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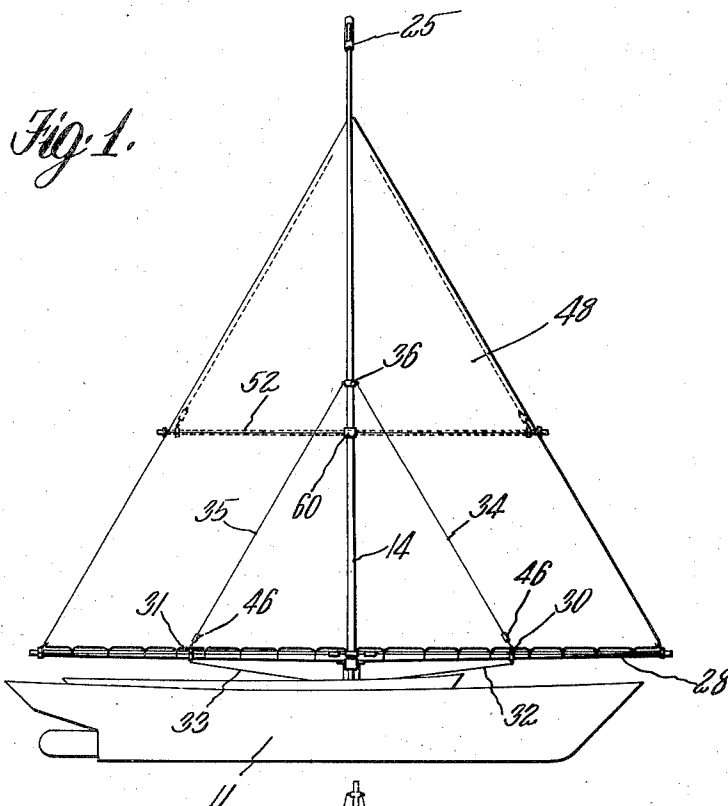
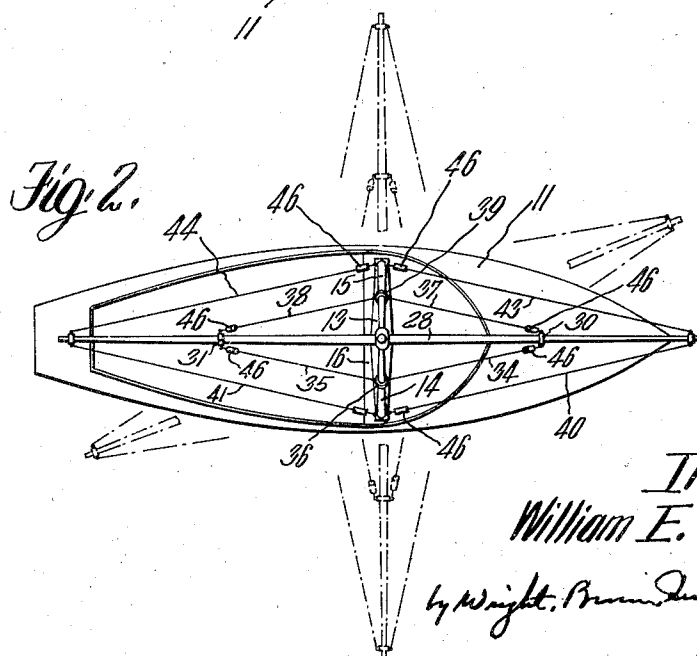
W. E. RYDER

