# United States Patent [19]

**Rudelick**

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[54] **UNSINKABLE RAFT**


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[73] Assignee: **Multi-Pro, Inc.,** Milwaukee, Wis.



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[21] Appl. No.: **208,745**

[52] **U.S. Cl.** ..... **9/11 R,** 9/6, 114/.5 F

[51] **Int. Cl.** ..... **B63c 9/04**

[58] **Field of Search**.. 4/171; 114/.5 F, 88, 219, 121; 9/6, 11 R, 2 R



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*Primary Examiner*—Duane A. Reger

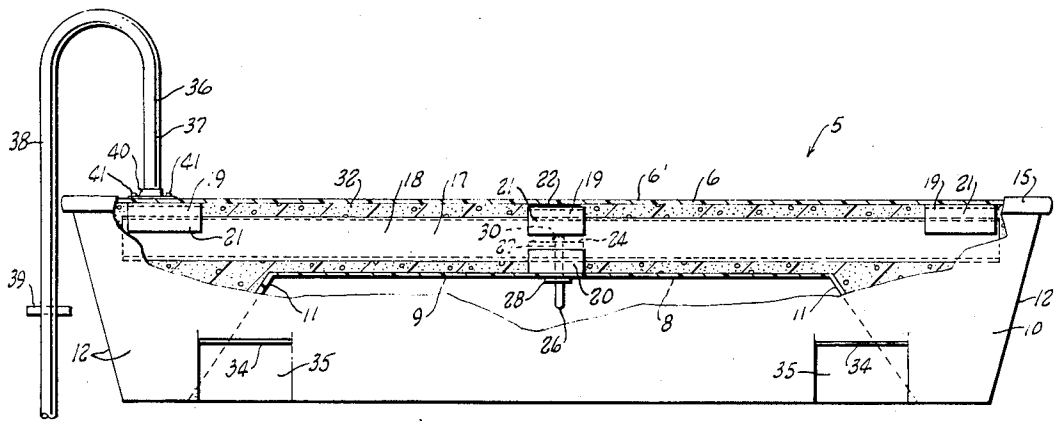
*Assistant Examiner*—Gregory W. O'Connor



[57] **ABSTRACT**

An unsinkable raft comprising a plastic foam filled hull capped by a flat deck. An inwardly displaced bottom portion of the hull provides a substantially large central cavity in its underside which enhances the buoyancy and stability of the raft. The bottom of the cavity is spaced a distance beneath the deck, and an anchor line attaching eye disposed at its underside, is attached to an elongated girder confined in the space under the deck, so that the pull of an anchor line will be transmitted to surfaces of substantial area in the interior of the body.


