June 23, 1942. E. T. FLYNN 2,287,518

LIFE RAFT

Filed Oct. 6, 1941 3 Sheets-Sheet 1

Fig. 1.

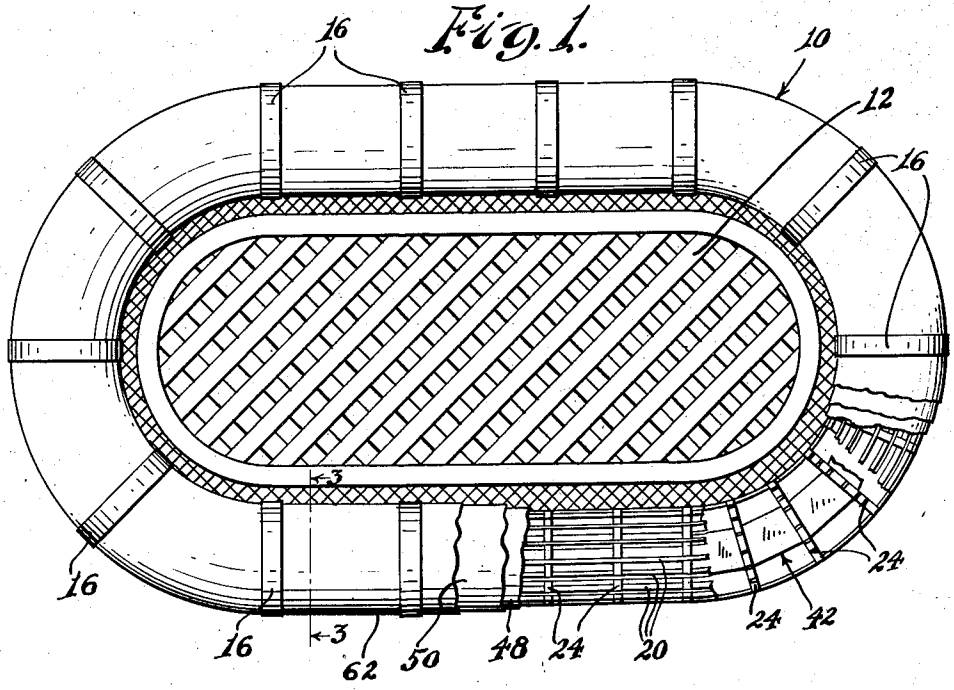
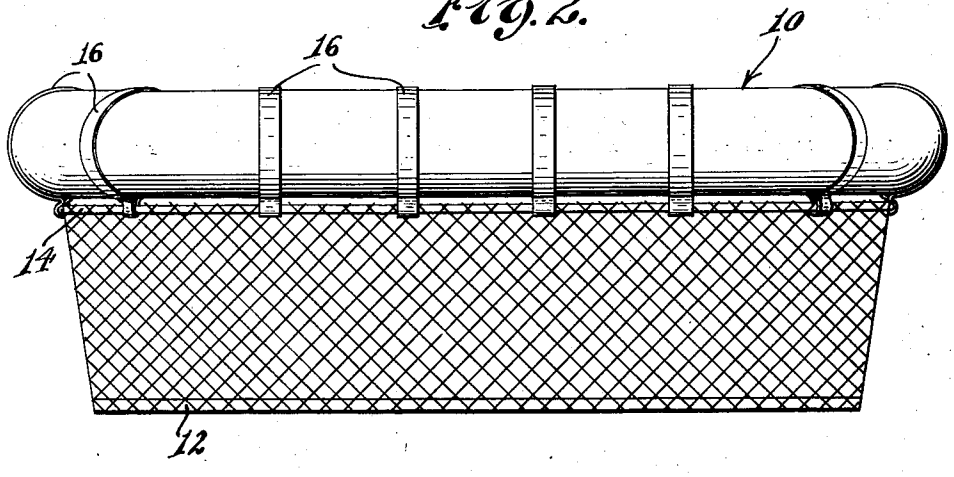



Fig. 2.




