United States Patent

Sundelin

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[54] **BOAT STABILIZER-SAILING RIG**

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[52] **U.S. Cl.** **114/39**

[51] **Int. Cl.** **B63b 35/00**

[58] **Field of Search** 114/39, 91, 102

[56] **References Cited**

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[57] **ABSTRACT**

Boat stabilizer-sailing rig wherein the mast is free to move arcuately transverse the boat in fixed relationship with associated outrigger stabilizers as the attitude of the stabilizers changes responsive to the wind action on the sail.

4 Claims, 6 Drawing Figures

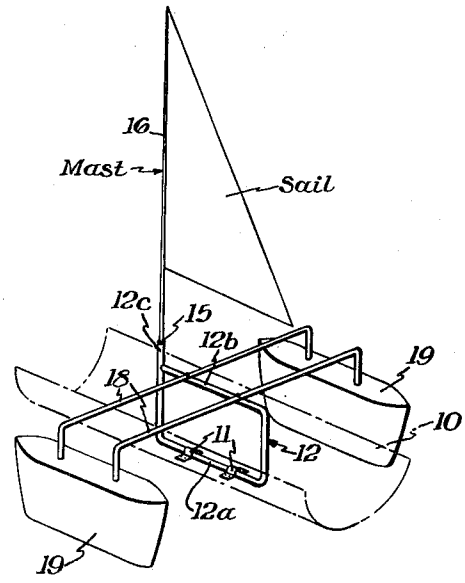


Fig. 1.

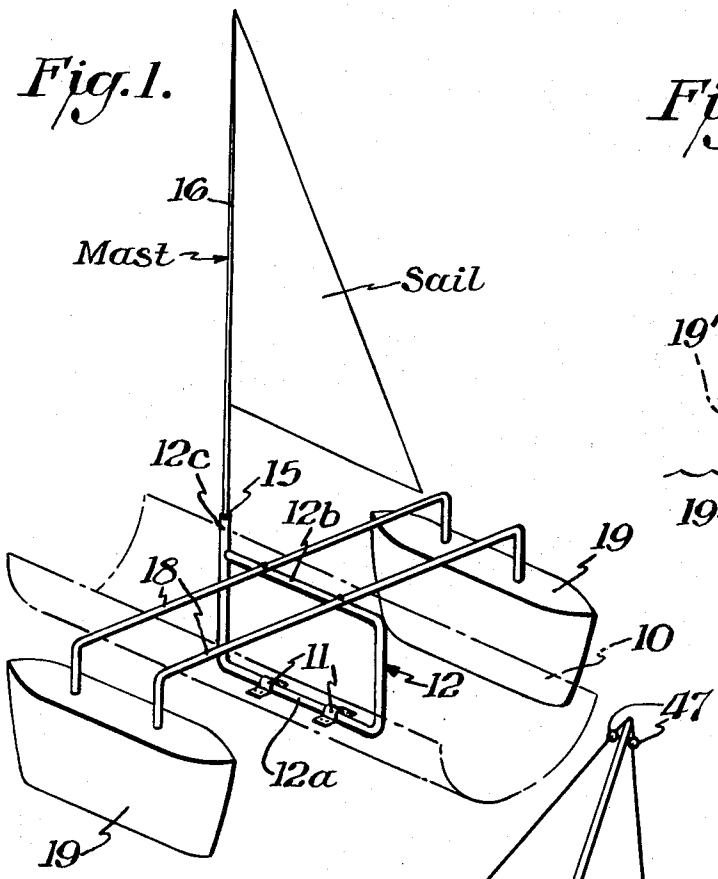


Fig. 2.