**5 Claims, 6 Drawing Figures**



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FIG. 1

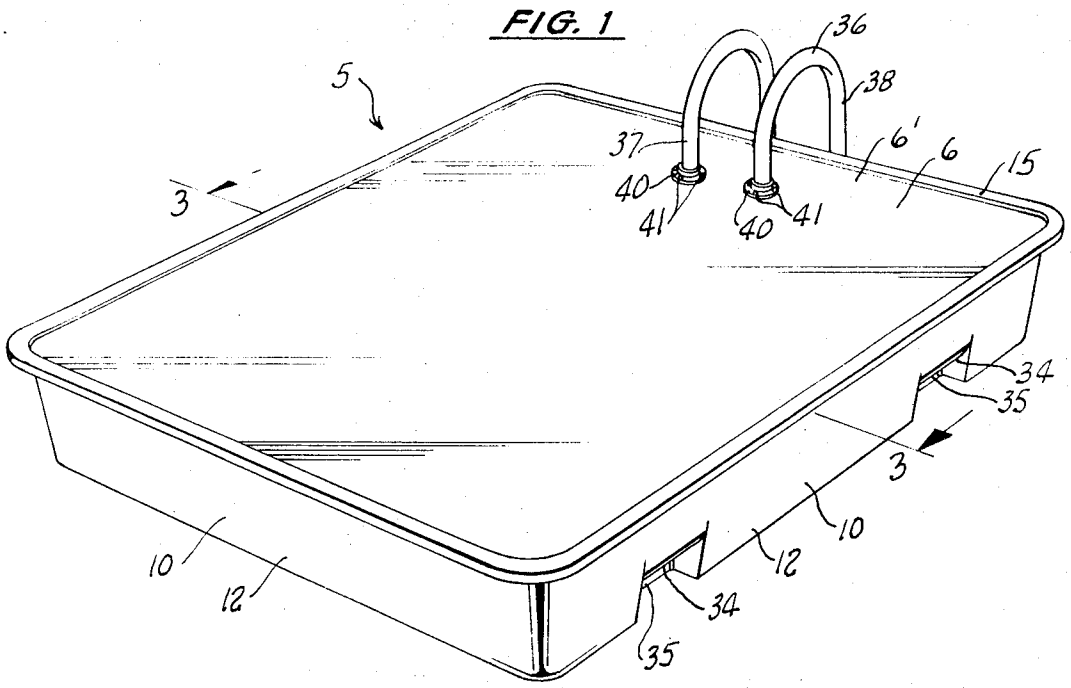



FIG. 2

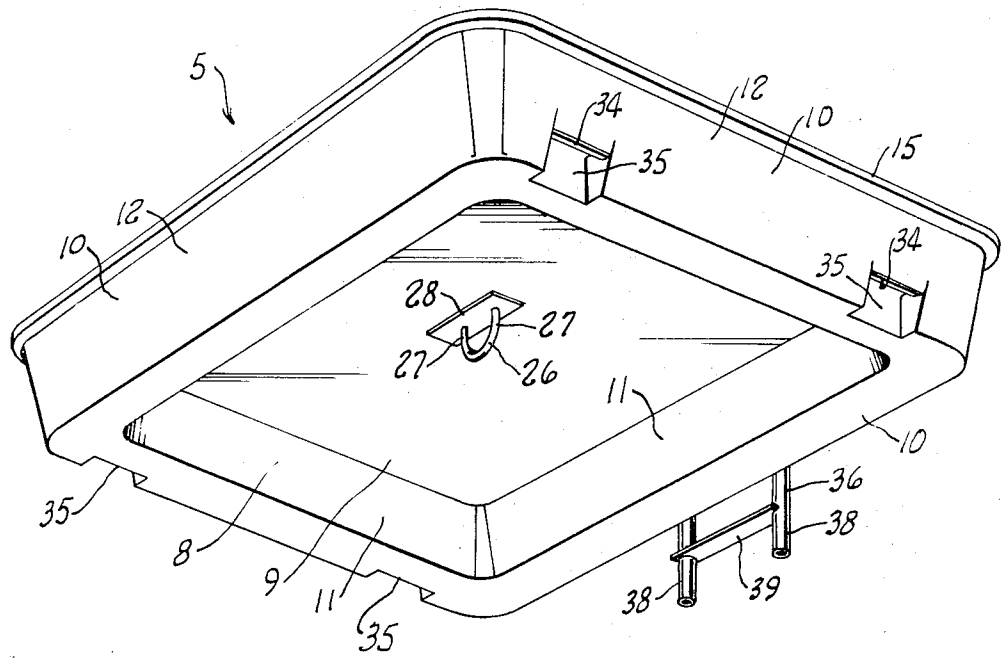


FIG. 3

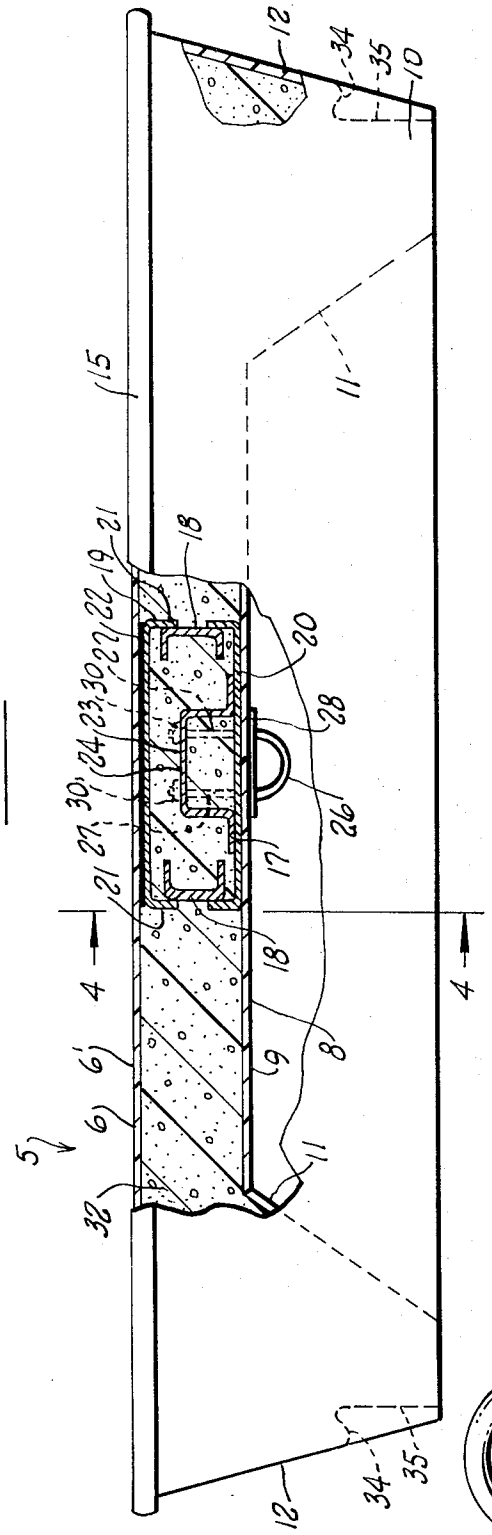

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FIG. 4

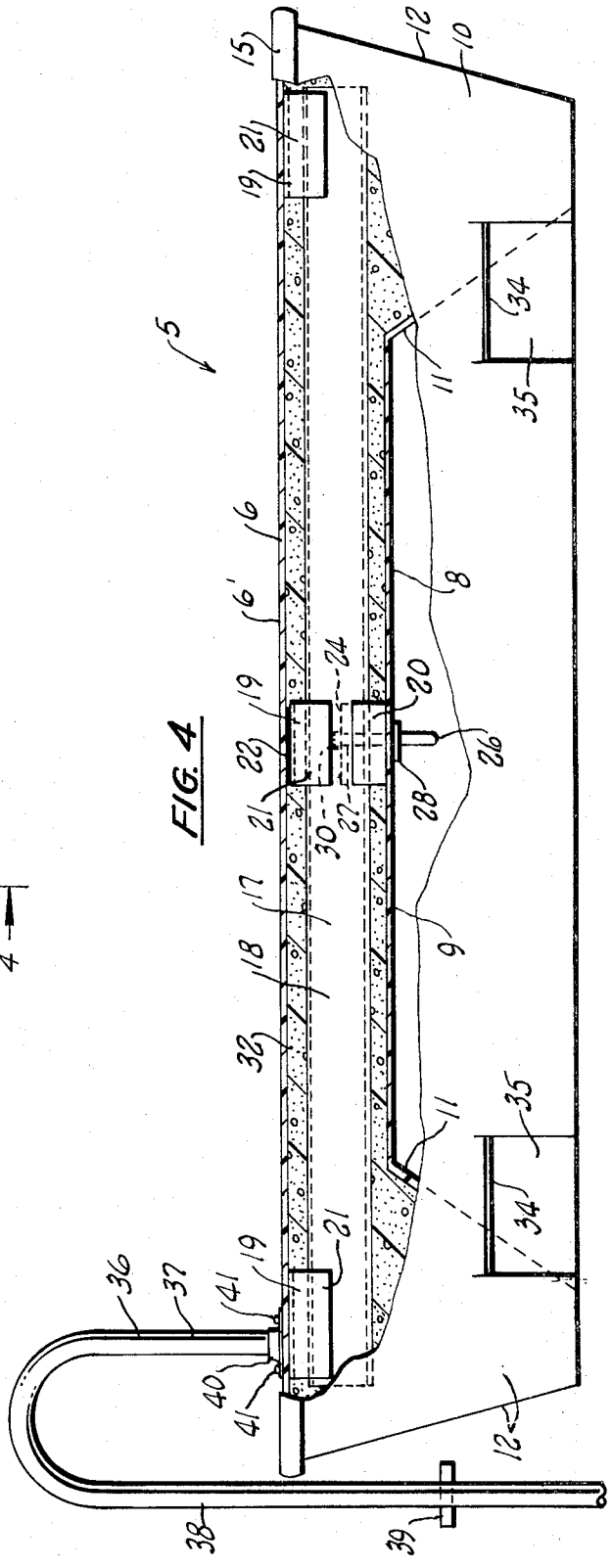

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FIG. 5

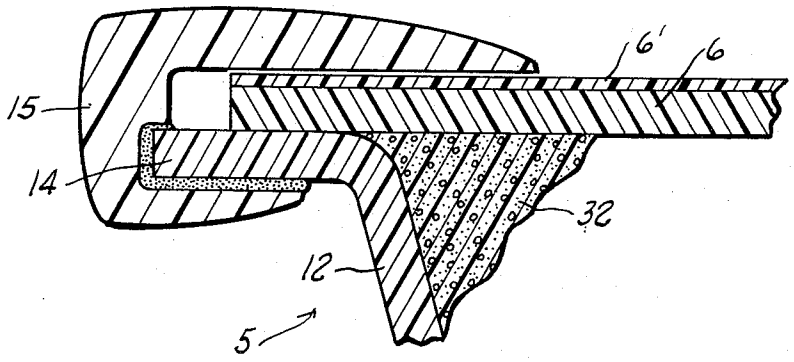
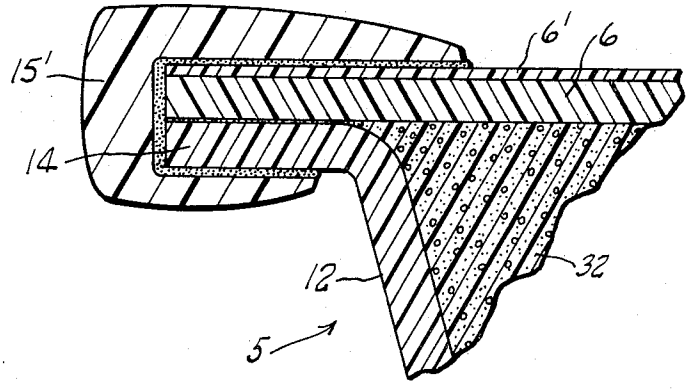



FIG. 6



# UNSINKABLE RAFT

This invention relates to rafts of the type used by swimmers, and has more particular reference to the provision of an unsinkable raft made substantially entirely from plastic material.

The main purpose of the invention resides in the provision of an unsinkable plastic raft which features exceptional stability and buoyancy.

In this respect, it is a more specific object of the invention to provide a raft having a hull with a central well or cavity in its bottom in which air can be trapped to enhance the buoyancy and stability of the raft.

