United States Patent [19]

Kratz

[11] **3,838,655**

[45] **Oct. 1, 1974**

[54] **SAILBOAT RIGGING**

[76] Inventor: **Kenneth E. Kratz,** Sisco St. P.O. Box 356, Westport, N.Y. 12993

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Related U.S. Application Data

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[52] **U.S. Cl.** **114/39,** 114/90, 114/102

[51] **Int. Cl.** **B63h 9/00**

[58] **Field of Search** 114/39, 102, 89, 90, 91, 114/97, 98

[56] **References Cited**

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Primary Examiner—Trygve M. Blix
Assistant Examiner—Stuart M. Goldstein
Attorney, Agent, or Firm—Samuelson & Jacob

[57] **ABSTRACT**

A sailboat in which an upwardly-extending mast is mounted upon the hull for free swinging movement about an upwardly-extending axis of rotation located aft of the mast and the boom is mounted for free pivotal movement about a pivotal axis extending transverse to both the axis of rotation and the boom intermediate the ends of the boom to allow upward and downward movement of the opposite ends of the boom, thus tending to balance the tension at the leech and the luff of the sail. In a gaff-rigged sailboat, the mast is hinged near its bottom end and the gaff is hinged to the mast near the top end of the mast so that the gaff can be folded against the mast and the mast and gaff together can be folded to a fore and aft position for ready transport of the sailboat, with minimal dismantling of the rigging.

3 Claims, 5 Drawing Figures

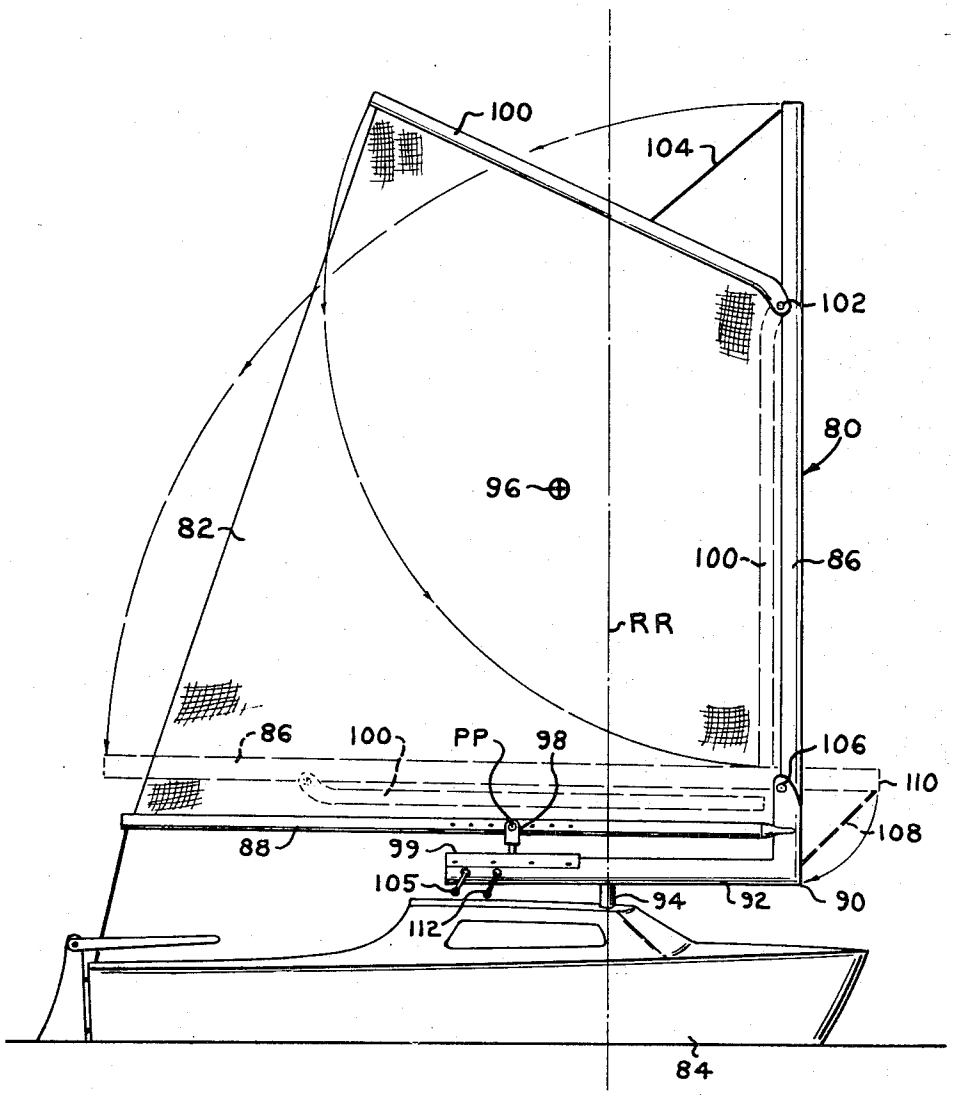
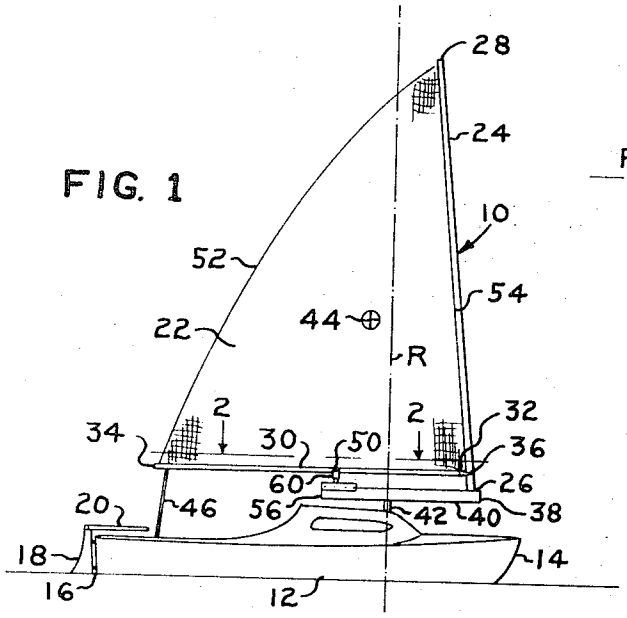


