Dec. 22, 1959 C. F. GUNDERSON 2,918,031

CATAMARAN

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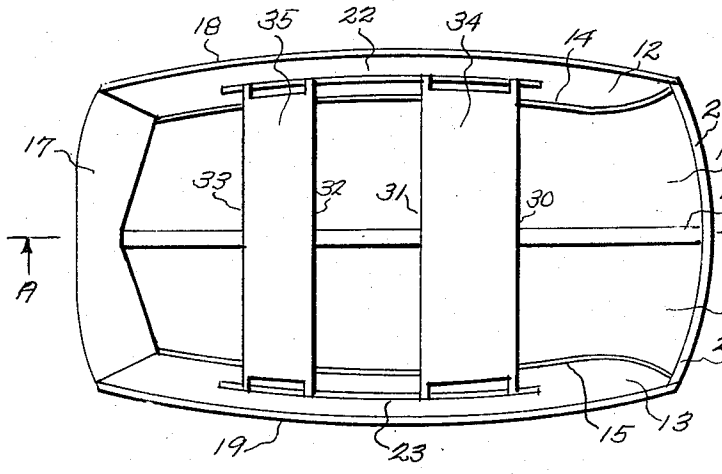


Fig 1

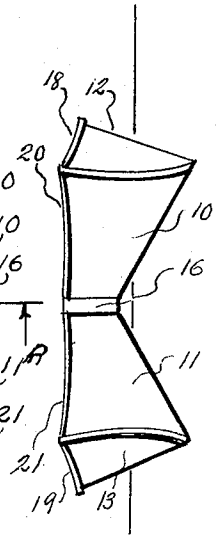


Fig 3

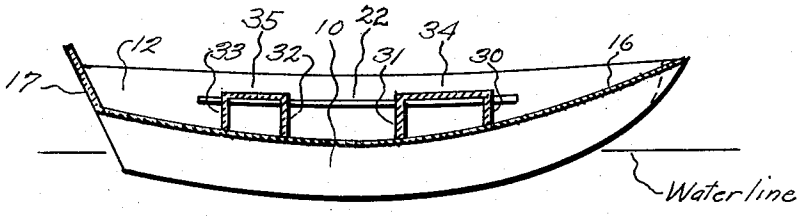


Fig 2

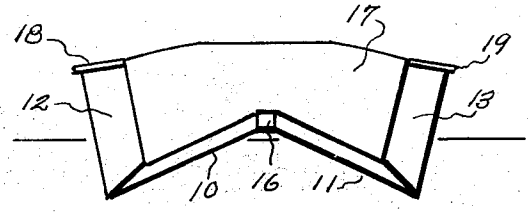


Fig 4

INVENTOR.

Charles F. Gunderson

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CATAMARAN

Charles F. Gunderson, Wall Township, Monmouth County, N.J.

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7 Claims. (Cl. 114—61)

This invention relates to boats and particularly to twin hulled boats or catamarans. More particularly this invention relates to improvements in hull shapes and construction of catamarans.

The boats currently available may be generally characterized as too heavy for ready portability or too small and unsafe for use by two or more people, particularly where capsizing is a risk. Very few, if any boats now available are of a size, weight and shape that can be handled by children while still retaining a sufficient degree of stability and safety to serve this purpose.

Some boats, such as the garvey, have incorporated certain of the catamaran features by raising the center section of an otherwise flat bottomed scow. The sea sled is even more controversial, with its inverted V bow, continuously changing to a nearly flat stern, and straight sides.

Both of these boats, and others like them, are designed for efficiency and stability at high speeds. Neither offers many advantages over standard boats at low speeds and both of them have complex, heavy structure to withstand the transverse stresses.

It is therefore an object of this invention to provide an improved boat of the twin displacement hull, or catamaran type.

It is a further object of this invention to provide a catamaran made from panels that may be cut from flat sheets of readily available materials.

It is a further object of this invention to provide an improved catamaran having a relatively large carrying capacity, stability, and strength for its weight.

