July 6, 1948. W. D. PAWLEY, JR 2,444,526

SAILBOAT

Filed Oct. 12, 1944

Fig. 1,

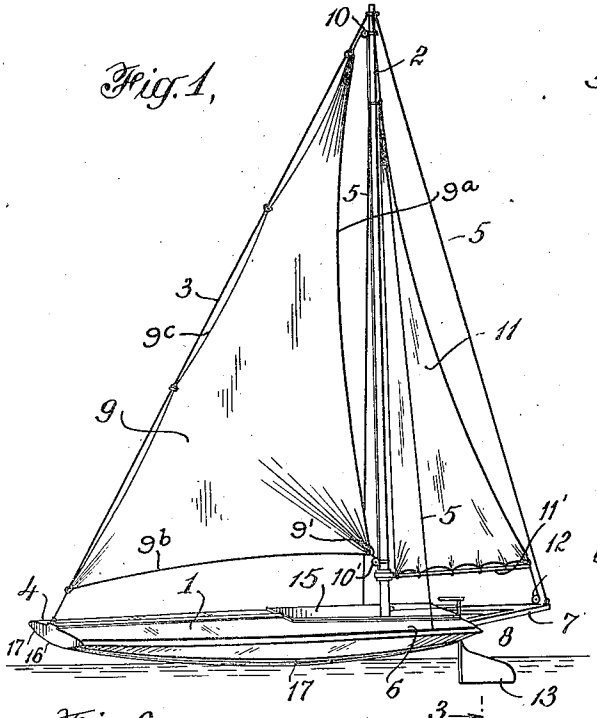


Fig. 3,

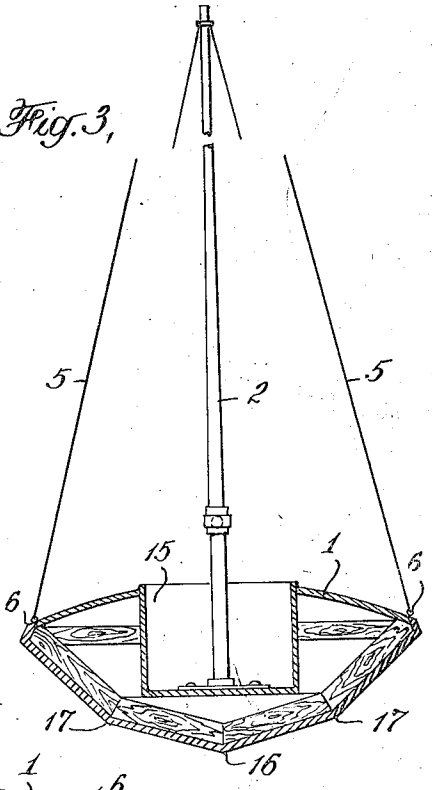


Fig. 2,

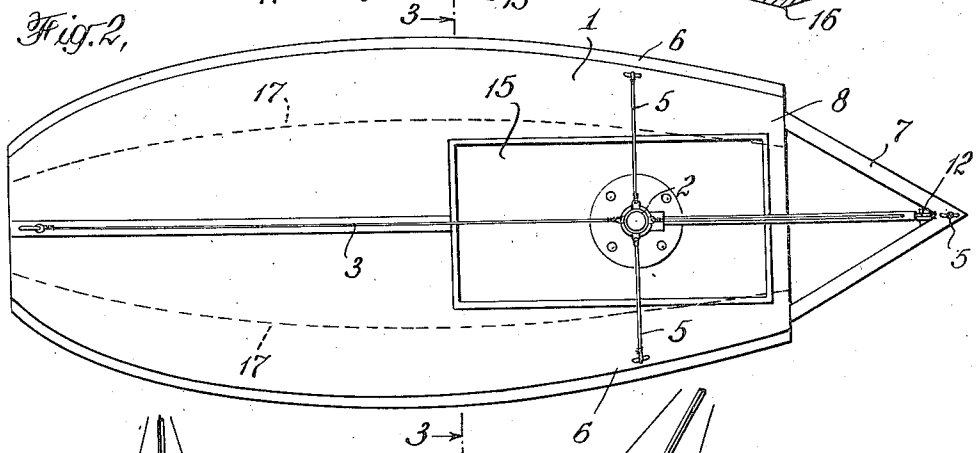


Fig. 4

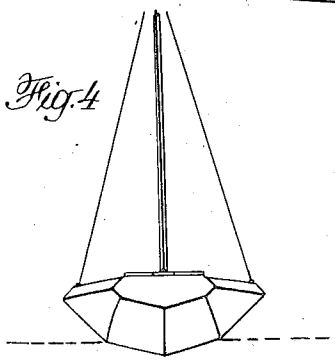
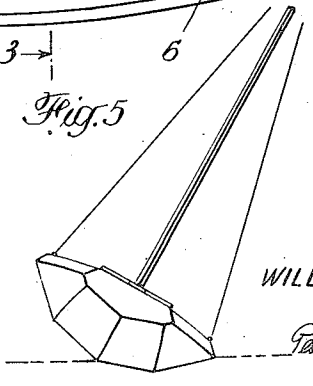


Fig. 5



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SAILBOAT

William D. Pawley, Jr., Miami Beach, Fla.

