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(54) Winch for sailing boats

(57) The invention refers to a winch (1) for sailing boats comprising a stator body adapted to be integrally mounted on a deck (2) of a sailing boat and a rotor body (3) coaxially and rotatably fitted on the stator body along a primary shaft extended along a first direction (x). The rotor body (3) comprises a body portion (5) adapted to receive the windings of a control rope (4) of a sail of the sailing boat. Such rotor body portion (5) comprises an outer lateral surface (7) wherein a plurality of recess elements (8) and a plurality of elements in relief (9) with respect to said recess elements (8) are defined. In accordance with the invention, the recess elements (8) and the relief elements (9) extend along a second direction (y) tilted at a predefined angle (α) with respect to said first direction (x).

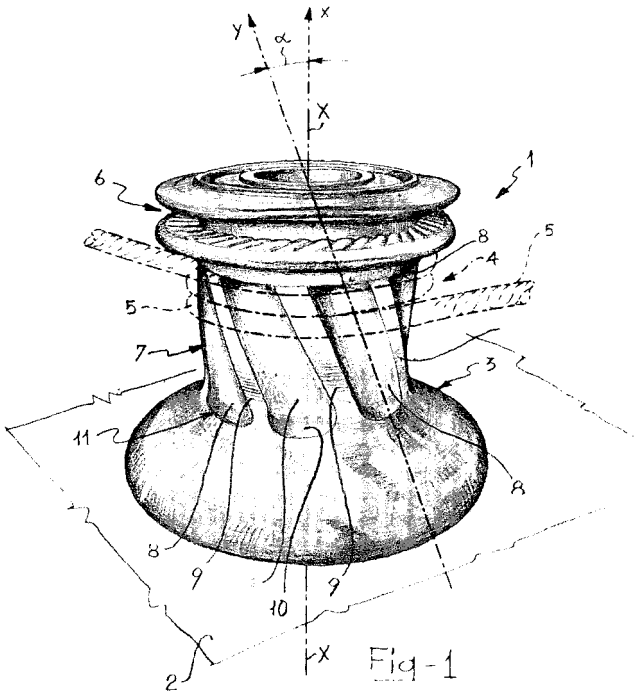

Fig-1

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Description

[0001] The present invention refers to a winch for sailing boats. In particular, the winch of the invention has a preferred, although not exclusive, application in the racing and/or cruising sailing boats.

[0002] As known, winches are employed in sailing boats to ease the manoeuvring and adjustment operations of the sails under stress, such as for example the positioning and hoisting operations of the same. Such operations are carried out by manoeuvring suitable ropes or lines (also commonly indicated with the term: sheets or halyards) suitably connected to the sails; in particular, the ropes are pulled by winding them over suitable winches, properly positioned on the boat deck. The ropes are then properly clamped by suitable locking means provided onto the winch or onto the boat, in such a way to be able to keep the sails in the desired position.

[0003] Typically, the winches comprise a stator base or support body, adapted to be fastened on the deck of the sailing boat and a rotor body, or drum or bell, rotatably associated with the stator body and comprising a zone adapted to receive the windings of the control rope of the sail during the traction operations of the rope itself. The rotor body is coaxially fitted on the stator body along a primary rotation driving shaft and it is kinematically connected to such shaft through a plurality of motion transmission and reduction gears.

[0004] The traction is applied to the rope by imparting a rotation to the primary shaft of the winch, for example through a handle or through suitable drive pedestals; such rotation is transferred to the rotor body, with a predefined reduction ratio, by means of the aforesaid plurality of gears, so as to obtain a predefined force multiplication ratio on the rope. More in particular, the rotation imparted to the primary shaft is transferred, by means of the aforesaid plurality of gears, to a secondary shaft in mesh engagement with a toothed crown gear internally associated with the rotor body.

