(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
30 October 2014 (30.10.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/174408 A1

(51) International Patent Classification:
B63H 9/10 (2006.01)

(21) International Application Number:
PCT/IB2014/060753

(22) International Filing Date:
16 April 2014 (16.04.2014)

(25) Filing Language: Italian

(26) Publication Language: English

(30) Priority Data:
PD2103A000111 24 April 2013 (24.04.2013) IT

(71) Applicant: **ARMARE DI STEFANO FINCO** [IT/IT]; Via Meucci, 3, I-33058 San Giorgio Di Nogaro (UD) (IT).

(72) Inventors: **ABOLAFFIO, Vieri**; Via Santa Reparata, 42, I-50129 Firenze (IT). **BACIGALUPO, Gabriele**; Via della Rocchetta, 7/13, I-16033 Lavagna (GE) (IT). **FINCO, Stefano**; Via Achille Cristofoli, 14, I-33058 San Giorgio Di Nogaro (UD) (IT). **FREDELLA, Raffaele**; Via Lorenzo Ghiberti, 4, I-34100 Trieste (IT).

(74) Agents: **CANTALUPPI, Stefano** et al.; Piazzetta Cappellato Pedrocchi, 18, I-35122 Padova (IT).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

[Continued on next page]

(54) Title: A FURLER DEVICE FOR STAYED SAILS AND THE LIKE

(57) Abstract: A furler device for stayed sails and the like comprises a torsionally rigid guide extending predominantly axially, a first swivel, slidable on the guide, having a first part fixed rotationally to the guide and a second part which is freely movable with respect to the first part, a stay which supports the guide, a furler with a rotating part designed to rotate the guide about its own axis in order to furl a sail hoist between the rotating part of the furler and the first part of the swivel, around the stay; the guide extends only over a portion of the stay, at the opposite end to the furler, and the stay is torsionally rigid and fixed rotationally to the rotating part and to the guide, so as to form a torque transmission member between the rotating part of the furler and the first part of the swivel when the swivel is engaged along the guide.

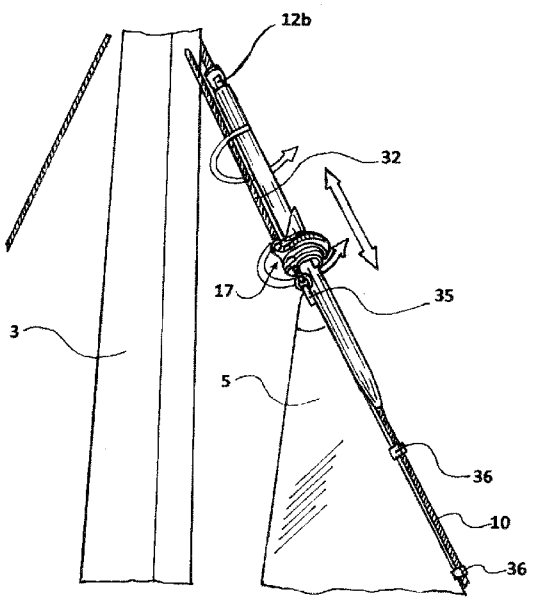


FIG.4

WO 2014/174408 A1

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

A furler device for stayed sails and the like

DESCRIPTION

The present invention relates to a furler device for stayed sails and the like.

Known furler devices for sails may be divided into two main types. The first type includes furler devices which provide only two operating positions of the sail, namely completely furled and completely unfurled. The second type includes devices which allow the sail to be used in a partially furled state, thus enabling the active sail surface to be adjusted with a good degree of continuity.

Examples of these devices are described in EP0541430A1, EP1378442A1, FR2751296A1, FR2792906A1, US3872816A, US3980036A, US4034694A, US5878683A, US6098560A, US6318285B1, US2005211149A1, and WO9722515A1.

Generally, it is only the devices of the second type that also allow the sail to be lowered (for replacement, for example) without also lowering the corresponding stay.

Both aforementioned types of furler devices have advantages and disadvantages. The advantages of the first type include, unquestionably, its lightness, due to some extent to the fact that these devices allow the use of textile stays made of anti-torsion structural cable. However, with the first type of furler it is generally difficult or impossible to substitute furlable sails having different bending lengths on the same stay.