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2 Claims. (Cl. 114—39)

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This invention relates to sail boats and has for its object to provide a sail boat which will under wind velocities of increasing intensity tend to lift out of the water, or "plane," in the same manner as a motor-propelled speed boat of modern design. Various attempts have heretofore been made to design hulls for sail boats to obtain this effect, but so far as I am aware none of them has proved successful because the sail plans employed in such boats as heretofore designed have been of a type such as to develop, in addition to the forward component from the force of the wind, a downward component at the bow of the boat, thus offsetting any lifting effect that might otherwise result from the hull design.

My improved sail boat presents novelty both in the hull design and in the sail plan, the two cooperating so that the force of the wind when transmitted to the boat has an upward and not a downward component at the bow, thereby assisting in lifting the boat out of the water under increasing wind velocities.

In the accompanying drawings I have shown my invention as applied to a single-masted small boat of the shallow-draft, broad beam type.

In the said drawings,

Figure 1 is a perspective view showing the boat as it appears afloat under a light breeze;

Fig. 2 shows the hull in plan;

Fig. 3 shows in cross section the outline of the hull amidships; and

Figs. 4 and 5 are diagrammatic views showing respectively the position of the hull under a light breeze and when heeled over.

Referring to the drawings, particularly Fig. 1, the boat here illustrated comprises a light decked-over hull 1, which in the actual craft represented in the drawings is 19 feet overall including the stern-sprit and has an 8-foot beam. The single mast 2, which is 24 feet high, is stepped at a point about 3 feet forward of the stern. The mast is braced by a stay 3 extending from the top to the bow 4 which, as shown, is of the blunt or scow type. Stays 5 also extend from the top of the mast to the gunwales 6 on each side and to the rear of the mast step. A third stay 5 extends from the top of the mast to a stern-sprit 7 consisting, as shown, of two timbers extending rearwardly from the stern-transom 8, although of course a single stern-sprit may be employed if desired.

The rigging consists of a mainsail 9 of right-triangular shape having eyes along its hypotenuse which ride on the forward stay 3 extending from the top of the mast to the bow. The right angle corner of the sail carries the sheet 9' which passes through a pulley 10' mounted on the mast. The sail is hoisted by a halliard which passes over pulley 10. The mainsail 9 has

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a generally vertical trailing edge 9a and a lower generally horizontal edge or foot 9b. The edges 9a and 9b are at right angles. The mainsail has a leading edge 9c, which is inclined or diagonal. At the rear corner, the mainsail is connected with a sheet, as stated which passes through the pulley 10', mounted upon the mast 2. This sheet 9' is used to trim the mainsail 9, as is well known. The mainsail has its lower edge or foot 9b free and flexible, which means that such lower edge is not attached to a boom or other rigid element. The leading edge 9c of the mainsail is inclined and diagonal, as stated, and is longer than the lower horizontal edge or foot 9b or the rear edge 9a. The mast 2 is mounted upon the hull near the stern and rearwardly of amidship and is nearer the stern than the amidship. By virtue of the arrangement of the mast 2 near the stern, the forestay 3 has an increased length and is inclined further from the perpendicular, which imparts a corresponding increased length to the leading edge 9c of the mainsail and increases the inclination of the edge 9c from the perpendicular. By providing the leading edge 9c with increased length the mainsail 9 creates the maximum lifting force.

The second and smaller sail 11 is also of right angle shape. Its base is attached in the usual manner to a rearwardly projecting boom 11' connected to the mast in the usual manner, preferably below the point of attachment of the pulley carrying the sheet for the mainsail. The boom 11' is controlled by a sheet leading to a pulley 12 carried at the end of the stern-sprit.

The boat is provided with the usual rudder 13, here shown as projecting rearwardly from the stern between the timbers making up the stern-sprit.

The hull is decked over except for a small cockpit 15 adjacent the mast. The hull design is shown in Figs. 1 to 3. The design provides the boat in effect with three bottoms and three separate keels. The middle keel 16 extends in the usual manner longitudinally along the mid line of the bottom. One each side of this mid keel are side keels 17 extending also from the bow transom 4 to the stern transom 8 and so shaped and positioned with respect to the mid keel that when the boat is heeled over to approximately 30° the bottom formed by the planking intermediate the mid keel and the side keel and the planking between the side keel and the gunwale will be of substantially the same contour as the bottom formed by the planking extending on each side of the mid keel. The rear transom is larger than the bow transom and the intermediate ribs are so shaped that the plane of the hull inclines upwardly from the stern to the bow, the angle of incline increasing toward the bow.

