United States Patent [19]

Shuman

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[54] **FLOATING DOCK OR THE LIKE AND FLOATATION UNIT FOR USE THEREWITH**

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[73] Assignee: **Woodall Industries Inc.**, East Detroit, Mich.

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[52] **U.S. Cl.** ..... **114/.5 F**

[51] **Int. Cl.** **B63b 35/00**

[58] **Field of Search** ..... 114/.5 R, .5 F, 123, 114/234; 9/11 R, 11 A, 8 R, 8 P; 73/305, 309, 311; 137/165, 192, 409

[56] **References Cited**

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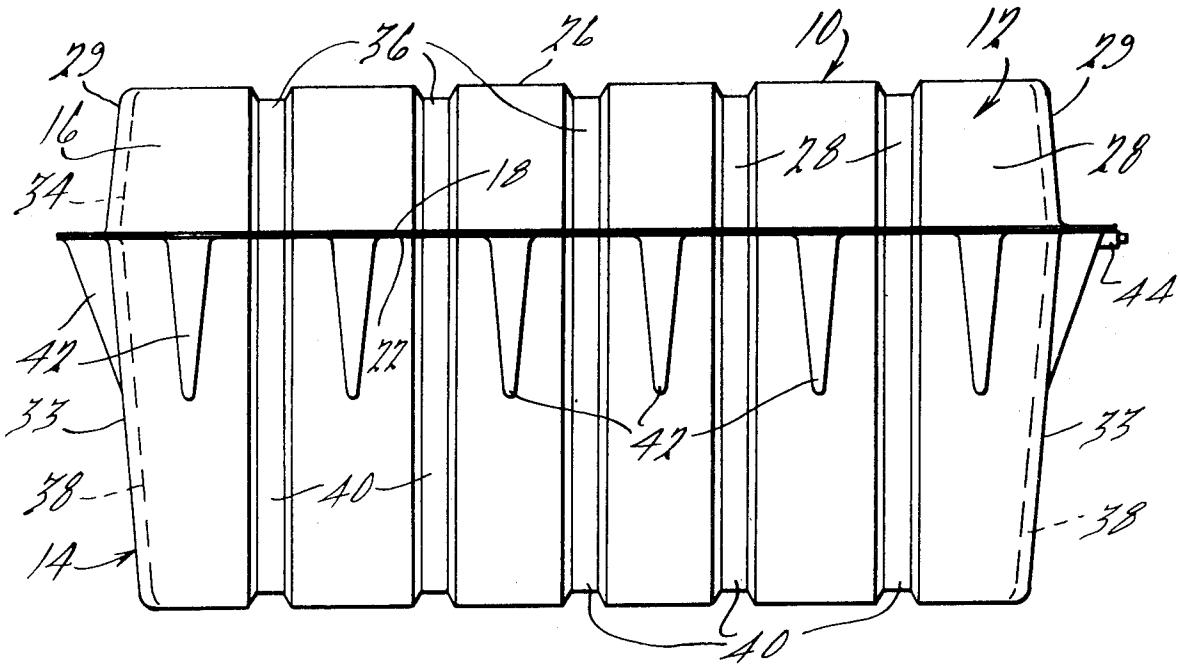
[57] **ABSTRACT**

A floating dock, raft or the like is made with special plastic floatation units. The floatation units consist of a pair of vacuum formed polyethylene sheets heat sealed together at peripheral flanges thereof. This flange is nailed to the bottom of joists which support the deck material of the dock.

