Aug. 9, 1938. J. T. ROWLAND 2,126,665

RIG FOR SAILBOATS AND VESSELS

Filed April 25, 1936 2 Sheets-Sheet 1

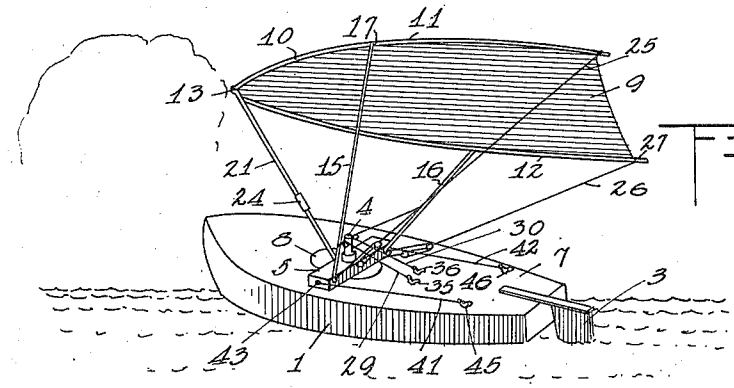


FIG. 1.

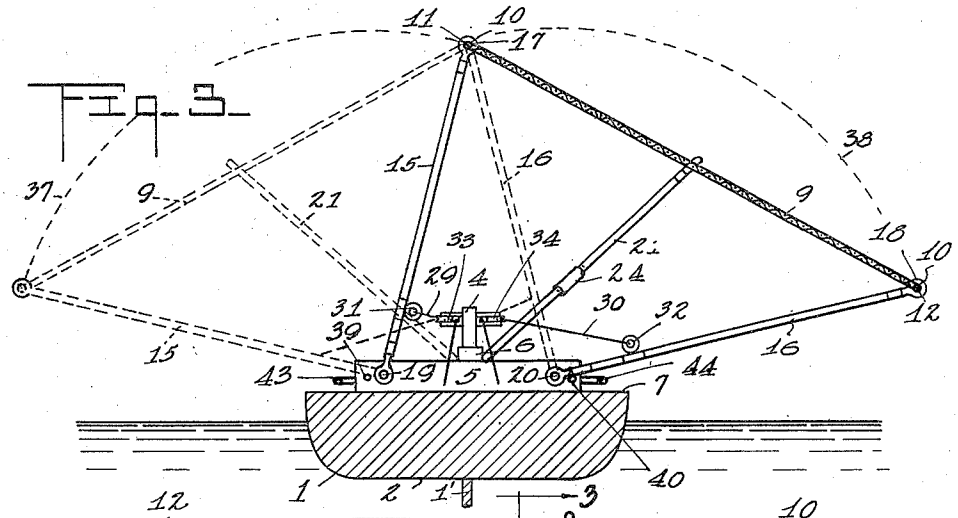


FIG. 3.

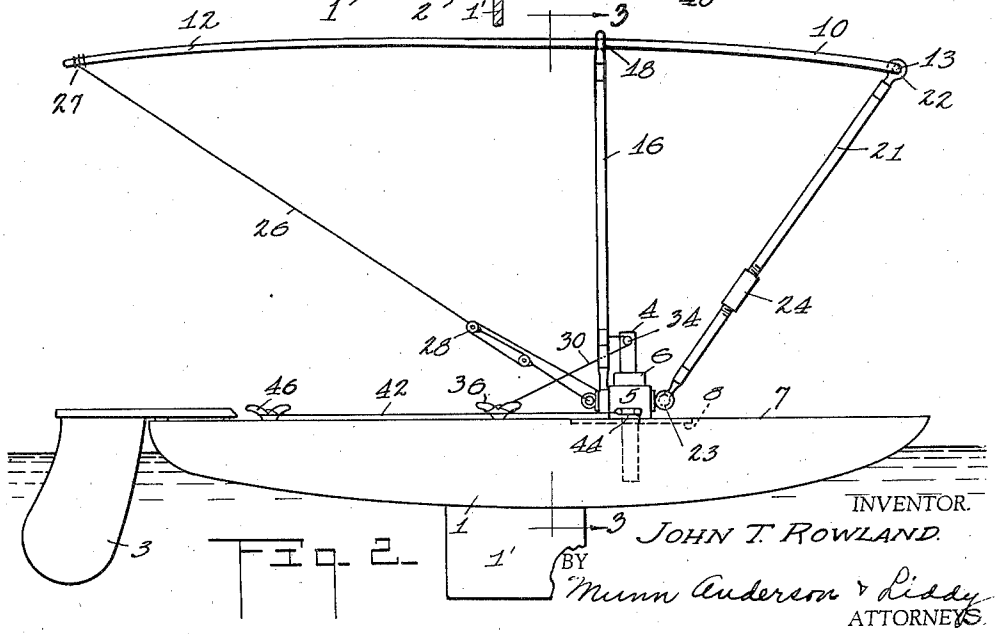


FIG. 2.

