Nov. 4, 1952 M. TYM 2,616,101

BOAT CONSTRUCTION

Filed May 10, 1948

Fig. 1.

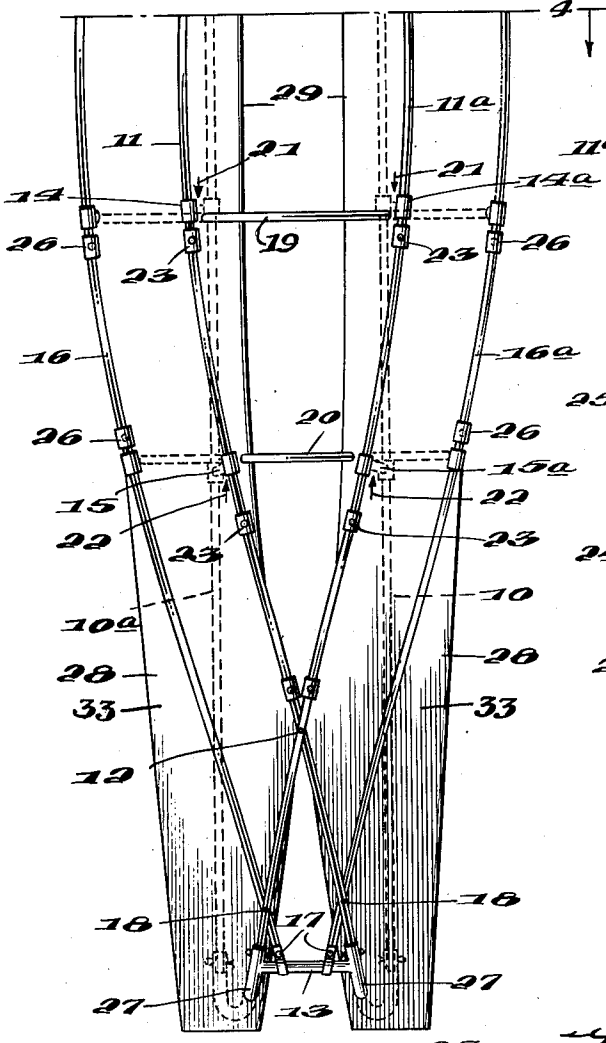


Fig. 3.

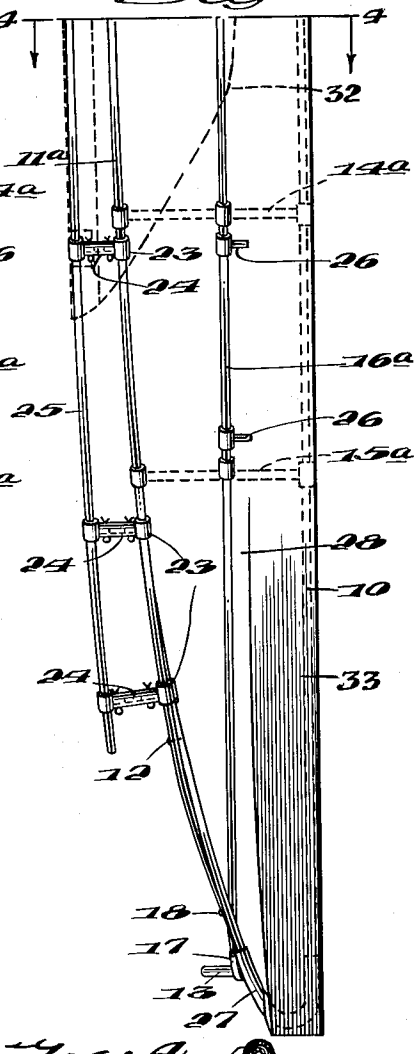


Fig. 2.

