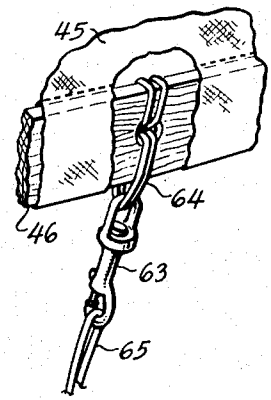
Nov. 22, 1955 J. J. SZAKACS 2,724,356

SAILBOAT

Filed March 29, 1951

Fig. 3



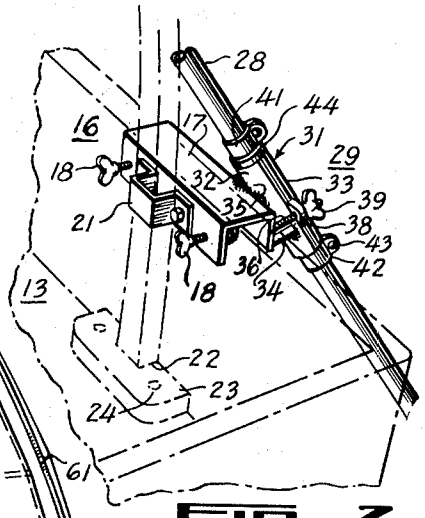
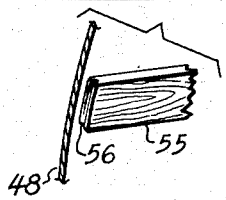




Fig. 2

Fig. 4



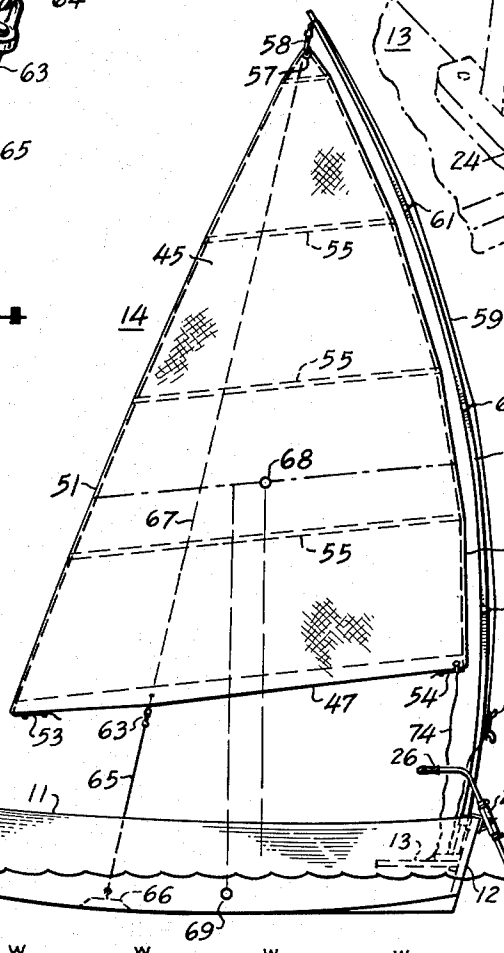




Fig. 1

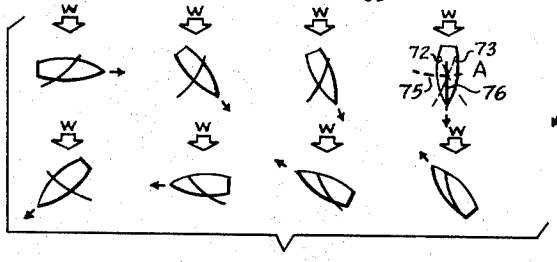



Fig. 5

INVENTOR:
Joseph J. Szakacs
BY
Walter J. Jason
ATTORNEY

United States Patent Office

2,724,356

Patented Nov. 22, 1955



2,724,356

# SAILBOAT

Joseph J. Szakacs, San Diego, Calif.

Application March 29, 1951, Serial No. 218,150

10 Claims. (Cl. 114—39)

This invention relates to watercraft and more particularly to an improved form of sailing rig for use with watercraft.