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FIG. 4.

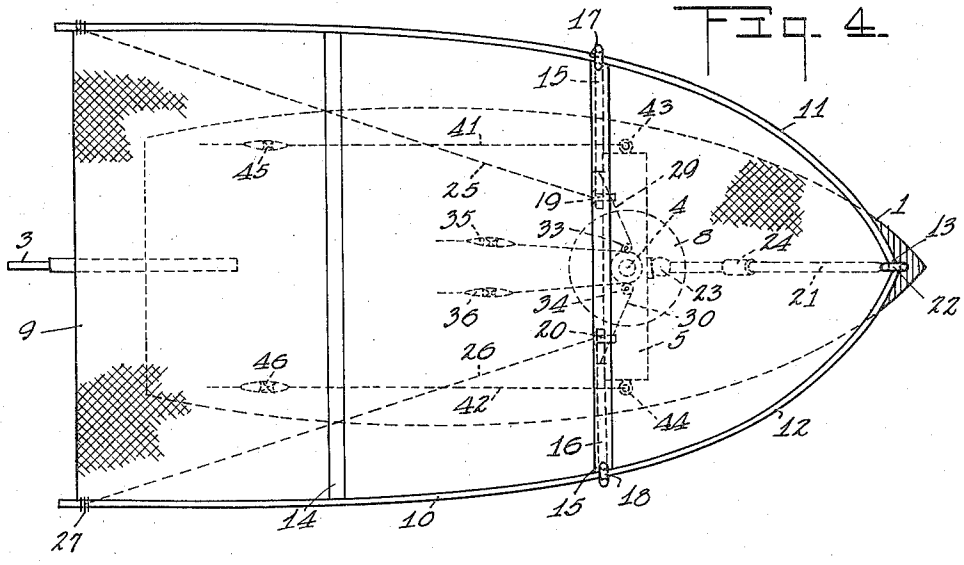


FIG. 5.

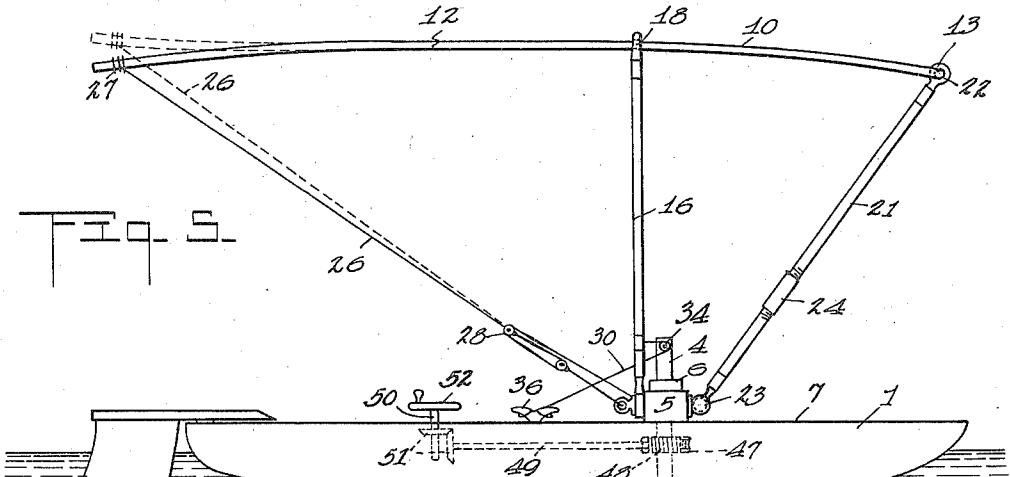
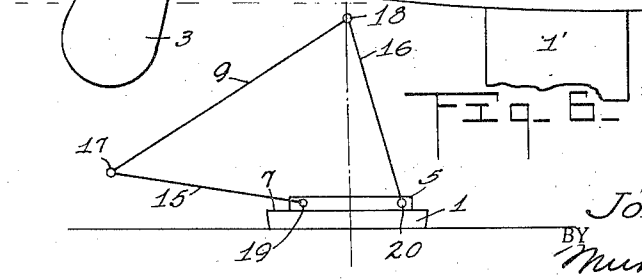


FIG. 6.



