

AERODYNAMIC STRUCTURE FOR VESSEL SAILS

DESCRIPTION

5 **Object of the invention**

The present invention relates to an aerodynamic structure for vessel sails, particularly for rigid vessel sails.

10 **Background of the invention**

The use of rigid sails for the propulsion of vessels is known, comprising an elongated main body situated vertically on the vessel's deck.

15 To improve their aerodynamic behavior, the rigid sails of a vessel may comprise aerodynamic structures located at, for example, the upper and/or lower ends of the sail.

Usually, these aerodynamic structures are complex elements with a high economic cost due to their manufacturing and assembly process.

20 **Description of the invention**

Therefore, an objective of the present invention is to provide an aerodynamic structure for vessel sails that is as simple and economical as possible.

25 With the aerodynamic structure for vessel sails of the invention, the aforementioned drawbacks are resolved, presenting other advantages that will be described below.

30 The aerodynamic structure for vessel sails according to the present invention is described in claim 1, and the dependent claims include additional features that are optional.

In particular, the aerodynamic structure for vessel sails is formed by a plurality of modules joined together, defining a central opening.

Advantageously, each module preferably comprises a frame and a plate situated on said frame.

5 Preferably, each module is joined to its adjacent modules laterally, for example, through beams.

Furthermore, in the aerodynamic structure for vessel sails according to the present invention, one of the modules preferably comprises a hatch, to allow access to the sail.

10 According to a preferred embodiment, the frames of the modules define, in plan view, a trapezoidal or irregular polygon shape.

Furthermore, the plate of each module preferably has at least one curved edge, in particular, the outer edge and/or the inner edge of the aerodynamic structure.

15 Preferably, the frame of at least some of the modules comprises a reinforcing rib and, according to a preferred embodiment, the modules define an ovoid-shaped outer profile.

20 Preferably, each module is made of metal or a composite material, for example, steel or glass fiber reinforced polyester.

In this way, a simpler aerodynamic structure is achieved, which is easier to manufacture and to mount around the sail, thus being more economical than conventional aerodynamic structures.

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Brief description of the drawings

For a better understanding of what has been set forth, drawings are attached in which, schematically and only by way of non-limiting example, a practical case of embodiment is represented.

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Figure 1 is a perspective view of the frames of the modules that form the aerodynamic structure for vessel sails according to the present invention joined together;

Figure 2 is a plan view of the aerodynamic structure for vessel sails according to the present invention; and

5 Figures 3 and 4 are perspective views of two embodiments of connections between the beams of the aerodynamic structure according to the present invention.

Description of a preferred embodiment

10 The figures show the aerodynamic structure for vessel sails according to the present invention. It should be noted that the vessel sail with which the aerodynamic structure according to the present invention is used is preferably a rigid sail, such as, for example, a suction sail, a Flettner rotor, or any other type of rigid sail.

15 Said aerodynamic structure is used to surround the sail, preferably at its ends, either at the upper end and/or at the lower end.

20 The aerodynamic structure is formed by a plurality of modules (1) joined together, defining an inner opening (2) for the sail, not represented in the drawings, to pass through it.

Each module (1) is formed by a frame (3), formed by profiles, and a plate (4), which is placed on said frame (3).

25 The frames (3) of the modules (1) have a trapezoidal shape or an irregular polygon shape, for example, a five-sided irregular polygon.

30 Furthermore, some of the frames (3) may comprise at least one reinforcing rib (7) to guarantee the integrity of its structure.

In the represented embodiment, there are eight frames (3), but there may be a greater or lesser number of frames, depending on requirements.

Said frames (3), as well as the reinforcing ribs (7), are preferably metallic, for example,

made of steel, although they could be of any other suitable material, for example, a composite material, such as glass fiber reinforced polyester.

5 For its part, each plate (4) of each module (1) has a shape corresponding to the frame (3) on which it is placed, with curved outer and/or inner edges, as can be seen in Figure 2.

10 The plates (4) are also preferably metallic, for example, made of steel, although they could be of any other suitable material, for example, a composite material, such as glass fiber reinforced polyester.

15 The joining of the modules (1) is carried out laterally, one module (1) with its adjacent modules, in particular by means of beams (5), a beam (5) being placed between two adjacent modules.

20 In Figures 3 and 4, two alternatives for the connection of the beams (5) with the modules (1) are shown. In Figure 3, the connection is made laterally and in Figure 4 the connection is made from below, although the connection could be made in any suitable manner.

25 Furthermore, to allow access to the sail when the aerodynamic structure is mounted around it, one of the modules (1) comprises a hatch (6), as can be seen in Figures 1 and 2.

As can also be seen in Figure 2, according to the represented embodiment, the outer shape of the aerodynamic structure is ovoid, while the shape of the opening (2) is oval.

30 Although reference has been made to a specific embodiment of the invention, it is obvious to an expert in the field that the described aerodynamic structure for vessel sails is susceptible to numerous variations and modifications, and that all the mentioned details may be replaced by others that are technically equivalent, without departing from the scope of protection defined by the attached claims.

CLAIMS

- 5 1. Aerodynamic structure for vessel sails, characterized in that it is formed by a plurality of modules (1) joined together, defining a central opening (2).
2. Aerodynamic structure for vessel sails according to claim 1, wherein each module (1) comprises a frame (3) and a plate (4) situated on said frame (3).
- 10 3. Aerodynamic structure for vessel sails according to claim 1 or 2, wherein each module (1) is joined to its adjacent modules (1) laterally.
4. Aerodynamic structure for vessel sails according to claim 3, wherein each module (1) is joined laterally to its adjacent modules (1) through beams (5).
- 15 5. Aerodynamic structure for vessel sails according to any one of the preceding claims, wherein one of the modules (1) comprises a hatch (6).
6. Aerodynamic structure for vessel sails according to claim 2, wherein the frames (3) of the modules (1) define, in a plan view, a trapezoidal or bottom irregular polygon shape.
- 20 7. Aerodynamic structure for vessel sails according to claim 2, wherein the plate (4) of each module (1) has at least one curved edge.
8. Aerodynamic structure for vessel sails according to claim 2, wherein the frame (3) of at least some of the modules (1) comprises a reinforcing rib (7).
- 25 9. Aerodynamic structure for vessel sails according to any one of the preceding claims, wherein the modules (1) define an ovoid-shaped outer profile.
- 30 10. Aerodynamic structure for vessel sails according to any one of the preceding claims, wherein each module (1) is made of metal or a composite material.
11. Aerodynamic structure for vessel sails according to claim 10, wherein each module (1) is made of steel or glass fiber reinforced polyester.