June 17, 1947. C. H. CLEMENT, JR 2,422,183

BOAT CONSTRUCTION

Filed Aug. 8, 1945 3 Sheets-Sheet 1

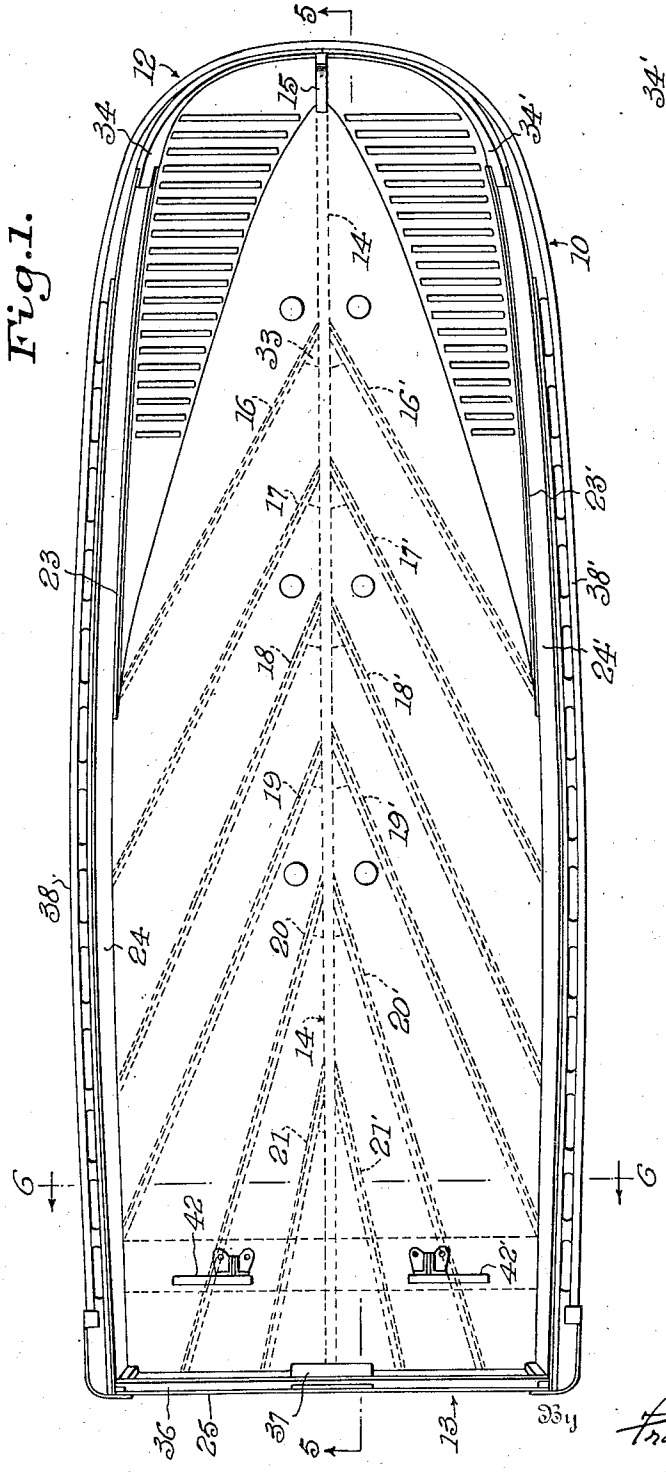


Fig. 1.

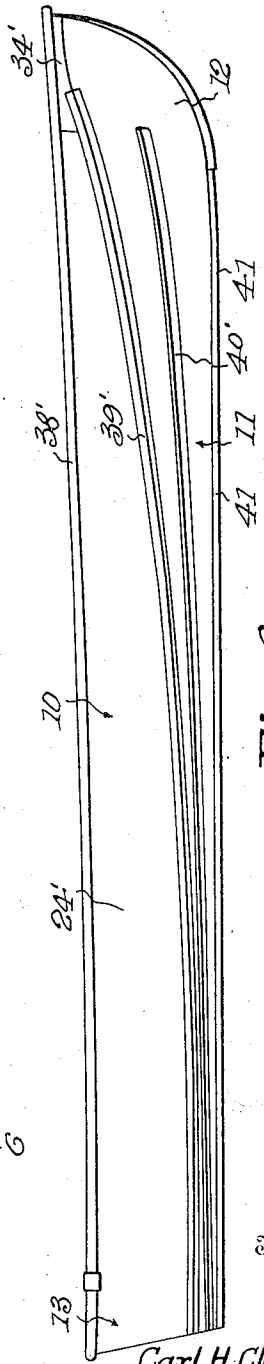


Fig. 2.