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2,126,665

RIG FOR SAILBOATS AND VESSELS

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Application April 25, 1936, Serial No. 76,477

8 Claims. (Cl. 114—102)

My invention relates to improvements in sail boat and vessel rigs, and it consists of the combinations, constructions and arrangements hereinafter described and claimed.

An object of my invention is to provide a sailing vessel rig in which the sail, instead of being set in the plane of a vertical mast, is disposed at such an angle that it will provide most efficiently both a propulsive force and a lifting force to the hull of the boat. With the sail disposed in the proper position, on the lee side of the hull, I have found that this lifting force imparts a righting moment to the hull instead of a heeling moment, irrespective of the righting moment of the hull itself. This makes the rig inherently self-righting and non-capsizable. Experiments have demonstrated that the device will remain upright even when sailing in a severe squall.

The sail is supported by two side booms in lieu of a mast, and these booms are connected pivotally to the sail sides and to a turn table. The turn table is rotatably mounted on the boat hull. I provide means for swinging the side booms for moving the sail from one side of the boat to the other. The length of the booms is such that when the sail is disposed on either side of the boat it will extend substantially at an angle of thirty degrees to the horizontal. The turn table permits the entire rigging to be rotated through three hundred sixty degrees in the horizontal plane. The entire rig supports the sail in such a manner that it may be trimmed at any desired angle according to the direction of the wind. For example, when it is desired to tack ship, that is to go from the starboard tack to the port tack, or vice versa, the head of the boat is brought up into the wind while the sail is trimmed fore and aft, after which the sail is thrown over to the opposite side of the boat by means of the pivoted side booms. The entire rig is now rotated or "trimmed" to the desired horizontal angle as the boat fills away on the new tack.

The sail is not only supported by the side booms, but in addition I show a front boom extending from the turn table to the forward edge of the sail, and I further show back stays extending from the turn table to the rear corners of the sail.

Other objects and advantages will appear in the following specification, and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming a part of this application, in which

Figure 1 is a perspective view of the rig as shown operatively applied to a boat hull;

Figure 2 is a side elevation of the device showing the sail in inoperative position;

Figure 3 is a section along the line 3—3 of Figure 2 illustrating how the sail can be swung from side to side of the boat;

Figure 4 is a top plan view of Figure 2;

Figure 5 is a side elevation of a slightly modified form of the invention; and

Figure 6 is a diagrammatic view showing the proportionate lengths of the various parts of the rig.

In carrying out my invention I make use of a boat hull indicated generally at 1. This hull may be of any shape desired, and in Figure 3 I show the bottom 2 of the hull as being flat. A rudder 3 is mounted in the stern of the hull. A suitable keel 1' or centerboard may be added to provide lateral plane, though it is not required to keep the vessel upright.

The rig is supported by the hull and is operatively connected thereto by means of a post 4. The post 4 extends vertically from the hull and has a turn table 5 rotatably mounted thereon. In Figure 1 this turn table is shown as being elongated in shape, although any other form of turn table may be used. A collar 6 is mounted on the post 4 and holds the turn table down upon the deck 7 of the hull. If desired, a ball race indicated diagrammatically at 8 in Figure 1 may be mounted on the deck and the turn table 5 will ride over this ball race. The ball race also is indicated by dotted lines in Figure 2.

The sail may be of any shape desired, and I have shown it as being in the shape of a triangle or substantially V-shaped in design. The sail 9 is supported in a resilient frame 10, and Figure 4 shows this frame as consisting of two side members 11 and 12 connected together at 13. The members 11 and 12 are bowed slightly in plan view, and stretchers 14 and 15 hold the members 11 and 12 at the desired distance from each other to stretch the fabric taut. The sail 9 is secured to the resilient frame 10 by any means desired. It is possible to close the rear end of the frame by another member, although Figure 4 does not illustrate this.

The sail 9 is of considerable size in proportion to the boat hull. In fact, the width of the sail at its widest point can be considerably greater than the width of the boat hull. The sail is operatively connected to the turn table by side booms 15 and 16, see Figure 3. These booms are pivoted at 17 and 18 to the sail frame 10, and

also are pivoted at 19 and 20 to the turn table 5. If desired, a forward boom 21 may extend from the leading edge 13 of the sail frame 10 to the turn table 5. In Figure 2 I show the forward boom 21 pivoted to the frame 10 at 22, and connected to the turn table 5 by a ball and socket joint 23. A turn buckle 24 is disposed in the front boom 21 for altering the effective length of the boom. By changing the length of this boom the frame 10 may be bowed in the manner shown in Figure 2.

