June 19, 1962 A. N. DUCOMMUN 3,039,416

CATAMARAN

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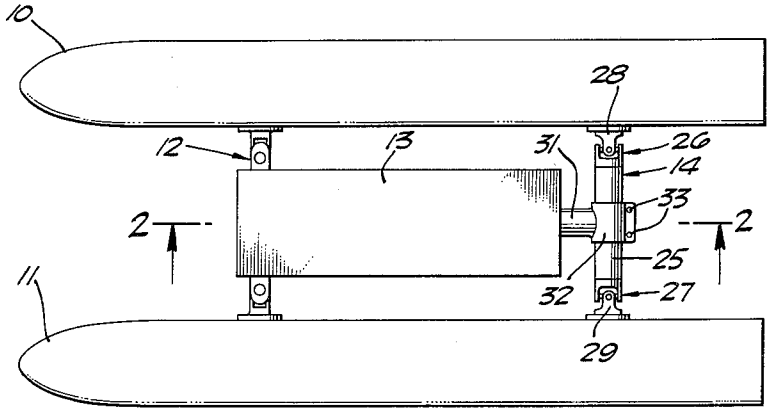


FIG. 1.

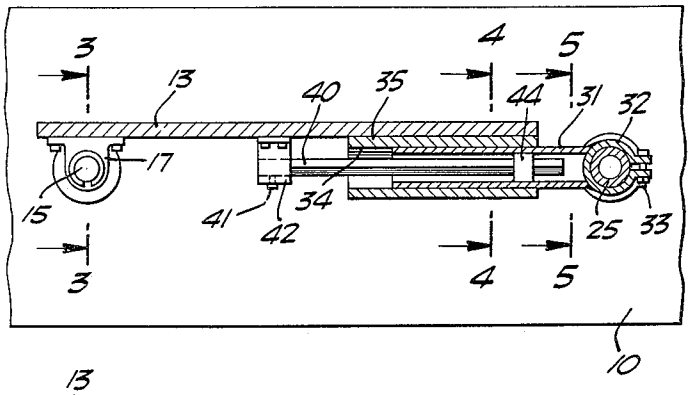


FIG. 2.

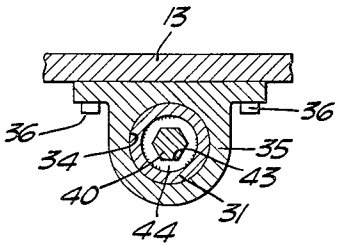


FIG. 4.

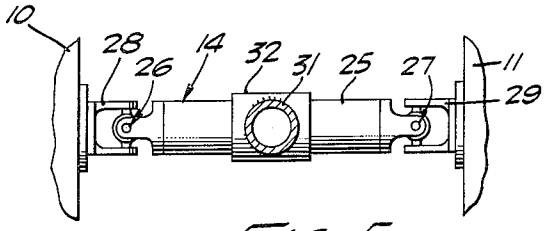


FIG. 5.

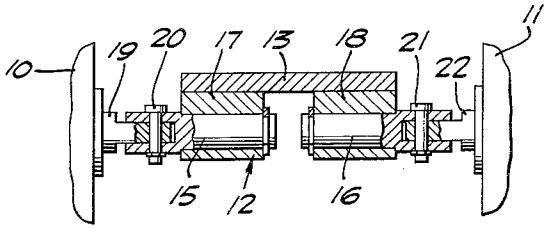


FIG. 3.

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CATAMARAN

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This invention relates to twin hull vessels, sometimes known as catamarans, and is particularly directed to an improved form of linkage which joins the two hulls and supports a platform between them so that the entire assembly can serve as a sailboat or a powerboat.

