

Jan. 25, 1938.

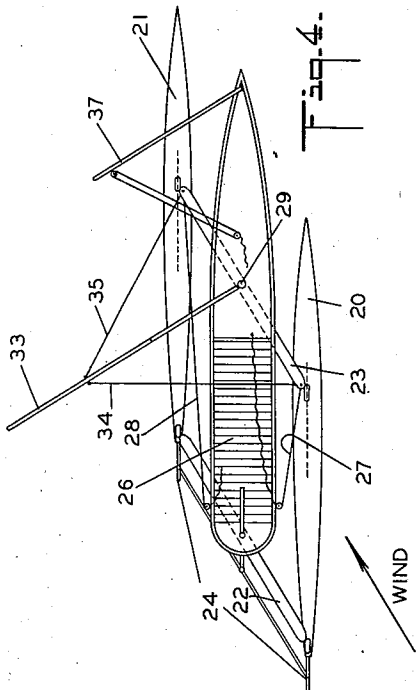
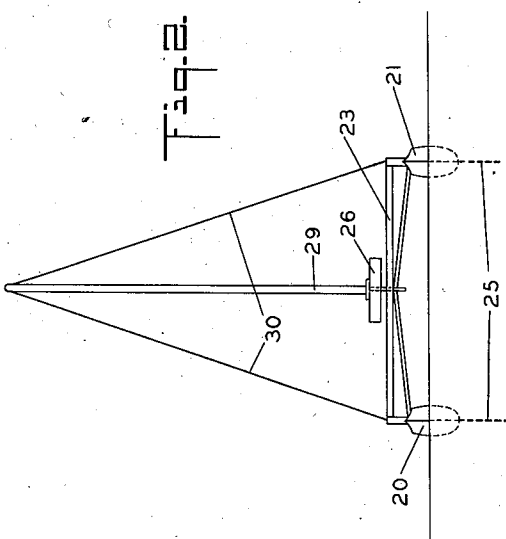
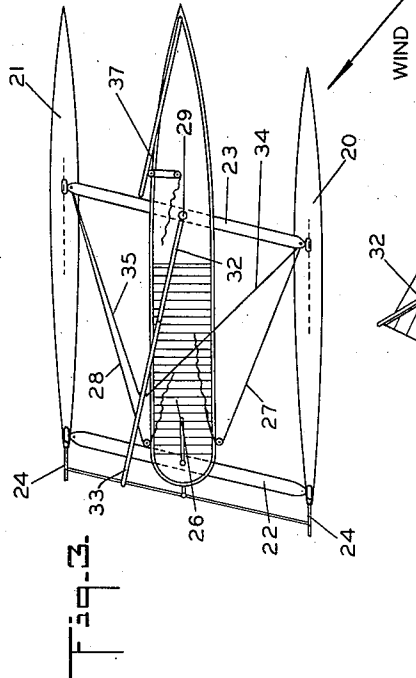
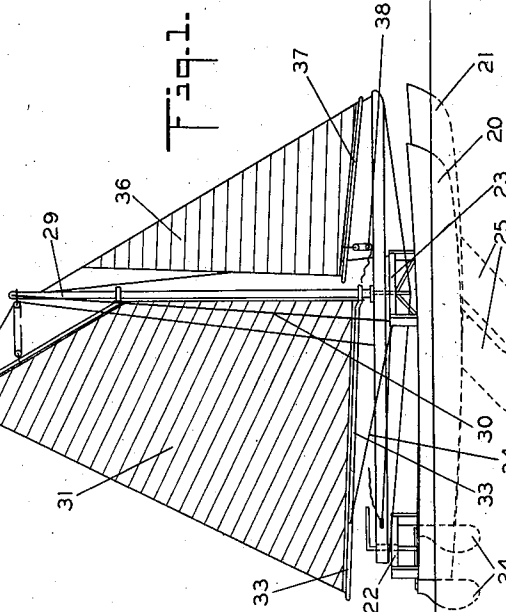
M. MCINTYRE

2,106,432

SAILING CRAFT

Filed June 27, 1934

5 Sheets-Sheet 1



INVENTOR.
MALCOLM MCINTYRE
BY HIS ATTORNEYS

Hawson and Hawson

Jan. 25, 1938.

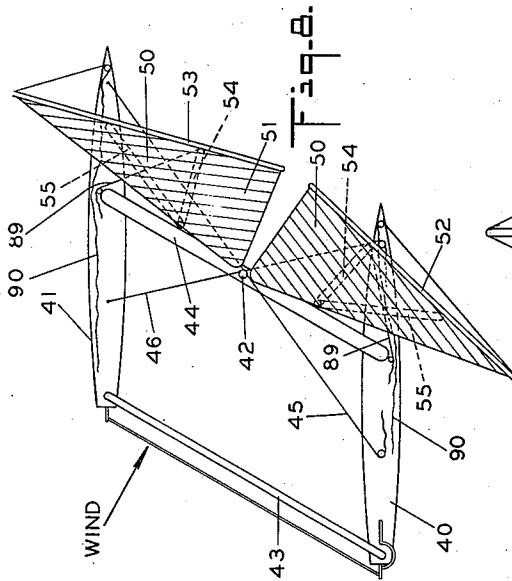
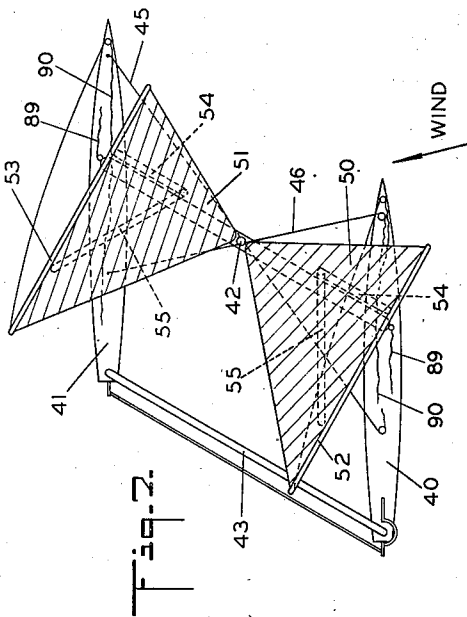
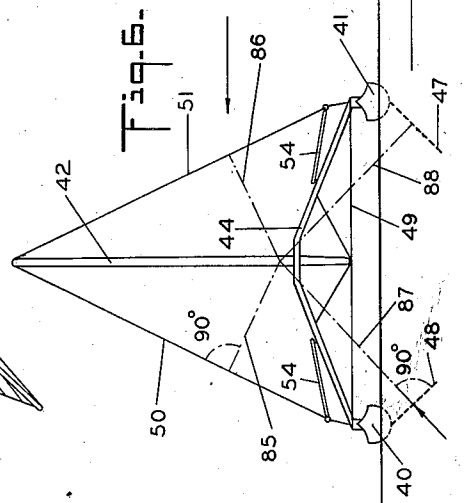
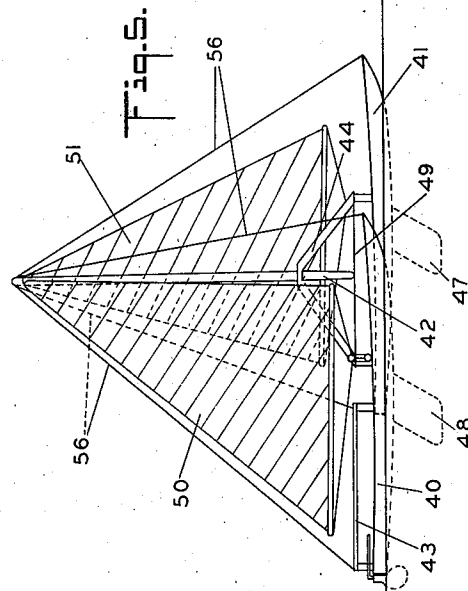
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2,106,432