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Fig. 3.

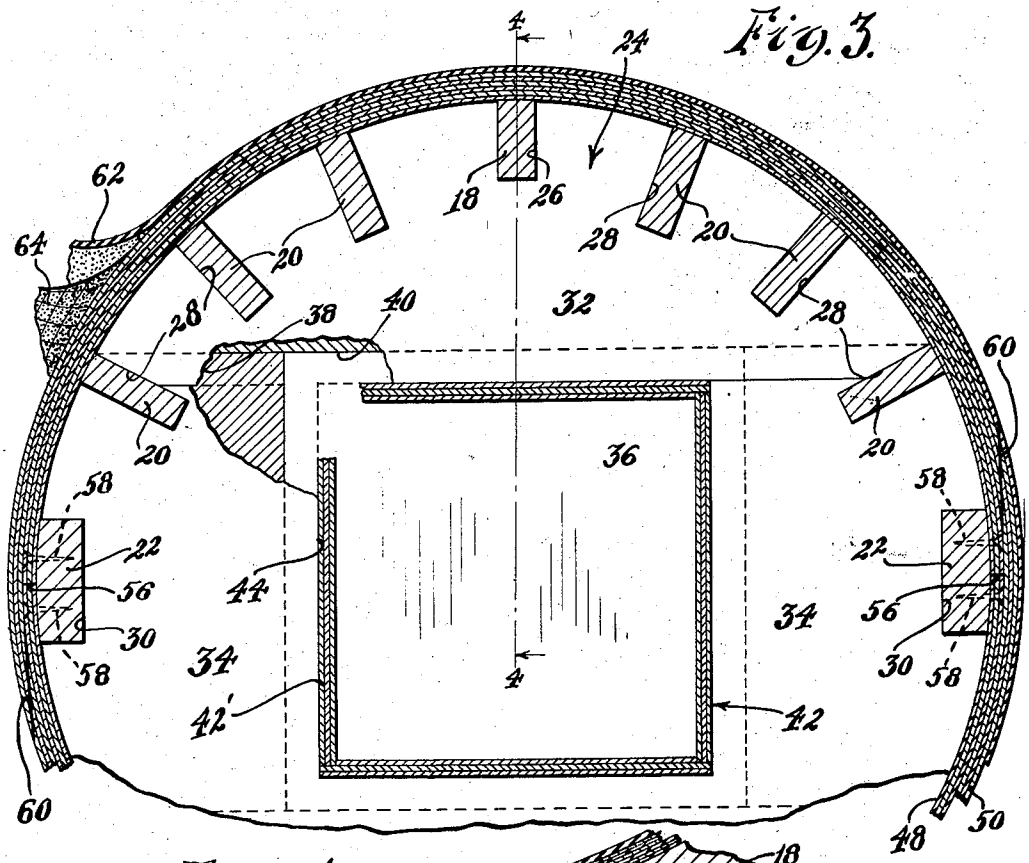
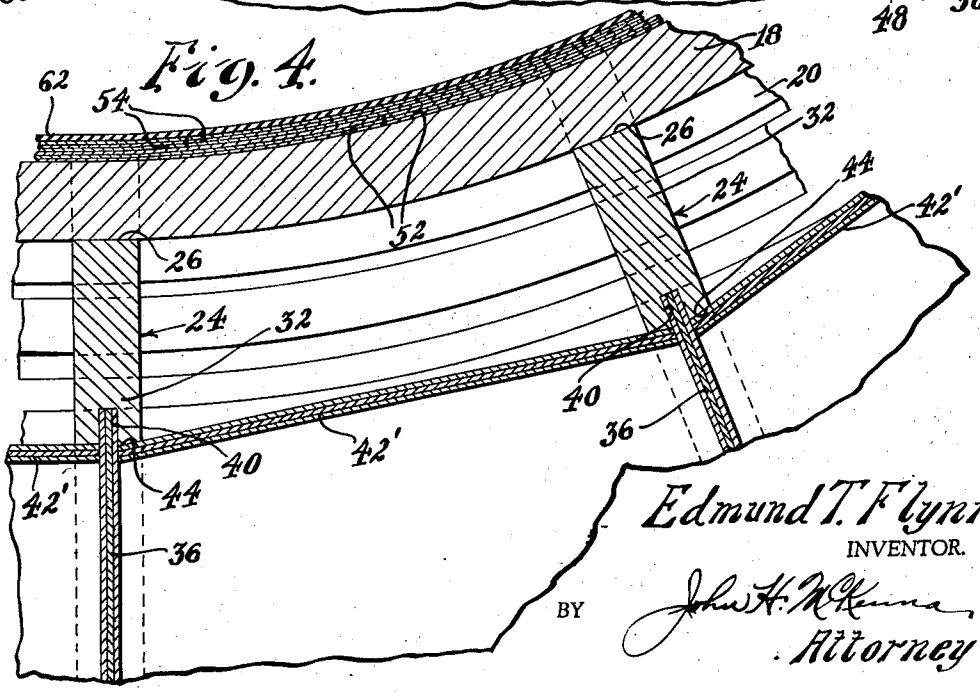