[0005] When a change of the position of the sail is desired, the rope wound on the winch is pulled or loosened according to the new desired configuration of the sail. Typically, when the rope is pulled, the windings of the rope on the winch tend to vertically move towards the lower part of the outer lateral surface of the rotor body; on the other hand, when it is loosened, the windings of the rope on the winch tend to vertically move towards the upper part of the outer lateral surface of the rotor body, worsening the rope control by the user.

[0006] To reduce in some way the vertical movement of the rope towards the upper part of the rotor body, winches wherein the zone of the rotor body adapted to receive the windings of the rope has a frustoconical, rather than cylindrical, shape have been proposed. In particular, in such winches, the diameter of the lateral surface in the highest portion of the rotor body zone adapted to receive the windings of the rope is slightly greater than the diameter of the lower part of such zone. Such a diameter difference reduces the movement of the windings of the rope towards the upper part of the rotor body.

[0007] Typically, in known winches, the zone of the rotor body adapted to receive the windings of the rope is provided with means to increase the friction with the rope.

[0008] In particular, in a first type of known winches, the outer surface of such zone is treated by means of known techniques, such as for example, sandblasting, knurling, oxide deposition, needle shooting etc. in order to make the surface rough. However, this solution has the disadvantage of damaging the rope in relatively short time periods. This is due to the continuous rubbing of the windings of the rope against such rough surface; this represents a practical problem from the economical point of view, especially in the cruising sailing boats, wherein it is periodically necessary to substitute the worn rope with a new one, with consequent cost problems.

[0009] In a second type of winches, the zone of the rotor body adapted to receive the windings of the rope comprises relief elements applied onto the outer lateral surface of the rotor body and arranged in vertical position, parallel to the direction of the primary shaft of the winch. The presence of said relief elements allows to concentrate the friction between the windings of the rope and the rotor body of the winch in those specific points of the rope which are in contact with the same relief elements only, thus reducing the damage of the rope.

[0010] The technical problem of the present invention is to provide a winch with means adapted to reduce the vertical movements of the windings of the rope along the outer surface of the rotor body, when the rope is pulled or loosened to modify the position of the sail and to ensure good friction between the rope and the rotor body of the winch, at the same time minimising the damage to the rope caused by such friction.

[0011] The invention therefore refers to a winch for sailing boats comprising:

- a stator body adapted to be integrally mounted on a deck of a sailing boat;
- a rotor body coaxially and rotatably fitted on the stator body along a primary shaft extended in a first direction and comprising a body portion adapted to receive the windings of a control rope of a sail of the sailing boat;

wherein said body portion comprises an outer lateral surface wherein a plurality of recess elements and a plurality of relief elements with respect to said recess elements are defined;
characterised in that said recess elements and said relief elements extend along a second direction tilted at a predefined angle with respect to said first direction.

[0012] Advantageously, the presence of recess elements and relief elements, properly tilted onto the outer surface of the rotor body portion adapted to receive the windings of the rope, reduces the vertical movements of such windings on the rotor body during the manoeuvring

operations of the sail. The Applicant has indeed verified that due to their tilting the relief elements generate a thrust on the windings which opposes the vertical movement tendency of the windings themselves when the rope is pulled or loosened to modify the position of the sail in manoeuvring operations of the sailing boat. Advantageously, the relief elements also ensure a good friction between the rope and the rotor body of the winch, at the same time minimising the damage caused by such friction to the rope. In fact, the friction between the windings of the rope and the rotor body of the winch is concentrated in those specific points of the rope which are in contact with the relief elements themselves only, and not over the entire length of the windings of the rope; the useful life of the rope is therefore increased with consequent advantages in terms of costs.

[0013] Preferably, the recess elements and the relief elements are arranged in such a way that each recess element is positioned between two adjacent relief elements. By this way, advantageously, the contact points of the windings of the rope with the sharp edges of the relief elements are distributed in a substantially systematic and regular way along the rope, thus ensuring a more uniform friction stress on the rope.