14 Claims, 5 Drawing Figures



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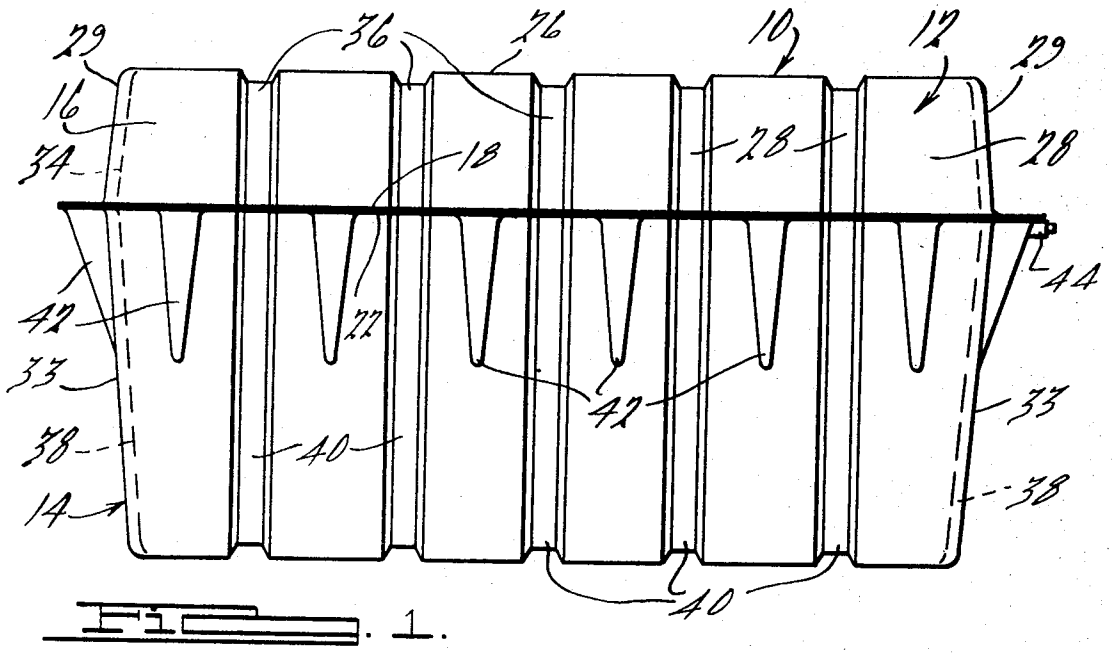

FIG. 1.

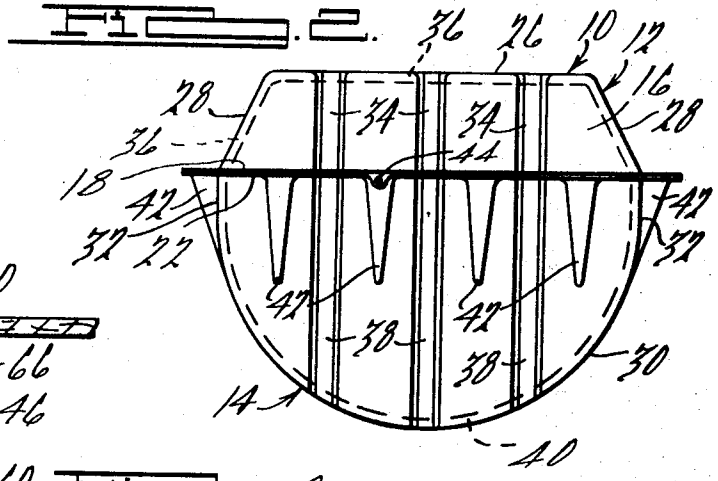

FIG. 2.

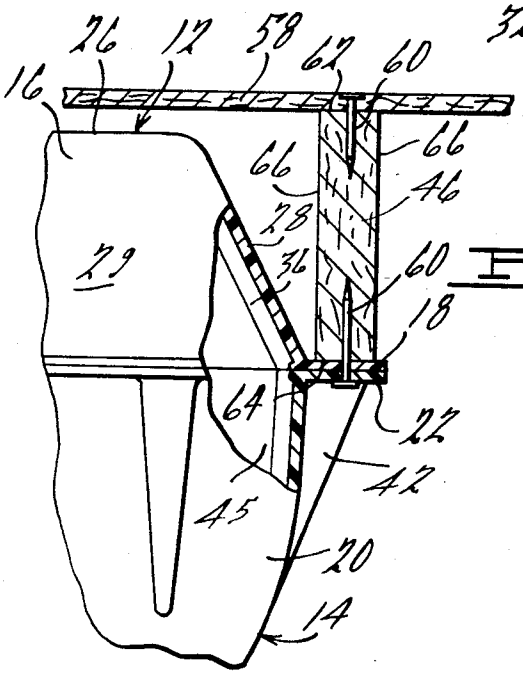

FIG. 4.