One object of this invention is the provision of a novel method of mounting a sail on a watercraft wherein the sail is automatically trimmed to a safe and correct angle relative to the wind.

Another object of the present invention is to provide for watercraft a sail and improved mounting apparatus therefor whereby, as the direction of the axis of the watercraft hull is changed relative to the direction of the wind, the sail is automatically actuated by wind pressure into proper position.

Another object of this invention is to provide a sailing rig for watercraft embodying improved mounting means for a sail wherein the sail is adapted to rotate freely in response to change of wind direction to assume automatically the correct setting.

Another object of the invention is to provide improved apparatus for maintaining automatically a triangular sail in proper position relative to the angle of the wind to effect a sailing boat which is easily handled and which affords a safe and comfortable ride.

Another object of the invention resides in providing a unique sailing rig for watercraft which embodies an improved construction permitting its ready attachment to watercraft.

A still further object of the invention is to provide an improved form of sailing rig for watercraft which is particularly characterized by its economy of manufacture, its simplicity, its ease of installation, and its efficiency of operation.

Other objects and features of the present invention will be readily apparent to those skilled in the art from the following specification and appended drawings wherein is illustrated a preferred form of the invention and in which:

Figure 1 is a side elevation of a boat equipped with a sailing rig embodying the present invention;

Figure 2 is a fragmentary perspective view of the mounting means for the rudder;

Figure 3 is a fragmentary perspective view of a detail with a portion cut away to better illustrate the manner of mounting a swivel member;

Figure 4 is a fragmentary perspective view of a detail; and

Figure 5 diagrammatically illustrates the relative positions of the sail as the angle of the axis of the hull of the boat is changed relative to the wind.

The drawings illustrate the use of the present invention with a row-boat, here generally indicated by the numeral **10**, which is of conventional construction, embodying a usual hull **11** having a transom **12** and with a seat **13** adjacent the transom **12**.

The sailing rig of the present invention is generally designated by the numeral **14**. The sailing rig **14** includes a mast **15** the lower end of which rests upon the seat **13**. The mast **15** is held to the boat **10** by a mounting assembly **16** which includes a channel member **17** fitted over the edge of transom **12** and secured thereto by a pair of usual clamping thumb-screws **18**. The mast **15** passes through a generally U-shaped strap **21** carried by the channel member **17** and has its foot disposed within an opening **22** provided in a brace-block **23** secured to the top of seat **13**, as by screws **24**, or by any other well-known fastening devices. Such loads as are applied to the mast **15** will be cared for by the arrangement above described; the brace-block **23** will hold the mast **15** against side-loads and the strap **21** will restrain the mast **15** on application of other types of loads. The use of a brace-block **23** is not compulsory. If desired, an opening could be cut through seat **13** through which the mast **15** could be passed to rest upon the bottom of the boat. The edge surfaces defining the opening would serve to accept the side loads applied to the mast. It is obvious that with this arrangement the mast **15** may be readily removed from the boat **10** and stored if desired. The described arrangement affords portability to the mast **15** and such sail as may be connected thereto. If a permanent installation were required, the mast **15** could be rigidly secured to transom **12** as by spaced U-bolts or by the use of any other conventional permanent-type fasteners.