SAILING CRAFT

Filed June 27, 1934

5 Sheets-Sheet 2



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Jan. 25, 1938.

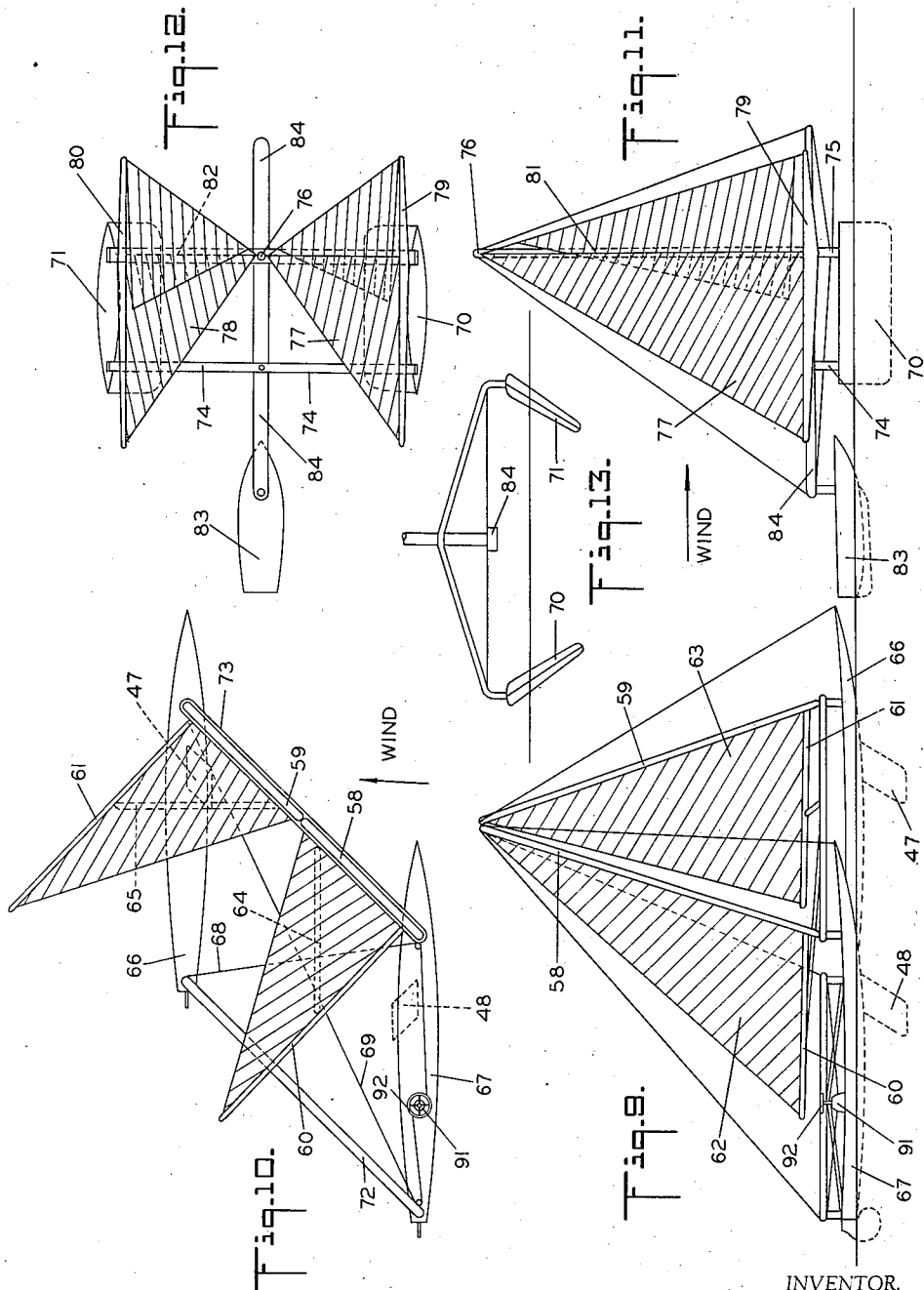
M. MCINTYRE

2,106,432

SAILING CRAFT

Filed June 27, 1934

5 Sheets-Sheet 3



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Hawken and Hawken

Jan. 25, 1938.