Another purpose of the invention resides in the provision of a raft of the character described in the central cavity of which is surrounded by a substantially deep trough having upwardly divergent inner and outer side walls.

Still another object of the invention is to provide an unsinkable raft of the character described having spaced superimposed walls one of which provides a deck and the other of which is provided by the bottom of the cavity in the underside of the hull, and wherein the pull of an anchor line on an attaching eye exposed in the bottom of the cavity is transmitted to wall surfaces of substantial area in the interior of the hull through a girder-like framework confined between said superimposed walls and to which the eye is secured.

With these observations and objectives in mind, the manner in which the invention achieves its purpose will be appreciated from the following description and the accompanying drawings, which exemplify the invention, it being understood that changes may be made in the specific apparatus disclosed herein without departing from the essentials of the invention set forth in the appended claims.

The accompanying drawings illustrate two complete examples of embodiments of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

FIG. 1 is a top perspective view of a raft embodying this invention;

FIG. 2 is a bottom perspective view of the raft;

FIG. 3 is a cross sectional view taken on the line 3—3 in FIG. 1;

FIG. 4 is a cross sectional view taken on the line 4—4 in FIG. 3;

FIG. 5 is an enlarged fragmentary view illustrating the guard which is applied to the outer top edges of the raft; and

FIG. 6 is a fragmentary sectional view illustrating another way of permanently joining the deck to the hull.

Referring now more particularly to the accompanying drawings, the numeral 5 generally designates the hull of a raft constructed in accordance with this invention. The hull is formed from sheet plastic material, and it includes a flat deck or platform 6 which can be made of a shatter proof plastic material of the type commonly referred to as an ABS plastic. Preferably, the deck has an overlay 6′ of an acrylic film such as sold under the trademark "KORAD," so that the deck will be immune to the otherwise deleterious effects of light in the ultraviolet band of the radiant energy spectrum.