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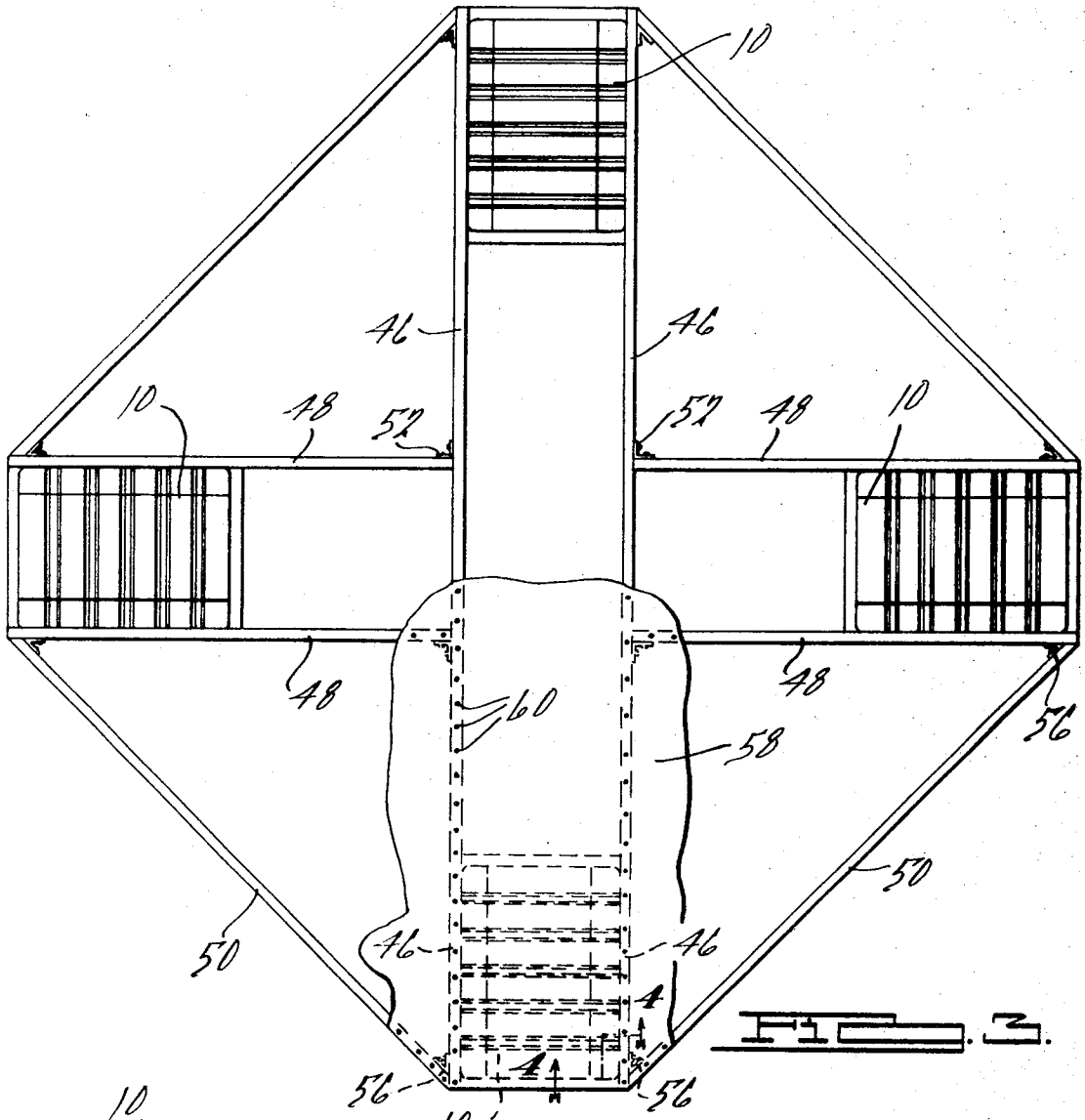

FIG. 3.

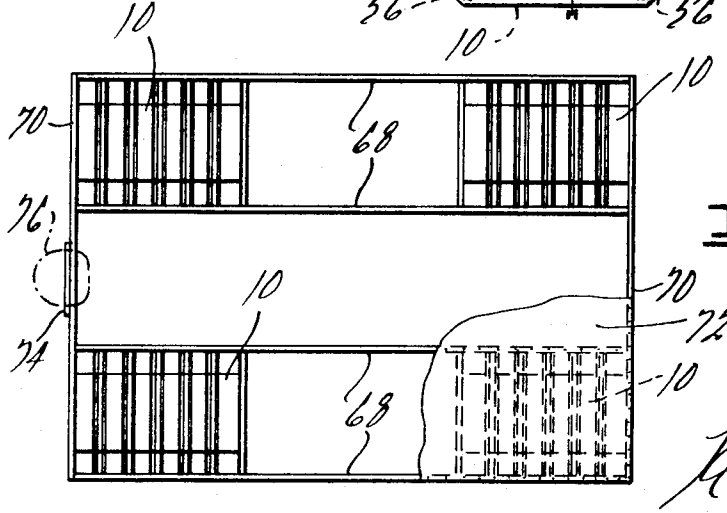

FIG. 5.