On the other hand, the second type of furler allows relatively easy substitution of the sails as well as partial furling for the purpose of adjusting the sail surface, although this is generally achieved at the cost of increased

weight, owing to the presence of profiled elements of aluminium or other composite materials, with bush and pin joints.

The fundamental problem of the present invention is that of providing a furler device for stayed sails whose structural and functional design is such that all the drawbacks of the aforementioned prior art can be overcome.

This problem is resolved by the invention by means of a furler device made in accordance with the appended claims.

The features and advantages of the invention will be made clearer by the following detailed description of a preferred example of embodiment thereof, illustrated, for the purposes of guidance and in a non-limiting way, with reference to the attached drawings, in which:

- Fig. 1 is a schematic perspective view of a sailing boat, shown only partially, equipped with a furler device according to the invention;
- Fig. 2 is a detail, on an enlarged scale, of the boat of Figure 1;
- Figures 3 and 4 are perspective views on an enlarged scale of another detail of the boat of Figure 1, in two different operating conditions;
- Figures 5 and 6 are perspective views on a further enlarged scale of the detail of Figures 3 and 4, in two different operating conditions;
- Figures 7 and 8 are perspective views, in assembled and exploded form respectively, of the same detail as that of Figures 3 and 4.

In Figures 1 and 2, a sailing boat, indicated as a whole by 1, comprises a hull 2 of which only the bow section is shown, a mast 3 of which only the terminal head section is shown, and a furler device 4 for a sail 5, in this case a jib or other foresail of the stayed type. In the following context, the

term "stayed sail" denotes a sail which is attached, for example by bends or hanks, to a stay 10 extending between a deck plate 11 and a fastening to the mast 12. The stay 10 is of a textile type, made from an anti-torsion structural cable, for example one of the type manufactured and marketed by the present applicant under the trade name "cavo NO-torsion" (see, for example, http://www.armare.it/softrig/no-torsion.php). These cables, constructed on the principle of single-thread winding from what are known as special fibres such as PBO, Kevlar™, or the like, have terminal thimbles 12a,b, and have the property of a degree of flexibility combined with a torque transmission capacity.

A jib roller 13 of the drum type is interposed between the lower thimble 12a and the deck plate 11. The jib roller 13 may conveniently be of another type, for example a closed-circuit top-driven type (winder) or a motorized type, provided that it includes a part 13 rotatable with respect to the plate 11 to cause the stay 10 to rotate about its axis.

This rotatable part is attached to a tack 14 of the sail 5 as well as to the stay 10.

A second swivel is interposed between the upper thimble 12b and the attachment to the mast, allowing the stay 10 to rotate freely with respect to the mast 3.

A guide 15 having a predominantly axial extension is fitted coaxially on to a portion of the stay 10 limited to the upper part of the stay, over a length of about 800 to 1500 mm, which is variable according to the length of the whole stay measured from the upper thimble 12b and according to the type of sails to be adapted. The guide 15 is torsionally rigid; that is to say it can

transmit torque when rotated about its own axis. This is achieved by making the guide 15 from a suitable material, and/or by attaching the guide 15 to the stay 10, which is torsionally rigid and which therefore imparts torsional rigidity to the guide 15 which is rotationally fixed to it. Preferably, in order to increase this torsional rigidity, the guide 15 is provided with a seat for the thimble 12b in which this thimble is received with a positive connection which prevents its relative rotation.

A first swivel 17 is mounted slidably on the stay 10; the first swivel 17 includes a first part 18 rotationally fixed to the guide but slidable thereon, and a second part 19 rotationally supported by means of free-running bearings 20 on the first part 18. The first part 18 of the swivel comprises an obliquely cut orientation device 21 whose inclined sides 22 converge from a single vertex towards an axial groove 23. An identical groove 23 is formed in a low-friction sleeve 24 coupled coaxially inside the first part. The orientation device 21 is designed to rotate the first swivel part 18 when it is fitted on to a tapered fitting 26 of the guide 15, by interaction between its sides 22 and an axial rib 27 formed longitudinally in relief along the outer shell of the guide 15, thus providing a guide having a grooved coupling between the first swivel 17 and the guide 15. The rib and the groove form means and counter-means for torsional coupling between the guide 15 and the first swivel 17. The torsional coupling with a groove profile can be replaced by other couplings capable of transmitting torque while allowing the relative sliding of the first swivel 17 along the guide 15, for example profiled bar couplings.

