

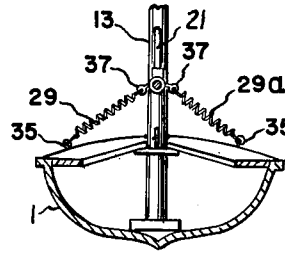
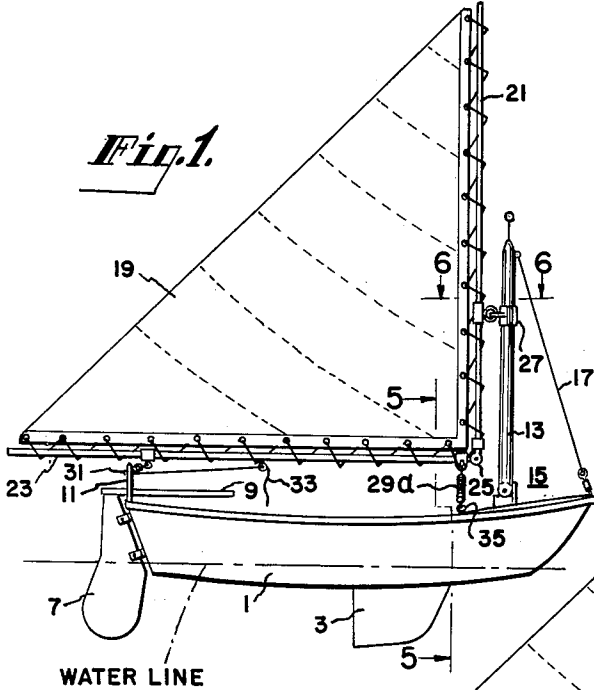
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B. S. McCUTCHEN ETAL  
SAIL AND RIGGING THEREFOR

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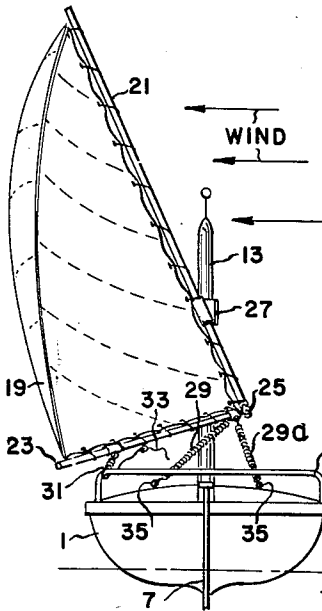
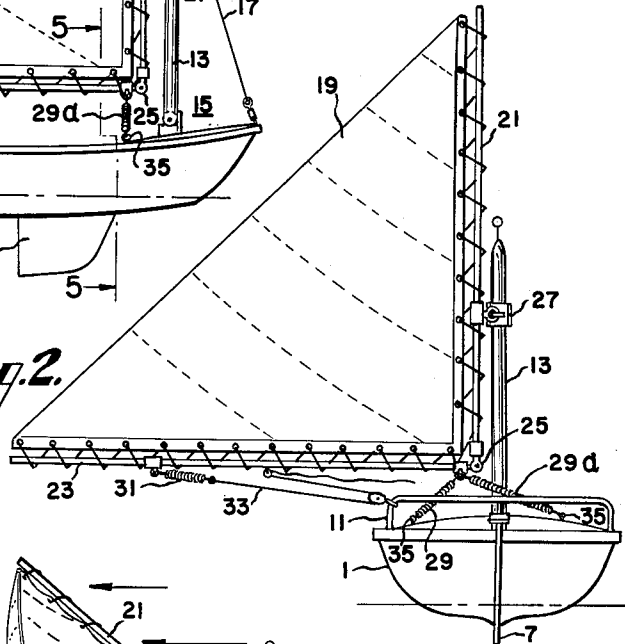
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*Fig. 1.*

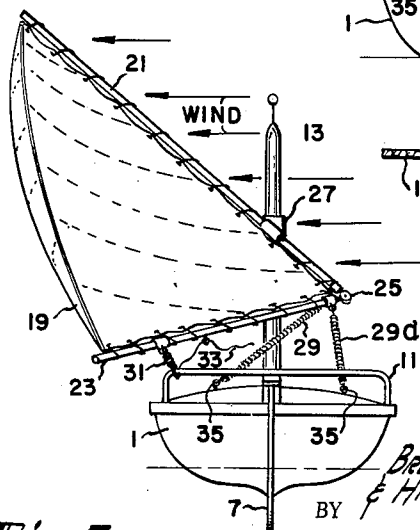


*Fig. 5.*

*Fig. 2.*



*Fig. 3.*



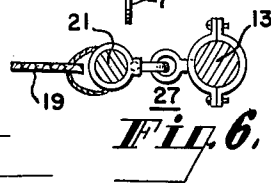
*Fig. 4.*

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*Fig. 6.*



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**SAIL AND RIGGING THEREFOR**

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This invention relates to improved sails and rigging for vehicles. The sail of the invention may be used on boats, ice-boats, or other vehicles to improve their safety and ease of handling. While the sail of the invention may be used on vehicles generally, it has special application to boats to which reference is made in the accompanying drawings and description; however, the invention is not limited thereto.