[0014] Preferably, said second direction is tilted with respect to said first direction at an angle α having a value greater than 0° and lower than about 60°; more preferably, said predefined angle has a value equal to about 35°. The Applicant has verified that by the aforesaid values of the tilt angle it is advantageously possible to reduce the vertical movement of the windings of the rope when the rope is pulled or loosened to modify the position of the sail during manoeuvring operations of the sailing boat.

[0015] Preferably, the portion of the rotor body adapted to receive the windings of the rope is made of metal, more preferably oxidised aluminium or chrome-plated bronze.

[0016] The preferred number of said relief elements can vary according to the material with which the rotor body portion, adapted to receive the windings of the ropes, is made. In particular, when said rotor body portion is made of oxidised aluminium, the number of relief elements is preferably between 4 and 20 for diameters of the rotor body preferably comprised in the range between about 80 and about 150 mm.

[0017] On the other hand, when the rotor body portion adapted to receive the windings of the rope is made of chrome-plated bronze, the number of said elements in relief is preferably between 30 and 150 for diameters of the rotor body preferably comprised in the range between about 80 and about 150 mm.

[0018] In a particularly preferred embodiment of the winch of the present invention, wherein the rotor body is made of oxidised aluminium, the number of relief elements is equal to 8 for a diameter of the rotor body equal to about 90 mm, while a particularly preferred embodiment of the winch of the present invention wherein the rotor body is made in chrome-plated bronze, the number of relief elements is equal to 60 for a diameter of the rotor body equal to about 90 mm.

[0019] In embodiments of the winch of the present invention wherein the rotor body is made in another material, different from oxidised aluminium or chrome-plated bronze, the preferred number of relief elements will be determined according to the surface friction for that particular material.

[0020] The Applicant has verified that the winches made in the above-described way allow to ensure an optimal compromise between the good friction with the windings of the rope and the minimal damage of the rope caused by such friction.

[0021] Preferably, the relief elements and the recess elements of the winch according to the present invention extend along respective helical paths having a specific pitch, whose value can vary according to the size of the winch diameter and to the abovementioned α angle. Still more preferably, such relief elements and recess elements are portions of respective helices. Advantageously, the helical progression of the relief elements allows to obtain a systematic and regular distribution of the friction stresses on the windings of the rope.

[0022] Preferably, the portion of the rotor body of the winch adapted to receive the windings of the rope has a substantially cylindrical shape, wherein for substantially cylindrical shape it is intended a perfectly cylindrical shape, a slightly frustoconical shape, as well as a pseudo-cylindrical shape where the diameter of the lateral surface can vary slightly in several parts of said rotor body portion. For example, in the highest part of the rotor body portion adapted to receive the windings of the rope, the diameter can be slightly greater than that one in the rest of such rotor body portion: such a shape is particularly advantageous in that it contributes to reduce the upward movements of the windings of the rope.

[0023] The recess elements of the winch according to the present invention can comprise a lower tapered end portion. Such tapering can form a β angle in the range from about 0° and 3° with respect to the direction of the primary shaft of the winch.

[0024] Preferably, the relief elements of the winch according to the present invention are defined by ribs obtained by making the recess elements by means of a milling process. More preferably, each relief element is obtained by making two adjacent recess elements by milling.

[0025] Further characteristics and advantages of the winch of the present invention will be more evident from the following detailed description of some of its preferred embodiments, made as only exemplifying and not limiting with reference to the attached drawings. In such drawings,

- Figure 1 is a perspective view of a first preferred embodiment of a winch according to the present invention;

- Figure 2 is a perspective view of a second preferred embodiment of a winch according to the present invention.

[0026] With reference to figures 1 and 2, a winch is indicated with 1 according to two preferred embodiments of the present invention.