Helm-controlling mechanism indicated generally by the numeral **25**, comprising a tiller bar **26**, rudder **27** and rudder shaft **28**, is operatively supported at the stern of boat **10** by a mounting assembly **29** which is associated with the mast mounting assembly **16**. Mounting assembly **29** includes a two-piece sleeve or bearing **31** comprising elongated, substantially half-round in cross-section sleeve members **32** and **33**, with member **32** fixedly secured to the channel member **17**. A brace **34** positions member **32** at the desired angle to properly position the rudder **27** relative to the boat **10**. The brace **34** is secured to the channel **17** and the member **32** by welding. Member **32** is welded to channel **17** in the area indicated at **35**. Member **31** is adapted to be fitted to member **32** with its longitudinal edges positioned upon and coextensive with the longitudinal edges of member **32**. A space is afforded between brace **34** and welded area which accommodates the bight of a U-bolt **36** whose legs extend at either side of member **32**. The legs of U-bolt **36** extend through apertured integral lugs **38** provided by removable sleeve member **33** and cooperate with wing-nuts **39** to secure member **33** to member **32** to effect a bearing for rudder shaft **28**. Rudder shaft **28** is adapted to be fitted loosely between sleeve members **32** and **33** so that the rudder **27** may be rotated by the tiller bar **26**. A pair of clamps **41** and **42** are positioned on rudder shaft **28**, one at each end of the bearing **31**, and are adapted to be tightened into clamped position on shaft **28** by means of screws **43** and prevent axial movement of rudder shaft **28**. Clamps **41** and **42** thus serve to properly locate the rudder **27** relative to the boat and the water. An anti-friction washer **44** is fitted on rudder shaft **28** between the upper clamp **41** and the bearing sleeve **31** to permit ready rotation of the rudder shaft **28** within the sleeve **31**. With the construction herein described the helm-controlling mechanism **25** may be removed alone, through separation of sleeve member **33** from sleeve member **32**, or removed as a unit with the mast mounting assembly **16** merely by loosening of the thumb-screws **18** to separate their swivel plates from the transom **12** to release channel **17** from transom **12**. This arrangement provides desirable portability and permits the ready attachment of the helm-controlling mechanism **25** to various boats.

It is to be understood that the mast **15** may be of any conventional type and formed of any suitable material. The location of the mast **15** on a watercraft is required to be substantially at the stern of the watercraft and to the

rear of the sail to be used. With the mast **15** positioned aft of the sail rather than forward, a source of turbulence and wind eddies is removed and the wind is permitted to flow smoothly onto and around the sail.

Sailing rig **14**, additionally to mast **15**, embodies a triangular or leg-of-mutton sail **45** framed by a strip **46**, formed of wood such as oak, which is sewn into the sail at its foot **47**, and a steel cable **48** which extends along the luff **51** and leech **52** and is made fast at each end to oaken strip **46**, as at **53** and **54**, by suitable screw means. The edges of the sail fabric along the luff and the leech are sewn around the cable **48** to encase it. A number of stretcher members **55** of varying lengths and in substantial parallelism, made of oak or other suitable material, serve to maintain the desired triangular shape of the sail **45**. The oaken stretcher members **55** are supported in place by being sewn into the canvas. A vertical groove **56**, as shown in Figure 4, is afforded in each end of the various stretcher members **55** to accommodate the cable **48**. An eyelet **57** is afforded at the apex of the triangular sail **45**, below the cable **48**, through which a connection can be made to the mast **15**. This connection is afforded by a conventional 360° swivel **58** which hooks to eyelet **57**. A hoisting halyard **59** is secured to swivel **58** and passes over a sheave (not shown) at the top of mast **15** and extends downwardly along the mast **15** through suitable guide hooks **61** to a cleat **62** provided near the lower end of mast **15**, to which cleat **62** the halyard **59** may be made fast.

A second 360° swivel **63** is attached by a cord **64** to the oaken strip **46** at the foot of sail **45** as shown in Figure 3 and has one end of a line **65** connected to it. The opposite end of line **65** is secured to a fixed member **66** on the bottom of the boat **10**. As best shown in Figure 1, mast **15** is provided with a forward bend. The purpose of bending mast **15** is to pre-load it and thereby do away with the need for braces and stays. Further with a stressed or pre-loaded mast the mast **15** may be of lighter weight and yet will accomplish the desired purpose of affording a proper support for the sail. The bending of mast **15** is effected by means of line **65**, through which line the required bending force is applied to the sail **45** and transmitted therethrough to the top of mast **15**. The connection of line **65** between the sail **45** and fixed member **66** is such that its line of direction will project through the apex of the triangular sail **45**. The projection of line **65** is shown diagrammatically in Figure 1 and is indicated by numeral **67**. Sail **45** under the pressure of wind forces will rotate about the projection **67** of line **65** as an axis. To permit sail **45** to operate in the manner desired the present invention requires that the line **65** be secured to foot **47** of said **45** in only that portion thereof which lies between 22% to 30% of its length measured from the forward end of the sail **45**. The opposite end of line **65** must be secured to the bottom of boat **10** at such a point that a projection of its line of direction always passes through the apex of triangular sail **45**.