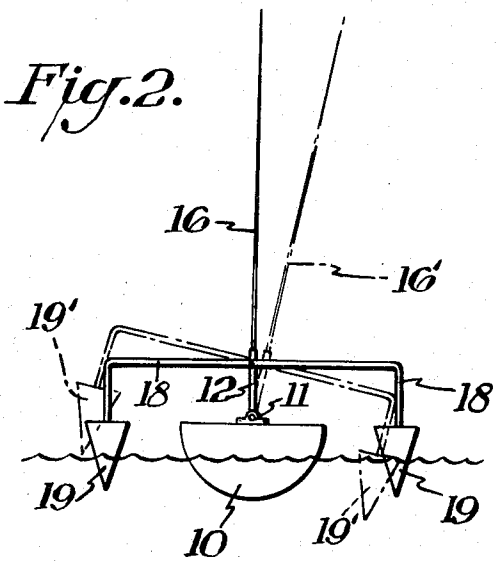
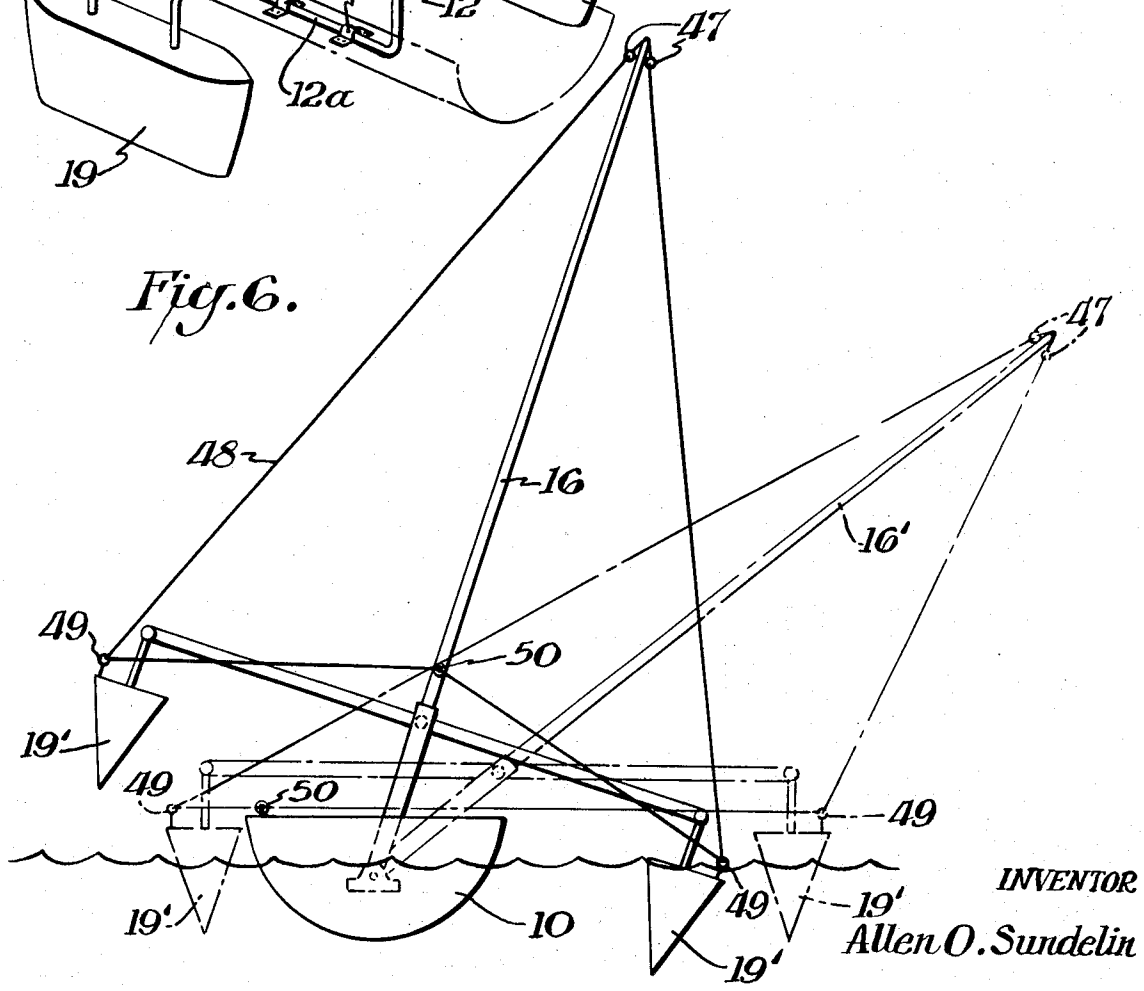


Fig. 6.



