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A request for correction of claim 6 has been filed pursuant to Rule 88 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 2.2).

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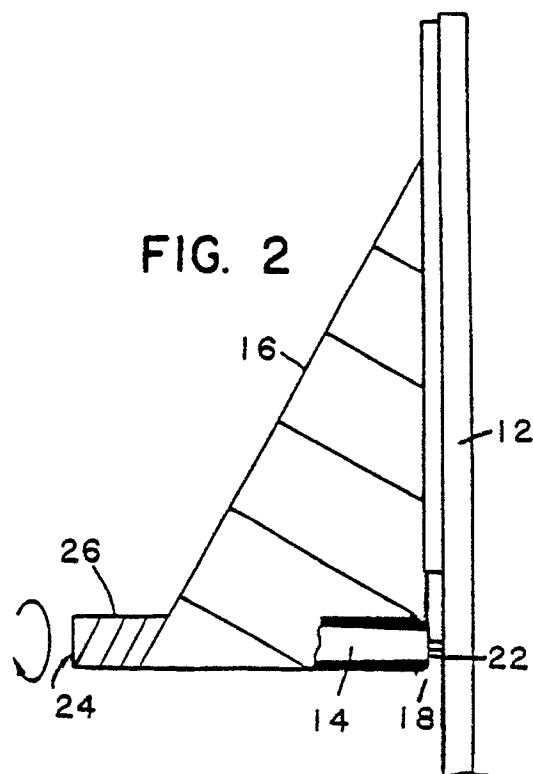
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54 **Roller-reefing boom apparatus.**

57 A roller-reefing boom apparatus includes a mast having a track which receives a bead along an edge of a sail, and a boom that is supported by the mast. The boom includes a member rotatably supported at one end adjacent the mast. This member is adapted for attachment of the bottom of the sail thereto. The member increases in diameter from its said one end to its other end.



ROLLER-REEFING BOOM APPARATUS

This invention relates to an improved roller-reefing boom apparatus for sailboats.

It is known to set, furl, and reef mainsails of sailboats using a roller-reefing boom system, e.g., G.B. Patent 1,179,981; G.B. 703,709; G.B. Patent No. 639,062; Kauert U.S. Patent No. 3,260,230; Katshen U.S. Patent No. 3,608,511; Court U.S. Patent No. 3,132,620; U.S. Patent No. 2,197,654; Potter U.S. Patent No. 3,285,215; Ingouf No. 4,324,192. Typically a triangular-shaped mainsail is supported along its horizontal side by the boom and its vertical side by a track fastened along the mast. The mast accepts a bead that is sewn along the vertical edge of the sail. The track captures and contains the bead, and hence this side of the mainsail, while allowing the sail and bead to move vertically in either direction relative to the track. A halyard (a rope or wire) is attached to the head of the mainsail in order to pull the mainsail upward.

Setting of the mainsail is accomplished by pulling on the halyard while rotating the boom. Thus the mainsail, which when not in use is rolled around the boom, is set by unwinding it from the boom while hoisting it via the halyard attached to the head. Furling and reefing of the mainsail are accomplished by loosening the halyard while rotating the boom, thus rolling the mainsail around the boom. As the mainsail continues to wind around the boom, the shape of the rolled-up sail on the boom often tends to become conical, with the larger diameter end of the cone being toward the mast. This conical shape has a plurality of causes: the bead on the edge of the sail, and the associated cloth which attaches the bead to the sail, creates a bulkier (thicker) sail in this area. Thus, as the sail rolls up on itself, this bulk causes the diameter of the roll to be larger than in the area of the sail which is away from the bead. In addition, as the sail is rolled up, the unsupported side of the sail has more tension on it than the side of the sail with the bead. This is because this side supports the weight of the boom. The tension on this side causes the sail to be rolled more tightly in this area than in the area of the sail which is near the bead and mast, thus the diameter of the rolled sail is smaller in this area.

As the mainsail is further rolled around the boom, the conical shape of the sail already rolled around the boom causes the mainsail to move toward the mast. This causes the forward edge of the sail with the bead to be biased toward the mast. However, space limitations in this area, as well as the track, prevent the bead from moving in this direction. This can cause severe wrinkles in this area of the sail as it continues to roll up around

the boom.

Potter U.S. Patent No. 3,285,215 discloses solving the build-up problem by omitting the bead so that the wound sail is flat. Ingouf U.S. Patent No. 4,324,192 discloses using a connecting member near the mast to direct the bead to a point on the boom away from the mast so that the sail does not travel toward the mast.

The invention features in general roller-reefing boom apparatus that includes a mast having a track for receiving an edge bead of a sail and a boom that is supported by the mast and has a rotatably supported wind-up member that increases in diameter going away from the mast. As the sail is wound up on the member, the build-up caused by the bead is compensated for by the extra room provided at the narrow diameter end about which the bead is wound.