FIG. 1



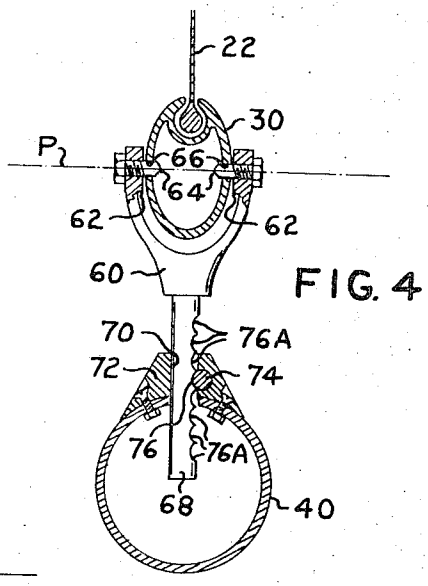


FIG. 4

FIG. 2

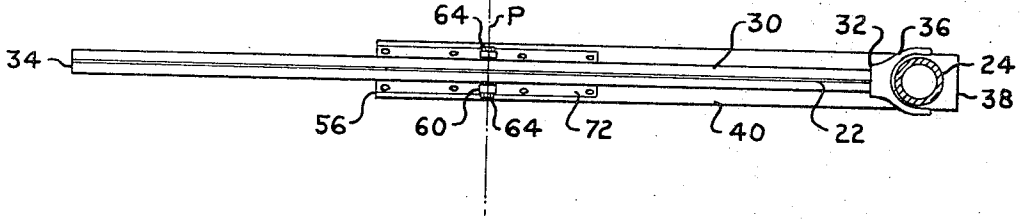
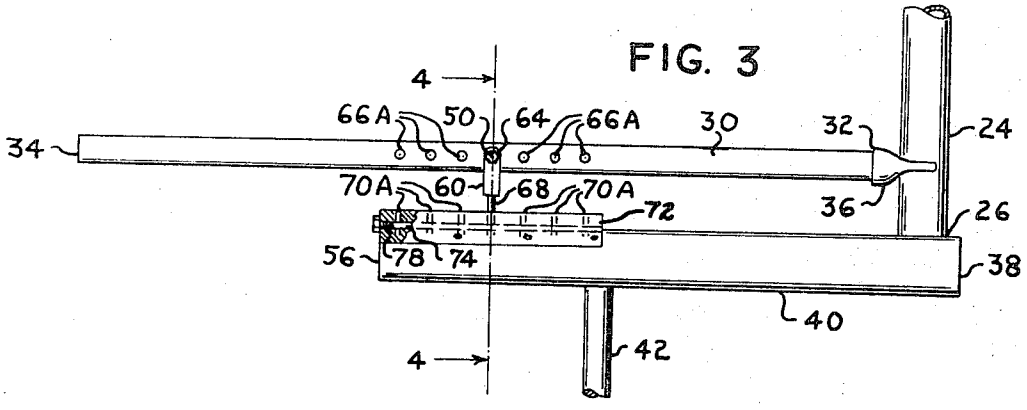