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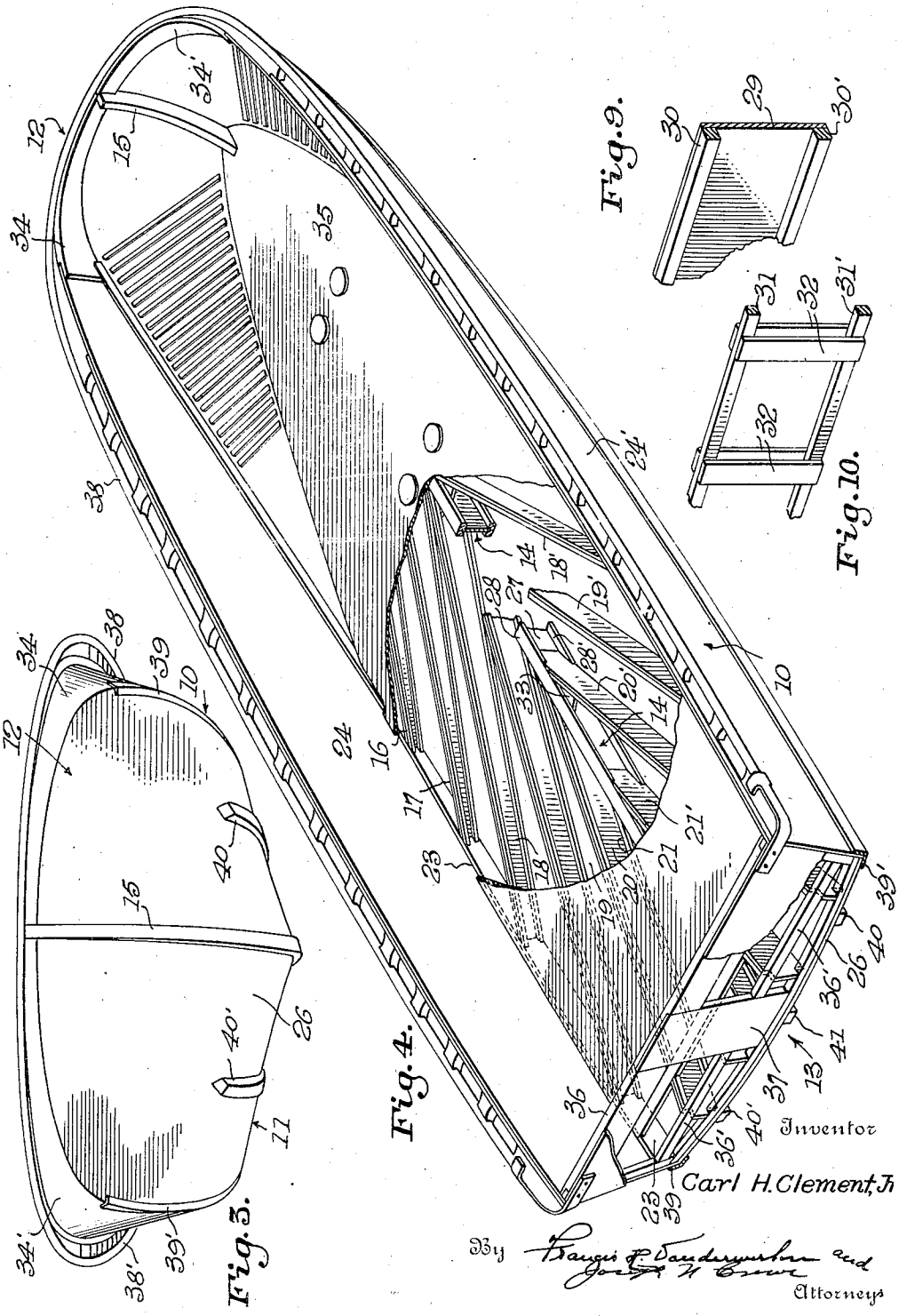


Fig. 4.