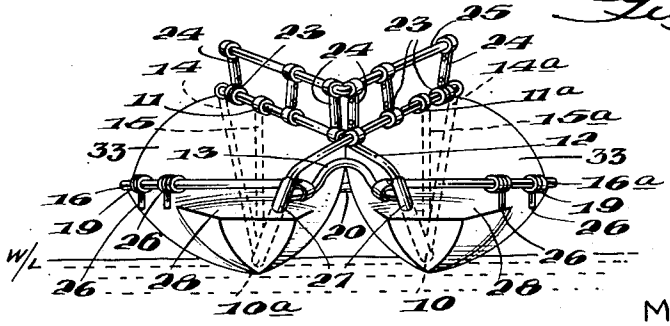
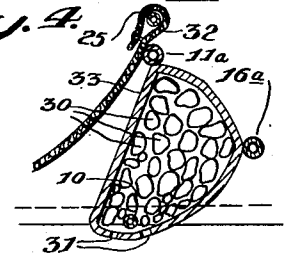


Fig. 4.



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BOAT CONSTRUCTION

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12 Claims. (Cl. 9—6)

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This invention relates to boats and the like and has for its principal object the production of a seaworthy vessel of low weight, draft and cost and having a high degree of buoyancy, stability and adaptability to the conditions of either deep or shallow water. Other and further objects and advantages of the invention will be apparent from the following description of a preferred embodiment thereof.

The invention resides in the novel features and combinations of structure employed in the framing, floatation bodies, and general arrangement of the boat hereinafter described and claimed.

In the accompanying illustrations of a preferred embodiment of the invention:

Fig. 1 is a half plan view of a boat according to the invention, the opposite half of the boat in this instance being the same in construction as the half shown, the boat being stood on end;

Fig. 2 is an end view of such boat in floating position;

Fig. 3 is a half side view thereof with the boat stood on end as in Fig. 1; and

Fig. 4 is a central transverse section through one of the hull elements taken on line 4—4, Fig. 3, looking in the direction of the arrows.

In the preferred embodiment shown in Figs. 1 to 3 the structural skeleton of the vessel consists essentially of a double truss arrangement comprising a pair of keel members 10, 10*a*, each of which is connected at its ends to one of two bowed members 11, 11*a*. The bowed members 11, 11*a* cross each other near the fore and aft ends of the boat at crossing points 12, and in close proximity to the bow and stern ends of the boat these bowed members are joined by bow and stern struts in the form of arched cross ties 13.

The bowed member 11 is braced to the strut member 10*a* by uprights 14 and 15 which are preferably secured to T's the heads of which are in the form of hollow sleeves embracing the members 10*a* and 11, and the legs of which enter the bracing struts 14 and 15 in which they are suitably secured as by cotter-pinning.

In the same way the bow 11*a* is braced to the keel member 10 by uprights 14*a* and 15*a* likewise secured to swivel T's carried by these members.

For defining the outer portion of the lateral sides of the hull, belt members 16, 16*a* are provided. These belt members are also preferably of bowed form, and preferably extend generally parallel to the waterline W/L as shown (see Fig. 2). These belt members are preferably secured to the double struts in a suitable manner, as by having their ends flattened and wrapped around

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the arched cross ties 13, the folded-over ends being secured by any suitable means such as by bolting at 17, as best shown in Fig. 1. In the preferred embodiment, to reach the cross ties 13 the side members 16, 16*a* pass under the bow members 11*a*, 11, respectively, and as best shown in Fig. 1 these members are suitably secured at each of the crossing points as by bolting at 18.

Cross ties 19 and 20 extend between the belt members 16, 16*a* to which they are suitably secured, for example by cotter-pin connection to swivel T's in the manner previously described. For mutual bracing the cross ties 19 and 20 are bolted to the uprights 14, 14*a*, 15, 15*a* at their crossing points, as indicated by the arrows 21, 22, Fig. 1.

The keel members 10, 10*a* with their associated bowed members 11, 11*a*, belt members 16, 16*a*, uprights 14, 14*a*, 15, 15*a* and cross ties 13, 19 and 20 form an extremely rigid double truss section especially suited to form the skeleton of a boat, and well adapted to resist lateral, vertical and torquing stresses encountered in rough seas and in the handling and transportation of the boat. The members 13 are preferably quite highly arched as shown to keep them well above the waterline, see Fig. 2.