Fig. 4.




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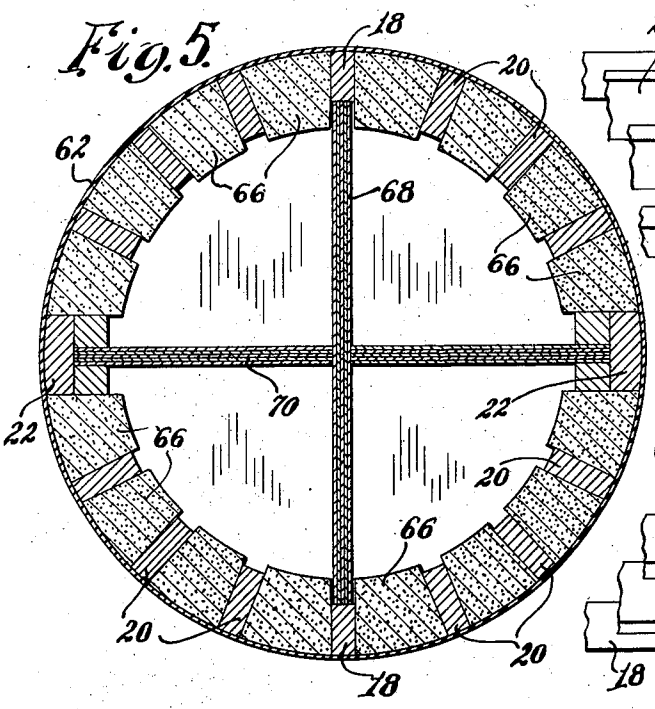
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LIFE RAFT

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Fig. 5.



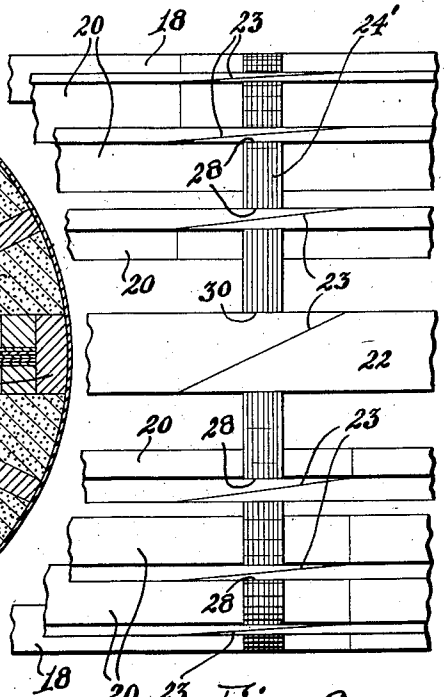




Fig. 6.