Fig. 5.

Fig. 9.

Fig. 10.

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BOAT CONSTRUCTION

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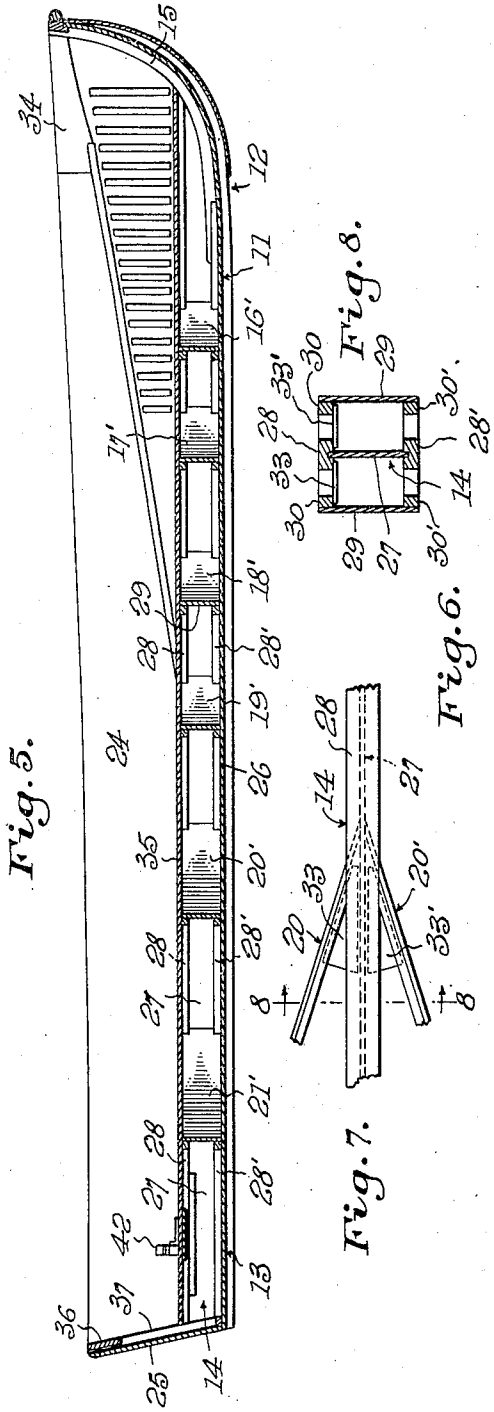


Fig. 5.

Fig. 8.

Fig. 7.