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SAILING RIG

Filed June 24, 1936

2 Sheets-Sheet 1



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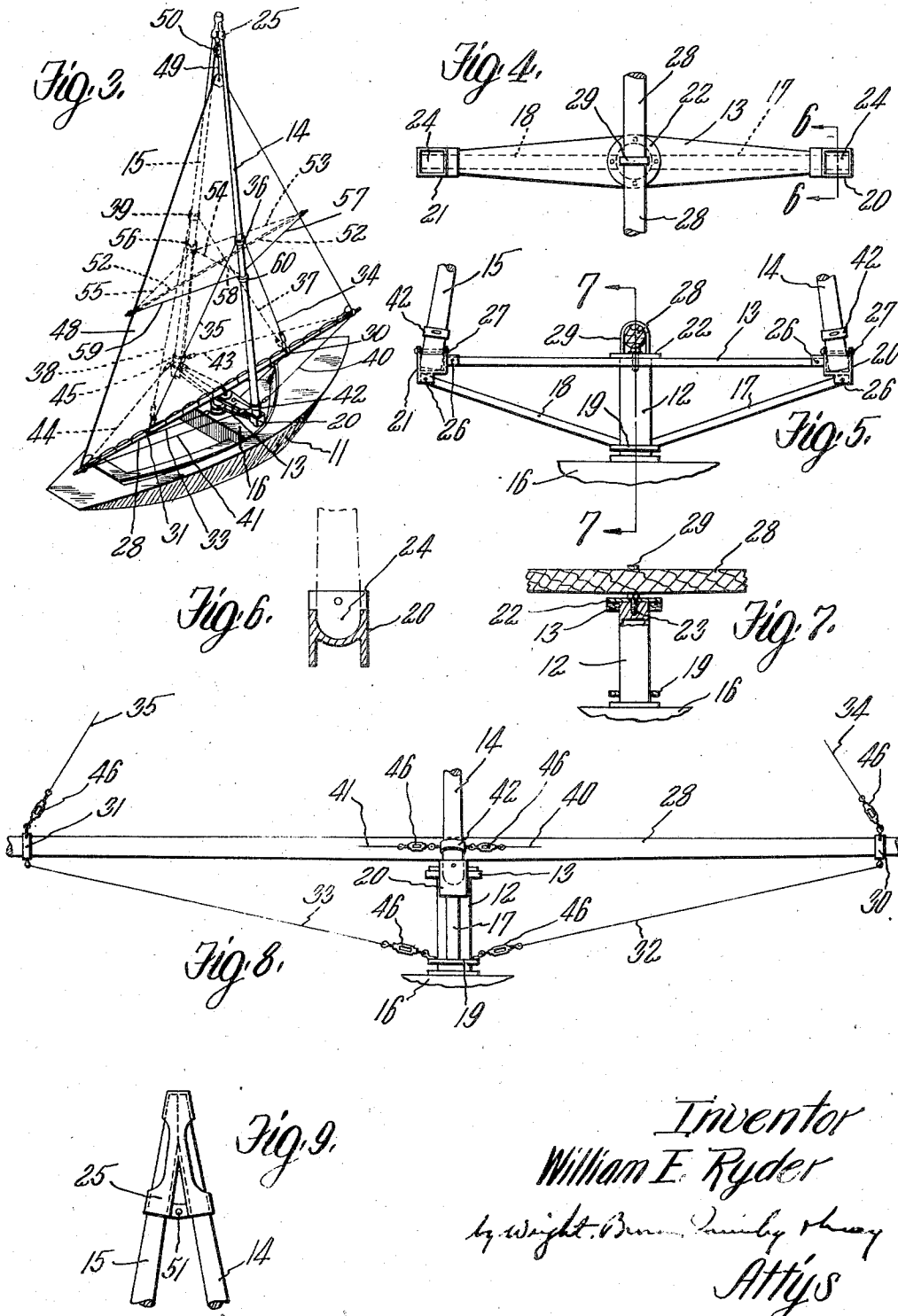
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UNITED STATES PATENT OFFICE

2,147,501

SAILING RIG

William E. Ryder, Boston, Mass.

Application June 24, 1936, Serial No. 86,924

7 Claims. (Cl. 114—102)

This invention relates to sailing vessels and is concerned with the masts, sails and rigging of such vessels. Its object is to furnish for the benefit of mariners and yachtsmen a new type of rigging by which greater ease of maneuvering and trimming the sail to the direction of the wind and the course of the vessel are obtained, by which a boat may be sailed closer to the wind than is possible with rigs heretofore known and used, and by which the component of the wind pressure available for forward propelling thrust is utilized more efficiently and effectively than is possible with fore and aft rigs.

The principles of the invention, within the scope for which protection is here claimed, are applicable to sailing vessels of all dimensions and tonnage from the smallest sail boats to the largest ships, and for commercial vessels as well as racing and pleasure yachts. The embodiment here shown for illustration is that designed for a racing boat of 19 foot water line.