The hull or body 5 can be either round, rectangular, or square as shown. In either case, a portion of its bottom is deformed upwardly to provide a substantially large and deep central cavity or well 8 in its underside,



which opens to the bottom of the raft. This cavity greatly enhances the buoyancy of the raft as well as its stability, due to the fact that a large volume of air is trapped in its bottom when the raft is placed in the water.

The bottom wall 9 of the cavity has been shown parallel to the deck 6, and it is spaced from the underside thereof a distance at least equal to one-half the height of the raft, and preferably such that the depth of the cavity is equal to about twice the spacing between the bottom wall 9 and the deck.

Because of the cavity 8, it can be said that the hull also comprises a substantially deep trough 10 which surrounds the cavity, and which is closed by the deck 6. The trough has upwardly divergent inner and outer side walls 11 and 12, respectively. The inner side wall 11 provides the side wall of the cavity 8, and its upper edge is joined to the marginal edge of the wall 9 in the bottom of the cavity. The outer wall 12 of the trough extends around the entire periphery of the raft and its upper edge portion provides a support for the marginal edges of the deck 6.

The upper edge portion of the outer side wall 12 of the trough is preferably formed with a lip 14 that extends horizontally outwardly to provide a seat upon which the marginal edge portion of the deck is flatwise slidably supported.

The bumper 15 of plastic material having a channel shaped cross section, can be engaged over the superimposed edge portions of the deck 6 and lip 14 to serve as a guard therefor. While the guard 15 is solvent welded to the outer edge portions of the lip 14, it has space therein to accommodate movement of the deck, in the plane thereof, due to heat expansion of the deck under a hot sun. This assures against buckling of the deck in hot weather. If expansion is not a problem, however, the deck can be solvent welded to the lip 14, and a guard 15′ of a suitable yieldable plastic material can then be applied over the welded joint, as seen in FIG. 6.

Both of the divergent side walls 11 and 12 of the trough can be disposed at angles to vertical. Thus, the outer wall 12 can slant upwardly and outwardly at an angle of about 15° and the inner side wall 11 can slope upwardly and inwardly at an angle of about 35°.

Secured to the bottom wall 9 and extending substantially entirely across the interior of the hull at its center, beneath the deck 6, is an elongated rigid framework fabricated from sheet metal, such as aluminum, and providing what can be considered as a lightweight girder 17. The girder is comprised of two laterally spaced continuous side channels 18 having opposing flanges, three cross pieces 19 joining the opposite ends and the mid portions of the channels 18 at their tops, and a central crosspiece 20 joining the channels at their undersides. The deck 6 is secured to the center one of the three cross pieces 19 by cement indicated at 22.

The cross pieces 19 are flatwise engaged with the underside of the deck 9 and they have depending flanges 21 which overlie and are flatwise secured to the backs of the side channels 18. The central cross piece 20 seats flatwise upon the upper surface of the bottom wall 9, and it has upstanding flanges which are flatwise engaged over and secured to the backs of the side channels 18.

The upper and lower flanges of the side channels **18** are spaced from the underside of the deck **6** and the wall **9** for a purpose to be described later.

The girder also comprises an inverted U-shaped bridge member **23** the opposite legs of which abut and are fixed to the center cross piece **20** to dispose its bight portion **24** parallel thereto but spaced a distance thereabove.

An anchor line attaching eye **26** is fixed with respect to the bottom wall **9**, and is disposed at its underside in the center of the cavity **8**. The anchor line attaching eye comprises a U-bolt, preferably made of a non corroding metal such as stainless steel. The opposite legs **27** of the U-bolt project upwardly through suitable holes in the wall **9**, the crosspiece **20** and the bight of the bridge member **23**, to a distance determined by the engagement of a bar **28** on the U-bolt with the underside of the bottom wall **9**. The bar **28** is welded to the legs of the bolt and spans the space between them. It engages flatwise against the underside of the bottom wall **9** and cooperates with the bridge member **23** in clamping the bottom wall **9** between the bar and the center crosspiece **20** when nuts **30** threaded on the upper ends of the legs **27** of the U-bolt are tightened against the bight **24** of the bridge member.