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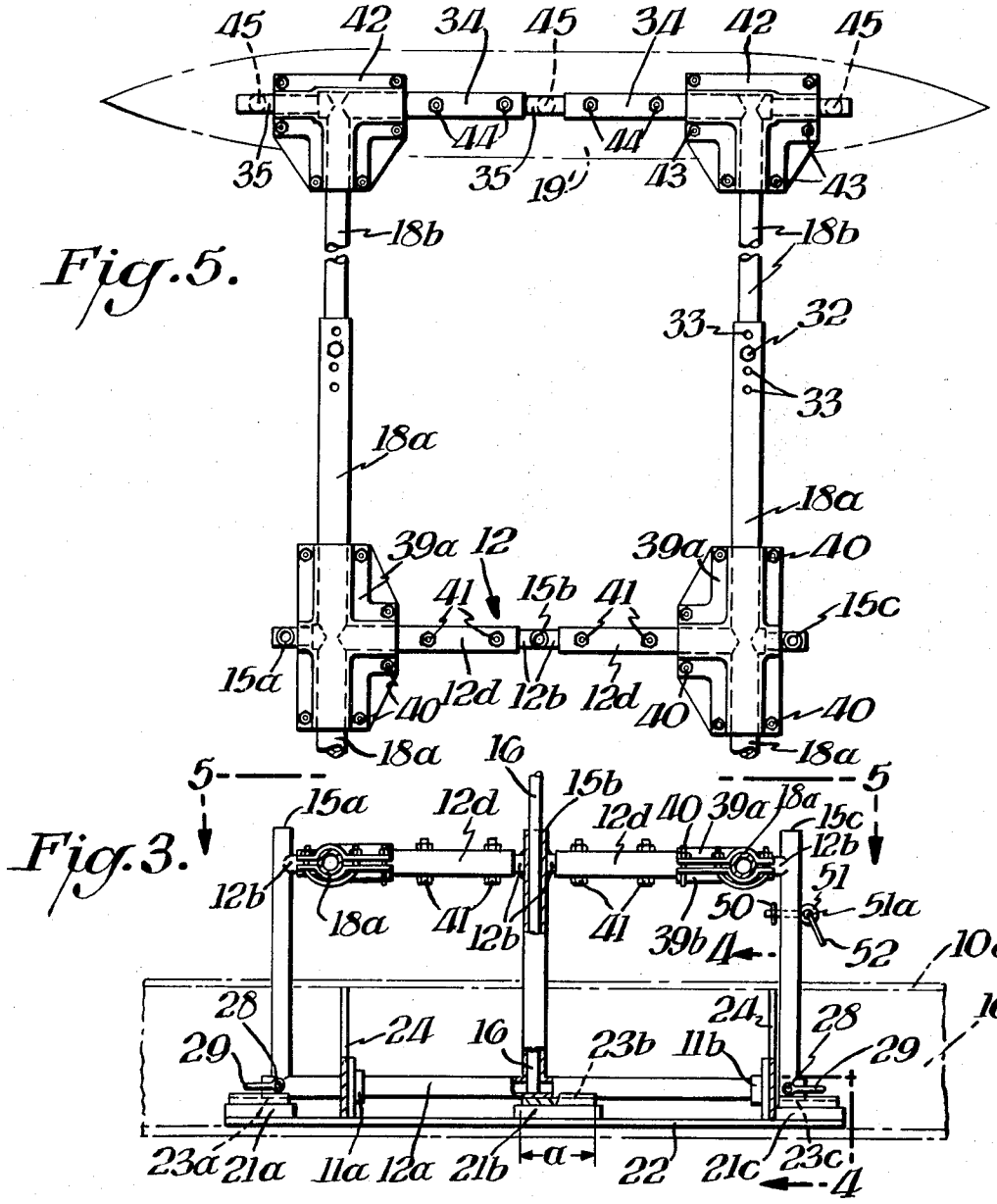


Fig. 5.

Fig. 3.