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FLOATING DOCK OR THE LIKE AND FLOATATION UNIT FOR USE THEREWITH

SUMMARY OF THE INVENTION

It has been common practice in the construction of rafts, floating docks and other water buoyant devices to employ barrels or drums as floatation units. Four or more steel barrels, when they are empty, will serve to support a considerable weight of framing and deck material well above the water line. While the use of steel barrels in such construction has been a useful expedient, this practice has a number of serious drawbacks. Docks and the like made with steel barrels are extremely heavy and are quite difficult to put in and take out of the water. The steel of the barrels tends to rust and specially designed brackets are often needed to secure the barrels to the framework of the dock or raft. Furthermore, the type of framework required with barrels must necessarily be of a sizable and expensive nature. Also, the decking is often supported at a greater height above the water than is desirable. The present invention relates to a floating dock, raft or similar device and a special floatation unit which is used therein in lieu of steel barrels. The arrangement of the present invention has a number of marked advantages over prior floating docks and raft constructions.

The device of the present invention is relatively easily constructed by an individual having few or no special skills. Apart from the special floatation units, a dock, raft or the like can be constructed with conventional, readily available, low cost materials. The amount of material needed for the framework is particularly minimal and low in cost. The resulting product is relatively light in weight, low in cost and requires minimal maintenance. Furthermore, it is of a durable and relatively rugged character.

The floatation units themselves can be manufactured and sold at a reasonable cost, they possess a high structural strength for their weight, and they are uniquely suited for use in the construction of floating docks, rafts, diving platforms and other floating devices operable to support humans or materials on water. The floatation units are substantially maintenance free, yet they are easily repaired if damaged.

The foregoing advantages of the present invention will be readily apparent from the ensuing description of the preferred embodiments of the invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a floatation unit constructed in accordance with the present invention;

FIG. 2 is an end elevational view on a reduced scale of the structure illustrated in FIG. 1;

FIG. 3 is a top plan view of a floating dock made with the floatation unit of FIGS. 1 and 2, most of the decking of the dock being broken away to illustrate the subjacent structure;

FIG. 4 is an enlarged sectional view of the structure illustrated in FIG. 3, taken along the line 4-4 thereof; and

FIG. 5 is a top plan view of a raft made in accordance with the present invention, the major portion of the decking of the raft being removed to illustrate the subjacent structure.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

The floating dock of FIGS. 3 and 4 employs four floatation units of the type shown in FIGS. 1 and 2. The floatation unit per se is designated by the numeral 10 and is best seen by reference to FIGS. 1, 2 and 4. The unit 10 is made from an upper plastic sheet 12 and a lower plastic sheet 14. The sheets 12 and 14 are desirably of polyethylene material and are vacuum formed by means of the method and apparatus shown in U. S. Pat. Nos. 3,242,245 and 3,250,660. The upper sheet 12 has a central upwardly dished portion 16 which is surrounded at its lower end by a planar peripheral flange 18. The lower sheet 14 has a downwardly dished central portion 20 which is surrounded at its upper end by a planar peripheral flange 22. The formed or upwardly dished portion 16 of the top sheet 12 will be seen to include a generally flat horizontal top wall 26 which is connected to the flange 18 by downwardly and outwardly inclined side walls 28 and end walls 29. The downwardly dished portion 20 of the lower sheet 14 will be seen to include a semi-cylindrical wall 30 which blends with straight side walls 32 at its upper ends. The straight side walls 32 connect the semi-cylindrical wall 30 with the flange 22. Generally flat end walls 33 enclose the lower dished portion 20 at the opposite ends thereof and merge with the flange 22.