[0027] Such a winch 1 comprises some conventional components generally present onto any winch for sailing boats. In particular, the winch 1 comprises a stator body (not shown in the figures), or support, adapted to be fixed by means of a base of it (also not shown in the figures) on the boat deck 2, and a rotor body 3, or drum or bell, rotatably associated with the stator body and adapted to receive the windings of a control rope 4 of a sail of the sailing boat during the traction operations of the rope 4 itself. More in particular, the portion of rotor body specifically adapted to receive the windings of the rope 4 is indicated with 5 in the attached figures. The winch moreover comprises an upper portion 6 adapted to the locking of the rope 4.

[0028] The rotor body 3 is coaxially fitted on the stator body along a primary shaft (not shown in the figures) having an X-X symmetry axis extended along a direction x. The rotor body 3 is associated with the stator body by means of the interposition of a plurality of rolling bearings (not shown in the figures) adapted to permit the related rotation of the rotor body 3 with respect to the stator body.

[0029] The general constituent elements of the winch 1 of the present invention are substantially similar to those of a known winch, and therefore its inner structural elements will not be described in detail below. Only the characteristic structural elements of the winch 1 of the present invention will therefore be described in detail.

[0030] With reference to figures 1 and 2, the portion 5 of the rotor body 3 adapted to receive the windings of the rope 4 has a substantially cylindrical shape. It is possible however to foresee different shapes, such as for example not perfectly cylindrical shapes or slightly frustoconical shapes, with for example a diameter of the highest part of the portion 5 slightly greater than the diameter of the lowest part of such portion 5.

[0031] The portion 5 of the rotor body 3 comprises a lateral surface 7 wherein recess elements 8 and elements 9 which result in relief with respect to the recess elements 8 are defined. The recess elements 8 and relief elements 9 extend along a second y direction and are arranged in such a way that each recess element 8 is between two adjacent relief elements 9.

[0032] In the specific embodiments shown in figure 1 and 2, the rotor body portion 5 has a diameter of about 90 mm and the second direction y is tilted at a predefined angle α with respect to the first direction x; in particular, the angle α is about 35°, but it is possible to foresee different tilt angles according to the diameter of the rotor body 3 of the winch 1.

[0033] The relief elements 9 and the recess elements 8 extend along respective helical paths having a fixed pitch based on the diameter of the winch and on the angle α. In particular, the relief elements 9 and the recess elements 8 are portions of respective helices. It is in any case possible to foresee different pitch values depending on the size of the winch.

[0034] With particular reference to the embodiment of the winch 1 shown in figure 1, the portion 5 of the rotor body 3 of the winch 1 is made of oxidised aluminium and comprises eight recess elements 8 and the same number of relief elements 9 (in figure 1, only the recess elements 8 and the relief elements 9 arranged on the front side of the winch are shown). It is in any case possible to foresee a different number of recess elements and relief elements depending on the size of the winch.

[0035] The recess elements 8 of the winch 1 shown in figure 1 moreover comprise a tapering 10 at the respective lower end portions 11. Such tapering 10 forms an angle β of about 0.5° with respect to the axis X-X.

[0036] With particular reference to the embodiment of the winch 1 shown in figure 2, the portion 5 of the rotor body 3 of the winch 1 is made of chrome-plated bronze and comprises 60 recess elements 8 and the same number of relief elements 9 (also in figure 2, only the recess elements 8 and the relief elements 9 arranged on the front side of the winch are shown). It is in any case possible, also in this case, to foresee a different number of recess elements and relief elements depending on the size of the winch.

[0037] In both the above-described embodiments, the relief elements 9 are defined as ribs obtained by making the recess elements 8 through a milling process. In particular, each relief element 9 is obtained by milling two adjacent recess elements 8.

[0038] Naturally, the above-described embodiments must be understood as mere not limiting illustrations of some possible embodiments of the winch of the present invention, it being clearly understood that any element pertaining to the winch itself can be varied by the man skilled in the art in order to satisfy specific and contingent needs, still remaining within the scope of that claimed below.