The second part 19 of the first swivel comprises pierced appendages 30

designed to receive a line spliced to form a closed ring (loop) 31 with which the second part 19 is attached, in use, to a halyard 32. In the same way, pierced appendages 33 and a respective loop 34 are provided on the first swivel part to secure a peak 35 of the sail 5.

The remaining bending area of the sail can be attached removably to the stay 10 by means of hanks 36.

To hoist the sail 5, it is simply necessary to lower the first swivel 17 along the stay 10, attach the tack and peak, respectively, to the jib roller 13 and to the first part 18 of the first swivel, and hank (or otherwise bend) the sail to the stay.

The sail 5 is then hoisted by pulling on the halyard 32. When the first swivel engages the tapered terminal fitting piece of the guide 15, the orientation device 21 is made to slide with its obliquely angled appendage behind one of its sides 22, thus rotating the first swivel part 19 about its own axis until the groove 23 is aligned with the rib 27 of the guide 15.

The peak and clew of the sail 5 are thus fixed rotationally to the stay 10, allowing the sail to be furled around the stay. However, it should be noted that, since the first swivel 17 is slidable on the guide 15, the position of the first swivel along the guide can be varied without preventing or altering the tensioning of the stay. Thus the sails in use can be exchanged for others having different bending lengths, or the halyard tension can be varied without changing the stay tension, thus increasing the possibilities of adjusting the sail. It is also possible to furl the sail only partially on the stay, in order to vary the sail surface of the boat.

Thus the invention achieves numerous advantages, including a remarkable

lightness of the rigging and extended possibilities for the adjustment of the staysails.

CLAIMS

1. A furler device for stayed sails and the like, including:

- a torsionally rigid guide extending predominantly axially,
- a first swivel, slidable on the guide, having a first part fixed rotationally to the guide and a second part which is freely movable with respect to the first part,
- a stay which supports the guide,
- a furler with a rotating part designed to cause the guide to rotate about its own axis in order to furl a sail hoisted between said rotating part of the furler and said first part of the swivel about said stay,

characterized in that the guide extends only over a portion of the stay, at the opposite end to the furler, and in that the stay is torsionally rigid and fixed rotationally to the rotating part and to the guide, thus forming a torque transmission member between the rotating part of the furler and the first part of the swivel when the swivel is engaged along the guide.

2. A furler device according to Claim 1, wherein the stay is flexible, at least in its part located outside the guide.
3. A furler device according to Claim 2, wherein the stay is made of textile material, in the form of an anti-torsion structural cable.
4. A furler device according to any one or more of the preceding claims, wherein the guide is fixed to the stay on the outside of the latter.
5. A furler device according to Claim 4, wherein the guide comprises two cheeks which are fixed to each other and to the corresponding portion of stay on which they are superimposed.
6. A furler device according to Claim 5, wherein the cheeks define a seat

for accommodating a terminal thimble of the stay.

7. A furler device according to Claim 6, wherein the thimble is accommodated in the seat with an anti-rotation coupling.

8. A furler device according to any one or more of the preceding claims, wherein a second swivel is mounted on the end of the stay opposite the furler.

9. A furler device according to any one or more of the preceding claims, wherein an orientation device is provided between the guide and the first part of the swivel, this orientation device being adapted to align respective means and counter-means for torsional coupling between the swivel and the guide during the fitting of the first swivel on to the guide.

10. A furler device according to Claim 9, wherein the torsional coupling means and counter-means are of the grooved coupling type.

11. A furler device according to Claim 10, wherein the orientation device comprises at least one longitudinal rib on the guide, this rib also forming the torsional coupling means, and at least one stop with an inclined profile on the swivel to orientate the swivel so that a groove on the swivel engages with the corresponding rib of the guide during the fitting of the first swivel on to the guide.