While a pull on an anchor line attached to the eye **26** will thus be distributed over a substantial surface of the bottom wall by the center crosspiece **20**, it is a feature of this invention that the load represented by such a pull can be distributed over substantially all of the upwardly facing surfaces of the hull at its interior. This is made possible by the fact that the girder is embedded in the mass of polyurethane foam **32** with which the interior of the hull is filled. Being permanently buoyant, the plastic foam material renders the raft unsinkable in the event the plastic shell comprising the hull is pierced by accident or by vandalism. In fact, the polyurethane foam filling will assure against the ingress of water into the interior of the hull for any reason whatever.

Polyurethane, mixed with a foaming agent, is poured into the hollow interior of the hull before the deck is attached, through a hole in a flat heavily weighted metal lid which is clamped in place over the lip **14** on the upper edge of the trough side wall **12**. Hence, the foam material will fill the hull to a level flush with the plane of the top surface of the lip **14**, and it will also fill all the spaces between the girder side channels and the walls above and below it.

It should also be observed that the opposite end portions of the girder extend out beyond the bottom wall **9** and over the trough **10**. Hence, load forces on the anchor line attaching eye **26**, which can be quite high in rough water, will be transmitted by the girder to the side and bottom walls of the trough **10** therebeneath.

If desired, hand holds **34** can be provided in the outer side walls **12** of the trough at opposite sides of the raft, to facilitate lifting and carrying the raft from one location to another. These hand holds are provided by forming indentations **35** in the walls **12** at the time the cavity or well **8** is formed in the bottom of the hull.

The raft is also shown provided with a ladder **36**, which can be mounted thereon at a side of the raft toward which one end of the girder projects. The ladder is comprised of a pair of inverted U-shaped tubular members having short inboard legs **37** which rise up from the deck, and longer outboard legs **38** which extend down along the adjacent side of the raft. The outer legs **38** are joined by a number of treads **39**, while each inboard leg has its lower end secured to the deck and to the adjacent end portion of the girder therebeneath. Any suitable means can be employed to fasten the ladder in place, as for example, pipe flanges **40** on the lower ends of the inboard legs **37**, and screws **41** passing through holes in the deck and threaded into the crosspiece **19** on the top of the adjacent end of the girder.

If desired, the deck can be provided with a somewhat roughened surface having non-skid characteristics.

From the foregoing description, together with the accompanying drawings, it will be readily apparent to those skilled in the art that this invention provides a raft which features an unusually high degree of stability and buoyancy, and which needs no maintenance.

Those skilled in the art will appreciate that the invention can be embodied in forms other than as herein disclosed for purposes of illustration.

The invention is defined by the following claims:

**1.** A raft having a hull characterized by:

A. a monolithic body of sheet plastic material having

1. side walls which slope upwardly and outwardly from the bottom of the body,
2. an upwardly deformed bottom portion which defines a central substantially large and deep airtight cavity that opens to the underside of the body,
3. the side walls of the cavity sloping downwardly and outwardly at a substantially wide angle from vertical to the bottom of the body and cooperating therewith and with the body side walls to define a substantially deep trough which completely surrounds the cavity,
4. and the body side walls having greater height than the side walls of the cavity and having bent upper edge portions providing a continuous outwardly directed horizontal lip;

B. and a flat deck supported on and secured to said lip, and extending over said upwardly deformed bottom portion in spaced relation thereto.

**2.** The raft of claim **1** wherein the entire space in the interior of the hull is filled with a rigid permanently buoyant plastic foam material.

**3.** The raft of claim **2**, further characterized by indentations formed in imperforate portions of the body side walls at two opposite sides of the raft to define hand holds that facilitate lifting and carrying the raft.

**4.** The raft of claim **2**, further characterized by:

A. said raft being rectangular in plan;

B. a framework of lightweight metal providing a rigid elongated girder which extends straight and substantially entirely across the raft parallel to and medially between two opposite sides of the raft and under its deck so as to be embedded in the foam material in the interior of the hull;

C. an anchor line attaching eye exposed in the bottom portion of said cavity and having a part projecting through said upwardly deformed bottom portion;

D. and means securing said part of the attaching eye to the girder.

**5.** The raft of claim **4**, further characterized by:

A. a rigid ladder at one side of the raft having a substantially inverted U-shape and an inboard leg which overlies an area of the deck directly over one end of said girder;

B. and means securing said inboard leg of the ladder to the deck and to said end of the girder.

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