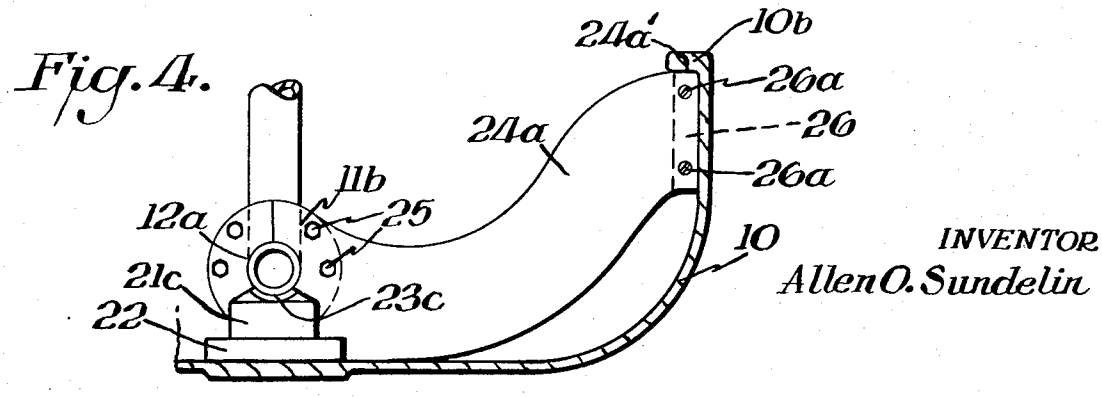


Fig. 4.

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BOAT STABILIZER-SAILING RIG

SUMMARY OF THE INVENTION

Generally, this invention comprises an outrigger stabilizer-mast step assembly comprising, in combination, journal means attachable to a boat hull with the longitudinal axis of the journal means disposed substantially within the longitudinal central plane of the boat hull at a point aft of the bow accommodating the associated mast in preselected position lengthwise of the boat hull, and a rigid frame mounted along its base edge within the journal means for free angular rotation in a plane substantially transverse the longitudinal central plane, the frame being provided with an upwardly oriented mast step and, attached to an edge of the frame disposed radially outward from the base edge, outrigger supports extending outboard from the gunwales of the boat hull preselected distances abeam, the outrigger supports being each provided with stabilizer means secured at the outboard ends of the supports in planes generally coparallel with the longitudinal plane of the rigid frame.

DRAWINGS

In the drawings:

FIG. 1 is a partially schematic fragmentary perspective view of a preferred embodiment of this invention wherein the stabilizers are floats,

FIG. 2 is a schematic view of a boat provided with a rig according to this invention, as seen from aft the boat stern, wherein becalmed position of the mast-outrigger assembly is shown in full-line representation, whereas a typical heeling position taken under a strong wind blowing from abeam is shown in broken-line representation,

FIG. 3 is a side elevation view of a preferred embodiment of rigid frame showing details of attachment to the boat hull,

FIG. 4 is an end (right-half) view taken on lines 4—4, FIG. 3,

FIG. 5 is a partial plan view taken on lines 5—5, FIG. 3, and

FIG. 6 is a schematic perspective view showing a second embodiment of this invention, as seen from aft the boat stern, provided with disconnect means permitting safe "knockdown" of the sailing mast.

INTRODUCTION

The purpose of this invention is to provide a boat stabilizer-sailing rig for ready conversion of practically any boat, surf-board or the like to sail power. Additionally, the sailing rig of this invention is of novel design vastly enhancing lateral stability of the craft to which it is attached by incorporating a free-rotational mounting of the mast, permitting it to accommodate, substantially independently of the boat hull, to the constantly changing attitude of the associated stabilizers responsive to the wind action on the sail. Because of this feature, my invention is particularly applicable to canoes and other small boats of relatively narrow beam; however, application is not in any way limited to these, and the term "boat," as hereinafter employed, is intended to comprehend both large and small craft of practically any hull design or construction, and also surf-boards, sail-boards and the like. In addition,

because of the improved sailing performance obtained with my invention, my design is also applicable to a wide variety of toy boats, as well as fishermen's trolling lures and the like.

The term "stabilizer," as hereinafter employed, is intended to encompass buoyant float-type elements and also relatively non-buoyant hydrofoil boards or similar devices affording stabilizing action.

Rigs constructed according to this invention are both compact and light in weight, especially for small boat sizes, and thus can be readily transported on automobile tops, or strapped or tied onto the boat itself when the boat is being transported by regular trailer.

DETAILED DESCRIPTION

Referring to FIG. 1, a preferred embodiment of this invention is shown schematically in a design wherein rig attachment is adjacent floor level of a boat hull **10**, shown only partially in broken line representation in this view.

My rig comprises journal means **11**, in this showing consisting of a pair of collars secured to the floor, spaced co-axially with respect to one another substantially within the central longitudinal plane of the boat hull.