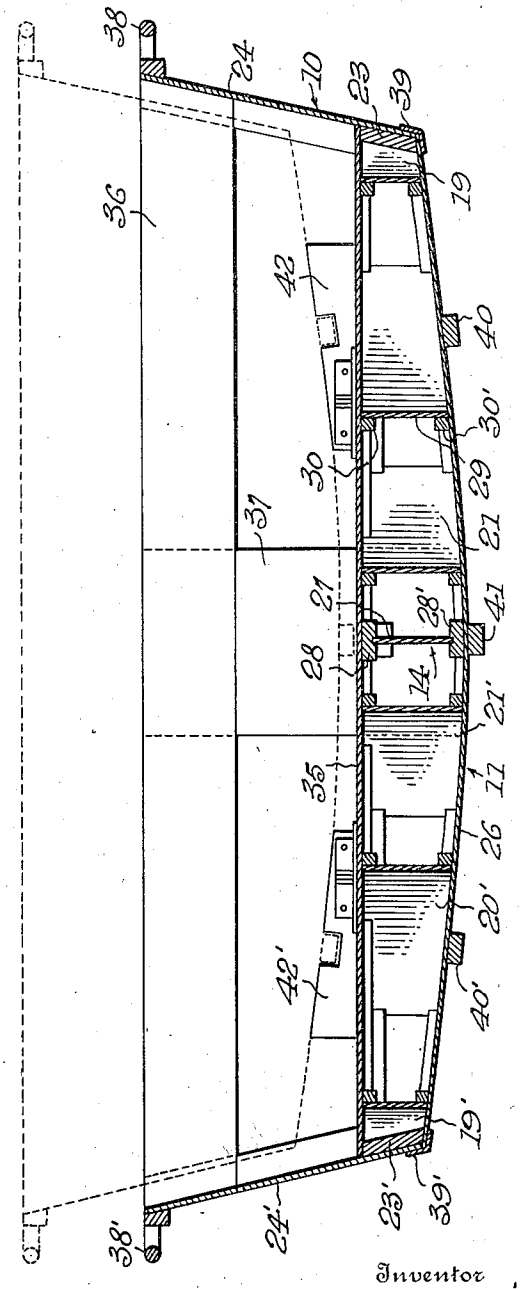


Fig. 6.

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2,422,183

UNITED STATES PATENT OFFICE

2,422,183

BOAT CONSTRUCTION

Carl H. Clement, Jr., United States Army,
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Application August 8, 1945, Serial No. 609,688

6 Claims. (Cl. 9—6)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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

This invention relates to a hull construction, and more particularly to a hull, the curved surfaces of which are generated by straight lines.

This application is in part a continuation of application Serial No. 477,582, filed March 1, 1943, and now abandoned.

In the present type of construction of hulls, it is necessary after the desired surface is calculated, to take a sufficient number of transverse cross-sections and design a frame for each such cross-section. For each frame the curvature must be completed and in a very few cases does the curvature result in a straight line. Similarly, longitudinal sections must be determined together with their curvature.

In the actual construction of the frame, special dies and woodworking machinery are required to produce the necessary curvature. Their production is accordingly time consuming, laborious and expensive.

It is accordingly an object of this invention to provide a method of hull construction which will obviate the disadvantages inherent in hulls of present day design.

It is also an object of this invention to provide a hull construction which will obviate the disadvantage inherent in hulls of present day design.

Another object of the invention is to provide a boat having its bottom and side panels formed from flat plywood sheets bent to shape, and one in which the shape of the supporting frames may be quickly and easily developed.

Still another object of the invention is to provide a boat in which the hull frames are cut out in straight lines which may be done by the simplest of woodworking machines.

A further object of the invention is to provide a boat which is of simple construction and which will resist torsional load with maximum efficiency.

A still further object of the invention is to provide a hull construction in which waterproof cells may easily be formed, as well as one having a type of framing which provides an excellent means for dissipation of concentrated shock loads caused by striking obstacles such as stumps or piles, and which tends to deflect the boat away from the object more than is found with boats having transverse or longitudinal frames.

These and other objects and advantages of my invention will become apparent upon a consideration of the following detailed description when

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taken in conjunction with the accompanying drawings in which like parts are designated, by similar reference characters and in which:

Figure 1 is a top plan view of a hull constructed in accordance with the invention;

Figure 2 is a side elevation of the hull shown in Figure 1;

Figure 3 is a perspective view showing the front of the hull;

Figure 4 is a perspective view showing the interior of the hull with the floor partially broken away to expose the beam construction;

Figure 5 is a sectionized elevation taken on the line 5—5 in Figure 1, looking in the direction of the arrows;

Figure 6 is a sectionized elevation taken on the line 6—6 of Figure 1, looking in the direction of the arrows;

Figure 7 is a plan view showing in detail a section of the keel, and means for connecting sections of the floor beams thereto;

Figure 8 is a cross-sectional view taken on the line 8—8 of Figure 7;

Figure 9 is a perspective view showing in detail a section of a floor beam having a solid web; and

Figure 10 is a perspective view showing in detail a section of the skeleton type of floor beam.

Briefly stated, this invention sets forth a boat construction in which the curved surfaces of the hull follow a contour formed by a plurality of straight line elements extending from the longitudinal center line of the hull. The desired shape of a hull having been determined, it will be noted that, if the sections are taken diagonally from the longitudinal center of the hull, rather than transversely thereto, a series of points may be found that, for all practical purposes, lie in straight lines, particularly where the desired shape of hull is formed from a smooth, one piece, unwrinkled and unstretched sheet.