The operation of the boat is as follows: As-

suming that the boat is sailing forwardly with the wind abeam, then the mainsail 9 is trimmed. This mainsail is ordinarily trimmed further out than is the case with the conventional mainsail having the rigid boom at its lower edge. The wind blowing against the mainsail passes about the forestay 3 and leading diagonal edge 9c of the mainsail, producing a low pressure about such leading edge 9c, which in turn produces a resultant upward and forward force. This upward and forward force is increased by the increased length of the leading edge 9c, which in turn results from the arrangement of the mast 2, as stated. The direction of this lifting and forward force is always perpendicular to the forestay 3 or leading edge 9c, and since the leading edge has an increased length and an increased inclination from the perpendicular, the lifting force is materially increased. This results in elevating the front end of the hull. When the wind blows abeam, the mainsail 9 is concaved in a direction perpendicular to the forestay 3 and leading edge 9c, thus producing the camber at the leading edge of the mainsail. Since the lower edge or foot 9b of the mainsail is free and flexible, it will follow the curvature of the mainsail perpendicular to the leading edge 9c, and the mainsail will be substantially flat in a direction parallel with the leading edge 9c. This will eliminate the camber produced at the lower edge of the conventional mainsail caused by the presence of the rigid boom. If this camber is produced at the lower edge of the mainsail, it will exert a downward pulling force, for the same reason that the forestay and leading edge 9c of the mainsail produce the camber and the upward pulling force. This disadvantage is eliminated in my construction by omitting the boom. The air currents discharge or slip over the lower edge 9b of the mainsail, and a somewhat similar action occurs at the trailing edge 9a. It is thus seen that the air currents are free to spill over the lower edge or foot and trailing edge of the mainsail.

The hull of the boat has a shallow draught and wide beam. This is the type of hull usually employed in connection with a power-driven speed boat. As far as I am aware, this type of bottom is not used with sailing boats. My hull has a speed boat bottom, which means that that portion of the keel which engages with the water during the travel is straight, with no rocker in the stern. The bottom is also V-shaped in cross-section, at the keel or keels.

The purpose in changing the design from the normal rig is to change the distribution and direction of forces exerted by the sails so that the rig might be used on what is commonly known as a standard motor speed hull. The normal rig cannot be successfully used on that type of hull. We are enabled to attain materially increased speeds.

In operation under light winds the boat floats on its middle bottom and the mid keel serves with the rudder to maintain the course of the boat. Under a stiff wind the boat heels over to 30°, at which angle it will be maintained by shifting the ballast and setting the sails, and in this position it rides on the bottom composed of a bottom symmetrical to one or the other of the side keels, whereby the boat has a true planing effect under stiff winds as well as light winds. When running heeled over the side keel serves with the rudder to maintain the course of the boat.

Due to the position of the mast near the stern and the use of a sail running on a stay extending from the bow to the mast instead of running on the mast in the conventional manner, the bow is lifted by the force of the wind, thereby increasing the angle of the bottom to the horizontal, thus aiding in the planing effect, and by providing three keels as shown, the maximum planing effect will be obtained at all wind velocities within a substantial range. That is to say, the boat can be maintained on its true bottom in all winds up to a certain velocity, depending of course on the direction of the wind, by shifting the ballast and trimming the sails to maintain the mast substantially upright. Above a predetermined velocity, selected according to the judgment of the operator, the ballast will be shifted and the sail set to heel the boat over approximately 30° so that it will ride on one or the other of the two side bottoms.

In the accompanying drawings and the foregoing specification I have illustrated and described a boat as actually constructed and operated by me, but it will be understood that my invention may also, within the scope of the appended claims, be applied to boats of other relative dimensions and types.

I claim:

1. In a boat, a hull having a shallow draught and wide beam and a speedboat type bottom, a mast mounted upon the hull closer to the stern than to the bow, a diagonal forestay secured to the mast near its top and to the bow of the hull, a mainsail having a leading diagonal edge secured to the forestay and having a foot which is free and flexible and also having a trailing edge, and a sheet connected with the mainsail near its lower corner.

2. In a boat, a hull having a shallow draught and wide beam and a speedboat type bottom, a mast mounted upon the hull at the rear of amidship and nearer the stern than the amidship, a diagonal forestay secured to the mast near its top and to the bow of the hull, a mainsail having a leading diagonal edge secured to the forestay and a trailing edge and a lower foot which is free and flexible, the trailing edge and foot being disposed at substantially right angles with relation to each other, and means connected with the mainsail near its lower rear corner so that the mainsail may be trimmed out.

WILLIAM D. PAWLEY, JR.

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