A rigid frame, denoted generally at **12**, which can conveniently be a rectangular loop of pipe, is journaled at its base edge **12*a*** within journals **11**, the opposite edge **12*b*** thereof being disposed radially outward, referred to the journals **11** as center of rotation, so as to extend above the gunwales of the boat hull. The forward end **12*c*** of frame **12** is provided with an upwardly oriented mast step **15** within which the base end of sail mast **16** is telescopically fitted and retained in place by friction, cotter keys or through bolts, not shown. If desired, of course, mast **16** can be of one-piece construction with frame end **12*c***; however, it is preferred to make the mast demountable, as a convenience in transportation.

Outrigger supports **18**, which can conveniently be lengths of pipe, are, in this first embodiment, fixedly secured to frame edge **12*b*** substantially normal with respect to the longitudinal plane of frame **12**, and extend outboard from the gunwales of the boat hull preselected distances abeam. The outboard ends of outrigger supports **18** are shown bent downwardly for secure attachment of stabilizer means **19**, which, in this instance, constitute floats formed to general boat hull shape. Floats **19** are oriented with bow ends directed forward in the same direction as the bow of boat hull **10**, and with their longitudinal central planes generally coparallel with the longitudinal plane of frame **12**.

The operation of the rig of this invention under sail is shown schematically in FIG. **2**, as seen from aft the stern, the sail being omitted for clarity in the representation.

Journal means **11** are shown, in FIG. **2**, at deck level, where journal attachment can alternatively be made if the boat is provided with a deck, and if such elevated positioning is especially desired. (In this connection, since the weight of the rig is distributed between floats **19** and hull **10**, elevation of the center of gravity incident to deck mounting is ordinarily not a serious problem).

Normal becalmed positions of mast **16**, outrigger supports **18** and floats **19** are shown in full-line representation, whereas the corresponding positions under the action of a relatively strong wind blowing from port side abeam are depicted in broken line representation (reference numerals primed). In the latter situation, the attitude of the stabilizers responsive to wind action on the sail has changed radically from the becalmed position, starboard float **19'** being now almost entirely water-submerged whereas its companion float **19'** to port is completely out of the water. Nevertheless, since this attitude change is accommodated completely by rotation within journals **11** of frame **12** supports **18** as an entity in a plane transverse the central longitudinal plane of the boat hull **10**, the lateral stability of the hull remains virtually unaffected and the boat rides in the water quite independently of wind conditions.

The advantages of lateral stability are manifest, in that the boat does not easily ship water, nor do the occupants suffer discomfort from the heeling action almost constantly present aboard conventional sailing craft. Thus, there are obtained with this invention great improvements in both safety and passenger comfort, together with other advantages hereinafter described.

It is well known that the optimum position of a sail-mast longitudinal of a boat hull is, to some degree at least, a function of existing wind conditions. Thus, with wind of a given velocity and direction, best propulsion is obtained with mast **16** relatively forward, whereas, with wind of a different velocity and direction, a mast position relatively aft can be desirable. The assembly of frame **12** within journals **11** can be made adjustable longitudinally at the helmsman's option by employing an integral rack-and-pinion, block-and-tackle or similar device, not shown, to thereby enable locked-in positioning of mast **16** in preselected location longitudinally of boat hull **10**.

The capability of fore and aft positioning of the mast while underway is advantageous, because the center of effort of the sails can thereby be better related to the center of lateral resistance of the boat hull-stabilizer assembly, obtaining optimum mast position for best propulsion and also self-steering action.

Referring to FIG. **3**, a preferred embodiment of rigid frame **12** comprises the unitary all-welded tubular aluminum assembly incorporating three individual upwardly oriented mast steps, consisting of the forward step **15***a*, the intermediate step **15***b* and the aft step **15***c*. In a typical case, the mast steps are spaced apart about **24''** by weld-attached tubular sections **12***b*, constituting the radially outward edge of frame **12**, so that the user can mount his mast in the particular step which best suits his boat's inherent sailing characteristics. A cut-away mast **16** is shown emplaced in step **15***b*, it being understood that the base end of the mast abuts the inside of the frame base edge **12***a* as shown by the partial section.