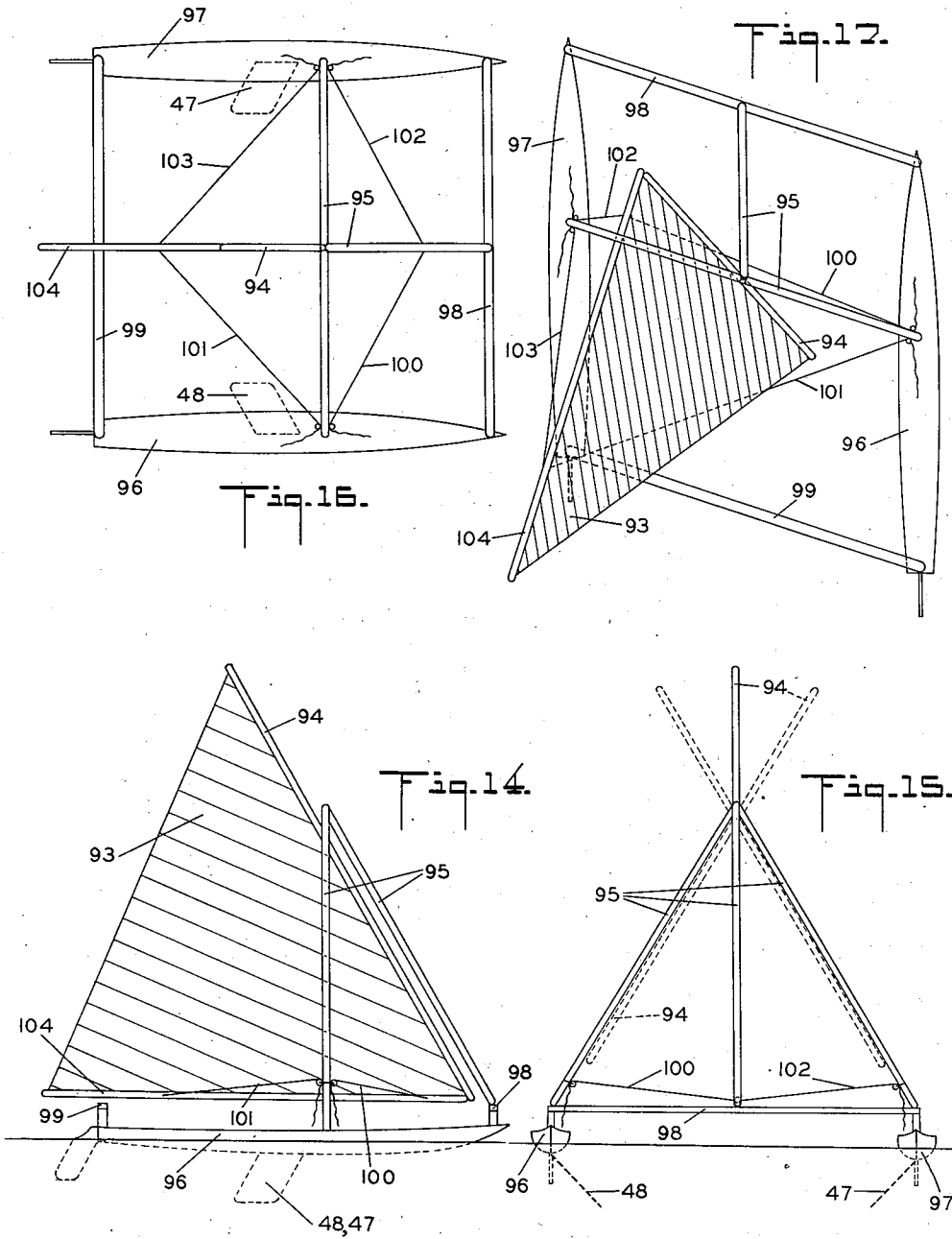
M. McINTYRE

2,106,432

SAILING CRAFT

Filed June 27, 1934

5 Sheets-Sheet 4



INVENTOR
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Hovsen and Hovsen

Jan. 25, 1938.

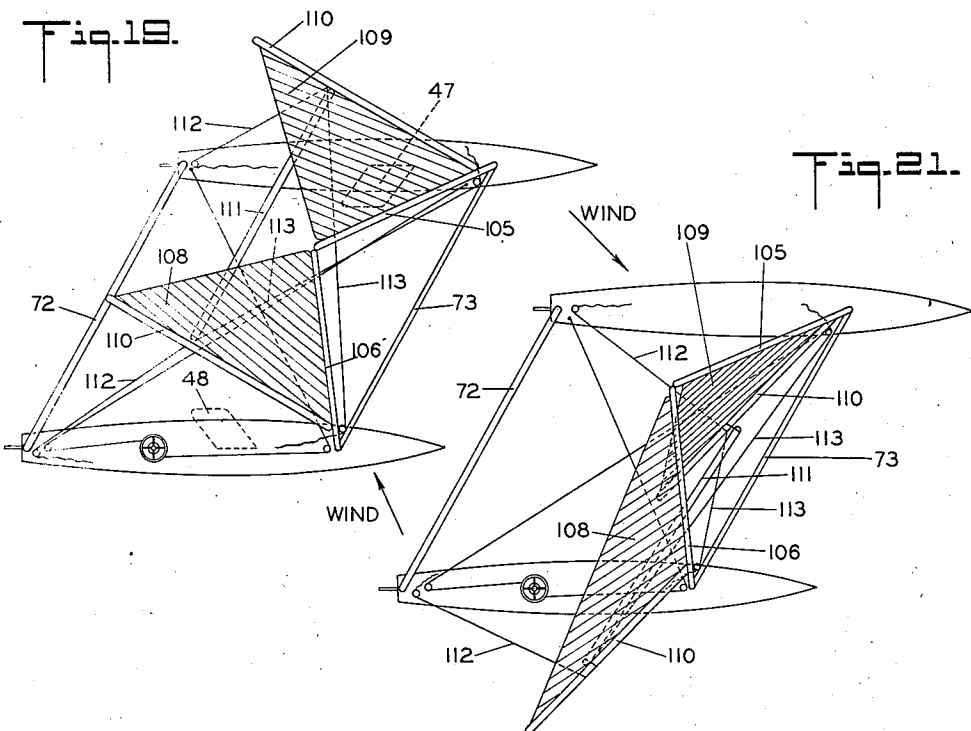
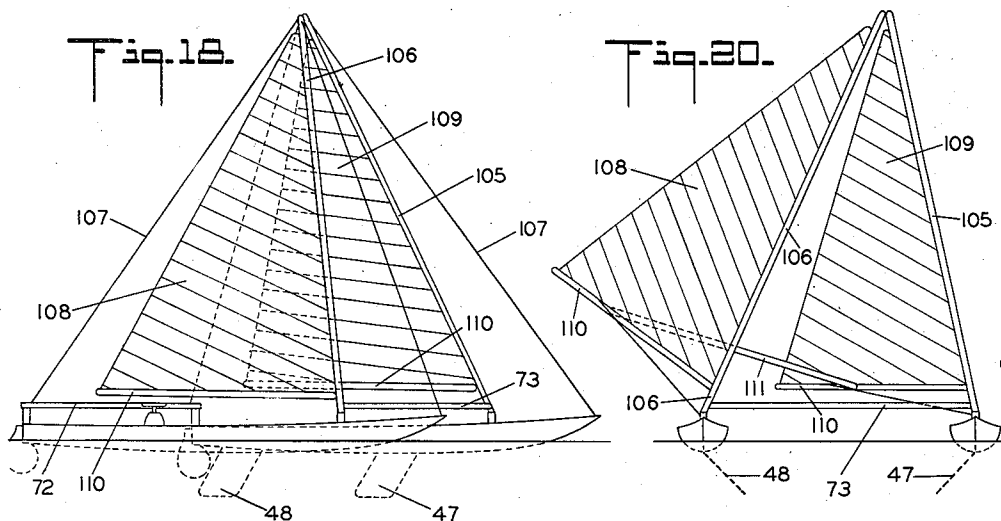
M. MCINTYRE

2,106,432

SAILING CRAFT

Filed June 27, 1934

5 Sheets-Sheet 5



INVENTOR
MALCOLM MCINTYRE
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Horizon and Hovey

UNITED STATES PATENT OFFICE

2,106,432

SAILING CRAFT

Malcolm McIntyre, Old Greenwich, Conn.