One of the objects of the invention is to provide a sail for a vehicle in which the wind pressure on the sail causes the head of the sail to tip to leeward and simultaneously causes the sail to point into the wind thereby to reduce the force tending to tip the vehicle. Another object is to provide automatic means for adjusting the sail to varying wind pressures. A further object is to provide a sailing rig for vehicles in which the courses for port and starboard tacks may be varied without manual adjustment of any sail controls. An additional object is to provide a sail for a boat to increase its safety when operated by a novice.

The invention will be described by referring to the accompanying drawings in which FIGURE 1 is a side view of the invention applied to a conventional boat; FIGURE 2 is a stern view of the boat of FIGURE 1 with the sail on the port side; FIGURE 3 is a stern view of the sail with a gentle wind from the starboard side of the boat; FIGURE 4 is a stern view similar to FIGURE 3 but representing an excessive wind; FIGURE 5 is a sectional view taken along the line 5-5 of FIGURE 1; and FIGURE 6 is a sectional view of the spar to mast coupling taken along the line 6-6 of FIGURE 1.

Referring to FIGURES 1, 2, and 3 which illustrate the application of the sail of the invention to a conventional boat consisting of a hull 1, a center board or a dagger board 3, and a rudder 7. The rudder is attached to a tiller 9 which passes under the traveler 11. A supporting mast 13 may be mounted in any conventional manner or may include a hinge 15 to permit the mast to be lowered toward the stern to facilitate lowering and furling the sail. The hinge is provided with a stop to prevent the mast from going too far forward and a forestay 17 to prevent the mast from going toward the stern except when the forestay is released.

The sail 19 may be of conventional materials and shape. In the reduction to practice a 12' sailing dinghy was provided with a substantially triangular sail in which the luff and foot were 148" long. The luff may be secured to a spar 21 by lashing or the like. The foot of the sail may be lashed or otherwise secured to a boom 23, or secured to the boom at the clew and tack ends only. The spar and boom are held together at the tack by fittings 25 that hinge to permit relative movement of the spar and boom. The spar is attached to the top of the supporting mast by means of a flexible or universal joint 27. The joint is secured to the spar at a point intermediate its ends and preferably at a point on the lower half of the spar. In the case of the sail used in the reduction to practice the joint was secured to the spar at a point 42" from the lower end of the spar.

In the present invention the boom is not fixed longitudinally with respect to the lower portion of the mast but is yieldably secured by one or two elastic means such as the springs 29, 29a. If two springs are used, they

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are secured to the port and starboard gunwales at points aft of the mast. If a single spring is employed, it is preferable to fasten it farther aft and along the centerline of the boat. In rigging the sail described above the forward spring yielded 1" under 13 pounds, 4" under 20 pounds, 7" under 26 pounds, and 10" under 32 pounds. The forces indicated are taken to the nearest pound. In the event that two springs are employed it should be understood that normally only one spring is effective when the boat is headed into or across the wind.

The sail of the invention includes another elastic member or spring 31 that is secured to a point on the boom preferably aft of its center. The fastening point for the sail described above was 52" from the stern or clew end of the boom. The other end of the spring is attached to the sheet which goes through a pulley slideably mounted on the traveler 11, and then through a second pulley mounted on the boom, and hence to the interior of the boat. The first pulley; i.e., the one on the traveler, is of the self-locking type so that the spring or elastic member 31 may be drawn up to the pulley and locked in this position for all sailing positions except on a reach or with the wind course as is illustrated in FIGURE 2. To sail downwind the operator merely yanks on the sheet which may then be controlled in the usual manner. Under normal conditions the presence of the spring will have no deleterious effect on the downwind sailing. Nevertheless the rigging may include an entirely independent sheet.

By way of example for the boat and sail used in the practice of the invention the last mentioned spring yielded 1" under 20 pounds, 4" under 30 pounds, 7" under 39 pounds, and 10" under 49 pounds. Thus the spring at the stern was 50% stronger than the spring at the tack end of the boom. The effect of either spring may be varied by moving the spring fastening point toward or away from the center of the boom. Moreover several weaker springs may be connected in parallel to obtain the exact yielding condition required for a predetermined spring location or a different size or shape of sail. Elastic cords, such as are used in shock-absorbers, may be substituted for springs.