It also is possible to connect the rear ends of the members 11 and 12 by back stays 25 and 26, see Figure 4. Figure 2 shows the back stay 26 connected to the member 12 at 27, and then connected to a back stay tackle at 28. The back stay tackle 28 in turn is connected to the turn table 5 at the point of pivot 20. The tackle 28 permits the back stay to be shortened for bowing the frame 10 in the manner shown in Figure 2. It also is possible to increase the effective length of the back stay 26 and thus permit the rear end of the frame 10 to bow upwardly as shown by the dotted line position in Figure 5.

The sail is swung up and over from one side of the boat to the other by any means desired, and in Figure 3 I show tacking gear consisting of two lines 29 and 30 connected to the side booms 15 and 16 at 31 and 32 respectively. These lines are passed through pulleys 33 and 34 mounted on the post 4, and then they are led to anchoring members shown at 35 and 36 in Figure 1. Figure 2 shows the anchoring member 36 extending upwardly from the deck 7. On a full size boat, however, the anchoring members or cleats would be placed on the turn-table itself in order to permit the free rotation of the turn-table. Figure 3 illustrates how the sail can be swung from the full line position into the dotted line position, and the dotted arcs 37 and 38 outline the paths taken by the upper ends of the side booms 15 and 16.

I have provided stops 39 and 40 on the turn table 5 which limit the movement of the booms beyond predetermined extreme positions. The booms are held in adjusted positions by connecting the ropes 29 and 30 to the cleats 35 and 36.

In actual practice I have found the following measurements or ratios to give the best results, although I do not wish to be confined to them. The side booms 15 and 16 should be twice the length of the distance between the pivot points 19 and 20, and the width of the sail between the pivot points 17 and 18 should be three times the distance between the pivot points 19 and 20. I have illustrated this diagrammatically in Figure 6. This gives the sail 9 an inclination of approximately 30° to the horizontal, and the windward boom 16 an angle of approximately 15° to the vertical. The top of the boom 16 will be disposed directly over the central line of the boat. The boom 15 makes an angle of 15° to the horizontal when the parts are in the position shown in Figure 6.

The means for rotating the turn table in Figures 1 to 4 inclusive consists of rope braces 41 and 42. These rope braces are connected to the sides of the turn table at 43 and 44 respectively, see Figure 4, and their free ends are secured to anchoring members or cleats 45 and 46 that extend above the deck 7.

In Figure 5 I show a slightly modified form of turn table rotating means. In this figure the post 4 is rotatably mounted on the hull 1 and carries a worm gear 47. A worm 48 meshes with the worm gear and is actuated by a shaft 49. The shaft 49 in turn is connected to a driving shaft 50 by means of bevel gears 51. A hand wheel 52 or other suitable actuating means is mounted on the shaft 50. It will be seen from this construction that a rotation of the hand wheel 50 will swing the turn table 5 to the desired extent and the turn table may be swung through a complete circle of 360° if necessary. The worm 48 locks the turn table in adjusted position.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood.

I have already explained how the sail 9 can be swung up and over from one side of the boat to the other by means of ropes 29 and 30, and how the entire rig can be rotated about the post 4. This will permit the device to tack, and also it is possible to swing the sail into a position where a wind blowing directly from the rear of the boat will move the boat forwardly. In going about from one tack to the other, the sail can be swung to the desired angular position by means of moving the side booms 15 and 16, and then the sail may be trimmed at the desired angle by rotating the turn table.

The advantages of the device over the usual types of sailing rig are: (1) the rig under normal conditions is virtually non-capsizable; (2) the boat sails on an even keel; (3) the boat may be lighter in weight because no ballast is needed; (4) the rig lessens the stresses ordinarily set up between the rig and the hull; (5) a positive lifting force of the hull (as distinguished from a lifting moment) also will be secured; (6) the sail tends to imprison the wind and build up a pressure against the driving face of the sail rather than spill the wind over the top of the sail as is true in standard sailing rigs. It should be noted further that due to a combination of these factors, the wind may be sufficient to lift the hull partially out of the water and thereby diminish the resistance of the hull in the water, resulting in a material increase in speed. Due to the angle at which the sail is inclined, this rig is capable of using to advantage air currents which ricochet from the surface of the water and from waves or which are deflected upwards in passing over the hull of the boat, which currents are largely lost in the case of all standard rigs by being spilled over the top of the sail, especially when the vessel is heeling in a breeze.