In the drawings,—

Fig. 1 is a side view of the boat above referred to showing the sail in the fore and aft midship plane;

Fig. 2 is a plan view of the boat with the sail trimmed as in Fig. 1, but showing by broken lines two other of the many possible positions in which the sail may be placed;

Fig. 3 is a perspective view of the boat showing the sail in its midship trim;

Fig. 4 is a plan view, and Fig. 5 an elevation, of part of the mast structure;

Fig. 6 is a detail of this structure being a section taken on line 6—6 of Fig. 4 and shown on a larger scale;

Fig. 7 is a section taken on line 7—7 of Fig. 5;

Fig. 8 is an elevation as seen from the right of Figs. 4 and 5 of the construction there shown;

Fig. 9 is a detail of the apex of the mast structure.

Like reference characters designate the same parts wherever they occur in all the figures.

While the hull of the boat here shown contains novel features of design and construction, these novelties are not shown or claimed herein, and it is sufficient for the present description to say that the hull 11 represents and typifies that of any sail boat or ship, whatever its dimensions may be. The subject matter disclosed herein as new, and for which I solicit protection, resides in the spars, rigging and sails and the combination thereof with a hull of any character or type.

The mast comprises the assemblage of a number of parts, namely, a lower mast or pivot 12,

and an upper mast or mast proper constructed of a beam 13 and legs 14 and 15. The lower mast is built strongly and rigidly into the framing of the hull and is itself of sufficiently massive and strong material and structure to sustain and transmit the stresses of the heaviest winds from the sail to the hull without distortion or injury. It is secured at its lower end to the keel and braced at a higher level by a thwart 16 or equivalent bracing means built into the hull structure and through which it passes. The lower mast rises to a sufficient height above the thwart 16 and the deck to serve as a pivot for the swiveled portion of the mast structure and to accommodate the props and stays presently described.

The cross beam 13 is swiveled on the upper end of the lower mast, and is braced by two struts or compression members 17 and 18, the inner ends of which are connected to a collar 19 rotatable freely about the lower mast at a low enough level to support the beam and transmit thrust to the lower mast effectively. Such beam and struts may be made from pieces of wood of suitable cross section to have the necessary stiffness, and their outer extremities are connected together by fittings 20 and 21. The middle part of the beam 13 is substantially wider than the end of the lower mast and is centrally apertured to fit thereon as a rotatable lateral bearing. A plate 22 is secured to it over the aperture as a thrust bearing piece, while a bolt or other suitable securing member 23 is engaged with the lower mast and plate to prevent the beam from rising. The legs 14 and 15 are stepped at their lower ends in sockets 24 (Fig. 6) in the fittings 20 and 21, and their upper ends are brought together in a double socket fitting 25 (Fig. 9). The fittings 20 and 21 have spaced lugs or sockets between or in which the outer ends of the beam 13 and the struts 17 and 18 are received, and to which they are made fast by pins or bolts 26. Pins 27 are passed through the sides of the sockets 24 and the lower ends of the legs.

A boom 28 placed across the upper side of the beam 13 at right angles thereto is restrained from lifting or sidewise movement by a stirrup 29, the ends of which are made fast in the plate 22. But the boom is fitted loosely enough in the stirrup to permit of longitudinal movement and adjustment. Collars 30 and 31 are secured tightly on the boom at points intermediate its middle and extremities. Stays or guys 32 and 33 are led from these collars and connected to the rotatable collar 19. Other stays 34 and 35 lead from the collars 30 and 31 to a collar 36 which is secured on the leg 14 at a point well above the level of the boom.

Similar stays 37 and 38 lead from the collars 30 and 31 to a collar 39 on the leg 15. As here shown, the collars 36 and 39 are placed near the mid height of the legs 14 and 15, but considerable latitude is permissible as to their location, provided only they are high enough to enable the stays 34, 35, 37 and 38 to control the angle between the boom and the plane of the legs. Stays 40 and 41 pass from collars near the extremities of the boom to a collar 42 secured to the leg 14 near its foot, while stays 43 and 44 pass from the boom ends to a collar 45 similarly secured to the leg 15. All of the stays thus described are equipped with turn buckles 46, or other suitable take up means, whereby they can be individually tightened or slackened.