In conventional catamaran construction, the two hulls are rigidly fixed together. In such devices, severe racking stresses are imposed upon the structure when a quartering wave lifts either the front or the rear of one of the hulls. In this situation, the other hull must be dragged up from the water until its position corresponds with that of the first hull, or else the whole structure must twist. The net effect is that whenever either hull meets a wave it will be forced below its normal level of flotation until its total flotation force is sufficient to lift the other hull above its normal position in the water. The entire structure therefore is subjected to continuous twisting and racking forces unless the water level for both floats is identical.

While attempts have been made to connect the twin hulls of catamarans in a manner so that the hulls may have limited relative motion, such devices have met with very little success. When flexible connecting structure has been used, the twisting and racking stresses imposed on such structure lead to early failure. When stiff cross members with flexible connections to the hull have been used, the connecting parts have had very short lives and the hulls have not been prevented from having relative rolling movement. Relative rolling movement of the hulls is particularly objectionable when sails provide the motive power, because such a structure lacks the necessary stability about the longitudinal axis to resist the overturning moment of the sails.

It is an important object of this invention to provide an improved form of apparatus for connecting the twin hulls of a catamaran in order to avoid the shortcomings pointed out above.

Briefly stated, this invention concerns a twin hull structure having a pair of connector assemblies extending between the hulls, one of the connector assemblies permitting relative pitching motion of the hulls but preventing relative rolling movement thereof, and the other connector assembly comprising a spacer strut connected to the hulls by self-aligning parts. Another feature of the invention concerns a central platform member mounted on the first connector assembly and having a part slidably guided with respect to a longitudinal projection on the spacer strut. Another feature of the invention concerns the provision of a longitudinal torsion bar operatively interposed between the central member and the spacer strut acting resiliently to oppose relative pitching motion of the two hulls.

Other and more detailed objects and advantages will appear hereinafter.

In the drawings:

FIGURE 1 is a top plan view in diagrammatic form showing a preferred embodiment of this invention.

FIGURE 2 is a longitudinal sectional view taken substantially on the lines 2—2 as shown in FIGURE 1.

FIGURE 3 is a transverse sectional view taken substantially on the lines 3—3 as shown in FIGURE 2.

FIGURE 4 is a transverse sectional view taken substantially on the lines 4—4 as shown in FIGURE 2.

FIGURE 5 is a sectional view taken substantially on the lines 5—5 as shown in FIGURE 2.

Referring to the drawings, the twin hulls or pontoons 10 and 11 are substantially parallel and are laterally spaced. A first connector assembly 12 extends horizontally between the hulls 10 and 11 and supports one end of a platform member 13 positioned between the hulls. A second connector assembly 14 longitudinally spaced from the connector assembly 12 extends transversely between the hulls 10 and 11.

As best shown in FIGURE 3, the first connector assembly 12 includes a pair of axially aligned axles or trunnions 15 and 16. Bearing housings 17 and 18 fixed to the platform member 13 support the trunnions 15 and 16 respectively for relative turning movement. An element 19 fixed on the hull 10 is connected by vertical pivot pin 20 to a projecting portion of the trunnion 15. Similarly, the element 22 fixed to the hull 11 is connected by vertical pivot pin 21 to the projecting portion of the trunnion 16. From this description it will be understood that the first connector assembly 12 permits the hulls 10 and 11 to have relative pitching movement about the common axis of the trunnions 15 and 16, and to have pivotal movement about the pins 20 and 21, but relative rolling motion of the hulls 10 and 11 about longitudinal axes is prevented.

As best shown in FIGURE 5, the second connector assembly 14 includes a spacer strut 25 connected by flexible joints 26 and 27 to elements 28 and 29 respectively fixed on the hulls 10 and 11. Th flexible joints 26 and 27 may take the form of gimbal rings or universal joints, or may comprise ball-and-socket connections. The strut 25 is preferably tubular in form for minimum weight and maximum stiffness.

It will be observed that when the hulls have relative pitching motion about the common axis of the trunnions 15 and 16 that the spacer strut 25 moves from horizontal to inclined position, thereby slightly reducing the horizontal spacing between the hulls from the first connector assembly 12 back toward the second connector assembly 14 and increasing the horizontal spacing forward of the first connector assembly 12. This motion is accommodated by movement of the parts about the vertical pins 20 and 21.