Application June 27, 1934, Serial No. 732,714

22 Claims. (Cl. 114—39)

My invention relates to sailing craft and more particularly to vessels having two hulls or planes spaced laterally from each other. One object of the invention is to produce a sailboat of great stability, and another object is to produce a craft which will be speedy.

My sailing craft is so built as to cause the overturning effect of the wind to be counteracted for all practical purposes without the use of ballast. It should be understood that my mechanism, if desired, can be made as an entire craft, model, or as a detachable rig which can be placed on two canoes or hulls or runners, wheels, etc. It can also be incorporated in model sailing craft. It also will be obvious that more than two hulls can be used, if desired.

In the drawings,

Fig. 1 is a side elevation of a sailing craft having the hulls shifted longitudinally with respect to each other and having vertical centerboards and a fore and aft sail rig, the port hull being shown advanced slightly over the starboard hull, certain ropes or sheets being omitted;

Fig. 2 is a front elevation of the craft shown in Fig. 1, with the sails omitted and the hulls opposite each other, certain lines being omitted.

Fig. 3 is a plan view of the craft shown in Fig. 1 with the hulls and sails adjusted in the same manner as in Fig. 1, the wind coming from the starboard bow as shown by the arrow;

Fig. 4 is a plan view similar to Fig. 3 showing the port hull well advanced and the sails held out at an angle of about 60° from fore and aft, the wind coming from the starboard quarter as indicated by the arrow;

Fig. 5 is a view similar to Fig. 1, of a modified form of sailing craft, showing inclined centerboards and inclined sails, the sails and hulls being adjusted for a wind coming from the starboard bow as shown by the arrow in Fig. 7;

Fig. 6 is a front elevation similar to Fig. 2 of the craft shown in Fig. 5, the sails being shown with booms fore and aft over the respective hulls, and the direction of the force of the wind and opposing forces tending to stabilize the craft being indicated by arrows and diagonal lines;

Fig. 7 is a plan view similar to Fig. 3, of the craft shown in Fig. 5, the craft being set as in Fig. 5, certain guy wires being omitted;

Fig. 8 is a plan view of the craft of Figs. 5, 6 and 7, with the sails set to run before the wind;

Fig. 9 is a side elevation, and Fig. 10 a plan view, of a second modified form of my invention, there being two inclined masts meeting at the top at the center of the ship, the sails and hulls

being adjusted for the starboard tack with wind on the starboard beam, as indicated by the arrow in Fig. 10;

Figs. 11 and 12 are respectively a side elevation and a plan view of a sailing craft made in accordance with my invention and having jibs in addition to the mainsails and a central rear hull to carry passengers;

Fig. 13 is a vertical section across the frame and buoyant inclined planes of the sailplane of Figs. 11 and 12 on the line of the mast;

Fig. 14 is a side elevation of a further modification of my invention, there being a single lateen sail mounted on a tripod mast;

Fig. 15 is an elevation of the bow of the sailing craft of Fig. 14 showing the yard in its central and two extreme or side positions;

Fig. 16 is a plan view of the craft shown in Fig. 14;

Fig. 17 is a plan view of the craft of Fig. 14 with the hulls and sail adjusted for a wind from the starboard beam with the sail to leeward;

Fig. 18 is an elevation and Fig. 19 a plan view of a modification like Figs. 9 and 10 except that the masts slope aft, the views showing the lead of the hulls and the trim of the sails for sailing with the wind from the starboard bow, as indicated by the arrow in Fig. 19; and

Fig. 20 is a bow elevation and Fig. 21 a plan view of the craft of Figs. 18 and 19 when adjusted for a wind from the port quarter, as indicated by the arrow in Fig. 21.

It is well known that the wind pressure on a sailboat tends to cause it to "lay over", and if the wind is coming from aft it will tend to depress the bow. In addition to the risk of capsizing, this keeling over and burying of the bow interferes with the sailing qualities of the boat. Various devices have been tried to give the boat stability to resist the keeling over. The most generally used device is ballast. The present invention does away with that entirely.

My present invention is an improvement on U. S. Letters Patent No. 1,356,300, dated October 19, 1920, granted to me and my brother, Thomas A. McIntyre, and on our U. S. Letters Patent No. 1,670,936, dated May 22, 1928. I have discovered that the double hull type of sailboat or plane can be much improved in its sailing qualities if the two hulls or planes as distinguished from centerboards (hereinafter called "hulls") are made longitudinally movable with respect to each other while maintaining them substantially parallel, as in the case of a parallel ruler.

It is also characteristic of the sails of my sail-

boat that the sails are set with relation to the struts connecting the two hulls, and trimming the sails and the hulls to the wind is done by adjusting the skew or relative advancing or displacing of the hulls. This works out in such a way that when the crew sets the sails properly for the wind by adjusting the skew of the hulls, the proper degree of skewing of the hulls to put the force of the wind at the midpoint of the vessel will automatically be obtained.

To illustrate this skewing or displacing of the hulls, I first will describe the construction shown in Figs. 1 to 4. This is a double hull type of sailboat having two narrow deep hulls 20 and 21. These hulls are kept parallel and spaced apart by a rear strut 22 and a fore strut 23. These struts are braced so as to keep the two hulls upright in cross section, i. e., prevent their rolling individually, and are pivoted to the hulls in such manner that one hull can be advanced ahead of the other in the form of a parallelogram, as shown for instance by Figs. 3 and 4. The amount of shifting of the hulls is determined by the different points of sailing. Each hull has a rudder 24 and a vertical centerboard 25.

In the construction shown in Figs. 1 to 4 there is a cockpit 26 midway between the two hulls. The fore and aft struts 22 and 23 permit each hull to pitch individually, but as already mentioned, the struts do not permit the hulls to roll. When sailing in a seaway there is very little motion to the spars and rig, as they take the average motion of the two hulls. The fore and aft adjustments for advancing and retarding of the hulls are accomplished by means of two diagonal skew lines 27 and 28 (Figs. 3 and 4), the line or rope 27 going from near the point of attachment of the fore strut 23 to the starboard hull 20 to the starboard side of the cockpit 26 aft, and the rope 28 extending from the point of attachment of the fore strut 23 to the port hull 21 to the port side aft of the cockpit.