In the bending of mast **15** care is taken that it not be bent to such an extent that the center of pressure of the sail **45**, indicated at **68**, be located forwardly of the center of lateral resistance of the boat **10**, shown at **69**, when the sail **45** lies in a fore-and-aft position, rather the amount of bending of mast **15** is restricted so that the center of pressure **68** will lie aft of the center of lateral resistance **69**. The amount of horizontal spacing between the transverse plane of the center of pressure **68** and the transverse plane of the center of lateral resistance **69** should lie in the range of from 1% to 8% of the mean chord line taken at the center of pressure of sail **45** to achieve the most satisfactory performance. Further, the angle that the inclined axis of rotation **67** of sail **45** makes with the vertical is required to be held to the range of 10° to 18°.

Figure 5 illustrates diagrammatically the various positions automatically assumed by sail **45** when the boat **10** is directed by the rudder **27** to move at various angles to the wind whose direction in the various views is indicated by the arrows W. The sail **45** is adapted to automatically adjust to accept wind forces to effect propulsion of the boat **10** at all angles of the boat to the wind, except that the sail cannot satisfactorily propel the boat **10** if the wind is directly astern. View A of Figure 5 illustrates the positions **72** and **73** (shown in dotted outline) that the sail **45** will assume when the wind is directly astern. The sail **45** will snap between positions **72** and **73** and the boat **10** will be caused to follow an erratic or zig-zag course in getting from point to point. To effect satisfactory operation of boat **10** when running directly before the wind a rope **74** is attached to the aft end of the foot **47** of sail **45**. With the rope **74** the sail **45** may be held in a 90°, or transverse, position to the boat, as shown in dotted outline at **75**, to take full advantage of the following wind. A second use for the rope **74** is that it may be employed to tie the sail **45** to the mast **15** to hold the sail **45** in a fore and aft position, as shown at **76**, whereupon the rudder **27** may be operated to nose the boat **10** into the wind and thereby render the wind force ineffective and thus maintain the boat **10** substantially stationary, which is to be desired when the occupant wishes to disembark.

The purpose of the above described sail mounting arrangement is to secure an inclined axis of rotation, indicated in the drawings by the numeral **67**, which permits the sail **45** to operate in the desired manner to effect satisfactory propulsion of the boat **10** carrying the sail **45**. The center of gravity force of the sail **45** causes it to balance about the inclined axis **67**. The force of the wind tends to feather or move the sail **45** into a neutral position, or a position of zero incidence. The center of gravity force of the sail **45** has a tendency to align the sail **45** on the center-line of the boat with the leading edge or luff **51** forward. The sail **45** balancing between its center of gravity force and the force of the wind will assume a positive incidence relative to the wind thereby causing a positive, forward acting, force to be exerted to propel the boat **10** regardless of the wind direction.

It is to be understood that the present invention is adapted to be used with a variety of watercraft and is not confined to use with a row-boat as illustrated herein. Watercraft such as ice boats, catamarans, model boats, auxiliary power boats and the like can be fitted with a sailing rig of the present invention.

While a certain preferred embodiment of the invention has been specifically disclosed, it is understood that the invention is not limited thereto as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What I claim is:

1. In combination with a watercraft, a mast, a triangular sail, and means mounting said sail forwardly of said mast, said same means mounting said sail for rotative movement automatically to operative position under the pressure of the wind, said rotative movement being about an inclined axis lying spaced from the forward edge of the sail and extending from the foot of the sail to the apex thereof, the angle of inclination to the vertical of said axis of rotation being in the range of between 10 degrees to 18 degrees, said means comprising a universal means carried by said mast and having an operative connection to the apex of the triangular sail to support the sail from the mast and a second universal means secured to the foot of the sail for connecting the sail to the watercraft, said two universal means disposed in the line of said inclined axis.