12. A furler device according to any one or more of the preceding claims, wherein the first swivel comprises pairs of pierced appendages each designed to a receive a respective spliced rope in the form of a closed loop for fastening the first swivel to a sail halyard and/or peak respectively.

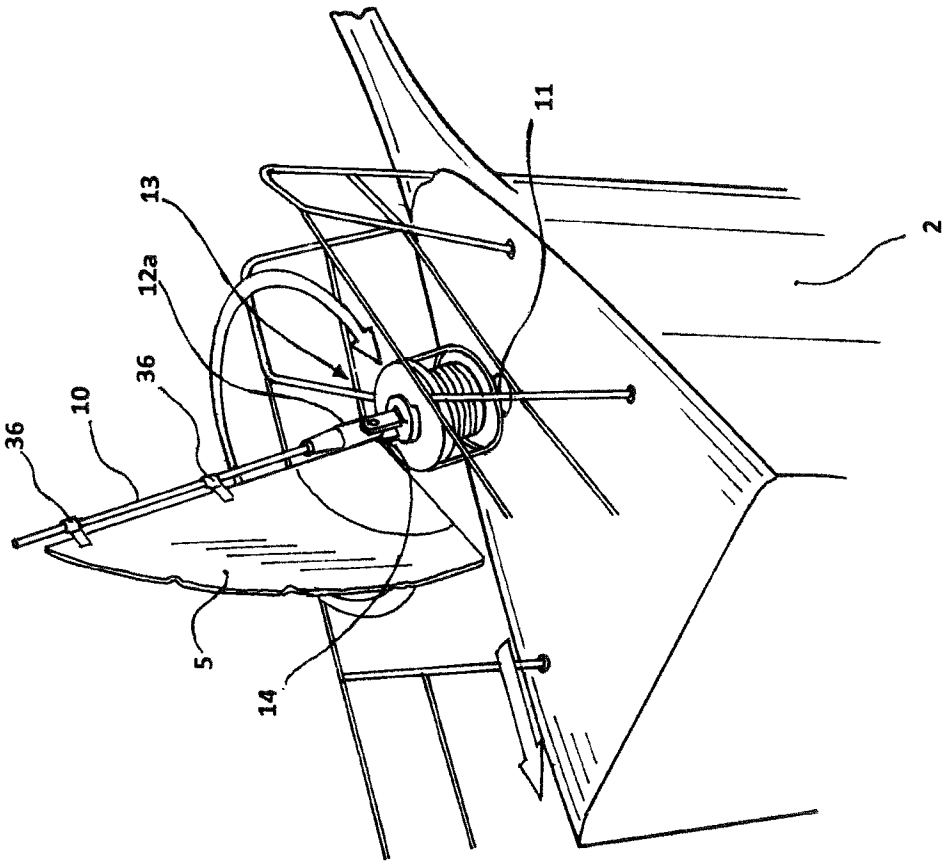


FIG.2

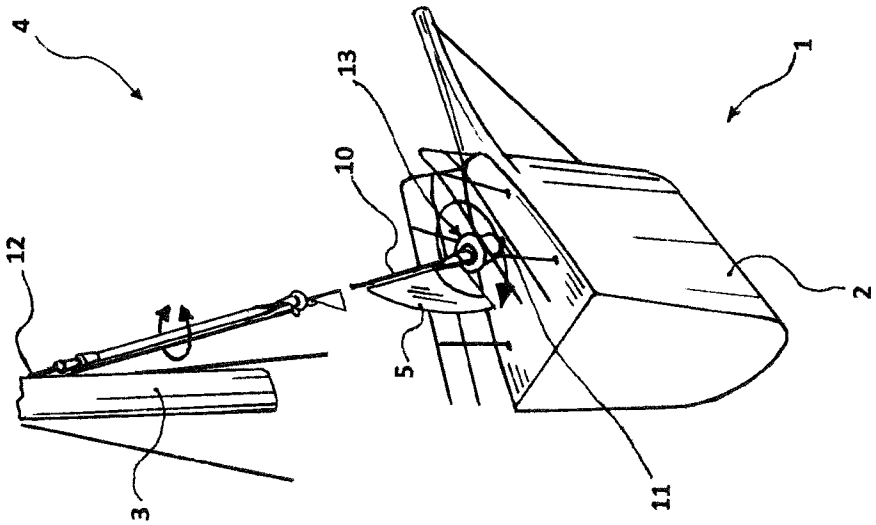


FIG.1