The ropes 27 and 28 are fastened to the sides of the cockpit in any desired manner. There is a vertical mainmast 29 mounted in the cockpit at the middle of the fore strut 23, extending vertically and held by the stays 30 shown in Figs. 1 and 2. The rig has the usual fore and aft mainsail 31 having a gaff 32 on the mast 29. The boom 33 is always kept at right angles to the fore strut by means of fixed guy wires 34 and 35. In addition, if desired, there can be a jib sail 36 having a jib boom 37, the sail being fastened to the top of the mainmast 29 in the usual manner, the rear end of the jib boom 37 being allowed to swing outwardly by means of the block and tackle or jib sheet 38. With this rig the mainsail is trimmed to the wind by staggering the hulls, i. e., advancing the lee hull until the sails are in the proper position. This, as already mentioned, is accomplished by means of the skew lines 27 and 28. The jib sail 36 is trimmed to be about parallel to the mainsail 31. With this skewing it will be found that the tendency of the leading hull to have its bow pushed under by the wind is reduced as the wind pressure is applied amidships, which is opposite the centerboard.

It will be observed that the struts hold the two hulls parallel fore and aft for all practical purposes, even when one hull is pitching.

The construction shown in Figs. 5, 6, 7 and 8 differs from that of Figs. 1 to 4 principally in that there are two inclined sails and the centerboards are inclined. Instead of the deep narrow hulls of the craft of Figs. 1 to 4, in these Figs.

5, 6, 7 and 8 the starboard hull 40 and the port hull 41 are wider and shallower, thus providing room for the crew and passengers on the hulls rather than in a central cockpit. The aft strut 43 joining the hulls can be of lighter construction than that shown in Figs. 1 to 4, because it does not have to support the cockpit. The fore strut 44 is preferably arched upwardly, as can be seen in Figs. 6, so that its high point is amidships. As in the case of the construction shown in Figs. 1 to 4, these struts 43, 44 hold the two hulls 40, 41 vertical in cross-section so as to prevent rolling individually, but permit one boat to pitch by itself, and of course permit the advancing of one hull ahead of the other—or "skewing", as it can be termed. For the purpose of skewing the hulls in this craft, the skew lines 46, 45 run respectively from the bow of the starboard hull 40 to a point aft amidships of the port hull 41 and from the bow of the port hull to a point aft amidships of the starboard hull 40. The adjustments of both skew lines 45, 46 are preferably made from one hull by having the free or adjustable ends of the skew lines both on one hull, as shown for instance in Figs. 7 and 8. The ship in these figures is controlled from the starboard hull.

The centerboards on this craft differ from those shown in Figs. 1 to 4. In the present example the centerboard 48 on the starboard hull 40 inclines to port about say 40° and the port centerboard 47 is inclined to starboard the same number of degrees. In other words, each centerboard is inclined inwardly as shown in Fig. 6. This boat has a vertical mast 42 amidships carried by the fore strut 44 extending below that fore strut to a cross wire 49 fastened to the ends of the fore strut, to add to the stability of the mast and the fore strut.

The rig of Figs. 5 to 8 has two sails inclined to the mast, each having a connection from the bottom to a point over the center line of a hull adjacent the end of the fore strut 44 and a connection at their tops to the mast. There are the usual shrouds 56 for holding the masts, passing over sheaves at the top of the mast to permit compensation for the skewing of the hulls. In this rig there are no jib sails, and the two mainsails, i. e., a starboard sail 50 and port sail 51, are complementary. Each sail has a boom 52, 53. Each boom is held down by a wire bridle 57 fastened to the fore and aft ends of the boom. A sheet 59 is attached to this bridle 57 and to the hull adjacent to the end of the strut 44. Each boom is also held by two arms 54, 55 joined to the boom at spaced points, the arms going to a point on the fore strut where they are pivoted. This point on the strut is between the foot of the mast and the point of connection to the adjacent hull—one on either side of the mast. In the embodiment shown in the drawings the sail is of a pyramidal shape with the lower rear end longer than the forward end. It will be obvious that each boom—and therefore the entire sail—can be swung about a center point located between the hulls to face in any desired direction. A wire stay can be fastened along the forward edge of each sail.

The booms are ordinarily kept in their usual position at right angles to the fore strut by sheets 59 and arms 54 and 55. When running before the wind they are pulled around to the front of the mast by sheets 90 (Fig. 8). The sheets 90 are fastened to the aft end of the boom carrying the sail and are each reeved through a sheave at the bow of its hull. Thus in Figs. 5 and 7 the vessel is shown with the

wind coming from the starboard bow, the starboard sail boom 52 at an angle of say 30° with its hull crossing to port at the rear, and the port sail 51 similarly related to the port hull 41.

5 The force of the wind tending to cause overturning of the vessel can be considered as exerted on the inclined sails perpendicularly to their surface at the center of effort, as shown in Fig. 6 by the lines 85, 86. It is the centerboards 10 which do the principal resisting against this overturning force, and by having these centerboards inclined as shown and the sails also inclined, there is provided a force which can be made substantially equal and opposite to the 15 overturning force of the wind. Thus, the line 86 from the port sail 51 may be taken as an illustration of the direction of the overturning force of a wind on the port sail (represented by the arrow) pushing downwardly, and the same 20 is met and counteracted for all practical purposes by the resisting moment represented by the line 87 from the centerboard 48. Thus the centerboard 48 resists being pushed down. In addition, the centerboard 47 resists being raised.

25 To obtain stability, a line drawn normal to a sail through its center of effort must intersect a line drawn normal to the submerged lateral plane at its center of pressure, at a point on the vertical line of the center of gravity of the vessel. 30

It will be observed that this overturning force of the wind is received at a different point on the lee hull 41 by virtue of the advancing of that hull than it would be otherwise. If the 35 hull had not been advanced this force would be applied near the bow of the hull, and that would tend to cause the familiar "burying". By advancing the lee hull 41 when the wind is from the starboard, the force is felt nearer amidships and at the point where the centerboard is located. This naturally distributes the pressure 40 more evenly and causes it to be applied directly opposite the principal resisting or righting force of the hull and centerboard and sails so that the ship stands up with practically no keeling over or burying of the bow. 45