Journal means **11** in this design comprises the two oppositely disposed pipe flanges **11***a* and **11***b*, which can be fabricated from polyvinyl chloride polymers or similar material, these being slidably mounted on the two ends of base edge **12***a* before the frame is welded into closed rectangular form. The downwardly directed compressive load imposed by the turnbuckle-tightened rigging stays is carried by three base pieces **21***a*, **21***b* and **21***c*, which may be 2 × 4 inch wood blocks, shown in end view in FIG. **4**. These base pieces are screw-attached to a common floor piece **22**, which can typically be a 1 × 6 inch board. The three base pieces are each provided on their top surfaces with fixedly attached coaxially aligned, longitudinally cutaway pipe sections **23***a*, **23***b* and **23***c*, respectively, which serve as longitudinal ways for accommodation of fore and aft adjustment of frame **12** as hereinbefore described. If desired, floor piece **22** can be secured to the boat floor; however, this is not ordinarily necessary because retention against longitudinal movement is afforded by thwart pieces **24**, hereinafter described.

The thwart pieces, which can typically be 1 inch thick plywood are preferably each cut into two separate half-sections, for ease of rig assembly inside the boat, one half-section being detailed at **24***a*, FIG. **4**. The abutting inboard ends are held in place by through bolts (not shown) passed through the pairs of flange bolt holes **25** overlying the ends. The outboard ends of the thwart pieces are upwardly curved, so that upper terminii underlie the boat gunwales **10***b*. It is preferred to provide extra strength for the thwart pieces by securing them together at the ends with longitudinal wood side pieces **26** attached thereto with wood screws **26***a*. Any tendency toward longitudinal shifting of the thwart piece **24** — journal **11** — frame **12** assembly can be countered by drilling the gunwales **10***b* on both sides of the boat, and also the upper edges of side pieces **26** opposite thereto, to provide sockets (not shown) accommodating single locking pins on each side of the boat. In practice, there is very little tendency for longitudinal shifting; however, there may be some slight cocking of frame **12** upwardly, depending upon which mast step **15***a*, **15***b* or **15***c* is being utilized, and the locking pin accommodates the slight movement permitting localized restraining abutment of thwart ends against the undersides of the gunwales while still preventing longitudinal shifting of the rig assembly.

Base edge **12***a* is drilled through at each end to receive the pins **28** of clevises **29**, to which are attached block-and-tackle retention lines (not shown). These lines are drawn up taut or eased while the boat is underway to bring frame **12** to preselected longitudinal position at the operator's choice, the limit of longitudinal adjustment being approximately the distance *a*, FIG. **3**, corresponding to the length of way **23***b*, typically 6 –12 inches.

The design of FIGS. **3**, **4** and **5** can be employed either for fixed attachment of outriggers to frame **12** or, if desired, this construction can be readily converted to the second embodiment of this invention enabling safe mast "knock-down," all as hereinafter described.

Outrigger supports **18** are preferably of two-part construction, as particularly shown in FIG. **5**, to permit outboard adjustability and easy disassembly for convenience in transportation. Thus, the outrigger supports typically comprise an outboard tubular aluminum section **18***b* of outside diameter telescoping snugly within inboard tubular aluminum section **18***a*, to which it is firmly secured by through bolt **32** fitted through preselected pairs of matching spaced holes **33** drilled through each of the sections **18***a*, **18***b*.

The inboard sections 18*a* of the outrigger supports are held in tight abutment at their inner ends against tubular sections 12*d* by companion clamp pieces 39*a*, 39*b* secured together by U-bolts 40. Tube sections 12*d* are telescopically fitted over tubular sections 12*b* before the weld assembly of frame 12 into closed form. The inside diameters of tube sections 12*d* are slightly larger than the outside diameters of tubular sections 12*b*, so that the sections 12*d* are free to rotate with respect to sections 12*b*, except that, in the embodiment of this invention hereinbefore described, there is fixed attachment of rigid frame 12 with outrigger supports 18, the paired tubular sections 12*b*, 12*d* being then locked together with through bolts 41 fitted through matching hole pairs in each.

The outboard ends of sections 18*b* are held in tight abutment with tubular sleeves 34, telescoped over tubular supports 35, by companion clamp pieces 42 secured together by U-bolts 43. Sleeves 34 are locked to tubular supports 35 by through bolts 44, passed through matching drilled hole pairs in each, which holes can be staggered peripherally of supports 35 to permit adjustments in camber of floats 19', if desired.

Depending tube lengths 45, welded at their upper ends to the underside of tubular support 35 in a plane substantially co-parallel with the longitudinal plane of frame 12, constitute the outrigger attachments to float 19'. Joinder of the lower ends of tubes 45 with the floats can be in any conventional manner, as, for example, by telescoping within aligned tubular inserts embedded in the float body material, or by pipe socket connection, or in other known manner.