The portions of the bow members 11, 11*a* between the bow and stern crossing points 12 define the cockpit space of the boat, and may be provided with further connecting means such as the swivel T's 23 for engagement with uprights 24 (Figs. 2 and 3) for supporting a superstructure such as the railing or weatherboard support 25 (Figs. 2 and 3, omitted in Fig. 1). The attachment of these parts may be effected by cotter-pin connections as above described.

In similar fashion the belt members 16, 16*a* may be provided with connecting means such as the swivel T's 26 to support other superstructure elements, as a sunshade, an awning, or a complete cockpit enclosure, the uprights of which may be secured thereto by cotter-pin connections as aforesaid. These lateral connecting elements 26 are also useful when it is desired to secure in side to side relation a number of the boat e'ements as for the anchorage thereof or the formation of a pontoon landing or bridge therefrom. For these purposes the swivel T elements 26 may be extended laterally and cotter-pinned or otherwise connected by tubular tie members not shown.

The keel, bow, belt, cross ties, and upright members above described are preferably of tubular construction for strength and lightness. Aluminum tubing has been found highly satisfactory

especially if protected with a treatment or coating to avoid corrosion when the boat is intended for salt water use. It will be appreciated that the structural members may be formed of other light metals or substitutes therefor without loss of this advantage of the invention.

It will further be appreciated that in the form shown, the bow and stern tie members **13** are integralized, as by welding, with U-shaped connector elements **27** which may be preformed of aluminum tubing or the like and are adapted to be secured to the ends of the members **10**, **10***a*, **11**, **11***a*, for example by cotter-pin attachment.

Around the structural skeleton formed by the members **10**, **10***a*, **11**, **11***a*, the desired shape of the hull is constructed. This may be effected by forming the hull sections of sheets of aluminum or the like **33**, fastening the same to the skeleton of the truss and wholly or partially filling the space therein with suitable light-weight non-absorbent material **30** such as a polystyrene foam, like that currently sold under the trade-name "Styrofoam," a foam glass, or a foam rubber. Alternatively, the light-weight non-absorbent buoyant material may be formed to shape or molded in place within or over the skeleton, and the assembly may be wrapped with burlap, muslin or other surfacing material, which may be secured with a proper cement, as a magnesium oxychloride cement of the type currently sold under the trade-name "Tymstone." A final finish of such cement and/or a suitable paint, may then be applied. As is shown, the hull elements preferably embrace the keel members **10**, **10***a*, and underly the bowed and belt members **11**, **11***a*, **16**, **16***a*.

The shape of the hull is, of course, designed in conformance with the laws of aquadynamics and is preferably as streamlined as possible, particularly as regards the submerged portions. In the embodiment disclosed in the drawings the hull outline is outwardly convexed throughout the areas between the bowed members **11**, **11***a* and the belt members **11**, **11***a*. In the outboard portions **28** the upper surfaces are gradually flattened into planelike form, and below these outboard sections the hull sections are suitably tapered toward their extremities and may assume the blunt ended outline shown.

The two hull sections in the illustrative embodiment come into abutting or near abutting relation in close proximity to the crossing points **12** as may best be seen in Fig. 2. The inboard portions of the hull sections between the crossing points **12** are preferably flattened to extend nearly vertically from the regions **29** (located between the cross ties **20** and the waterline) to the bowed members **11**, **11***a*. In this way a relatively roomy bottomless cockpit section is provided, substantially isolated from wave motion of the surrounding water by its enclosure between the catamaran hull sections.