Both the top and bottom sheets 12 and 14 are provided with suitable strengthening ribbing which contributes to the strength and rigidity of the floatation unit 10. Inwardly deformed ribs 34 are formed in the upper sheet end walls 29 and extend upwardly from the flange 18 to the top wall 26. Inwardly deformed transverse ribs 36 are formed in the top wall 26 and side walls 28 and extend from one side of the floatation unit to the other side thereof. The lower sheet 14 is similarly provided with inwardly deformed ribs 38 in the end walls 33 thereof and with inwardly deformed transverse ribs 40 in the wall 30 and walls 32 thereof. The ribs 40 extend from the portion of the flange 20 at one side of the unit to the portion of the flange 20 on the opposite side thereof. Load supporting vertical ribs 42 are formed on all sides of the lower sheet dished portion 20 in columnar supporting relation to the flange 22. It will be seen that the ribs 42 extend downwardly from the flange 22 and outwardly from the walls 32 and 33. The ribs 42, of course, constitute outward deformations of the walls 32 and 33. A plugged hole 44 is formed in the floatation unit 10 between the flanges 18 and 22 to facilitate the emptying of water from the unit in the event of a leak.

The two sheets 12 and 14 are heat sealed together at their flanges 18 and 22. The flanges 18 and 22 thus become one solid flange for the floatation unit which will hereafter be referred to as the flange 18–22. This flange will be seen to be uninterrupted on its upper surface and supported on its lower surface by the ribs 42. The formed or dished portions 16 and 20 of the sheets 12 and 14 define a substantially water tight compartment 45 which normally contains only air at atmospheric pressure and provides the unit 10 with the desired buoyancy.

The floatation unit 10 may be utilized to construct various floating structures such as floating docks, rafts, diving platforms or the like. Such structures may differ in size or shape although they have certain common

structural features. One such structure in the form of a floating dock is illustrated in FIG. 3. This dock will be seen to have a framework which includes a plurality of parallel long joists 46 and parallel short joists 48 set at right angles to the long joists 46. Joists in the form of angular struts 50 connect the joists 46 and 48 at the outer ends thereof. The joists 46 and 48 as well as the struts 50 desirably consists of lumber such as standard 2 ×6 inch lumber. Right angle steel brackets 52 are used at the junctures of joists 46 and 48 while brackets 56 are used at the joints between struts 50 and the joists 46 or 48. The joists 46 and 48 are set on edge on the upper surfaces of the flanges 18–22 of four floatation units 10 while a deck in the form of plywood panels 58 is fastened to the joists 46 and 48 by nails 60. As seen in FIG. 4, the plywood deck panels 58 rest on the upper edges 62 of the joists 46 while lower edges 64 of the joists 46 rest on the upper surface of the flanges 18–22. The nails 60 are also used to secure the joists 46 and 48 to the flanges 18–22 of the floatation units 10, the nailing being accomplished from the underside of the flanges. The joists 46 and 48 are thus positioned in vertical attitudes and extend horizontally with their upper surfaces in a common plane and their lower surfaces in a common plane. In the particular dock illustrated in FIG. 3, a pair of floatation units 10 are positioned between the joists 46 at the opposite ends thereof. A third floatation unit 10 is positioned between one pair of short joists 48 at their outer ends and a fourth floatation unit is positioned between another pair of short joists 48 at their outer ends. The resulting structure, as seen in plan view, is a polygon having four long sides and four short sides with floatation units being positioned at each of the four short sides. This arrangement gives good balance and stability to the dock and is manufactured at a relatively low cost.

The floatation unit 10 has been designed so that lumber of a conventional, inexpensive size may be employed for the joists 46 and 48. The flat top wall 26 of the unit 10 is spaced above the flange 18–22 less than the vertical height of the joists 46 and 48 and will lie closely beneath the deck 58. It will be seen that the flange 18–22 is much closer to the flat top wall 26 than it is to the bottom of the floatation unit. This permits the use of joists of short vertical height in the construction of the dock framework. While the members 46 and 48 have been characterized as joists, it will be apparent that various braces, supports, beams, stringers or frame members could be used as a connection between the deck 58 and the flanges 18–22. As used herein, the word "joist" is intended to refer generically to all such horizontal elongated members. It should also be noted that only portions of the flange 18–22 on opposite sides of the floatation unit 10 need be utilized to support the joists. Accordingly, it would be possible to interrupt or remove portions of the flange 18–22 which are not needed for such purpose. It will be apparent, however, that the ribs 42 perform a highly desirable function in resisting downward deflection of the flange 18–22 and contribute to the overall load supporting capability of the unit 10.