FIG. 3



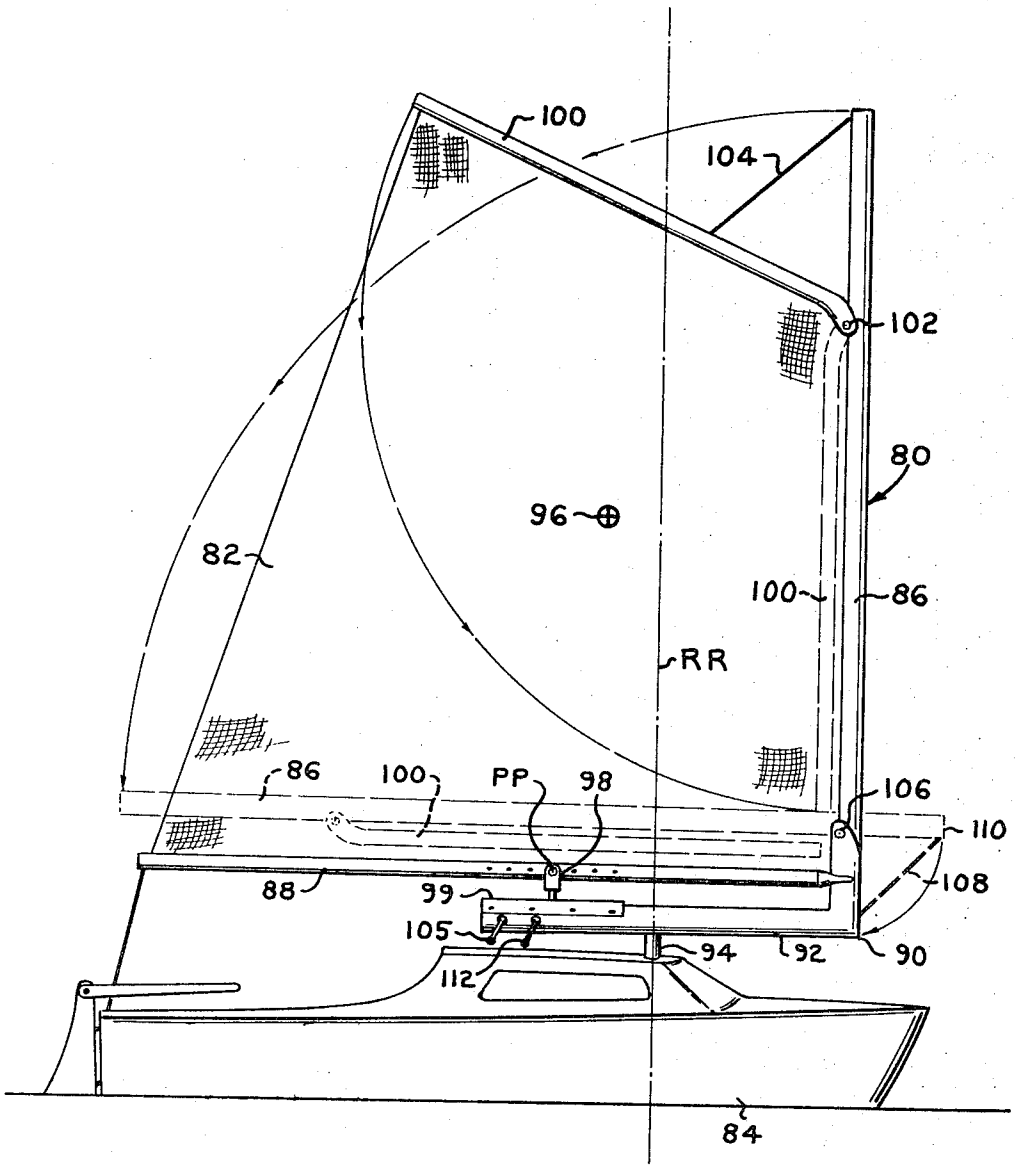

100
104
102
80
96
82
100
86
RR
86
100
PP
98
106
110
88
99
108
105
94
92
90
112
84

FIG. 5

SAILBOAT RIGGING

This is a division of application Ser. No. 230,334, filed Feb. 29, 1972, now U.S. Pat. No. 3,768,426.

The present invention relates generally to sailboats and pertains, more specifically, to improvements in the rigging of sailboats.

Currently, boating is enjoying increased popularity as more people become interested in piloting their own boats. The demand for small boats, in particular, has become great and has given rise to the requirement for boats which are easier to operate and which will operate with greater safety than before. These requirements are especially important in small sailboats which require some degree of skill for their proper operation and which are more apt to be operated by persons having little skill in the handling of such sailboats.

In my earlier U.S. Pat. application, Ser. No. 42,999, filed June 30, 1970, now U.S. Pat. No. 3,656,444, improved rigging is described for increasing the ease of handling sailboats. In the present application, there is described a further improvement which renders such rigging even more effective from the standpoint of both operation and construction.

It is therefore an important object of the present invention to provide sailboats with improved rigging for the purpose of increasing the ease of handling such sailboats and enabling simple operation with increased safety.

Another object of the invention is to provide a sailboat with rigging which establishes better balance and control together with more efficient propulsion.