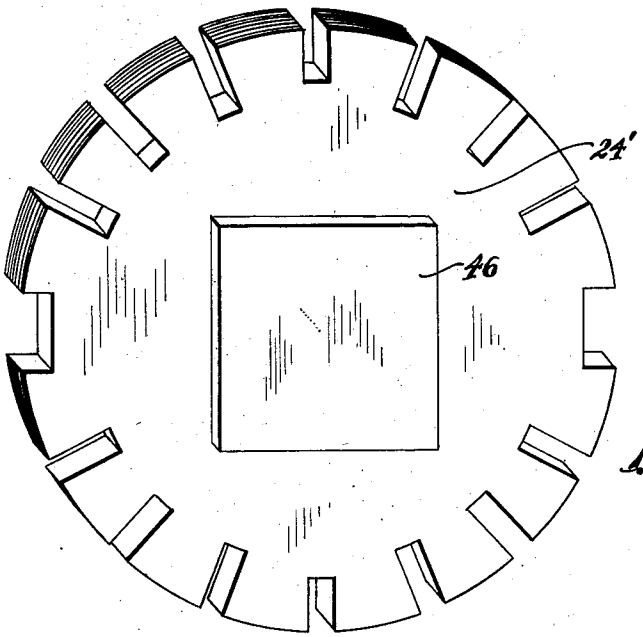



Fig. 7.

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Patented June 23, 1942 2,287,518

# UNITED STATES PATENT OFFICE

2,287,518

## LIFE RAFT

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Application October 6, 1941, Serial No. 413,725

16 Claims. (Cl. 9—11)

This invention relates to improvements in life rafts.

More particularly it provides improvements in a buoyancy unit or float for such rafts, on which any suitable platform may be suspended or otherwise mounted.

It is among the objects of the invention to provide a float which may be made entirely of wood of varieties which are available in quantity at low cost as compared with comparable prior constructions which employ difficultly obtainable and expensive bass wood or balsa for buoyancy, or which combine the balsa with sheet metal tubing, the metal for which is now inaccessible in quantity because of government priorities for defense purposes.

Another object is to employ an endless tubular construction having extent in the form of an oval, and having cross-partitions dividing the interior of the tube into a multiplicity of air chambers, whereby puncture of the tube wall at any particular chamber has no effect on the chambers whose walls remain intact.

A further object is to provide a wooden frame structure which, without any covering layer of wood or metal, may present a substantially smooth exterior surface over which the usual exterior covering of canvas or the like may be secured directly.

Still another feature resides in a structural frame having a series of ribs which are disposed around a torsional tube which may extend at the axis of the larger tube, and which itself is divided into a multiplicity of air chambers occurring in succession around the oval of the float.

Another feature is that pre-formed plywood may be applied over the structural frame, to provide a substantially waterproof covering, and to lend strength and durability to the float, the usual exterior covering of canvas being applied over the plywood.

It is, moreover, an important feature that my improved float is reversible the same as prior floats, and is adapted for any suitable platform to be suspended thereon according to well known procedures.

The mentioned objects and results may be attained with a structural frame made entirely of wood, in the general shape of an oval, and having ribs extending endlessly along the oval contour of the float, in spaced relation around the axis of the sides and ends of the oval. Cross partitions are spaced apart along the extent of the oval frame, supporting the said ribs and maintaining their said spaced relation.

In a preferred form, pre-formed plywood covers the frame throughout the oval extent thereof, being glued thereto in suitable sections to provide a tubular oval float, whose sides and ends are circular in cross-section, and have a succession of air chambers such that puncture of the wall of any particular chamber leaves the buoyant character of all other chambers unaffected.

Any usual exterior covering, of canvas or the like, may be applied over the plywood; and any suitable platform may be suspended from the float by rigging well known in the art.

If desired, the plywood covering for the frame may be omitted, and the spaces between ribs in the region at the circumference of the cross-sectional circle of the frame be filled with any suitable wood filler or other buoyant material, to provide an approximately smooth exterior of frame for reception of the exterior layer of canvas thereon directly.