FIGURE 5 illustrates a means for securing the supporting mast 13 in the hull 1 of the boat. The springs 29, 29a may be hooked to eye-bolts 35 fastened to the port and starboard gunwales at points aft of the mast. The opposite ends of the springs may be hooked to eyes 37 secured to the fitting 25 which joins the boom and spar. If the boat is already provided with a mast, it may be used to support the rigging of the invention. Moreover the universal joint, shown in section in FIGURE 6, may be pulled up the mast by a conventional halyard and secured in position.

The operation may be explained as follows: If a line is drawn from the universal or flexible joint 27 along the sail and through the boom 23 at the point of attachment of the spring 31, the area of the sail above the line will be found by mere inspection to exceed substantially the area of the sail below the line. Therefore the pressure of the wind on the sail area above the line will exceed the pressure of the wind on the sail area below the line. Moreover the sail will be free to turn about an axis substantially, but not necessarily exactly, coincidental with said dividing line. Thus the wind will cause the head or upper area of the sail to go leeward and the lower area of the sail to go windward. This turning of the sail will spill some of the wind and permit the boat to remain on substantially an even keel which is the safest condition and often the most efficient position for port and starboard tacks. As shown in FIGURE 4, in which the wind pressure is greatly increased over

FIGURE 3, the sail heels more to the leeward thus further spilling the wind and permitting the boat to remain level. It should also be noted that the spring 31 permits the clew end of the boom to go to leeward and the tack end of the boom to go to windward by the yielding of the spring 29. This last described action points the sail into the wind which also reduces the effect of the wind on the sail.

Thus the invention utilizes two effects: (1) the tilting of the sail, and (2) the pointing of the sail. These two effects occur simultaneously and proportionally to the forces which cause them. Both effects tend to relieve the wind pressure on the sail and hence the normal tendency of the boat to heel. Since the two effects occur automatically due to the pressure yielding means connecting the sail to the boat, the operator of the boat simply steers the boat on its port and starboard tacks. The sail and rigging of the invention includes the feature of automatically reducing the strain of an unintentional jibe due to the elastic coupling between the boom and the craft. When the sail is employed in sailing before the wind, the pressure yielding means has less effect and the boat carrying the sail is operated normally. Finally the minimization of the tendency of the boat to heel promotes safer sailing and usually more efficient operation against the wind.

The invention is claimed as follows:

1. A device for a sailing vehicle including a sail, a boom for supporting the foot of said sail, a spar for supporting the luff of said sail, a mast for supporting said spar on said vehicle, a flexible joint connected to said mast and to said spar at a single point intermediate the ends of said spar, pressure yielding means for connecting said boom to said vehicle between a point adjacent the stern of said vehicle and a point aft of the center of said boom, and a second pressure yielding means for connecting the tack end of said boom to said vehicle whereby wind pressure on said sail tends to rotate the sail about an axial line between said flexible joint and the first mentioned pressure yielding means and about the axis of said spar.

2. A device for a sailing vehicle including a sail, a boom for supporting the foot of said sail, a spar for

supporting the luff of said sail, a supporting mast secured to said vehicle, a universal joint secured to said supporting mast and secured to said spar at a point intermediate its ends, a spring connected at one end to a point on said vehicle and at the other end to a point on said boom intermediate the tack and clew of said sail, and a pair of springs connected respectively to points on the starboard and port sides of said vehicle near said supporting mast end to a point on said boom adjacent the tack of said sail.

3. A device for a sailing vehicle including a sail, a boom for supporting the foot of said sail, a spar for supporting the luff of said sail, a mast for supporting said spar on said vehicle, a universal joint connected to said mast and to said spar at a point nearer its foot than its peak, a spring for connecting said boom to said vehicle between a point adjacent the stern of said vehicle and a point near the stern end of said boom, and a second spring for connecting the tack end of said boom to said vehicle whereby wind pressure on said sail turns the sail about an axial line between said universal joint and the first spring and about the axis of said mast.

4. A sail rigging for a vehicle including a mast, a boom, a spar, a sail including means for attaching its foot to said boom and its luff to said spar, a coupling rotatable with respect to said mast and rotatable with respect to said spar connected to said mast and to a point on the lower portion of said spar, a spring for connection between the stern portion of said boom and the stern of said vehicle, and a second spring for connection between the port and starboard sides of said vehicle on the aft side of said mast and connected at its mid-point to the tack end of said boom whereby wind normal to the sail tends to move that portion below a line between the coupling and the spring connection point on the stern portion of said boom toward the wind and the portion above the line with the wind.

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

#### UNITED STATES PATENTS

481,614	Comstock	Aug. 30, 1892
721,286	Couch	Feb. 24, 1903
1,429,156	Moraitis	Sept. 12, 1922