Claims

1. Winch (1) for sailing boats comprising:

- a stator body adapted to be integrally mounted on a deck (2) of a sailing boat;
- a rotor body (3) coaxially and rotatably fitted on the stator body along a primary shaft extended in a first direction (x) and comprising a body portion (5) adapted to receive the windings of a control rope (4) of a sail of the sailing boat;

wherein said body portion (5) comprises an outer lateral surface (7) wherein a plurality of recess elements (8) and a plurality of elements in relief (9) with

respect to said recess elements (8) are defined;
characterised in that said recess elements (8) and said relief elements (9) extend along a second direction (y) tilted at a predefined angle (α) with respect to said first direction (x).

2. Winch (1) according to claim 1, wherein said recess elements (8) and said relief elements (9) are arranged in such a way that each recess element (8) is positioned between two adjacent relief elements (9).

3. Winch (1) according to claim 1 or 2, wherein said predefined angle (α) has a value greater than 0° and lower than about 60°.

4. Winch (1) according to any one of the preceding claims, wherein said predefined angle (α) has a value of about 35°.

5. Winch (1) according to any one of the preceding claims, wherein said rotor body portion (5) is made of metal.

6. Winch (1) according to claim 5, wherein said rotor body portion (5) is made of oxidised aluminium.

7. Winch (1) according to claim 5 or 6, wherein the number of said relief elements (9) is between 4 and 20.

8. Winch (1) according to claim 5, wherein said rotor body portion (5) is made of chrome-plated bronze.

9. Winch (1) according to claim 5 or 8, wherein the number of said relief elements (9) is between 30 and 150.

10. Winch (1) according to any one of the preceding claims, wherein said relief elements (9) and said recess elements (8) extend along respective helical paths.

11. Winch (1) according to claim 10, wherein said relief elements (9) and said recess elements (8) are portions of respective helices.

12. Winch (1) according to any one of the preceding claims, wherein said rotor body portion (5) is substantially cylindrical.

13. Winch (1) according to any one of the preceding claims, wherein said relief elements (9) are defined as ribs obtained by making said recess elements (8) by means of a milling process.

Amended claims in accordance with Rule 86(2) EPC.

1. Winch (1) for sailing boats comprising:

- a stator body adapted to be integrally mounted on a deck (2) of a sailing boat;
- a rotor body (3) coaxially and rotatably fitted on the stator body along a primary shaft extended in a first direction (x) and comprising a body portion (5) adapted to receive the windings of a control rope (4) of a sail of the sailing boat;

wherein said body portion (5) comprises an outer lateral surface (7) wherein a plurality of recess elements (8) and a plurality of elements in relief (9) with respect to said recess elements (8) are defined,
characterised in that said recess elements (8) and said relief elements (9) extend along a second direction (y) only, said second direction (y) being tilted at a predefined angle (α) with respect to said first direction (x), and have a constant circumferential width from the top to the bottom of the body portion (5).

2. Winch (1) according to claim 1, wherein said recess elements (8) and said relief elements (9) are arranged in such a way that each recess element (8) is positioned between two adjacent relief elements (9).

3. Winch (1) according to claim 1 or 2, wherein said predefined angle (α) has a value greater than 0° and lower than about 60°.