Also, for additional strength and durability, and for increased safety against loss of buoyancy, a torsional tube of plywood, of rectangular cross-section, may extend at the axis all around the oval, with interruption of continuity of the air space within the tube at each said cross-partition of the frame.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

In the accomyanying drawings:

Figure 1 is a top plan of a life raft embodying features of my invention, a portion being broken away to show the interior frame structure;

Figure 2 is a side elevation thereof;

Figure 3 is an elevation in section on 3—3 of Figure 1, on an enlarged scale;

Figure 4 is an elevation in section on 4—4 of Figure 3;

Figure 5 is a view similar to Figure 3, but on a smaller scale, showing a modified form in which the canvas covering is applied directly to the frame, the spaces between ribs, at the circumference of the frame being filled to provide an approximately smooth exterior frame surface; and showing also cross-partitions of plywood;

Figure 6 is an elevation, on the same scale as Figure 5, of a section of my improved frame, stripped of all covering; and

Figure 7 is a perspective of a plywood cross-partition having a central element on each face for seating the end of a torsion tube section.

Referring to the drawings, the buoyancy unit or float 10 may have the oval shape represented in Figure 1, its sides and ends being preferably circular in cross-section.

Such floats ordinarily have an exterior covering of canvas or the like suitably treated for waterproofness, or combined with a waterproofing substance applied under the canves.

A platform 12, of any desired or usual con-

struction, may be suspended by suitable rigging from the float, such as from a rope 14 held on the float by the canvas straps or bands 16.

The invention has to do primarily with a structural wooden frame for the float which cooperates admirably in providing needed buoyancy coupled with strength, durability and required characteristics of elasticity which make the float entirely adequate for withstanding the rigorous and strenuous service required of life rafts.

The structural frame comprises a series of endless ribs 18, 20, 22, which extend in spaced relation along the sides and around the ends of the oval float. Disks 24 may be suitably spaced apart around the ovel and support the ribs, constituting both cross-partitions and lateral struts. Each disk 24 has notches 26, 28, 30 in its edge for receiving the ribs, the notches 26 and 28 receiving the ribs 18 and 20 edgewise therein, and the notches 30 receiving ribs 22 flatwise therein.

In one form of the invention, the disks 24 are made up of pieces 32, 34 and 36, of which the pieces 32, 34 may be of solid wood such as ash, with glued tongue-and-groove securement together as indicated at 38 in Figure 3. The part 36 may be of three-ply weldwood securely glued with its edges engaged in grooves 40 in the pieces 32, 34.

However, disks made of a suitable number of plies of weldwood, as indicated at 24' in Figures 6 and 7, may be employed with satisfactory results.

The ribs 18, 20, 22 may be of solid wood such as ash, which lends itself to the required bending of ribs at the end regions of the oval float. Conveniently and economically, each endless rib may be constituted of several sections glued together. As illustrated by the oblique lines at 23 in Figure 6, each glued joinder of rib sections preferably involves the clamping together of relatively long skived end-portions of adjoining sections, with glue between, the clamping being conveniently effected by locating each rib-joint at a notch 26, 28 or 30 of a disk 24, 24', so that the skived end of rib sections can be forced together between the walls of the notch, with the notch walls serving as a clamp. The joinders 23 of different ribs, however, will be preferably staggered along the float.

The rib sections which are to have curved extent at end regions of the float will be suitably prepared by steaming or wetting, so that they may be bent while being applied, a waterproof glue being employed throughout which effects secure wood-to-wood joinders in spite of moisture which may be on a surface or surfaces which are to be glued.

The torsion tube 42 (Figures 1, 3 and 4) at the region of the axis of the disks 24 and extending all around the oval contour of the float, is regarded as a desirable but not an essential element. As illustrated, it comprises multiple sections 42' of rectangular plywood tubing, each section extending between two of the disks 24.

In Figures 3 and 4 the sections 42' are shown fitted into the rectangular opening 44 formed by the pieces 32, 34 of the disk, with its end butted against the plywood piece 36 which closes the opening 44 and which also serves to close the end of the tube section 42'.