The hull consists essentially of a series of diagonally positioned tapered frames or beams joining into a fore and aft member or keel extending longitudinally along the center of the boat. These diagonal frames separate the floor from the bottom of the hull and may also serve to form a plurality of water-tight compartments. Their general pattern of location as viewed from directly above or directly below is similar to that of herringbone construction, the backbone being the fore and aft member in the center, as shown in Fig. 1. Referring to the drawings specifically, the numeral 10 indicates generally the improved boat hull having a curved bottom 11, as illustrated in Figs. 2, 3 and 6, the bow and stern of the hull

being indicated respectively by the numerals 12 and 13. The hull is formed with a central keel 14 connected at its forward extremity to a stem 15, which curves upwardly from the keel line as shown in Figs. 1 to 5, inclusive. To the keel 14 are connected a plurality of floor beams 16 to 21 and 16' to 21', inclusive, which extend diagonally outward and rearward from the opposite sides of the keel and which at their outward extremities are connected to chines 23 and 23', side panels 24 and 24', and to a transom 25 at the rear end of the boat.

The bottom of the boat hull is covered with suitably-bent sheets of plywood 26 conforming to the curves of the hull which are outlined by the lower straight line edges of the beams. This construction is advantageous in boat building because both sides of the frame members are cut in straight lines and may be made of straight stock.

The spacing of the frame members 16 to 21 and 16' to 21', inclusive, is determined from the curvature formed by the above-mentioned straight line elements. By relatively simple calculation or by actual cut and try on a model hull, the requisite number and angularity of the sections may readily be determined. After the dimensions of the sections have been determined the frame members are cut in accordance therewith. The keel is the only part of the hull that needs to be cut on a curve.

While I have illustrated a large number of frame members 16 to 21 and 16' to 21', inclusive, it is clear that for practical purposes only a sufficient number of frames need be made to permit the hull covering material to assume the desired shape.

The keel 14 is constructed with a central web or spacer 27 formed of birch plywood, which fits into grooves in upper and lower mahogany battens 28 and 28' thus forming an I member which extends centrally along the bottom of the boat. The floor beams 16 to 21 and 16' to 21' which are connected to either side of the keel are constructed in two forms, the solid type beams shown in Figures 4, 5 and 6, and a skeleton type beam shown in Fig. 10. The solid type beam is shown in detail in Fig. 9 and consists of a solid web 29 or spacer of spruce or mahogany plywood, to the upper and lower edges of which are attached longitudinally extending strips 30 and 30'. The skeleton type of beam consists of upper and lower elongated strips 31 and 31' spaced by struts 32 which are connected to the opposite sides thereof at intervals along their length. The floor beam connections with the keel are reinforced by plywood gusset plates 33 and 33' as shown in Fig. 7.

The floor beams 16 to 21 and 16' to 21' taper from the width of the keel to a narrower width at their juncture with the chines 23 and 23'. The upper and lower surfaces or edges of the beams to which the floor and bottom of the boat are attached follow straight lines from the keel to the chines. The lower surfaces of the beams define elements in the curvature of the bottom surfaces of the boat.

In the construction shown in Figs. 4 and 5 it will be noted that floor beams 16 to 21 are of the solid type. The skeleton type beam may be employed in lieu of or in conjunction with the solid beam construction shown. Adjacent solid beams will form in conjunction with floor and bottom members, water-tight compartments.

The chines 23 and 23' are formed of mahogany and extend along the side panels 24 and 24' of the hull from the bow boards 34 and 34' to the transom 25. The floor beams which extend from the keel 14 to the side panels and are connected thereto form in conjunction with the keel and the chines supports for the inner floor 35 and the bottom 11. The spaces in the hull bounded by adjacent floor beams, the keel 14 and the chines 23 and 23' may be sealed so as to form water-tight compartments as mentioned above.

The transom 25 at the rear of the stern is attached to oak cross beams 36 and 36' and is also provided with a centrally located oak stiffener 37 which is attached to the cross beams and extends from the bottom of the hull to the top of the transom.