The spars and stays thus described constitute a rigid and adequately braced structure which is completely rotatable about the mast pivot 12. The beam 13 and struts 17, 18 form a rigid truss structure, and the legs 14 and 15, connected to such truss at their foot ends and to one another at their head ends, form an A frame or sheer-legs which is wholly rigid in its own plane; while the guys or stays 32, 33, 34, 35, 37 and 38, together with the boom 28, brace the legs securely against angular displacement across this plane. By suitably taking up certain of these stays and slacking off others, the boom may be adjusted lengthwise or tilted either way from the horizontal position, and/or the legs may be tilted more or less to either side of the vertical position. The foot ends of the legs and the sockets 24 are suitably shaped and fitted to permit such tilting of the legs.

A single sail 48 is secured at its foot to the boom. It is hoisted by a halyard 49 running through a block 50 suspended from an eye 51 (Fig. 9) in the socket fitting 25 between the mast legs. The halyard is led down alongside one of the legs and belayed to a cleat mounted at any convenient point on that leg. As here shown, the sail is triangular and cut so that its head is in the plane of the legs when the boom is perpendicular to, and located with its mid point in, that plane. It is my intent, however, to provide a sail of quadrilateral outline and provide a yard for its head. Approximately half of the area of the sail is at each side of the plane of the legs. The provisions for adjustment of the boom and legs enable the set of the sail to be changed and adjusted to suit different conditions of wind and weather and to utilize the driving force of the wind most effectively.

A substantially horizontal yard or batten 52 is contained in a transverse pocket in the sail and connected near its ends to leech ropes which are sewed into the leeches of the sail in well known manner. The purpose of the yard is to prevent bulging of the sail between leeches; i. e., to hold it flat in the horizontal direction and limit the bulging to substantially only horizontal cylindrical curvature between the yard and the head and foot of the sail. To hold the yard in position and prevent it from bending, it is equipped with stay lines or braces on opposite sides of the sail connected to both of its ends and its middle point and to the mast legs. As shown by Fig. 3, the braces 53, 54 and 55 at one side of the sail lead to blocks supported by a collar 56 on the mast leg 15 at that side, and thence downward to a single cleat, or to separate cleats for each one, on that leg. The corresponding braces 57, 58 and 59 at the other side of the sail lead to blocks connected to a collar 60 on leg 14, and thence to a cleat or cleats on that leg. The stays for the yard

must be provided as running rigging in order that the sail may be lowered and furled or reefed. The yard is an aid to reefing the sail, for it need only be laid on the boom and tied thereto at its ends in order to make the reef secure. Although only one yard or batten is here shown, located slightly below mid height of the sail, it is to be understood that I may locate it at any other desired height or provide two or more similar yards at any suitable locations.

The advantages of the rig here disclosed are numerous. A particular advantage is the ease of maneuvering which it affords. Being substantially equally balanced on both sides of the mast, the sail offers no substantial resistance to a change of trim, and has no substantial tendency to shift its trim, no matter how the wind blows. Hence no sheet is needed to retain the mast and said assemblage in any position to which it may be turned. The friction of the rotating part on the fixed mast stump is sufficient for that purpose even if the wind pressure on the sail is not perfectly balanced at opposite sides of the axis. But it is of course feasible, if desired, to provide a sheet, or other fastening, or locking device in connection with the base truss of the sheer-legs structure to prevent unintended rotation of this assemblage.

The boat can be sailed closer to the wind than fore and aft rigged boats and with more effective driving effect when on the wind than fore and aft rigged boats because the horizontal angle of the sail to the wind direction is substantially uniform throughout its entire width, and it has no hollow luff directly to leeward of a mast. It is superior to square rigged vessels in this particular also because the rigging does not limit the angle at which the sail may be placed with respect to the length of the hull, but the sail may be completely rotated around a vertical axis, and because the batten or battens 52, and the stays by which they are braced, keep the sail as a whole flatter than the familiar square sails.

In tacking, the sail may be turned toward the midship line as the hull swings into the wind until both hull and sail are parallel with the wind. Then as the boat falls away on the other tack, the sail takes the wind on the other side and is trimmed to the new course. In wearing ship the difficulty of gybing it is avoided, while in sailing before the wind the course may be changed to any angle in either direction without danger or necessity of gybing. The way of the boat can be instantly checked by bringing it into the wind and backing the sail.