Another modification of my invention is shown in Figs. 9 and 10 where the masts and sails are differently arranged. Whereas in Figs. 5 to 8 inclusive there was a single upright mast amidships of the two hulls, in Figs. 9 and 10 there are two masts 58, 59 each mounted on a hull and inclined toward the center of the ship at an angle of say 30°. These masts do not take 55 the place of the forward strut 73, which can be the same as the forward strut in Figs. 1 to 4 inclusive. The hulls 66 and 67 have the inclined centerboards 47, 48 of the ship shown in Figs. 5, 6, 7, 8, and it will be noted that they are inclined so that each centerboard is inclined in the opposite direction to the mast on its hull. The sails shown in these two Figures 9, 10 are the ordinary leg-of-mutton sails 62, 63 with booms 60, 61 pivoted near the foot of the mast. The 65 booms 60, 61, however, are braced in order to hold them at right angles to the forward strut 73, this being accomplished by an arm 64, 65 fastened near the middle of each boom and near the middle of the forward strut. It will be obvious that as one hull is advanced over the other, or the two are brought more nearly in line, the sails move around, maintaining their position with regard to the forward strut. As in the case of the construction shown in Figs. 3 and 4 and the constructions shown in Figs. 5-8, the 70 75

degree of advancement of the lee hull is determined by the proper adjustment of the sails with relation to the wind. In this construction the skew lines 68, 69 are fastened one at the point of attachment of each strut to one hull and extend from there about pulleys adjacent the points of attachment of the other struts to the other hull, the two free ends being on one hull for ease in management. 5

In Figs. 9 and 10 there is shown an improved 10 mechanism for managing the skew lines, consisting of a tapered drum 91 and a hand-wheel 92 for controlling the drum. This drum is shown mounted on the deck of the starboard hull 67 and the two skew lines are shown wound around 15 the drum. By turning the handwheel the drum is turned and the skew lines are pulled so as to keep both taut and yet advance the hulls as required. I have noted that the length of the skew lines is not the same when the hulls are 20 opposite each other, as when one hull is advanced and the hulls form a parallelogram. I have allowed for this fact by making the drum 91 tapered so that the amount wound on the drum is not the same when the hulls are parallel and when one hull is advanced. 25

In Figs. 11, 12 and 13 a further modification is shown, in that instead of having ordinary hulls, hulls in the form of hollow planes 70, 71 are employed. For the accommodation of the crew 30 in this case it becomes necessary to put a small boat 83 at the rear, and this is connected to a central backbone 84 fastened to the fore and aft struts 75, 74. The mast 76 is mounted on the forward strut 75 and two leg-of-mutton mainsails 77, 78 are inclined at say 30° or other desired angle, similar to those shown in Figs. 5-8. The mainsails have booms 79, 80 which extend forward of the mast, though the mainsails do not. Supplementing these leg-of-mutton sails 40 are small jibs which overlap the mainsails at the bottom. Their forward lower corners are attached to the forward ends of the main booms 79, 80. The luffs of the mainsails are fastened to wire stays 81, 82 which run from the booms 79, 80 to the top of the mast. In these two views the ship is shown with the sails trimmed fore and aft. In this case the small hull 83 which carries the passengers can be pivoted at the point of attachment to the backbone 84 so as to act as a rudder. As in the case of all the previous constructions, the hulls can be skewed, i. e., one advanced ahead of the other, to trim the craft. The skew lines and other controls are not shown in Figs. 11 and 12, but they can be similar to those shown in the previous constructions, more particularly that shown in Figs. 1-4, and can be controlled from the small boat 83. 50 55

In Figs. 14 to 17 inclusive, is shown an embodiment of my invention in which a single triangular sail 93 is made to act as a sail inclined to catch wind from port or starboard according to which way it is inclined. This sail 93 is mounted on a long yard 94 as a lateen sail midway between the two hulls, the yard being slung at a considerable distance from its lower end by a tripod. This tripod consists of three masts 95 one extending sideways and stepped in each hull 96, 97 and the third being slanted forward and stepped at the forward strut 98, connecting the bows of the two hulls. The aft strut 99 is located at the sterns of the hulls. The centerboards 47, 48 are shaped and located on the hulls as in the ship shown in Figs. 5 to 8. The trim of the sail is controlled by four guy sheets 100, 75

101, 102 and 103 (Figure 16). A sheet 100 extends from the starboard hull to the forward end of a boom 104 fastened to the lower edge of the sail, the sheet being adjustable at the hull end. Another sheet 101 extends from the starboard hull to the aft end of the boom 104. There are corresponding sheets 102 and 103 from the port hull to forward and aft ends of the boom respectively. The length of each sheet can be adjusted at its hull end. It will be obvious that the yard 94 can be swung to either side of the ship as shown in Fig. 15, and further that by pulling the forward and aft ends of the boom sideways to different extents, the sail can be trimmed for any wind. Thus in Fig. 17 the sail is shown inclined and angled over the port hull to catch a wind from the starboard side. The skew lines for the hulls are not shown in these figures, any of the skew lines of the previously described embodiments being satisfactory.

In light winds this single lateen sail is held vertical and also trimmed by skewing the hulls. As the wind increases, the weather boat will lift and the lee boat will tend to bury more than desirable. The foot of the sail is then allowed to go to leeward by adjusting the boom by means of the four guy sheets 100, 101, 102, 103 (Fig. 17). Thus with a strong breeze the foot of the sail or the boom 104 has to be swung to leeward on each tack or jib of the craft.

In Figs. 18 to 21 inclusive is shown still another modification of my invention. This embodiment differs from that shown in Figs. 9 and 10 in the angle of the masts and the manner in which the sails are controlled. There are two masts 105, 106 each stepped on a hull forward of amidships, the two masts leaning towards each other. However, these masts differ from those in Figs. 5 to 8 in that in addition to leaning toward each other they lean aft. They are held by guy wires 107 running from the bow and stern of each hull through sheaves at the junction point of the tops of the two masts. There are two sails 108, 109. Each is mounted with one edge along its mast and there is a boom 110 along its lower edge. To keep the two booms parallel there is a stretcher 111 pivoted to each boom about one third of the length of the boom from the aft end. To hold or change the position of the booms, stays are attached to each boom, one (112) running to the stern of the hull on the side where the mast is stepped and the other (113) to the bow or the end of the fore strut at the opposite hull. Preferably the point of attachment of the stays to the boom is at or near the pivot point of the stretcher 111. At the hulls the stays can be put through sheaves and fastened on cleats as usual. By adjusting the stays 112 and 113 the booms can be swung further to leeward than their normal position at right angles to the fore strut 73. In Figs. 18 and 19 the booms are at right angles to the fore strut with the hulls skewed for a wind coming from the starboard bow as indicated by the arrow in Fig. 19. In Figs. 20 and 21 the craft is shown sailing with the wind as indicated by the arrow in Fig. 21, namely, over the port quarter. In this setting the booms are nearly parallel to the fore strut 73. When sailing directly before the wind the two hulls are brought opposite each other by the skew lines and the booms left in their adjustment shown in Fig. 20. When jibing both sails are jibed over, by means of the boom stays 112 and 113 in the same manner as the usual fore and aft sails are jibed.