A longitudinal tubular post 31 is fixed centrally to the spacer strut 25 by any convenient means. As shown in the drawings, this longitudinal post 31 is fixed to a split sleeve 32 clamped to the outer surface of the strut 25 by means of the threaded fastening 33. The post 31 is slidably received within the bore 34 of the socket member 35. This socket member 35 is fixed to the platform member 13 by any convenient means such as, for example, by the threaded fasteners 36. From this description it will be understood that the post 31 assists in supporting the platform member 13 and that the post 31 turns with respect to the socket member 35 upon relative pitching movement of the hulls 10 and 11.

Means are provided for resiliently opposing relative pitching movement of the hulls 10 and 11 about the common axis of the trunnions 15 and 16, and as shown in the drawings, this means includes a longitudinal torsion bar 40 positioned between the hulls and under the platform member 13. The forward end of this torsion bar is fixed by means of a set screw 41 within bracket 42 fixed to the underside of the platform member 13. The bar may be hexagonal in form and extends slidably through a hexagonal opening 43 in an internal collar 44 fixed within the tubular post 31. When the tubular post 31 and collar 44 turn with the spacer strut 25, the effect is to twist the torsion bar 40, and this action resiliently opposes relative pitching movement of the hulls 10 and 11.

The linkage provided by the first and second connector assemblies and central platform member permits the two

hulls to move independently in a fairly extended range. The vertical hinge pins **20** and **21** afford the full resistance of the two widespread hulls to oppose any overturning moment of a sail about the longitudinal axis of the craft. The universal joints **26** and **27** and the hinge pins **20** and **21** make the craft comparatively easy to disassemble for hauling, beaching or repair.

Having fully described my invention it is to be understood that I am not to be limited to the details herein set forth but that my invention is of the full scope of the appended claims.

I claim:

1. In a catamaran, the combination of: twin hulls; first and second connector assemblies extending between said hulls; said first connector assembly having axially aligned trunnions each connected by means of a vertical pivot to one of the hulls, respectively, and mounting means for said trunnions whereby the hulls are permitted to have relative pitching movement and are prevented from having substantial relative rolling movement; said second connector assembly having a transverse spacer strut, and universal joint means connecting the ends of said strut to said hulls; a central member supported upon said trunnion mounting means; and a longitudinally extending part on said strut slidably connected to a cooperating part on said central member.

2. In a catamaran, the combination of: twin hulls; first and second connector assemblies extending between said hulls; said first connector assembly having axially aligned trunnions each connected by means of a vertical pivot to one of the hulls, respectively, and mounting means for said trunnions, whereby the hulls are permitted to have relative pitching movement and prevented from having substantial relative rolling movement; said second connector assembly having a transverse spacer strut, and universal joint means connecting the ends of said strut to said hulls; a central member supported upon said trunnion mounting means; and means including a torsion bar extending parallel to said hulls connecting said strut and said central member and acting resiliently to oppose relative pitching movement of said hulls.

3. In a catamaran, the combination of: twin hulls; first and second connector assemblies extending between said hulls; said first connector assembly having axially aligned trunnions each connected by means of a vertical pivot to one of the hulls, respectively, and mounting means for said trunnions, whereby the hulls are permitted to have relative pitching movement and prevented from having substantial relative rolling movement; said second connector assembly having a transverse spacer strut, and universal joint means connecting the ends of said strut to said hulls; a central member supported upon said trunnion mounting means; a tubular post extending longitudinally on said strut, a socket member on the central member slidably receiving said post; and means including a torsion bar extending within the tubular post connecting said post and said central member and acting resiliently to oppose relative pitching movement of said hulls.