As in the preferred form of the present invention the whole buoyancy of the vessel depends on the buoyancy of the non-absorbent fill within the hull or pontoon sections, no effort whatsoever is made to make the skin **33** of these sections watertight. To the contrary it is desirable that the spin be open at the joints or perforated as at **31** so as to have free communication with the water. In this way a calculated amount of unfilled space at the bottom of each hull is free to receive water entering through the skin to form a water ballast within the same, the lift being effected by the pressure of the buoyant fill against the upper portions of the pontoon sections. Also, by virtue of this construction, the boat is incapable of losing its buoyancy as the result of puncture of its floatation elements, and the improved floatation elements thus render the boat unsinkable.

In a working embodiment of this vessel which has a twenty foot length, a four foot beam, and an eight inch draft, and bears Coast Guard Registration No. 39–M–544, the entire space within the metal skin **33** is occupied by a loose filling of "Styrofoam." This boat has been found well adapted for operation in heavy seas, as the water entering its hull sections renders it particularly stable. However, it is to be understood that the amount of the buoyant fill used may be varied in accordance with the carrying capacity desired. Where little carrying capacity is needed, a portion of space within the skin of the hulls may be used for the reception of loads of goods or other purposes.

In the exemplary embodiment illustrated herein, the seats for the propelling motors and for the crew are placed in the open well between the hulls, directly over the horizontal cross ties **19** and **20** connecting the hulls above the waterline. Preferably no rigid bottom whatsoever is employed. When protection is desired, a waterproof cloth or tarpaulin lining **32** for the crew space in the cockpit–well may be hung therein from the rail members **25**, affording a combined flexible cockpit bottom and weatherboarding. Preferably such tarpaulin embraces only the central part of the cockpit adjacent and between the cross tie members **19**, leaving the end wells adjacent the cross tie members **20** open for the inboard mounting of an outboard motor of the like. Planking may be placed longitudinally over the members **19** and **20** along the inner sides of the hulls or otherwise, if desired, to enable the crew to walk inside the boat or to stand thereon while poling or paddling. The submerged V-shaped parts of the hulls constitute ample keels, and no additional keels, leeboards or centerboards are required even when the vessel is under sails.

The absence of a fixed bottom inside the boat aids in the attaining of unusual stability and has other advantages. For example, when it is desired to guide the boat over shallow waters or push it over thin ice, this may be readily effected. The crewmen or crewman, barefooted or booted, may stand up inside the well, and by grasping the rail **25** and lifting the same may reduce the draft of the boat. The water ballast thereupon drains away lightening the boat and making it very easy to move it as aforesaid.

When the boat is equipped with an inboard mounted outboard motor, this motor is preferably secured to a transom block (omitted in Figs. 1–3 for clarity), which may be supported by the cross ties **19** or **20** or from the bowed members **11**, **11***a*. With such mounting the motor may be tilted to raise its propeller above the waterline within the well, or it may be positioned vertically with its propeller and skeg in driving position. With such mounting the propelling motor is within the well and protected by the hull sides from splash. Such outboard motor, being swiveled in the usual manner, also acts as a rudder for the boat, avoiding necessity for separate rudders. If inboard motors are employed separate rudder means may be attached either astern of the hull tips, or in the space between such tips astern of the crossing point **12**.

It will be appreciated that the bending of the bowed and belt members in the present construc-

tion may impart to these members a degree of initial tension, and that the shape and positioning thereof and their association with the keel members affords a resilient but highly rigid structure particularly resistant to collapsing, weaving and bending actions.

While I have described herein as exemplifying the invention the arrangement of elements employed in the Michael VII above identified, it is to be understood that the exemplifying embodiment is illustrative and not restrictive of the invention, and that the invention is not limited to the form described, but comprises the features and combinations of parts defined in the appended claims.

I claim as my invention:

1. A skeleton boat frame comprising a pair of spaced substantially parallel keel members, bowed members assembled at their respective ends to said keel members, said bowed members crossing one another and defining a cockpit section between their crossed portions.

2. A skeleton boat frame comprising a pair of spaced substantially parallel keel members, bowed members assembled at their respective ends to said keel members, said bowed members crossing one another and being secured together at their crossing points and defining a cockpit section between their crossed portions.