In the case of the plywood disks 24', I prefer to secure centrally of each face a rectangular piece 46 (Figure 7) for nicely fitting the interior cross-section of a tube section 42', so that the end of a tube section may be fitted over and glued to this piece 46, with the end of the section butted against and secured to the face of disk 24'.

In either case the tube sections 42' will be straight tubes with weldwood walls, such as three plies making a total thickness of walls of one-eighth of an inch, for example. At the curved end regions of the oval float these sections 42', instead of following the curve of the frame, extend each in a straight line from the center of one disk 24 or 24' to the center of the next disk.

In addition to its strength-giving advantages, the torsion tube 42 provides multiple additional air pockets for providing substantial unaffected buoyancy when the walls of any one or more individual air chambers of the float become punctured.

As seen in Figure 1, the disks 24 which occur along the parallel sides of the float are arranged with their faces parallel to each other. At the curved ends of the float, however, the disks are disposed radially of the center of curvature of the end of the float, as seen in Figure 1 and also to some extent in the larger showing of Figure 4. By this construction, combined with the described arrangement of the ribs, maximum strength of frame is attained, and also elastic qualities which result in quick resumption of its normal shape after relatively severe distortions.

In the form of the invention illustrated in Figures 1–4, a plywood sheathing may entirely cover the structural frame. As illustrated this covering comprises two layers 48, 50 of three ply weldwood, applied in sections 52, 54 (Figure 4), each of which is pre-formed to approximate the shape it will have on the frame, each extending around one half the circular cross-section. The sections may be five or more inches in width, with the butted edges of adjacent sections staggered in outer and inner layers.

The pre-formed inner sections 52 are glued to the ribs of the frame, and the ends of each inner section may be butted at a rib as at 56 in Figure 3, needing only glue securement because of the pre-formed character of the sections. However, if desired the butted ends of the inner sections may be nailed to a rib, for additional strength of securement, as indicated at 58 in Figure 3.

The outer plywood sections 54, similarly pre-formed, each has its ends skived, as at 60 in Figure 3, to provide relatively long oblique surfaces for overlapping end securement of the section, with the joint staggered in relation to the butted joint of an underlying section.

Such a plywood covering lends great strength to the float as a whole and constitutes in itself an approximately watertight sheathing for the float.

However, I prefer to apply the usual exterior covering of canvas 62 or the like, which may be suitably treated to be waterproof, or which may be applied over a layer of reinforced asphalt paper, 64 (Figure 3), or other waterproofing substance.

The canvas exterior covering 62 provides a convenient means for mounting the canvas straps or bands 16 which in turn can support the rope 14 for suspension of a platform 12.

In Figure 5 a modified form of frame structure is illustrated in which the spaces between ribs 18, 20, 22 are filled with pre-formed pieces 66 of any suitable buoyant material, of cross-sectional shape to be wedged between adjacent ribs. Their outer surfaces may be buffed or otherwise

treated to provide a smooth cylindrical surface on the frame. In this case the exterior canvas covering 62 may be applied directly on the frame, or over asphalted paper as in Figure 3.

Figure 5 shows also how horizontal and vertical plywood partitions 68, 70 may be combined with the ribs and cross-partitions heretofore described, being preferably pre-formed with the curvatures which they will have in the float. The partitions extend from one cross-partition to the next one, and from side to side of the frame, between opposite ribs, being glued in place, with additional securing means if desired. In addition to the strength-giving character of these partitions, they divide each air chamber between cross-partitions into quarters, thus multiplying the number of individual air chambers in the float by four.

The torsion tube 42 would not be used with the partitioned structure of Figure 5.

I claim as my invention:

1. A buoyancy unit for life rafts, comprising an endless structural frame having a multiplicity of cross-partitions arranged in spaced relation along the endless extent of the frame, and a series of endless ribs extending along the frame and spaced apart around the edges of said cross-partitions, each rib being secured to the edge region of each partition; and a waterproof covering of sheet material enveloping the ribs and partitions throughout the endless extent of the frame, and forming, with said cross-partitions, a succession of water-tight air chambers within the frame.