I have discovered that by combining the inclined planes or center boards with the sloped sails, the ship can be made to have the proper stability and balance to wind pressure when combined with the skewing of the hulls, thus providing an ideal sailing craft.

The manipulation of the vessels having inclined sails may be described as follows. On the wind, the lee hull is moved ahead a little, swinging the booms to leeward to their correct trim, close hauled. When "keeping-off", the lee hull is skewed further ahead until the correct trim of the sails is obtained. When sailing with the wind more than two or three points abaft the beam, the lee sail commences to be blanketed by the weather sail. In the case of the craft shown in Figs. 5 to 8, both booms are then swung forward nearly parallel to the forward cross strut and held by means of fixed sheets 89 and 90. The booms are kept in this position for a broad reach or before the wind, the sails acting like a squaresail. When running before the wind, the centerboards are raised as their stabilizing effect is not then required. In the cases of the vessels shown in Figs. 5 to 17, the sails are not jibed when going from one free reach to the other.

Referring more particularly to Figs. 5 to 8, when tacking, jibing or changing course, the sails are trimmed entirely by turning the "skew wheel" and practically no effort is required. When luffing from a beam wind to by-the-wind, the helm is put down a little and no power is needed on the skew wheel to drop back the lee hull and so trim the sails. There are no backstays, sheets, etc., to handle except the fixed sheets which are used when the booms are "winged out".

In handling the craft a slight turn of the helm and a readjustment of the skew lines cause the boat to turn about, each hull turning on its own center. In this respect the ship is different from the ordinary catamaran, which turns on the common center of the two hulls. With the applicant's rig the ship can be stopped and she can be made to sail astern without changing her heading. This is due to the fact that the booms of the sails are fixed. The ship is very seaworthy, taking the wind without keeling over, burying, rooting or gripping in a strong breeze. It will be obvious that since the craft takes the wind without keeling over and carries no ballast, it will sail very fast.

It will be noted that the centers of effort 85, 86 and inclination of the sails, the centers of lateral resistance 87, 88 and inclination of centerboards, and the distance apart of the two hulls, have all been figured to give complete stability without consideration of the hull's displacement. There is no tendency to lift the weather hull or bury the lee hull. In other words, the wind pressure on the inclined sails is balanced by the water pressure on the inclined centerboards for all points of sailing except when the wind is aft, and the only function of the hulls is to hold and float the centerboards, the rig and the crew.

While in the claims I speak of sailing craft, it should be understood that I include not only vessels having two or more hulls but sail rigs to be mounted on a plurality of hulls or runners or wheels or models of such vessels or rigs. Where I speak of hulls I should be understood as including planes. Where I speak of centerboards I should be understood as including fins, lee boards and keels as well as centerboards.

When I speak of booms it is understood to include "wish-bone" booms, and single sprit booms, which have only the clew of the sail attached to one end of the boom, the boom slanting upward from the foot of the sail, the other end being attached to the mast or spreader.

What I claim is:

1. A sailing craft of the catamaran type having two similar hulls and a fore and aft rig, a mast carried thereby, a sail carried by said mast, a boom on said sail, and struts spaced longitudinally of said hulls and pivotally connected to said hulls at corresponding points thereon, said struts holding said hulls parallel but permitting one hull to be advanced with respect to the other, in combination with means for holding said boom at right angles to one of the struts as a hull is advanced and means controlling the advancement of the hulls.

2. A sailing craft having two hulls, a plurality of struts connecting said hulls and permitting skewing thereof, means connecting said struts together, a mast on said connecting means, a sail attached to said mast, a boom attached to said sail, means holding said boom rigidly at right angles to the strut carrying the mast, and means controlling the skewing adapted to be operated from the means connecting the struts.

3. A sailing craft of the catamaran type having two similar hulls and fore and aft rig and means connecting said hulls permitting either hull to be advanced ahead of the other while maintaining said hulls parallel, in combination with a rope fastened to the forward half of one hull and the after half of the other, and another rope fastened to the after half of the first hull and the forward half of the second hull, for the purpose of advancing one hull relatively to the other and maintaining the hull advanced.

4. A sailing craft of the catamaran type having similar hulls, continuous spaced struts extending between said hulls, flexible couplings connecting said struts individually to said hulls, said struts and couplings being constructed and arranged to hold said hulls parallel while permitting relative longitudinal displacement thereof and means extending between said hulls and connected thereto for relatively displacing said hulls longitudinally and for holding said hulls in relatively fixed positions.

5. A sailing craft of the catamaran type having similar hulls, continuous parallel rigid means extending between said hulls, flexible couplings connecting said rigid means individually to said hulls, said rigid means and couplings being constructed and arranged to hold said hulls parallel while permitting relative longitudinal displacement thereof, means extending between said hulls and connected thereto for relatively displacing said hulls longitudinally, a sail, sail supporting means carried by said craft and means connecting said sail and hulls for trimming said sail by relatively longitudinally displacing said hulls.

6. A sailing craft of the catamaran type having similar hulls, continuous parallel struts extending between said hulls, flexible couplings connecting said struts individually to said hulls, said struts and couplings being constructed and arranged to hold said hulls parallel while permitting relative longitudinal displacement and pitching of said hulls and means extending between said hulls and connected thereto for relatively displacing said hulls longitudinally and for holding said hulls in relatively fixed positions.

7. A sailing craft of the catamaran type hav-

ing similar hulls, continuous spaced parallel rigid means extending between said hulls, flexible couplings connecting said rigid means individually to said hulls, said means and couplings being constructed and arranged to hold said hulls parallel while permitting relative longitudinal displacement thereof and lines extending from spaced points on said craft to a common point for relatively displacing said hulls longitudinally and for holding said hulls in relatively fixed positions.

8. A sailing craft of the catamaran type having similar hulls, continuous parallel means extending between said hulls, flexible couplings connecting said parallel means and hulls, said means and couplings being constructed and arranged to hold said hulls parallel while permitting relative longitudinal displacement thereof, means extending between said hulls and connected thereto for relatively displacing said hulls longitudinally and for holding said hulls in relatively fixed position, sail supporting means, a sail carried thereby, a boom secured to said sail and means connecting said boom to said hulls for holding said boom at a fixed angle to a line drawn through the midpoints of said hulls as said hulls are relatively displaced longitudinally.

9. A sailing craft of the catamaran type having two similar hulls, spaced parallel struts extending between said hulls, couplings arranged for pivotal movement about a vertical axis and connecting said struts individually to said hulls, said struts and couplings holding said hulls parallel during relative longitudinal displacement of said hulls, means for relatively displacing said hulls longitudinally, sails and centerboards carried by said hulls and struts, said sails and centerboards being inclined inwardly to position said centerboards to offer surfaces of lateral resistance to the overturning moment of the wind on said sails and means connecting said sails to said hulls and struts to adjust said sails by relative longitudinal displacement of said hulls, said means holding said centerboards and sails positioned with the centerboard opposing the overturning moment of the wind on said sails during relative longitudinal displacement of said hulls.