A vessel may be equipped with any number of masts and sails embodying this principle. When two or more are provided, each is substantially the duplicate of the one here illustrated. The single mast, or the plural masts where more than one are provided, are located suitably to the design of the hull and keel to obtain the desired steering balance or departure from exact balance, such as to give the vessel a weather helm, for instance.

It will be understood that variations may be made from the specific designs and constructions here shown without departure from the principles which I claim as my invention. For instance, while the lower mast 12 here described provides one form of pivot for the rotatable mast structure, it will be understood that other constructions of pivot or turntable having like functions and effects may be used. Neither is it vital that the pivot bearing for the rotatable mast struc-

ture be specifically like that shown. It is within my contemplation also to make the legs of the mast parallel to one another instead of convergent.

5 What I claim and desire to secure by Letters Patent is:

1. A sailing rig comprising a stationary lower mast, an upper mast frame consisting of separated legs connected to one another at their upper ends and a transverse beam connected to their lower ends, mounted on the lower mast to rotate about the axis thereof, a collar rotatably surrounding the mast below said beam, a boom extending across said beam, struts extending between said collar and the outer portions of the beam, and stays or guys extending from points on the boom at opposite sides of the plane of the legs to both legs and to said collar.

2. A sailing rig comprising a stationary lower mast, an upper mast frame consisting of separated legs connected to one another at their upper ends and a transverse beam connected to their lower ends, mounted on the lower mast to rotate about the axis thereof, a boom extending across said beam, stays extending from points on the boom at opposite sides of the plane of the legs to both legs and to the lower mast beneath the boom, said stays being adjustable in length independently of one another and the boom being longitudinally shiftable with reference to the frame structure, and means for taking up or slacking off said stays.

3. In a sailing vessel, a mast and boom connected together in a unit assemblage, means supporting said mast pivotally on the hull of the vessel with the pivot axis of said means substantially vertical, the boom extending substantially horizontally and equally to opposite sides of the mast, and a sail connected at its foot to the boom and suspended at its head from the mast, said sail being so shaped and disposed that its highest point approximately coincides with said axis and substantially equal parts of its area are symmetrically disposed at opposite sides of the mast.

4. In a sailing vessel, a mast structure comprising separated legs connected together at their upper ends, a cross beam to which the lower ends of the legs are connected at laterally separated points, a boom extending across the middle part of said cross beam transversely to the plane of the legs, and stays connecting the boom, cross beam and mast legs into a substantially rigid unit structure, said structure being connected pivotally to the hull of the vessel to rotate about

a substantially vertical axis, and a sail connected to the boom and adapted to be hoisted in the space between the mast legs.

5. In a sailing vessel, a mast structure comprising separated legs connected together at their upper ends, a cross beam on which the lower ends of the legs are supported, a boom extending across the middle part of said cross beam transversely to the plane of the legs, and stays connecting the boom, cross beam and mast legs into a substantially rigid unit structure, a rigid pivot in the hull of the vessel on which the said cross beam is supported to rotate about a substantially vertical axis, a sail connected to the boom and adapted to be hoisted in the space between the mast legs, a yard fast to the sail arranged to occupy a substantially horizontal position when the sail is hoisted in a location spaced apart from both the head and foot of the sail, and stays connecting a plurality of points of said yard to both mast legs.

6. The combination with a vessel's hull, of an upstanding pivot, a rigid truss structure mounted to rotate about said pivot and having lateral bearings thereon at different levels and a thrust bearing to prevent endwise displacement relatively to the pivot, said truss structure having lateral arms extending to opposite sides of the pivot, mast legs stepped on the respective arms and being connected to one another at or adjacent to their upper ends, a boom extending horizontally across the truss structure above the upper end of the pivot substantially at right angles to said arms, stays leading from points on the boom at opposite sides of the pivot to connection with the truss structure below the boom, other stays leading from points on the boom at opposite sides of the pivot to connections with both mast legs at a sufficient height above the boom to stay the mast legs in an upright position, and a sail secured at its foot to said boom and adapted to be hoisted between the legs; the space around said structure, boom and sail being unobstructed so that rotation thereof through 360° is permitted.

7. In a sailing vessel, a mast, means supporting said mast with capability for complete rotation about a substantially vertical axis, and a sail supported by the mast and rotatable therewith about said axis, the sail having portions of its area approximately like each other in outlines and dimensions symmetrically disposed at opposite sides of said axis.

WILLIAM E. RYDER.