It is a further object of this invention to provide an improved catamaran having a minimum of wetted surface, both in a loaded and in an unloaded condition, for its displacement.

It is a further object of this invention to provide an improved boat having unusual bow and side stability.

It is a further object of this invention to provide a catamaran having harmonious contours and smoothly arched panels to provide an easy passage through the water with a minimum of applied force.

It is a further object of this invention to provide a catamaran that retains an appreciable resiliency in structure to dissipate a large amount of the shock and strain of wave action.

It is a further object of this invention to provide an improved catamaran that may be carried on a car-top.

These objects are achieved by a boat comprising four hull panels with smoothly arched edges joined to form two approximately 90 degree angle keels and an obtuse central angle. In cross section the boat approximates the letter W at all points.

The catamaran type boat will be more fully described and additional objects will become apparent from the following specifications taken in conjunction with the attached drawings of which:

Fig. 1 shows a plan view of one embodiment of this invention taken from overhead;

Fig. 2 is a sectional view taken along the line A—A of Figure 1;

Fig. 3 is a front elevation; and

Fig. 4 is a rear elevation of the same embodiment of this invention.

Referring now more particularly to the drawings, Fig. 1 shows the port and starboard bottom panels, which are numbered 10 and 11 respectively, and the port and starboard side panels which are numbered 12 and 13 respectively. These pairs of side and bottom panels are joined together by the port and starboard chine strips 14 and 15.

A center strip 16 joins the port and starboard bottom panels 10 and 11. A transom 17 joins the after ends of the panels, although it is obvious that the after end of this boat could be made identical to or similar to the bow, thereby providing double-ended hulls for this catamaran.

Each side panel has a substantially straight upper edge opposing the smoothly arched lower edge along which it is joined to its adjacent bottom panel. The smoothly arched lower edge is convex with respect to the panel, and has a substantially constant radius of curvature over the major portion of the junction between the two panels. The best conformations of the hull are had with this radius of curvature greater than one hull length but less than two hull lengths.

Each bottom panel also has a smoothly arched edge along its junction with its adjacent side panel. This arch is convex and is substantially the same as the convex edge along each side panel. In fact, these convex edges may be identical.

Since the side and bottom panels are joined at approximately 90 degrees, each panel will have substantially the same arch as the edge of the adjacent panel. Consequently both side and bottom panels have a major portion smoothly arched at a radius between one and two hull lengths, and the convex sides of the arched panels are outwards and downwards for the side and bottom panels respectively.

The bottom panels are seen to be joined together along the center of the structure. In the typical case shown here the structure is symmetrical about the vertical plane through the longitudinal center and this juncture of the bottom panels is equivalent to the keel of a standard boat. However, instead of the smoothly arched edges along the center being convex with respect to the panel as they are in standard boat construction the center edges of the bottom panels have concave arches which are of a much greater radius than the convex edges. In a desirable conformation of the hulls, the radius of the major portion of the center edges of the bottom panels is greater than two hull lengths and at least two times the radius of the convex edges.

The top edges of the side panels are strengthened by the port and starboard gunwales 18 and 19 which also add materially to the finish of the boat.

The bow ends of the bottom panels are reinforced by strips 20 and 21 which may be gunwale like strips, steamed to fit the ends, or thin strips laminated to any desired thickness.

The port and starboard cross brace support strips 22 and 23 are fastened to the side panels to secure the extremities of the cross braces 30 to 33 which, together with the transom 17 provide the only lateral bracing outside of the arched panels themselves. This provides a new type of ribless construction that is lighter, simpler, and more versatile than the conventional mold or rib structure used in almost all conventional boats.

The seat panels 34 and 35 are fastened to the adjacent cross braces and they mutually strengthen each other.

In Figure 2 a cross section of the hull is shown in a vertical plane through the center strip along the lines AA of Fig. 1. Here the port gunwale 18, side panel 12, bot-

tom panel **10**, cross braces **30—33**, seat panels **34** and **35**, center strip **16** and transom **17** are clearly seen.