10. A sailing craft having two hulls and fore and aft rig struts extending between said hulls and spaced longitudinally thereof, couplings pivotally connecting said struts and hulls, said struts and couplings maintaining said hulls parallel during relative longitudinal displacement thereof, a mast associated with said hulls and struts, a sail pivotally supported by said mast, a boom attached to said sail, means connecting said boom and one of said struts to hold said boom in fixed relation to said struts and to turn said boom with respect to said hulls as said hulls are relatively displaced longitudinally to trim the sail in combination with centerboards on said hulls inclined inwardly whereby said movements of hulls and sails maintain the center of effort of said sail and the centers of lateral resistance of said centerboards in the substantially same vertical plane.

11. A sailing craft having a plurality of hulls, mast means mounted on said craft, a sail pivotally mounted on said mast means adjacent the upper portion of said sail only for laterally swinging movement of said sail, a boom attached to the lower portion of said sail, rigid means extending between said hulls and spaced longitudinally thereof, couplings pivotally connecting said rigid means and hulls, said rigid means and couplings maintaining said hulls parallel and permitting

relative longitudinal displacement of said hulls and variable link means connected to the end portions of said boom and on and adjacent the ends of one of said rigid means for shifting both ends of the boom laterally of said craft to incline the sail to either side of said craft, said link means serving to trim said sail by relative longitudinal displacement of said hulls.

12. A sailing craft of the catamaran type having two similar hulls, a fore and aft rig and parallel means spaced longitudinally of said hulls and connected to said hulls for pivotal movement about a vertical axis, said means and said pivotal connections permitting said hulls to be relatively displaced longitudinally while maintaining said hulls parallel, in combination with lines extending diagonally between the hulls and a drum for operating said lines to control the relative longitudinal displacement of said hulls by said lines, said drum being tapered to keep the lines taut at all positions of the hulls.

13. A sailing craft of the catamaran type having two similar hulls and a fore and aft rig, parallel means spaced longitudinally of said hulls, said means extending between corresponding points on said hulls and connected thereto for pivotal movement about a vertical axis, said means and said pivotal connections maintaining said hulls parallel while permitting either hull to be displaced longitudinally with respect to the other and means for relatively displacing said hulls.

14. A sailing craft having two hulls, means connecting said hulls, and inwardly inclined centerboards on said hulls, in combination with two sails associated with said hulls and means supporting said sails, said sails being inclined inwardly from bottom to top, each sail and the opposite centerboard thus tending to direct the effort of the wind and the lateral resistance of the centerboards toward each other.

15. A sailing craft having two hulls, struts connecting said two hulls and permitting the advancement of one hull ahead of the other, masts on said craft and sails carried by said masts, the sails being inclined toward the center of the craft, in combination with centerboards on said hulls inclined inwardly at an angle of the same order as the angle to the vertical formed by the sail on the opposite side of the craft, said centerboards being inclined inwardly in all positions of said hulls.

16. A sailing craft having two hulls, means connecting said hulls permitting skewing of same, and sails, said sails being associated with said hulls and connecting means and inclined inwardly at the top from opposite sides of the craft, in combination with centerboards on said hulls each inclined inwardly at angles of the same order as and opposite to the associated sail, the skewing of the hulls and the angles of the sails and centerboards being adapted to cause the force of the wind on the sails to be at least partly opposed to the resultant of the lateral resistance of the centerboards.

17. A sailing craft of the catamaran type having two similar hulls and a fore and aft rig, a mast carried by each hull, a boom carried by each mast, a sail on each boom and parallel struts connecting corresponding points on said hulls and holding said hulls parallel but permitting either hull to be relatively displaced with respect to the other, in combination with means holding said booms at right angles to the struts as a hull is dis-

placed and means controlling the relative displacing of the hulls.

18. A sailing craft of the catamaran type having two similar hulls and a fore and aft rig, a mast carried by each hull, a boom carried by each mast, a sail on each boom and parallel struts connecting corresponding points on said hulls and holding said hulls parallel but permitting either hull to be relatively displaced with respect to the other, in combination with means holding said booms at right angles to the struts as a hull is displaced, means to place said booms parallel to said struts and means controlling the relative displacing of the hulls.

19. A sailing craft having two hulls, spaced parallel means connecting like points on said hulls, said means being constructed and arranged to hold said hulls parallel while permitting relative displacement longitudinally thereof, in combination with a mast supported by said means midway between said hulls, a boom, bracing means attached to said boom and adapted to pivot about a point on said connecting means offset from the boom and between the midpoint of said connecting means and one of the hulls and means passing between the two hulls and connected thereto for relatively displacing said hulls.

20. A sailing craft of the catamaran type having two similar hulls and a fore and aft rig, continuous parallel rigid means extending between said hulls, flexible couplings connecting said rigid means and hulls, said means and couplings being constructed and arranged to hold said hulls parallel during relative longitudinal displacement thereof, means for relatively displacing said hulls, sail supporting means associated with said rigid means and hulls and located between the latter, sail means carried by said sail supporting means and adjustable means for holding said sail means at a fixed angle with relation to said rigid means and changing the angle of the sail means with respect to said hulls as the relative longitudinal displacement of said hulls is changed.

21. A sailing craft of the catamaran type having two similar hulls and a fore and aft rig, spaced struts extending between said hulls, couplings pivotally connecting said struts and hulls, said struts and couplings being constructed and arranged to hold said hulls parallel during relative longitudinal displacement thereof, means for relatively displacing said hulls, a mast centrally located on one of said struts, a sail mounted on said mast, a boom projecting from said mast and connected to the lower end of said sail and means for connecting said boom to the strut carrying the mast and holding said boom in rigid relation thereto.

22. A sailing craft having two hulls, means connecting said hulls, said connecting means being constructed and arranged to hold said hulls parallel and for relative longitudinal displacement of said hulls, centerboards on said hulls, two sails associated with said hulls and said connecting means, each sail being inclined from the vertical to direct a component of the wind force in the general direction of the centerboards and means for connecting the sails and hulls for trimming the sails by relative longitudinal displacement of said hulls, said connecting means holding said sails and centerboards in position with the centerboards opposed to a component of the wind force on the sails.

CERTIFICATE OF CORRECTION.

Patent No. 2,106,432.

January 25, 1938.

MALCOLM MCINTYRE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 6, second column, line 36, claim 20, after the word "hulls" and before the comma insert longitudinally; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of March, A. D. 1938.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.