4. In a catamaran, the combination of: a pair of longitudinally extending laterally spaced horizontal hulls; first and second laterally extending longitudinally spaced connector assemblies extending horizontally between said hulls; said first connector assembly including a pair of trunnions mounted for relative turning movement about a common horizontal axis extending transversely of the hulls, a pair of elements, one fixed to each hull, respectively, pivot means connecting each trunnion to one of said elements, respectively, for pivotal movement about vertical axes, whereby said hulls may have relative pitching movement about said common transverse axis of said trunnions as well as relative movement about said pivotal axes but are held against substantial relative rolling motion; said second connector assembly including a transverse spacer strut, a pair of elements, one fixed to each hull, respectively, universal joints connecting the ends of said strut to the latter said elements, a central member provided for supporting said trunnions for relative turning movement, and wherein a longitudinally extending part on said spacer strut is slidably received in guided relationship with a cooperating part on said central member.

5. The combination as set forth in claim 4 wherein the said longitudinally extending part on said spacer strut is slidably received within a socket member on said central member.

6. Linkage for connecting twin hulls of a catamaran, comprising, in combination: first and second laterally extending longitudinally spaced connector assemblies adapted to extend horizontally between the hulls; said first connector assembly including a pair of trunnions mounted for relative turning movement about a common horizontal axis extending transversely of the hulls, a pair of elements, one adapted to be fixed to each hull, respectively, pivot means connecting each trunnion to one of said elements, respectively, for pivotal movement about vertical axes, said second connector assembly including a transverse spacer strut, a pair of elements, one adapted to be fixed to each hull respectively, universal joints connecting the ends of said strut to the latter said elements, respectively, a central member provided for supporting said trunnions for relative turning movement, and wherein a longitudinally extending part on said spacer strut is slidably received in guided relationship with a cooperating part on said central member.

7. Linkage for connecting twin hulls of a catamaran, comprising, in combination: first and second laterally extending longitudinally spaced connector assemblies adapted to extend horizontally between the hulls; said first connector assembly including a pair of trunnions mounted for relative turning movement about a common horizontal axis extending transversely of the hulls, a pair of elements, one adapted to be fixed to each hull, respectively, pivot means connecting each trunnion to one of said elements, respectively, for pivotal movement about vertical axes, said second connector assembly including a transverse spacer strut, a pair of elements, one adapted to be fixed to each hull respectively, universal joints connecting the ends of said strut to the latter said elements, respectively, a central member provided for supporting said trunnions for relative turning movement, a longitudinally extending tubular post mounted on said spacer strut and slidably received within a socket member on said central member, and wherein a torsion bar extending within said post is connected at longitudinally spaced locations to said central member and to said post.

8. Linkage for connecting twin hulls of a catamaran, comprising, in combination: first and second laterally extending longitudinally spaced connector assemblies adapted to extend horizontally between the hulls; said first connector assembly including a pair of trunnions mounted for relative turning movement about a common horizontal axis extending transversely of the hulls, a pair of elements, one adapted to be fixed to each hull, respectively, pivot means connecting each trunnion to one of said elements, respectively, for pivotal movement about vertical axes, said second connector assembly including a transverse spacer strut, a pair of elements, one adapted to be fixed to each hull, respectively, universal joints connecting the ends of said strut to the latter said elements, respectively, a central member connected to said trunnions and wherein means including a longitudinally extending torsion bar operatively connects said member and said spacer strut.

9. Linkage for connecting twin hulls, comprising, in combination: first and second connector assemblies extending between said hulls; said first connector assembly having axially aligned trunnions each connected by means of a vertical pivot to one of the said hulls, respectively, and mounting means for said trunnions whereby

the hulls are permitted to have relative pitching movement and are prevented from having substantial relative rolling movement; said second connector assembly having a transverse spacer strut, and universal joint means connecting the ends of said strut to said hulls; a central member supported upon said trunnion mounting means; and longitudinal pivot means connecting the said strut and said member whereby relative movement of the said hulls toward each other in a horizontal plane as a result of parallel angular rotation of the said connector assemblies relative to said hulls is prevented.

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