompanying drawing forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In said drawing:

FIG. 1 is a front elevational view of an inflatable structure embodying the present invention;

FIG. 2 is a top plan view of the same;

FIG. 3 is a front elevation, on an enlarged scale, of the door opening and door in the upright wall of the inflatable structure;

FIG. 4 is an enlarged section taken substantially along the line 4—4 of FIG. 3, looking in the direction of the arrows;

FIG. 5 is an enlarged scale vertical section taken substantially along the line 5—5 of FIG. 1, looking in the direction of the arrows;

FIG. 6 is a view, partly broken away, and in enlarged vertical section, showing the wall structure only partially inflated; and

FIG. 7 is an enlarged fragmentary vertical section showing the overhanging portions of the roof sheet or unit overlapping the entire wall throughout its height and extending beneath the lowermost wall tube, section, or chamber.

Before explaining in detail the present invention, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced or carried out in various ways. It is to be understood also that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the inven-

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tion claimed herein beyond the requirements of the prior art.

One embodiment of the present invention is shown in FIGS. 1 and 2, wherein the inflatable structure is in the form of a round or circular building 9 having a straight upright wall 10 and a flat roof 11. A door opening is provided in the wall and a pair of doors 12 are employed to close the opening. As seen in the top plan view of FIG. 2, the wall may be provided with door openings in opposite sides, closed by doors 12. While the structure 9 is shown as being round or circular, it can, of course, take other shapes.

As best seen in FIG. 5, the upright wall 10 comprises a base tube-like member 13 which is completely filled with water ballast through a valve assembly 14. The tube member 13 is contained within the lowermost compartment 15 of the wall. This compartment and those superimposed above it are formed from a length or sheet of flexible fabric 16 which is liquid, air and gas tight and which is folded once and has its longitudinal edges folded in and secured together at 17. The folded sheet has its opposite walls connected together in spaced relationship by means of a plurality of perforate webs or partitions 18 to provide, in effect, a series of superimposed or stacked individual compartments 19. The perforate partitions 18 provide means for intercommunication between all compartments 19 with the exception of the lowermost 15 which contains the water-filled tube 13. All of the intercommunicating chambers or compartments 19 are air-inflated through one or more valve assemblies 20. After partial inflation of the tubes or compartments 19, the flexible roof sheet or member 11 is laid over the upper edge or top of wall 10. Further inflation will, not only erect the wall but will lift the roof into place with the roof sheet 11 stretched taut and having its marginal edge portions 11a overlapping the outer face of at least the top inflated member or compartment 19, as shown in FIG. 5, without requiring inside air pressure, so to do.

It is, of course, highly desirable to have the wall 10, when inflated, extend upright in a straight line. To accomplish this, I prefer to provide a series of encircling cables 21 which are located at the juncture of each pair of stacked compartments 19 and at the points of connection of the partitions 18 with the spaced portions of wall-forming fabric sheet 16. By encircling the wall 10 with the cables, outward expansion is resisted and a straight upright, preferably vertical wall, is maintained. It is to be noted that the top cable 21 engages and secures the overlapping marginal edge portions 11a of the roof sheet 11 to the wall 10, FIG. 5.

The upright wall 10 may be provided with one, two, or more door openings having either single or double doors, such as shown at 12 in FIGS. 1, 2 and 3. One of the door openings is shown somewhat in detail in FIGS. 3 and 4. The door frame, as shown, consists of a top or upper channel member 22 and side upright channel members 23. The channels 23 are both provided with spaced hollow projections or bosses 24 which extend outward from the webs of the channels adjacent the flanges thereof, see FIG. 4. These channel bosses 24 receive, in telescoping relationship, the adjacent ends of the tube-like compartment members 19 and are held in airtight condition on the bosses by tightening clamps 24a. Thus, the tube-like inflatable members, for the entire height of door frame members 22, 23, are not continuously circular but are formed of proper lengths to fit over the bosses 24 and cooperate with the framing for the door openings. Thus, the structure for attaching the tubes to the door frames is one of maximum simplicity and provides for a minimum of stress.

In FIG. 7, the roof sheet 11 is made large enough to

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overlap the entire height of wall 10 and also underlie the lowermost compartment 19. The wall covering portions of the sheet are shown at 11b and the underlying portion at 11c.

FIG. 6 shows the wall 10 before its compartments 19 are fully inflated; without the water ballast in the tube 13 of the lowermost compartment 15; and without the roof sheet 11 in place.

It will be understood that the wall unit 10 may be fabricated in any convenient and desirable manner, it being formed from a series of stacked tube-like intercommunicating compartments made possible by dividing the whole wall chamber into a series of individual chambers by the perforate dividers or partitions 18.