3. A skeleton boat frame comprising a pair of spaced substantially parallel keel members, bowed members assembled at their respective ends to said keel members, said bowed members crossing one another, and that bowed member end-attached to one keel member being braced to the other keel member intermediate its ends.

4. A skeleton boat frame comprising a pair of spaced substantially parallel keel members, bowed members assembled at their respective ends to said keel members, cross tie members connecting said assemblies of bowed and keel members above the waterline, said bowed members crossing one another and defining a cockpit section between their crossed portions.

5. A skeleton boat frame comprising a pair of spaced substantially parallel keel members, bowed members assembled at their respective ends to said keel members, cross tie members connecting said assembled bowed and keel members above the waterline adjacent their ends, and bow-shaped belt members lying below and outside said bowed members and secured to said assembly, said bowed members crossing one another and defining a cockpit section between their crossed portions.

6. A skeleton boat frame comprising a pair of spaced substantially parallel keel members, crossed bowed members embracing a cockpit space and end secured to said keel members, bowed belt members extending below and outwardly of said crossed bowed members, said belt members being connected together and to said crossed bowed members.

7. A catamaran boat having a tubular skeleton including cockpit defining tubular portions according to claim 1 and means carried by said portions for supporting a superstructure therefrom.

8. A catamaran boat having a tubular skeleton according to claim 1 and including hull members carried thereby and belt members extending about the lateral sides of the boat, and means carried by said belt members for the securement of tie members thereto.

9. A skeleton boat frame according to claim 1, in combination with a pair of flotation chambers, each constructed on and secured to one of said keel members and the portions of the crossed bowed member lying thereabove, said flotation chambers having parallel keel portions along said keel members tapering toward their ends, and having enlarged outwardly bowed portions thereabove, said bowed portions being substantially in contact adjacent the crossing points of said bowed members and being flared apart between said crossing points to provide an open cockpit.

10. A skeleton boat frame according to claim 1, in combination with a pair of flotation chambers, each constructed on and secured to one of said keel members and the portions of the crossed bowed member lying thereabove, said flotation chambers having parallel keel portions along said keel members tapering toward their ends, and having enlarged outwardly bowed portions thereabove, said bowed portions being substantially in contact adjacent the crossing points of said bowed members and being flared apart between said crossing points to provide an open cockpit, said flotation chambers each comprising a permanently apertured skin secured to said keel and bowed members, with a filling of lightweight non-absorbent material confined therein, whereby entry of water into the spaces within the skin affords a quickly drainable water ballast.

11. A skeleton boat frame according to claim 1, in combination with a pair of flotation chambers, each constructed on and secured to one of said keel members and the portions of the crossed bowed member lying thereabove, said flotation chambers having parallel keel portions along said keel members tapering toward their ends, and having enlarged outwardly bowed portions thereabove, said bowed portions being substantially in contact adjacent the crossing points of said bowed members and being flared apart between said crossing points to provide an open cockpit, said flotation chambers each comprising a permanently apertured skin secured to said keel and bowed members, with a filling of lightweight non-absorbent material confined therein, and said open cockpit having an open bottom of such width that a crewman may walk on shallow bottom within said cockpit, whereby entry of water into the spaces within said skin affords a water ballast quickly drainable by a crewman exerting lifting force on the boat while standing on shallow bottom within it.

12. A skeleton boat frame according to claim 1, in combination with a pair of flotation chambers, each constructed on and secured to one of said keel members and the portions of the crossed bowed member lying thereabove, said flotation chambers having parallel keel portions along said keel members tapering toward their ends, and having enlarged outwardly bowed portions thereabove, said bowed portions being substantially in contact adjacent the crossing points of said bowed members and being flared apart between said crossing points to provide an open cockpit, cockpit framing rail members supported above said flotation members and in spaced relation thereto, and a flexible sheet-like waterproof element formed to hang within said cockpit in suspension from said cockpit framing members to constitute a flexible bottom for the cockpit and to deflect into the cockpit under said element water splashing in over said flotation chambers.

M. TYM.

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