Still another object of the invention is to provide a sailboat with rigging which tends to retain the sail at the most effective contour for propulsion by providing for the retention of a predetermined relationship between luff tension and leech tension in the sail during operation, thus enabling the sail to adhere to its design contour and reducing the tendency for the said to become distorted in use.

A further object of the invention is to provide rigging in a gaff-rigged sailboat which enables ease of transport of a gaff-rigged sailboat together with increased ease of erecting the gaff-rigged sail of such a sailboat.

A still further object of the invention is to provide, in a gaff-rigged sailboat, rigging which enables better balance and increased ease of control, with more efficient propulsion.

The above objects, as well as still further objects and advantages, are attained by the invention which may be described briefly as providing, in a sailing boat having a hull and a sail supported by a mast extending upwardly from a bottom end to a top end and a boom extending laterally from one end adjacent the mast to an opposite end remote from the mast, first means mounting the mast upon the hull for free rotation about an axis of rotation extending upwardly and spaced laterally from the mast in the direction extending from the mast toward the remote end of the boom, and second means coupled to the boom for enabling free pivotal movement of the boom about a pivotal axis extending transverse to both the axis of rotation and the direction in which the boom extends and passing through a point located laterally intermediate the opposite ends of the boom to allow upward and downward movement of the opposite ends of the boom about the pivotal axis.