On all points of sailing except when running before the wind I have found that a greater speed results when the back stays 25 and 26 are slacked off so that the after ends of the sail frame are permitted to bow upward in response to the wind pressure on the sail, as shown by the dotted lines in Figure 5. Whereas in the conventional type of sailing rig it has been demonstrated that most of the draft or propulsive force is delivered at the luff of the sail close to the mast, in the present device an additional propulsive effect is provided by the upward bowing of the rear portion of the sail, which permits the build up pressure of wind to escape with a forward moment of force delivered to the rig. This advantage may be further increased by making the rear sail frame tips more limber and attaching the back stays some distance forward of the tips. These back stays may then be left standing and this effect will obtain without the necessity of slackening them.

It also is possible to swing the sail into a horizontal position as shown in Figures 2, 4 and 5,

and the sail is inoperative when in this position so far as moving the hull is concerned. The sail when disposed horizontally will act as an awning.

Multiple units of this rig may be mounted on the hull if desired, and these can be of different sizes.

Although it is contemplated that the sail would ordinarily be left standing in a neutral or horizontal position while the boat is not in use, it may be lowered by any appropriate means not shown. In any boat where the sail frame could not be conveniently reached from the deck in order to detach it from the booms for lowering, a system of halyards and downhauls could be provided whereby the sail may be lowered to the deck in order to furl it or unlace it from the frame. One method of furling would be to hinge the two side members of the sail frame at their apex so that upon the removal of the stretchers 14 and 15, the sail frame sides could be folded together and the sail could be clewed up with suitable stops or a lashing.

While I have shown only the preferred forms of my invention, it should be understood that various changes or modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. In a device of the type described, a boat hull, a rig carried thereby and including means mounted on said hull and two side booms swingable in the same plane and being pivoted to said means at points adjacent to the hull and equidistant from a center point on the hull, and a sail having its sides pivotally connected to the free ends of the booms, and means for swinging the booms for moving the sail from one side of the boat hull to the other and for holding the sail in any desired position between its extreme limits of movement.

2. In a device of the type described, a boat hull, a pair of booms pivoted to the hull in spaced relation at the two sides of the center thereof and swingable in a plane at right angles to the deck of the hull, a sail having its sides pivoted to the booms, means for moving the booms for swinging the sail into the desired position and for holding the sail in this position, and means cooperating with the booms for holding the front and rear ends of the sail while still permitting the sail to be adjusted.

3. In a device of the type described, a boat hull, a pair of booms pivotally mounted on the hull in spaced relation at the two sides of the center thereof, a sail having its sides pivotally secured to the booms, means connected between the boat hull and the forward and after edges of the sail for holding the sail in proper relation to the side booms, and means for varying the effective lengths of said last named means for bowing the sail to the desired extent.

4. A rig for a sail boat comprising a turn table, self-locking means for rotating said turn table, a pair of side booms pivoted to the turn table, a sail pivotally secured to the booms between the ends of the sail, a front boom pivoted to the luff of the sail and to the turn table, and back stays connecting the leech of the sail to the turn table.

5. A rig for a sail boat comprising a turn table, self-locking means for rotating said turn table, a pair of side booms pivoted to the turn table, a sail pivotally secured to the booms between the ends of the sail, a front boom pivoted to the luff of the sail and to the turn table, and back stays connecting the leech of the sail to the turn table, and means for altering the effective lengths of the front boom and back stays.

6. A sailing rig comprising a base, side booms supported by and pivotally mounted on the base, and a sail carried by and pivoted to the side booms, the base, side booms and sail forming a quadrilateral in which the width of the sail between the side booms is greater than the distance between the booms at their point of connection with the base, and in which the side booms are of equal length, thus providing a sail that may be shifted to the lee side of the boat and inclined at such an angle as to deliver a righting moment to the hull.

7. A rig for a sail boat comprising a relatively elongated sail tapering from its after edge towards its forward edge, a flexible frame for the sail, and means including a member mounted on the boat hull and a pair of booms pivotally mounted on the member for supporting the said sail in spaced relation above the boat so that it can be shifted as a unit across said boat from side to side, said sail being substantially horizontal when positioned above the center of the boat and tilted laterally as it is shifted towards the respective sides of the boat.

8. A rig for a sail boat comprising a relatively elongated sail tapering from its after edge towards its forward edge, a flexible frame for the sail so as to permit upward bowing of the after edge of the sail, and means including a member mounted on the boat hull and a pair of spaced booms pivotally mounted on the member of substantially equal length for supporting said sail in spaced relation above the boat so that it can be shifted across said boat from side to side, said sail being substantially horizontal when positioned above the center of the boat and tilting laterally as it is shifted towards the respective sides of the boat.

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