A water line is also shown to clearly illustrate the distinctive, catamaran characteristics of this boat and the relation of the center strip to the water.

The bow view of Fig. 3 shows the hull panels **10—13**, the gunwales **18—19**, and the center strip **16**.

The stern view of Fig. 4 shows substantially the same members in a reversed position and the transom **17**.

These last two views also have the water level shown to emphasize the catamaran characteristics of this boat. It is obvious that the separate hulls will provide the extraordinary stability to be found only in catamarans. The occupants of the boat may stand up or move around in the boat in a manner that would not be possible in any conventional boat of comparable size.

The smoothly tapered V hulls also make possible exceptionally easy passage through the water with a minimum of effort at rowing or sailing speeds.

The hull configuration also provides the additional advantage that this catamaran can be sailed against the wind reasonably well without a centerboard. This adds to the value of the boat for shallow bodies of water, and makes a notable improvement in reducing the complexity of a sail boat.

While the boat will actually sail well, even without a center board, this does not mean that a center board, dagger board, lee board or the like may not be adapted to this hull to further improve its manueverability and general sailing ability.

The rudder to steer this boat may be of any conventional type although a sweep steering oar, or a rudder incorporating its characteristics is preferable.

Another distinctive feature of this catamaran is that its compact size and seating layout, together with its easy motion through the water make it an excellent rowing boat with standard sized oars.

It can be seen from the drawings that the hull requires only four panels. In standard boat construction, panels can be only roughly cut since they must be fitted over the forms or ribs and secured in final position before the edges can be trimmed along the line where the adjacent panels will be joined.

In the construction of this catamaran, the hull panels can be pre-cut in their final form. If the arched edges of the bottom and side panels are accurately cut, these edges are the only guides needed for fastening the chine strips to the panels. Any error, however, will produce a corresponding irregularity in the boat. The method of cutting will depend on the material to be cut and can be any of the methods well known in the art. With plywood a small circular or a saber saw could be used.

In the construction of this catamaran the chine strips are first fastened along the arched lower edges of the side panels on the side that is to be within the hulls. Steaming is probably necessary along the sharpest radius of bend of the chine strips near the bows. The fastening or joining may be with nails, screws or any other well known fasteners. The joints between the panel edges and their adjacent panel edges may also be secured by glue or a reinforced plastic such as "fiberglass."

The corresponding arched edges of the bottom panels are next fastened to the chine strips with the side panels and the chine strips arched to conform to the edge and the panels intersecting at a right angle. The bow section of this panel may be given a very sharp arch to present a more pleasing conformation. This sharp arch may again require steaming of the corresponding panel section.

If a transom is to be used, it can now be nailed to the after ends of the four panels, leaving room for the center strips and allowing for motion of the bottom panels when the boat is drawn into shape.

The inner arched edges of the two bottom panels are fastened to the center strip to complete the hull surface.

It should be pointed out that the chines will be under water and the center strip may also be wet occasionally so that suitable bedding compound should be used in the assembly.

At this point, the striking dissimilarity between this type of construction and conventional construction is most apparent since the hull is now extremely resilient and can be forced into a considerable degree of variations of the desired shape.

The cross brace support strips are next fastened to the side panels and the cross braces, with their mid points secured to the center strip, have their ends secured to the support strips. This, literally, pulls the hull into its desired shape.

To realize as many as possible of the objects and advantages of this boat, its center strip should be well above the water line. On the other hand if the center strip is too high it interferes with the cross braces and reduces the foot room and comfort of the boat. The optimum configuration appears to be with the lowest point of the center strip about mid way between the water line and the level of the gunwales.

The bow ends of the bottom panels have an irregular bend due to the extreme curvature of the panels. These bow ends need not be finished as far as the sea worthy characteristics of the boat are concerned but since light panels are used it is very desirable for strength and appearance to finish off the exposed edges of the panels. Consequently, the bow section can be cut to a shape that can be closed or finished off with heavier molding, or the thin strips **20** and **21** may be laminated along the bow edge of the bottom panel. The bow strips may be made of rubber, plastic, wood, metal or any material that will adequately strengthen the bow and improve the appearance of the boat.