The invention will be more fully understood, while still further objects and advantages will become apparent, in the following detailed description of preferred embodiments of the invention illustrated in the drawing, in which:

FIG. **1** is an elevational view of a sailboat employing improved rigging constructed in accordance with the invention;

FIG. **2** is an enlarged, fragmentary cross-sectional view taken along line **2—2** of FIG. **1**;

FIG. **3** is an elevational view of the components illustrated in FIG. **2**;

FIG. **4** is a further enlarged cross-sectional view taken along line **4—4** of FIG. **3**; and

FIG. **5** is an elevational view of another sailboat employing another embodiment of the improved rigging of the invention.

Referring now to the drawing, and especially to FIG. **1** thereof, a sailboat is illustrated generally at **10** and is seen to have a hull **12** which includes a bow **14** and a stern **16.** A rudder **18** is affixed to the stern in a conventional manner and includes a tiller **20** extending forward to a passenger compartment just forward of the stern.

The sail **22** of sailboat **10** is supported by a mast **24** which extends generally upwardly in a vertical plane (the plane of the paper) from a bottom end **26** to a top end **28** and a boom **30** which extends laterally between opposite ends **32** and **34.** A fork **36** is integral with end **32** of the boom **30** and engages the mast **24** in such a way that the end **32** of the boom is permitted to move upwardly and downwardly in a generally longitudinal direction along the mast but is precluded from movement in a transverse direction perpendicular to the vertical plane of the mast and the boom.

The mast **24** itself is affixed to one end **38** of a horizontal beam **40** and the beam **40** is mounted upon the hull **12** by means of a shaft **42** journalled upon the hull in a manner similar to that disclosed in my aforesaid patent application. In this manner, the mast **24** is free to rotate or swing about the longitudinal axis of rotation R of the shaft **42.** The axis of rotation R of the shaft **42** is located on the longitudinal centerline of the hull **12,** lies in the same common plane with the mast **24** and the boom **30,** and is preferably oriented in a vertical direction. Thus, the axis of rotation R is spaced laterally from the mast **24** in the direction extending from the mast toward the remote end **34** of the boom **30.** In addition, the axis of rotation R is preferably located between the mast **24** and the center of effort **44** of the sail **22,** with the center of effort **44** located relatively close to the axis of rotation. The center of effort of a sail is that point at which the whole propelling force of the wind might be applied to the sail to produce the same effect as when distributed over the entire area of the sail.

Because the sail assembly, which includes the boom **30** and the mast **24** as well as the sail **22,** is free to rotate about the axis of rotation R, the wind will swing the mast into the wind and the sail will luff, whenever the sheet **46** is released, regardless of the orientation of the sail assembly. Since the center of effort is in close proximity to the centerline of the hull there is a lesser tendency for the hull to point back into the wind, with a concomitant reduction in rudder correction, a reduction in drag and an increase in efficiency. In addition, control of the sailboat is enhanced by requiring less

manual force upon the sheet **46** which is connected to the remote end **34** of the boom **30.**

In use, the center of gravity of the sail assembly remains to the windward side of the hull. Thus, the weight of the sail assembly will counteract the tendency of the wind to cause the boat to heel.

In order to attain even more effective propulsion, it is desirable to maintain the sail at its particular design contour in all modes of operation. Where the boom is free to move relative to the mast, distortion may be introduced and the sail may tend to depart from its designed airfoil-like contour. The rigging of the invention tends to eliminate such distortion by providing for the retention of the boom **30** within the common plane of the mast **24** and the boom, and by precluding relatively large displacements of the boom **30** within that common plane, all without introducing undue stresses in the sail **22.** To accomplish such a result, means are provided for coupling the boom **30** to the beam **40** at a point **50** located laterally intermediate the opposite ends **32** and **34** of the boom **30,** and the boom is permitted to pivot freely about a transverse pivotal axis P (see FIG. **2**) passing through that point **50** and, in this instance, passing through the boom **30,** so as to tend to achieve a balance between tension in the sail **22** at the leech **52** and at the luff **54** of the sail.