In addition to the advantages mentioned, a hull constructed as described above is inherently strong since the herringbone construction enables it to resist torsional loads with maximum efficiency. Furthermore, this type of framing provides excellent means for lessening the effects of concentrated shocks caused by striking obstacles such as stumps, or piles because they tend to deflect the boat away from the object more than transverse frames or longitudinal frames.

The boat is provided with carrying rails 38 and 38' which are attached to the side panels 24 and 24' adjacent their upper edges as shown in Fig. 1. To the sides of the hull at the juncture of the side panels with the bottom are attached binding angles 39 and 39' and to the bottom are attached lateral skids 40 and 40' and a central skid 41, as shown in Figs. 2 and 6.

The lateral skids 40 and 40' in addition to their usual function are adapted to fit within nesting blocks 42 and 42' which may be bolted to the floors of the hulls so that the boats may be stacked one within the other for transportation purposes.

It is to be understood that variations in the construction of the hull and the materials used therein may be made without departing from the spirit of the invention so long as the design is kept within the scope of the claims.

Having thus described my invention, what I claim as new and wish to secure by Letters Patent is:

1. A hull comprising a central keel member connected to an upwardly curved stem, floor beams having straight lined lower edges connected at one end to said keel and extending outwardly and rearwardly therefrom, side panels extending outwardly and rearwardly from the stem and connected to the outer ends of said floor beams, an inner floor and a bottom connected respectively to the upper and lower edges of said floor beams and to said side panels and keel.

2. A hull comprising a central keel member connected to an upwardly curved stem, floor beams having straight lined upper and lower edges connected at one end to said keel and extending outwardly and rearwardly therefrom with tapering width, side panels extending outwardly and rearwardly from the stem of said keel and connected to the outer ends of said floor beams, an inner floor and bottom connected respectively to the upper and lower edges of said floor beams and to said side panels and keel.

3. A hull comprising a central keel member connected to an upwardly curved stem, floor beams having straight lined upper and lower edges and of uniformly decreasing width therebetween connected at one end to said keel and extending outwardly and rearwardly therefrom, side panels extending outwardly and rearwardly

from the stem of said keel and connected to the outer ends of said floor beams, an inner floor and bottom connected respectively to the upper and lower edges of said floor beams and to said side panels and keel.

4. A hull comprising a central keel member formed with a central web connecting upper and lower battens, said keel extending along the stern and midship sections of the hull and connected to a curved stem in the bow sections, solid web and skeletonized floor beams connected to said keel and extending rearwardly and outwardly therefrom, said floor beams having straight upper and lower edges, side panels connected to said stem and extending rearwardly therefrom and outwardly from the longitudinal center of the hull and connected to the outward extremities of said floor beams, a transom connected to the extremities of said floor beams and said side panels, and an inner floor and a bottom connected to the upper and lower surfaces of said floor beams and to said side panels to divide the lower portion of the hull into water-tight compartments.

5. A hull comprising a central keel member formed with a central web connecting upper and lower battens, said keel extending along the stern and midship sections of the hull and connected to a curved stem in the bow sections, floor beams formed with a web having upper and lower reinforcing strips connected to said keel and extending rearwardly and outwardly therefrom, said floor beams having straight upper and lower edges, side panels connected to said stem and extending rearwardly therefrom and outwardly from the longitudinal center of the hull and connected to the outward extremities of said floor beams, a transom connected to the extremities

of said floor beams and said side panels, and an inner floor and a bottom connected to the upper and lower surfaces of said floor beams and to said side panels to divide the lower portion of the hull into water-tight compartments.

6. A hull comprising a central keel member formed with a central web connecting upper and lower battens, said keel extending along the stern and midship sections of the hull and connected to a curved stem in the bow sections, floor beams formed with a web having upper and lower reinforcing strips connected to said keel and extending rearwardly and outwardly therefrom, said floor beams having straight upper and lower edges, said lower edges defining the lower curvature of the hull, side panels connected to said stem and extending rearwardly therefrom and outwardly from the longitudinal center of the hull and connected to the outward extremities of said floor beams, chines connected to said side panels, a transom connected to the extremities of said floor beams and said side panels, and an inner floor and a bottom connected to the upper and lower surfaces of said floor beams and to said side panels and chines to divide the lower portion of the hull into water-tight compartments.

CARL H. CLEMENT, JR.

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