Should the unit 10 become punctured, it is relatively easily repaired. If made from polyethylene, it is only necessary to melt additional polyethylene onto the puncture hole in order to reclose the same. Any water which has leaked into the float can be emptied through the closable or plugged hole 44. The various ribs 34, 36, 38 and 40 add substantially to the stiffness of the sheets 12 and 14 without interferring with the assembly of the floatation unit 10 to the framework of joists 46 and 48 and without materially detracting from the buoyance of the unit.

Another form of the invention is illustrated in FIG. 5 and consists of a raft having four parallel joists 68. The joists 68 are joined at their opposite ends to cross members 70 while a deck 72 is nailed to the upper edges of the joists. A pair of floatation units 10 are positioned between one pair of joists 68 at the opposite ends thereof while a second pair of floatation units 10 are positioned between a second pair of joists 68 at the opposite ends thereof. The joists 68 rest on the upper surfaces of the floatation unit flanges 18–22 and are nailed thereto from the underside of said flanges. A motor mounting board 74 for supporting a motor 76 may, if desired, be nailed to one of the cross members 70. It will be apparent that a purchaser of four floatation units 10 can construct the raft of FIG. 5 with a minimal amount of lumber, plywood and nails. The joists 68 are stabilized at their upper edges by the deck 72 and at their lower edges by the floatation units 10, in addition to the stabilization given thereto by the cross members 70, which are end nailed to the joists 68. Accordingly, the entire structure is quite rigid as well as being very light.

What is claimed is:

1. A floating load supporting structure comprising a framework having a plurality of parallel joists, a deck mounted on said joists and a plurality of floatation units positioned between and supporting said joists, said floatation units being made from upper and lower thin walled plastic members joined at peripheral flange portions thereof to define a water tight compartment between said members, said flange portions being disposed in a horizontal plane located intermediate the upper and lower extremities of said floatation units, and fastener means extending upwardly through said flange portions into said joists to secure said flange portions to said joists.

2. The structure set forth in claim 1 in which one thin walled member of said floatation unit is upwardly dished from said flange and in which the other thin walled member of said floatation unit is downwardly dished from said flange.

3. The structure set forth in claim 1 in which said floatation unit flange portions are heat sealed together.

4. The structure set forth in claim 1 in which said joists comprise lumber of greater height than width.

5. The structure set forth in claim 1 in which one of said floatation unit members incorporates an upwardly formed central portion having a substantially flat upper wall and in which the other floatation unit members incorporates a central downwardly formed portion having an arcuate wall.

6. The structure set forth in claim 1 in which a lower one of the members of said floatation units incorporates outwardly projecting ribs supportingly connected to said flange portions on the lower side thereof.

7. A floatation unit for floating docks, rafts or the like comprising a pair of formed synthetic resinous top and bottom sheets, said sheets having peripheral flanges sealed together to define a water tight compartment in the space between said sheets, said top sheet being upwardly formed in the area thereof bounded by its said flange and being unobstructed in areas above its said

flange on opposite sides thereof to permit a pair of joists or the like to be supported thereon, said bottom sheet having load supporting ribs formed therein and connected to its said flange to reinforce said flanges against downward deflection.

8. The structure set forth in claim **7** in which said top sheet has a central upwardly deformed portion located entirely above the plane of said flange portions and in which said bottom sheet has a downwardly deformed portion located entirely beneath the plane of said flange portions.

9. The structure set forth in claim **8** in which said top sheet is provided with a raised generally flat top wall at the upper end thereof and in which said bottom sheet is formed with a depressed arcuate wall at the lower end thereof.

10. The structure set forth in claim **7** in which the flange portions of said sheets are heat sealed together.

11. The structure set forth in claim **7** in which one of said sheets is formed with inwardly depressed reinforcing ribs.

12. The structure set forth in claim **7** in which said flange portions are located in a plane disposed above a point midway between the top of said top sheet and the bottom of said bottom sheet.

13. The structure set forth in claim **7** in which each of said sheets is provided with a peripheral flange extending entirely therearound and in which said flanges are heat sealed together.

14. The structure set forth in claim **13** including load supporting ribs deformed outwardly from said lower sheet and merging with the flange of said lower sheet to provide columnar support against downward deflection of said lower sheet flange.

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