With through bolts 41 inserted, tubular sections 12*d* are locked to tubular sections 12*b*, and operation is as hereinbefore detailed with respect to FIG. 2.

Referring to FIGS. 3 and 6, when through bolts 41 are withdrawn, tubular sections 12d are freed for rotation about tubular sections 12*b*. However, the same relative positions of floats 19' with respect to rigid frame 12 and mast 16 are preserved by employing a closed loop shroud line 48 connected at the upper ends to rings 47 on the mast head and run through fair-leads 49 on the top sides of each of the floats 19', and thence to a small ring member 50, sized to slip through leads 49 if drawn that far upon disconnection, the lower ends of shroud line 48 being tied to ring 50.

As shown in FIG. 3, ring 50 can be maintained in fixed position with respect to frame 12 by engaging it with the inner end of disconnect pin 51, the outer end of which is drilled to provide an aperture 51*a* to which is tied a pull cord 52.

Now, when extreme heeling of floats 19' and mast 16 occurs, as shown in full line representation in FIG. 6, and there is danger of capsizing, it is only necessary to pull cord 52 to free ring 50 from the inner end of disconnect pin 51. Tube section 12*d* thereupon rotates counter-clockwise, as viewed in FIG. 6, under the weight of elevated left-hand float 19', and the two floats take the equilibrium positions shown in broken line representation. This pulls shroud line 48 in clockwise direction through fair-leads 49, so that slack is rapidly supplied to the left shroud line of mast 16, thereby permitting the mast to "knock-down" to the right, as shown in broken line representation at 16'. Collapse of the sail averts danger of capsizing, and sail can be taken in and the mast-stabilizer assembly restored to its normal sailing position with ring 50 retained on replaced disconnect pin 51 at the convenience of the crew.

As a safety feature, and especially where young persons are boat occupants, the free end of cord 52 can be secured to a pin mounted on hull 10, e.g., adjacent a gunwale, so that, when mast 16 cants to a predetermined angle, the free length of cord 52 will be taken up and disconnect pin 51 withdrawn automatically.

As previously mentioned, through bolts 44 can be engaged at different peripheral angles, locking sleeves 34 with tubular supports 35 in positions providing preselected inclinations of depending tubes 45, thereby giving preselected camber to floats 19'. This provides lift which enhances the sailing speeds of boats fitted with the stabilizer-rig of this invention.

What is claimed is:

1. An outrigger stabilizer-mast step assembly for boats fitted with conventional saild comprising, in combination, journal means attachable to a boat hull with the longitudinal axis of said journal means disposed substantially within the longitudinal central plane of said boat hull at a point aft of the bow accommodating the associated mast in preselected position lengthwise of said boat hull, and a rigid frame mounted along its base edge within said journal means for free angular rotation in a plane substantially transverse said longitudinal central plane, said frame being provided with an upwardly oriented mast step and, attached to an edge of said frame disposed radially outward from said base edge, outrigger supports extending outboard substantially normal laterally with respect to said frame from both gunwales of said boat hull preselected distances abeam, said outrigger supports being each provided with stabilizer means secured at the outboard ends of said supports in planes generally coparallel with the longitudinal plane of said rigid frame, both said stabilizer means being disposed at substantially equal immersion levels within water floating said boat hull when said frame is disposed in equilibrium position in alignment with said longitudinal central plane of said boat hull.

2. An outrigger stabilizer-mast step assembly according to claim 1 wherein said stabilizer means are buoyant floats.

3. An outrigger stabilizer-mast step assembly according to claim 1 wherein said outrigger supports are fixedly attached to said edge of said frame disposed radially outward from said base edge.

4. An outrigger stabilizer-mast step assembly according to claim 1 having said outrigger supports attached at their inboard ends to tubular means co-axially mounted in free rotational relationship with respect to said edge of said frame disposed radially outward from said base edge, and a closed loop running shroud line extending from an elevated point on said mast through fairleads carried by each of said stabilizer means and thence to ring means in substantial alignment with said longitudinal central plane of said boat hull when said boat hull and said stabilizer means are substantially in horizontal balance, and disconnectible means pinning said ring means to the angularly rotatable portion of said rigid frame, said disconnectible means being operable manually or automatically as a function of boat heeling angle.

* * * * *