It is to be understood also that the water ballast in the lowermost tube or compartment serves to hold the structure on the ground and to permit its erection on uneven ground. The water ballast cannot move to the low side since the tube is completely filled with it.

I claim:

1. In a flat top circular inflatable structure, the combination of a circular upright flexible wall formed from a plurality of tube-like members stacked one upon another and in communication one with the other with exception of the lowermost member, said lowermost member containing water and all of the tube-like members above the lowermost member being air-inflated at a relatively high pressure, valve means for inflating the tube-like members, a door opening in said upright wall, a rigid top frame member and two cooperating rigid side frame members defining said opening, said rigid side frame members having spaced bosses for receiving and supporting the opposite ends of a plurality of the air-inflated tube-like members, means for releasably clamping said opposite ends to said spaced bosses, a door or doors for closing the door opening, a flexible sheet-like roof member engaging the top of the upright wall and overlapping at least a portion of the outer surface of said wall, and a series of cables encircling the upright wall at predetermined spaced points to maintain said wall straight by resisting its outward expansion under inflation, at least one of said encircling cables engaging the overlapping portion of the roof member to maintain the same in place.

2. An inflatable structure according to claim 1, wherein the overlapping portions of the roof member extend to the bottom of the upright wall and underlap the lowermost water-containing tube-like member, and wherein a plurality of said cables engage the overlapping portions of said roof member at spaced points vertically of the upright wall to maintain said portions in wall-covering relationship.

3. In a flat top circular inflatable structure, the combination of a circular upright flexible wall formed from a plurality of tube-like members stacked one upon another and in communication one with the other with the exception of the lowermost member, said lowermost member containing water and all of the tube-like members above the lowermost member being air-inflated at a relatively high pressure, valve means for inflating the tube-like members, a door opening in said upright wall, a top and two side frame members defining said opening, hollow stud-like members associated with the side frame members for receiving and supporting the opposite ends of a plurality of the air-inflated tube-like members, said lowermost water-filled tube-like member and said tube-like members above the top frame member being continuous throughout the circumference of the circular upright wall, the intermediate air-filled tube-like members being of shorter lengths and having their opposite ends in seating contact with said hollow stud-like members, band-like clamps for sealingly holding the intermediate tube-like members to said hollow stud-like members, a

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flexible sheet-like roof member engaging the top of the upright wall and overlapping at least a portion of the outer surface of said wall, and a series of cables encircling the upright wall at spaced points to maintain said wall straight by resisting its outward expansion under inflation, at least one of said encircling cables engaging the overlapping portion of the roof member to maintain the same in place.

4. In a flat top circular inflatable structure, the combination of a circular upright flexible wall formed from a plurality of tube-like members stacked one upon another and in communication one with the other with the exception of the lowermost member, said lowermost member containing water and all of the tube-like members above the lowermost member being air-inflated at a relatively high pressure, valve means for inflating the tube-like members, a door opening in said upright wall, a top and two side frame members defining said opening, hollow stud-like members associated with the side frame members for receiving and supporting the opposite ends of a plurality of the air-inflated tube-like members, said lowermost water-filled tube-like member and said tube-like members above the top frame member being continuous throughout the circumference of the circular upright wall, the intermediate air-filled tube-like members being of shorter lengths and having their opposite ends in seating contact with said hollow stud-like members, band-like clamps for sealingly holding the intermediate tube-like members to said hollow stud-like members, a flexible sheet-like roof member engaging the top of the upright wall and overlapping the outer surface of said wall and having a portion underlying said lowermost tube-like member, and a series of cables encircling the upright wall and engaging the sheet-like roof member at spaced points to maintain said wall straight by resisting its outward expansion under inflation and to maintain said roof member in place over the outer surface of said wall.

5. A flat top inflatable structure having an annular upright flexible wall formed from a plurality of tube-like members stacked one upon another and in communication one with the other with the exception of the lowermost member, said lowermost member containing ballast and all of the tube-like members above the lowermost member being air-inflated, valve means for inflating the tube-like members, said upright flexible wall having a door opening formed therein, a rigid top frame member and two cooperating rigid upright side frame members defining said door opening, said rigid upright side frame members having means for receiving and supporting the opposite ends of a plurality of the air-inflated tube-like members, a door for closing the door opening, a flexible sheet-like roof member engaging the top of the annular upright flexible wall and overlapping at least a portion of the outer surface of said wall, and a plurality of cables encircling the annular upright wall at spaced points to maintain said wall straight by resisting its outward expansion under inflation, at least one of said encircling cables engaging the overlapping portion of the roof member to maintain the same in place.

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