In preferred embodiments the boom includes a tubular outer shell that encloses the wind-up member and defines a slot through which the sail passes. The wind-up member can either continuously increase in diameter (e.g., be conical) or can have a plurality of stepped diameters.

The preferred embodiments will now be described.

Fig. 1 is a diagrammatic elevation showing an embodiment of roller-reefing boom system according to the invention.

Fig. 2 is a diagrammatic elevation showing the Fig. 1 system when the sail is partially furled.

Fig. 3 is a diagrammatic elevation showing an alternative, most preferred, embodiment of a roller-reefing boom system according to the invention.

Fig. 4 is a diagrammatic elevation showing a further alternative embodiment of roller-reefing boom system according to the invention.

Referring to Fig. 1, mainsail rigging 10 includes mast 12, boom 14, and mainsail 16. Mainsail 16 is connected at its bottom to boom 14 and at its vertical edge via luff bead 18 to track 20 of mast 12. Bead 18 is fed through and held in place in track 20 and can be raised by a halyard (not shown), as is standard in the art.

Boom 14 is rotatably attached to mast 12, allowing mainsail 16 to be rolled around boom 14 (see Fig. 2), which serves as a wind-up member on which sail 16 is wound. Boom 14 is shaped such that its diameter increases from end 22, near the mast, to end 24, opposite end 22. Boom 14 thus has a conical shape. Boom 14 is 12' (3.6576m) long, has a 1½" (3.81cm) diameter the mast and 3" (7.62cm) diameter at the other end. Bead 18 has a 3/16" (0.47625cm) outer diameter.

Referring to Fig. 2, as mainsail 16 is rolled around conical boom 14, the shape of boom 14 counteracts the tendency of the rolled-up sail 26 to form a conical shape as described above. Thus as mainsail 16 is initially rolled up, the portion near end 24 has a larger diameter than the portion near end 22. The sail tends to travel toward the larger diameter. It thus initially tends to travel outward, with the bead lying down outside of the bead of the previous wind. A typical reefed position is shown in Fig. 2. After rolling up about half of the sail, the rolled-up sail has a generally cylindrical shape. With further rolling, the larger diameter is closer to the mast, and beads begins to lie down on the inside of the bead of the previous wind. The shape of the boom thus avoids the problem of the sail moving up against the mast and the resulting wrinkles.

Other embodiments are feasible.

For example, referring to Fig. 3, boom 29 includes conical rotating member 30 and outer shell 32 in which rotating member 30 is rotatably supported. Shell 32 has slot 34 along the top for mainsail 16 to enter boom 29 and be rolled-up around rotating member 30. The use of the shell permits attaching lines to positions other than the end of the boom. Referring to Fig. 4, rotating member 30 need not be smoothly and continuously conical; it may be of stepped diameters, e.g., rotating member 40.

6. A sailboat provided without at least one mast mounted thereon, the (or each) mast having a track adapted for operatively receiving a bead along an edge of a sail, a (respective) boom being supported by the (or each) said mast and comprising a wind-up member rotatably supported at one end thereof adjacent the (respective) said mast, said member being adapted for attachment of the bottom of said sail thereto; characterised in that said member increases in diameter from its said one end to its other end.