2. A buoyancy unit as in claim 1, wherein the frame has its said endless extent in the general form of an oval, and the said ribs are bent at the curved regions of the oval, and the said partitions, at the curved regions of the oval, are disposed radially with respect to the center of curve at their particular locations.

3. A buoyancy unit as in claim 1, wherein the said cross-partitions are disks with notches in their edges, and the said ribs are spaced around the peripheries of the disks, each rib seated in a notch of each disk.

4. A buoyancy unit as in claim 1, wherein the said cross-partitions and ribs are made entirely of wood, and there is a covering of plywood applied over the ribs and partitions and having a general cross-sectional contour corresponding to the edge contour of a said cross-partition.

5. A buoyancy unit as in claim 1, wherein the said cross-partitions are circular disks of wood, and the said ribs are strips of wood, and there is a covering over the ribs and partitions having cross-sectional circular contour approximating in size the circle of a said disk; said covering comprising associated sections of plywood preformed with curvatures approximating their ultimate curvatures on the frame.

6. A buoyancy unit as in claim 1, wherein a tubular strut extends from center to center of successive ones of said cross-partitions.

7. A buoyancy unit as in claim 1, wherein a rectangular tube made of plywood extends as a strut from center to center of successive ones of said cross-partitions.

8. A buoyancy unit as in claim 1, wherein each said cross-partition is a circular disk made of wood sections with tongue-and-groove securement together, a central section of the disk being of plywood of less thickness than the surrounding sections, whereby the laterally projecting inner edges of the surrounding sections may constitute a seat for a strut which may extend from one to another of the disks.

9. A buoyancy unit as in claim 1, wherein the said cross-partitions are made entirely of plywood.

10. A buoyancy element as in claim 1 wherein the said cross-partitions are made entirely of plywood, and there is a central projection on each face of the disk for constituting a seat for a strut which may extend from one to another of the disks.

11. A buoyancy unit as in claim 1, wherein there is a horizontal and a vertical partition, each extending between successive cross-partitions and between two ribs on opposite sides of the axis of the cross-partitions.

12. A buoyancy unit as in claim 1, wherein the said cross-partitions are circular disks of wood, and the said ribs, each comprises a series of strips of wood with skived ends of adjacent strips glued together, there being notches in the edges of the disks for reception of the ribs, and each said glued joinder of skived ends of rib strips being at a said groove, with the walls of the groove constituting a clamp.

13. A buoyancy unit as in claim 1, wherein there is a covering over the ribs and partitions made of sections of preformed plywood, the said plywood sections being applied in two layers of which the butted edges of inner and outer sections are staggered.

14. A buoyancy unit as in claim 1, wherein the said cross-partitions are circular disks of wood, and the said ribs are of wood, spaced around the circumference of the disks; and a plywood covering around the ribs and disks made of preformed sheet sections of which each section is pre-formed with curvature for extending around approximately one-half of the circular cross-section as determined by the diameter of said disks.

15. A buoyancy unit as in claim 1, wherein the said cross-partitions are circular disks of wood, and the said ribs are of wood, spaced around the circumference of the disks; and a plywood covering around the ribs and disks made of preformed sheet sections of which each section is pre-formed with curvature for extending around approximately one-half of the circular cross-section as determined by the diameter of said disks; and an exterior covering of fabric secured over the plywood; there being a waterproofing material intervening between the plywood and the fabric.

16. A buoyancy unit as in claim 1, wherein the said cross-partitions are circular disks of wood, and the said ribs are of wood; the outermost portions of said ribs being at a distance from an imaginary line passing through the centers of the disks equal to the radius of a said disk; filler material between the said outermost portions of said ribs making the exterior of the frame approximately smooth; and an exterior covering of fabric secured over the frame; there being a waterproofing material intervening between the surface of the frame and the exterior fabric.

EDMUND T. FLYNN.