2. In combination with a watercraft, a mast, a triangular sail, and means mounting said sail for rotative movement automatically to operative position under the pressure of the wind, said rotative movement being about an inclined axis lying spaced from the forward edge of the

sail and extending from the foot of the sail to the apex thereof, the angle of inclination to the vertical of said axis of rotation being in the range of between 10 degrees to 18 degrees, said means comprising a universal means mounted on said mast and having an operative connection to the apex of said triangular sail for rotatively supporting the sail from the mast and a second universal means secured to the foot of the sail for rotatively connecting the sail to the watercraft, the connection of the second universal means being at a point on said foot of the sail lying in an area extending from 22 percent to 30 percent of the length of said foot measured from the forward end of the foot.

3. In combination with a watercraft, a mast, a triangular sail, and means positioning said sail forwardly of said mast and relative to said watercraft to locate the center of pressure of the sail aft of the center of lateral resistance of the watercraft when the sail lies in a fore and aft position, said same means mounting said sail for automatic rotative movement to operative position under the action of wind forces, said rotative movement being about an inclined axis lying spaced from the forward edge of said sail, said means comprising a universal means mounted on said mast and having an operative connection to the apex of said triangular sail for rotatively supporting the sail at its apex from the mast, a second universal means secured to the foot of the sail, and a line interconnecting said second universal means and the watercraft, said two universal means and said interconnecting line being arranged in the line of said inclined axis.

4. In combination with a watercraft, a mast, a sail, means positioning said sail forwardly of said mast and relative to said watercraft to locate the center of pressure of the sail aft of the center of lateral resistance of the watercraft when the sail lies in a fore and aft position, said same means mounting said sail for automatic rotative movement to operative position under the action of wind forces, said rotative movement being about an inclined axis lying spaced from the forward edge of said sail and forwardly of said center of pressure of said sail, said means comprising a universal means carried by said mast and having an operative connection to the sail for rotatively supporting the sail from the mast, a second universal means secured to the foot of the sail, and a line interconnecting said second universal means and the watercraft, said first and second universal means and said interconnecting line being arranged in the line of said inclined axis, said interconnecting line being stressed to exert a bending pull through said sail, and said two universal means and along said axis of rotation to bend said mast forward to place it in a pre-loaded state.

5. In combination with a watercraft, a mast, a triangular sail, means positioning said sail forwardly of said mast and relative to said watercraft to locate the center of pressure of the sail aft of the center of lateral resistance of the watercraft when the sail lies in a fore and aft position and for mounting said sail for automatic rotative movement to operative position under the action of wind forces, said rotative movement being about an inclined axis lying spaced from the forward edge of said sail and extending from the foot of the sail to the apex thereof, the angle of inclination to the vertical of said axis of rotation being in the range of between 10 degrees and 18 degrees, said means comprising a universal means having a connection to said mast and to said sail for rotatively supporting the sail from the mast, a second universal means secured to the foot of the sail at from 22 percent to 30 percent of the length of said foot measured from the forward end thereof, and a line interconnecting said second universal means and the watercraft, said first and second universal means and said interconnecting line being arranged in the line of said inclined axis, and means for bending said mast forward to place the mast in a pre-loaded state, said latter means comprising said line which



exerts a bending pull through said sail and along said axis of rotation.

6. In combination with a watercraft, a mast, a sail, and means positioning said sail relative to said watercraft to locate the center of pressure of the sail aft of the center of lateral resistance of the watercraft when the sail lies in a fore and aft position, the distance that said center of pressure is spaced from said center of lateral pressure being in the range of from 1% to 8% of the length of the mean chord line of the sail taken through said center of pressure thereof, said same means mounting said sail for rotative movement to operative position under the action of wind forces, said rotative movement being about an inclined axis lying spaced from the forward edge of said sail and forwardly of said center of pressure of said sail, said means comprising a universal means having a connection to said mast and to said sail for rotatively supporting the sail from the mast, a second universal means secured to the foot of the sail, and a line interconnecting said second universal means and the watercraft, said two universal means and said interconnecting line being arranged along the line of said inclined axis.