The gunwales along the upper edges of the side panels may be of any standard material and applied in a conventional manner.

Wooden or metal knees or angle pieces may be formed into any of the corners of this catamaran in a well known manner for strengthening purposes.

The seat panels may be of light material, similar to the hull, since they are well supported by the cross braces. The cross braces are supported in turn by the seat panels so that thinner lumber can be used. The seat panels together with their cross braces form U shaped girder members.

This boat may be constructed of plywood, preferably of the best marine grade, or of fiberglass panels or of any other resilient sheet material. The maximum strength will be realized if the material is as rigid as it can be and still make the bends.

An additional factor in the choice of the configuration of the hulls is the possibility of nailing, rather than screwing the panels to the chine and center strips. If the keel angles are maintained at about 90 degrees, square or rectangular chine strip can be used and a suitable anvil surface can be placed under one of the sides of a chine strip while the panel edge is nailed along the other side of the chine strip.

The hull may also be made of panels preformed into final shape or the hull may be molded of wood, fiberglass, plastic or any material that will harden to sufficient rigidity to serve this purpose.

It is also entirely feasible to construct this hull, according to this method, of one material such as plywood and cover it with another, such as fiberglass cloth impregnated with a suitable plastic.

In a practical example of this catamaran, the hull panels are cut from ¼ inch, 3-ply plywood, the 4 panels requiring only 2, 4′ x 10′ sheets. The chine strip are oak, while the transom, gunwales and center strips are cut from 1″ thick mahogany planking. The seat panels are also ¼″ plywood mounted on cross braces cut from 1″ spruce, 5″ wide.

A typical hull of these materials would be 10′ long,

5' 4" wide, 21" high at the mid-point, and have the general configuration shown in the drawings. It would weight about 100 pounds.

For sailing, any type of sail or rig may be adapted to this catamaran. A sail area of 35 square feet is adequate while a sail area of 100 square feet can be used in fair weather.

Although what is shown and described here may be considered to be an optimum embodiment of the invention many variations of hull configuration, materials and dimensions will be obvious to anyone skilled in the art.

I claim:

1. In a non-rigid boat of the catamaran type: a first resilient, waterprof hull panel having a convex edge of a first radius and an opposing concave edge of a second, larger radius; a second resilient, waterproof hull panel of the same size as said first hull panel having a convex edge of said first radius and an opposing concave edge of said second radius; a third resilient, waterproof hull panel having a convex edge of a third radius and a substantially straight opposing edge; a fourth resilient, waterproof hull panel of the same size as said third hull panel having a convex edge of said third radius and a substantially straight opposing edge; the convex edge of said first panel hermetically sealed to the convex edge of said third panel, the convex edge of said second panel hermetically sealed to the convex edge of said fourth panel, the concave edge of said first panel fastened to the concave edge of said second panel, and rigid braces connected between said third and fourth panels for spacing said straight opposing edges of said third and fourth panels at equal distances from said concave edges.

2. In a non-rigid boat as in claim 1, the greater portion of said convex edges having substantially constant radii of curvature, said radii being comparable to the length of the hull, and the greater portion of said concave edges having a substantially constant radius of curvature, much greater than said length of said hull.

3. In a non-rigid boat as in claim 2, said radii of convex curvature being greater than one hull length but less than two hull lengths, and said radius of concave curvature being greater than two hull lengths.

4. In a non-rigid boat as in claim 2, the ratio of said concave radius of curvature to said convex radii of curvature being greater than two to one.

5. In a non-rigid boat as in claim 2, said convex radii of curvature being equal and said concave radii of curvature being equal.

6. In a non-rigid boat as in claim 2, said convex radii of curvature of said third and fourth panels decreasing considerably at at least one end of said boat.

7. In a non-rigid boat as in claim 2, a transom member positioned transversely to at least one end of said panels and fastened along the ends of said panels in a water-tight manner.

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