Thus, referring to FIGS. **2** through **4,** as well as to FIG. **1,** the beam **40** extends beyond the shaft **42** in the aft direction to terminate at a second end **56** located laterally aft of the shaft **42.** A member, shown in the form of a yoke **60,** extends upwardly from the beam **40** and, as best seen in FIG. **4,** includes a pair of inwardly-extending shoulders **62.** The pair of shoulders **62** carries a pair of pins **64** threadedly engaged within the yoke **60** and extending along pivotal axis P transverse to both the axis of rotation R and the direction of extent of the boom **30.** The shoulders **62** engage the boom to retain the boom against transverse movement relative to the beam **40,** and thus confine the boom to the same common plane within which the mast, the beam and the axis of rotation R are located. The pins **64** engage complementary sockets **66** in the boom **30** such that the boom may pivot freely about the pivotal axis P to allow upward and downward movement of the opposite ends **32** and **34** of the boom about the pivotal axis. Such upward and downward movement of the opposite ends of the boom will enable the tension at the leech **52** of the sail **22** and the tension at the luff **54** of the sail to achieve a predetermined relationship, preferably a balance, determined by the location of the pivot point **50** provided by the pivotal axis P.

While the preferred location of the pivotal axis P is at or very near the mid-point between the opposite ends **32** and **34** of the boom **30,** varying conditions, such as wind force, sailboat load, water conditions, or other conditions normally affecting the operation of a sailboat, may require slight shifts or adjustments of the location of the pivotal axis relative to the boom, along the boom, to compensate for such conditions for any given sail configuration. In addition, different sail configurations may require different locations of the pivotal axis. For the same reasons, it may become necessary to relocate the boom and/or the pivotal axis upwardly or downwardly relative to the ends of the mast.

In order to provide for the relocation of the pivotal axis P laterally along the boom **30** relative to the ends **32** and **34** of the boom, the pins **64** may be withdrawn from the sockets **66** in the boom by rotating the pins relative to the yoke **60** until the pins **64** are entirely retracted from the boom **30** and the boom is released from the yoke **60.** The yoke **60** itself is supported by a column **68** which extends downwardly through an aperture **70** in a block **72** which is affixed to the beam **40.** A rod **74** extends along the length of the block **72** and intercepts the aperture **70** to engage a complementary notch **76** in the column **68** and thus secure the column **68** within the aperture **70.** The rod **74** is threaded adjacent one end thereof at **78** and engages complementary threads in the block **72** to secure the rod **74** in place. Upon disengagement of the thread of the rod **74** from the complementary thread in the block **72,** the rod may be withdrawn from the block to release the column **68** and thereby permit removal of the yoke **60** from its position on the beam **40.** The column **68** may then be inserted into any one of several alternate apertures **70A** in the block **72** and the pins **64** may be engaged in any one pair of several alternate pairs of sockets **66A** in the boom **30,** corresponding to the alternate locations of the yoke **60.** In this manner, the pivotal axis P is relocated relative to the boom **30.** The boom itself, along with the pivotal axis may be relocated upwardly or downwardly relative to the beam **40** and the mast **24** by selectively locating the rod **74** in any one of the alternate notches **76A** in the support column **68.** Thus, the yoke **60** may be selectively displaced relative to the boom and the beam to selectively relocate the pivotal axis P relative to the boom and the beam, as well as relative to the axis of rotation R, while still retaining the boom in alignment with the beam and in the common plane of the mast and the boom.