7. In combination with a watercraft, a mast, a triangular sail, means positioning said sail forwardly of said mast relative to said watercraft to locate the center of pressure of the sail aft of the center of lateral resistance of the watercraft when the sail lies in a fore and aft position and for mounting said sail for automatic rotative movement to operative position under the action of wind forces, the distance that said center of pressure of the sail is spaced from said center of lateral pressure being in the range of from 1% to 8% of the length of the mean chord line of the sail taken through the center of pressure thereof, said rotative movement being about an inclined axis lying spaced from the forward edge of said sail and extending from the foot of the sail to the apex thereof, the angle of inclination of said axis of rotation being in the range of between 10 degrees and 18 degrees, said means comprising a universal means supported from said mast and having an operative connection to said sail for rotatively supporting the sail from the mast, a second universal means secured to the foot of the sail at from 22 percent to 30 percent of the length of said foot measured from the forward end thereof, and a line interconnecting said second universal means and the watercraft, said first and second universal means and said interconnecting line being arranged in the line of said inclined axis, said interconnecting line being stressed to exert a bending pull through said sail, said two universal means and along said axis of rotation to bend said mast forward to place it in a pre-loaded state.

8. In combination with a watercraft, a mast, a triangular sail, means mounting said sail for rotative movement automatically to operative position under the pressure of the wind, said rotative movement being about an inclined axis lying spaced from the forward edge of the sail and extending from the foot of the sail to the apex thereof, the angle of inclination to the vertical of said axis of rotation being in the range of between 10 degrees to 18 degrees, said means comprising a universal means having a connection to said mast and to said sail for rotatively supporting the sail from the mast and a second universal means secured to the foot of the sail for rotatively connecting the sail to the watercraft, the connection of the second universal means being at a point on said foot of the sail lying in an area extending from 22 percent to 30 percent of the length of said foot measured from the forward end of the foot and means secured to the aft end of the foot of the sail to permit manual control of the sail.

9. In combination with a watercraft, a mast, a triangular sail, means positioning said sail forwardly of said mast and relative to said watercraft to locate the center of pressure of the sail aft of the center of lateral resistance of the watercraft when the sail lies in a fore and

aft position, said same means mounting said sail for automatic rotative movement to operative position under the action of wind forces, the distance that said center of pressure of the sail is spaced from said center of lateral pressure being in the range of from 1% to 8% of the length of the mean chord line of the sail taken through the center of pressure thereof, said rotative movement being about an inclined axis lying spaced from the forward edge of said sail and extending from the foot of the sail to the apex thereof, the angle of inclination to the vertical of said axis of rotation being in the range of between 10 degrees and 18 degrees, said means comprising a universal means having an operative connection to said mast and to said sail for rotatively supporting the sail from the mast, a second universal means secured to the foot of the sail at from 22 percent to 30 percent of the length of said foot measured from the forward end thereof, and a line interconnecting said second universal means and the watercraft, said first and second universal means and said interconnecting line being arranged in the line of said inclined axis, said interconnecting line being stressed to exert a bending pull through said sail, said two universal means and along said axis of rotation to bend said mast forward to place it in a pre-loaded state, and means secured to the aft end of the foot of the sail to permit manual control of the sail.

10. A sailing boat including in combination a hull, a mast stepped in and lying at least mainly above the after part of the hull, a pivot member attached to the hull at a point forward of said mast, a boom pivotally attached



to said pivot member, and with the greater part of its length lying and capable of swinging between said pivot member and said mast and another part extending forward beyond said pivot member, a sheet connected to said boom to control the swinging movement thereof, and a triangular area of sail constituting the main sail area of the boat connected at its lower end to said boom and hoistable between said boom and the masthead.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 24,090 | Bell | May 24, 1859 |
| 70,256 | Peterson | Oct. 29, 1867 |
| 1,589,488 | Smith | June 22, 1926 |
| 2,107,303 | Ljungstrom | Feb. 8, 1938 |
| 2,197,654 | Beudry | Apr. 16, 1940 |
| 2,364,578 | Wilkie | Dec. 5, 1944 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 5,205 | Great Britain | July 8, 1825 |
| 8,885 | Great Britain | A. D. 1903 |

OTHER REFERENCES

Boat Book, 2nd ed., Popular Mechanics Press, Chicago, 1935, pages 174, 175, 177; page 175 specifically relied on.

The Sailing Boat by H. C. Folkard, 4th ed., pages 74–83. Published by Longmans Green Co., London, 1870; Patent Office Library No. V M 351. F 66 1870.