Claims

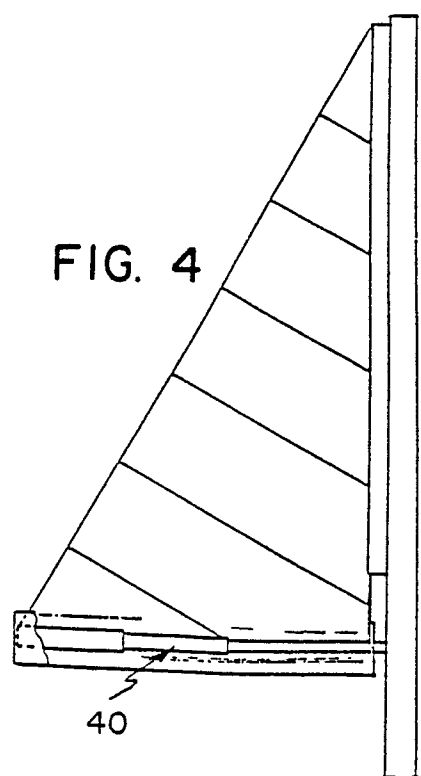
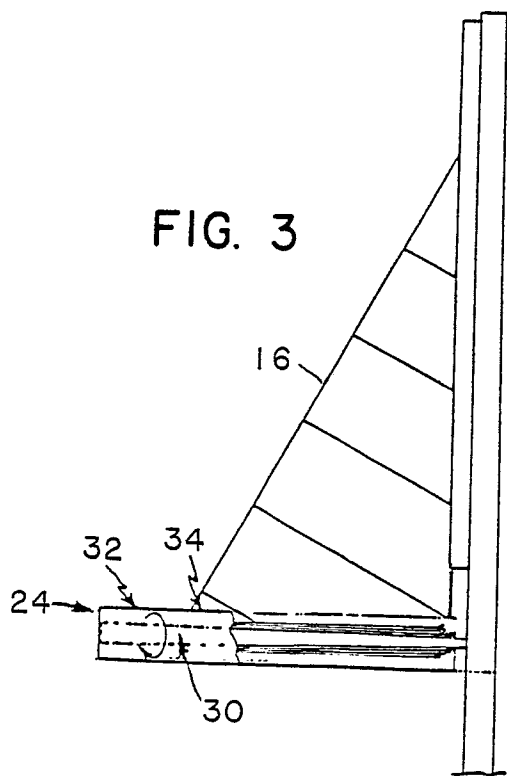
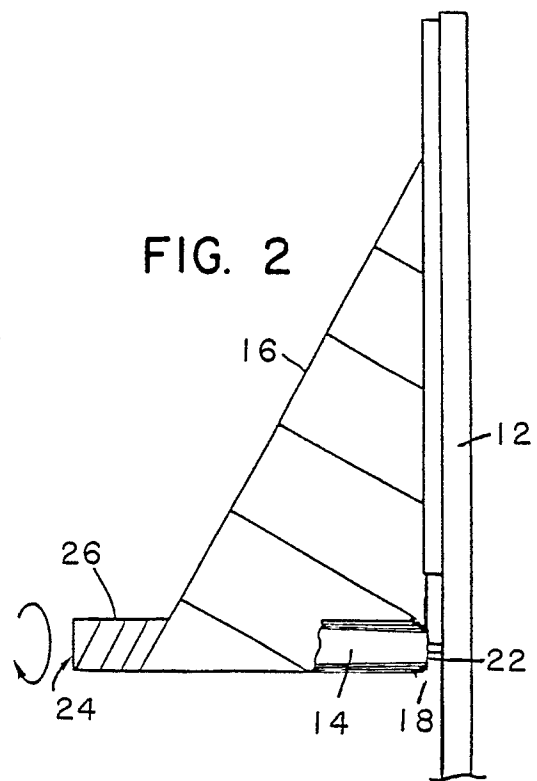
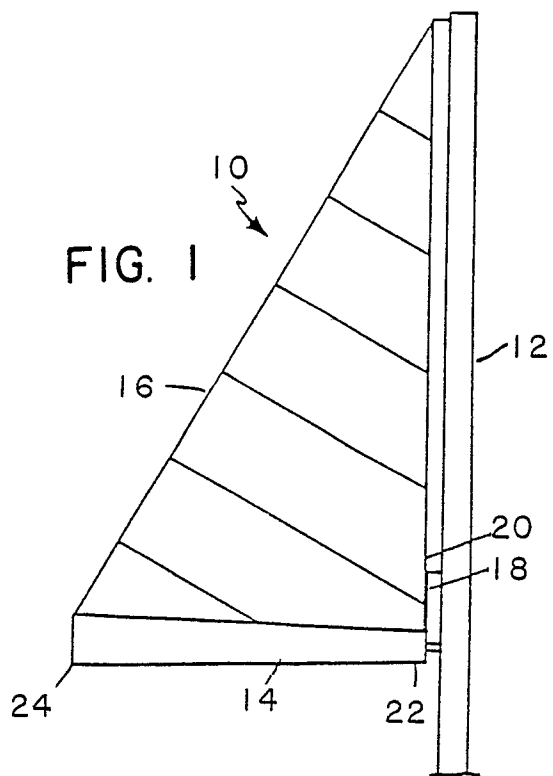
1. A roller-reefing boom apparatus comprising: a mast having a track adapted for operatively receiving a bead along an edge of a sail, and a boom supported by said mast and comprising a wind-up member rotatably supported at one end thereof adjacent said mast, said member being adapted for attachment of the bottom of said sail thereto; the apparatus being characterised in that said member increases in diameter from its said one end to its other end.

2. Apparatus according to Claim 1, further characterised in that said member continuously increases in diameter.

3. Apparatus according to Claim 2, further characterised in that said member is substantially conical in shape.

4. Apparatus according to Claim 1, further characterised in that said member has a plurality of stepped diameters.

5. Apparatus according to any preceding claim, further characterised in that said boom comprises a tubular outer shell enclosing said wind-up member and provided with a slot through which said sail is adapted to pass.





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 30 3144

DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	US-A-3 749 043 (CRALL) * Column 2, lines 41-48; figure 3 * ---	1,4,6
A	GB-A-2 113 636 (RUSSEL) * Page 1, lines 107-130; page 2, lines 1-23; fig. * ---	1,2,4,6
A	FR-A-2 621 882 (MAILLARD) * Page 2, lines 18-21; figure 1 * -----	5
The present search report has been drawn up for all claims		
Place of search	Date of completion of the search	Examiner
THE HAGUE	25-06-1990	VISENTIN, M.
CATEGORY OF CITED DOCUMENTS		
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document		

TECHNICAL FIELDS
SEARCHED (Int. Cl.5)

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