Turning now to FIG. **5,** another sailboat is illustrated generally at **80** and is seen to have an arrangement similar to sailboat **10** in that a sail **82** is carried upon a hull **84** by a mast **86** which extends upwardly and a boom **88** which extends laterally aft of the mast. The mast **86** is affixed adjacent one end **90** of a horizontal beam **92** carried by a shaft **94** which is journalled in the hull **84,** preferably along the centerline of the hull. The axis of rotation RR of the sail assembly is located near the center of effort **96** of the sail, as described above. Again, the boom **88** is mounted upon the beam **92** for pivotal movement about a transverse pivotal axis PP established by a yoke **98** affixed to a block **99** carried by the beam **92.**

Sailboat **80,** however, is gaff-rigged and includes a gaff **100** affixed to the mast **86** by means of a hinge **102** at a location spaced upwardly a considerable distance from the boom. The gaff **100** is retained in the erected position, wherein the gaff **100** extends laterally in the same general direction as the boom **88,** as illustrated in full lines, by a peak halyard **104** which extends from the gaff **100** to the mast **86** and then downwardly through the mast, whence it is routed to a first winch **105** mounted upon the beam **92.** The mast **86** itself is affixed to the beam **92** by means of a hinge **106** disposed a relatively short distance upwardly from the beam **92** and the boom **88.** A cable **108** extends between the bottom end **110** of the mast **86** and a second winch **112,** also carried by the beam **92.**

The sail **82** and rigging may be lowered quickly without removing the sail from the rigging by merely operating the first winch **105** to extend the peak halyard **104** and thus lower the gaff **100** from the first position,

illustrated in full lines in FIG. **5**, to the second position, illustrated in phantom, wherein the gaff extends along the mast, and by operating the second winch **112** to extend the cable **108** to enable movement of the mast **86** from the first position illustrated in full lines in FIG. **5**, to a second position, illustrated in phantom, where the mast **86** and the gaff **100** extend in a fore and aft direction, essentially parallel to the boom **88**. The relatively short distance between the beam **92** and the hinge **106** is great enough to enable the boom **88** to lie between the beam **92** and the mast **86** and the distance between the boom **88** and the hinge is great enough to enable the gaff **100** to lie between the boom and the mast when the mast and the gaff are in their respective second positions. Erection of the sail and the rigging is readily accomplished by merely reversing the procedure and operating the winches **112** and **105** to retract the cable **108** and the peak halyard **104**, respectively, to raise the mast and then raise the gaff to their respective first positions. In this manner, the sail and rigging may be lowered easily for transportation of the sailboat, such as by means of a trailer, and may be raised without delay when the sailboat is put to use.

It is to be understood that the above detailed description of preferred embodiments of the invention is provided by way of example only. Various details of design and construction may be modified without departing from the true spirit and scope of the invention as set forth in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a sailing boat having a hull and a sail supported by a mast extending upwardly from a bottom end to a top end and a boom extending laterally between opposite ends:

first hinge means coupling the mast with the hull such that the mast is movable between a first position wherein the mast extends upwardly and a second position wherein the mast extends laterally generally parallel to the boom;

a gaff; and

second hinge means affixing the gaff to the mast at a location spaced upwardly from the boom, when the mast is in the first position thereof, said second hinge means permitting movement of the gaff from a first position wherein the gaff extends laterally from the mast, in the same general direction as the boom, to a second position wherein the gaff extends along the mast;

the first hinge means being located upwardly relative to the boom a distance sufficient to enable the mast, the boom and the gaff to extend laterally mutually parallel to one another, with the gaff located between the mast and the boom when the mast and the gaff are in their respective second positions.

2. The invention of claim **1** including:

a peak halyard extending between the gaff and the mast; and

means for selectively extending and retracting the peak halyard to move the gaff between the first position thereof and the second position thereof and for retaining the gaff in said second position.

3. The invention of claim **2** wherein:

said mast extends downwardly beyond the first hinge means such that the bottom end thereof is located below the first hinge means when the mast is in the first position thereof;

a cable is affixed to the mast at the bottom end thereof; and

means are included for selectively extending and retracting the cable to move the mast between the first position thereof and the second position thereof.

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