4. Winch (1) according to any one of the preceding claims,
wherein said predefined angle (α) has a value of about 35°.

5. Winch (1) according to any one of the preceding claims,
wherein said rotor body portion (5) is made of metal.

6. Winch (1) according to claim 5, wherein said rotor body portion (5) is made of oxidised aluminium.

7. Winch (1) according to claim 5 or 6, wherein the number of said relief elements (9) is between 4 and 20.

8. Winch (1) according to claim 5, wherein said rotor body portion (5) is made of chrome-plated bronze.

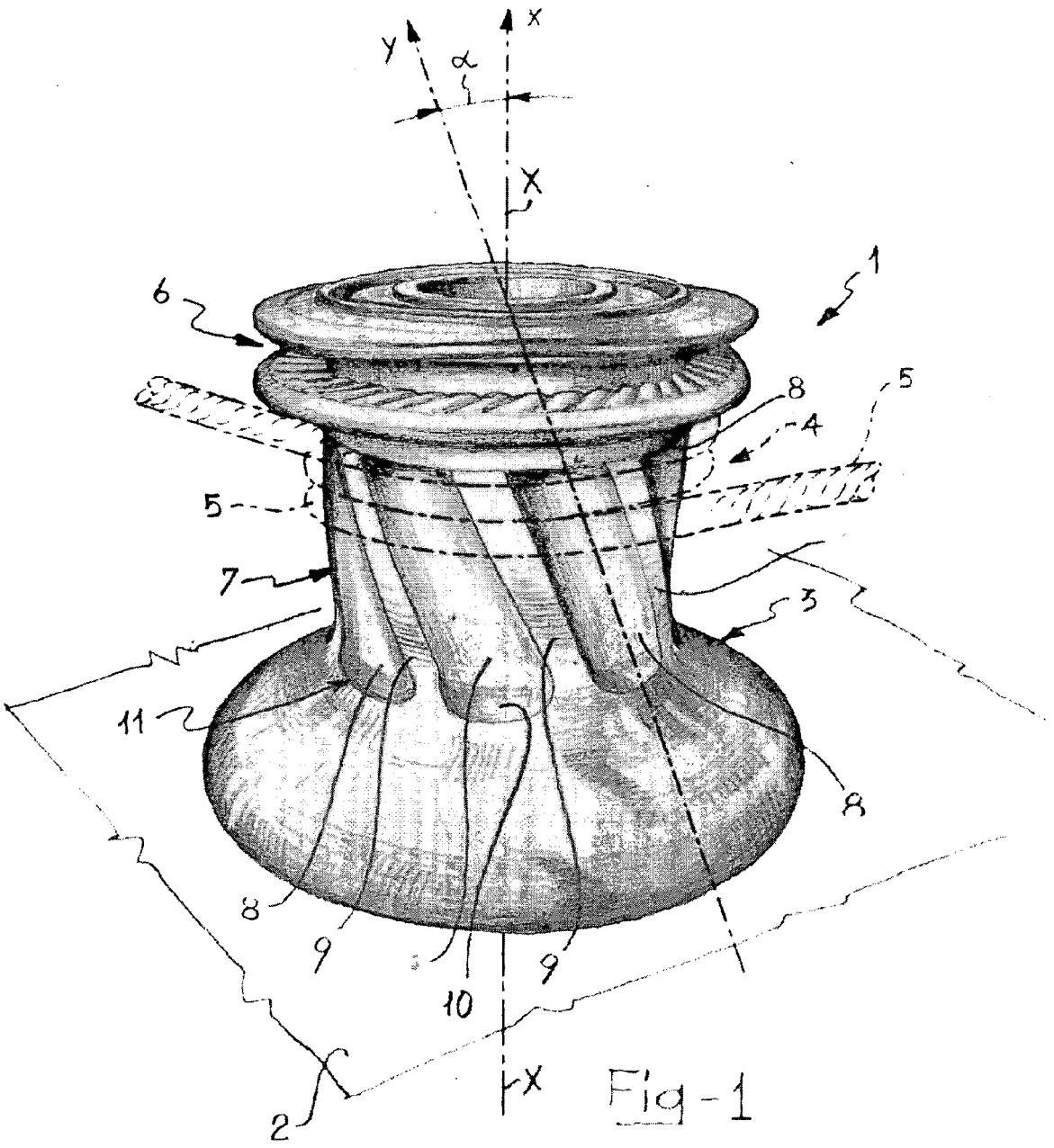

Fig-1

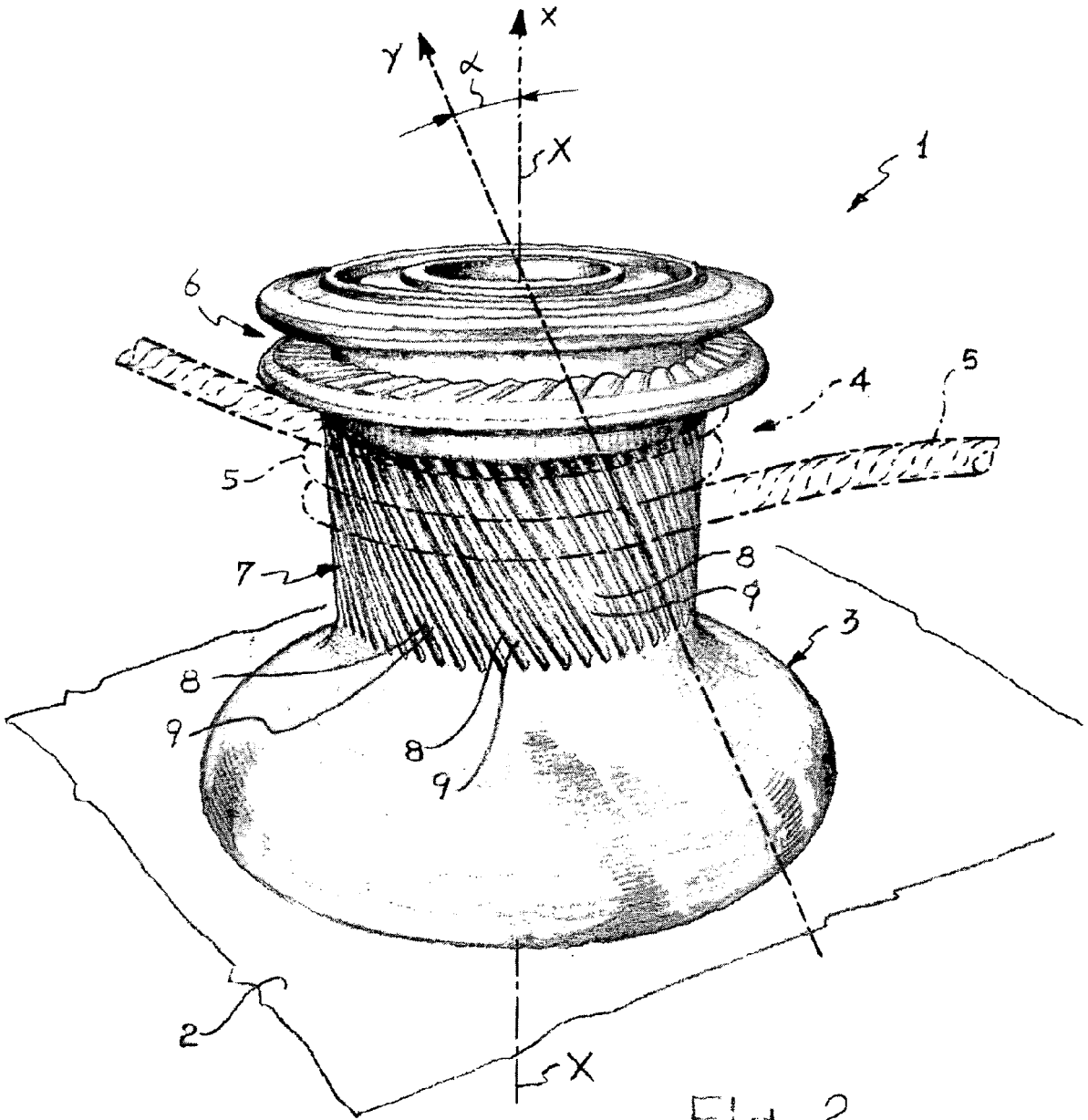

Fig-2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 42 5308

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 September 2006	Verheul, Omiros

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 42 5308

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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