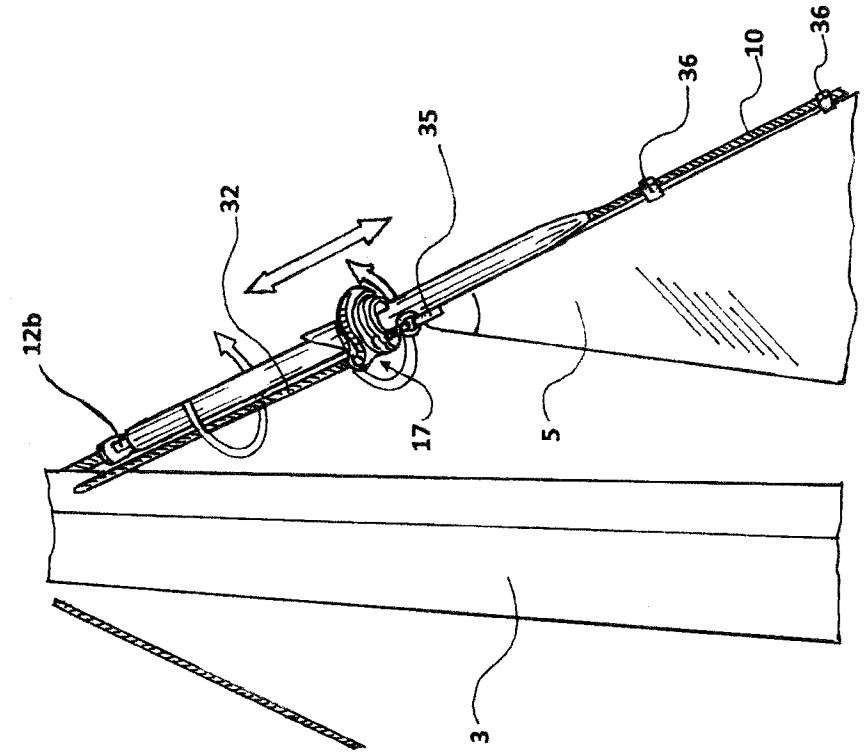


FIG.4

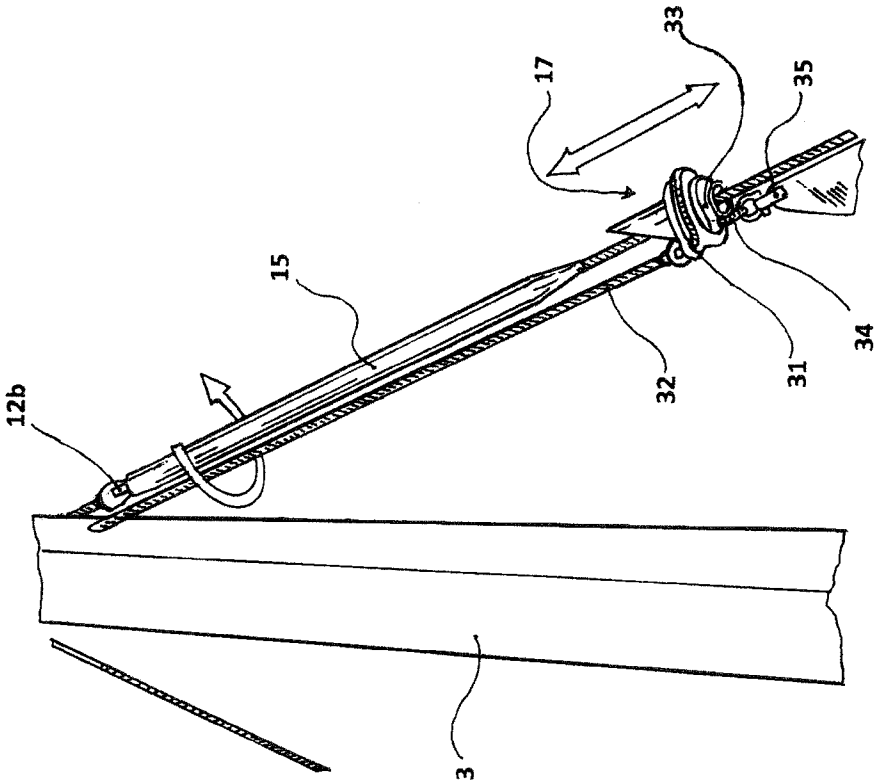


FIG.3

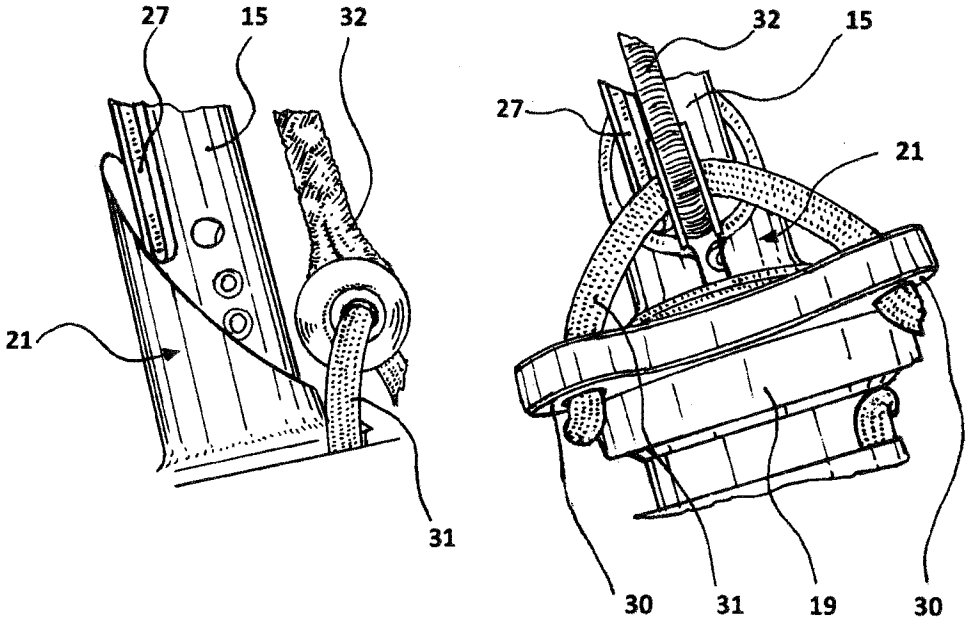


FIG.5

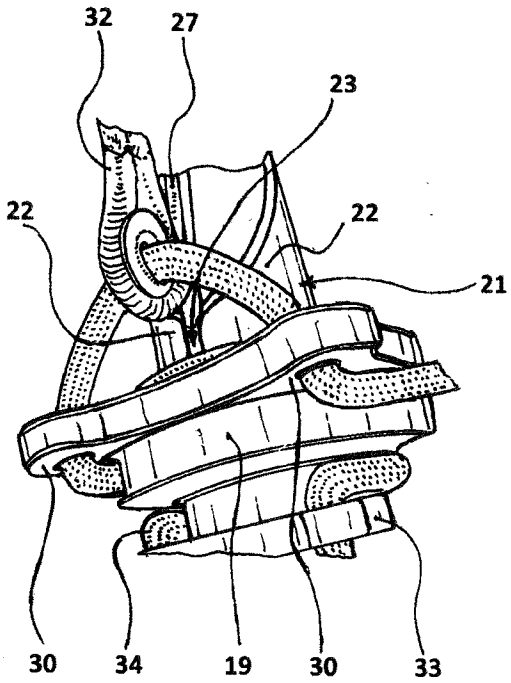


FIG.6

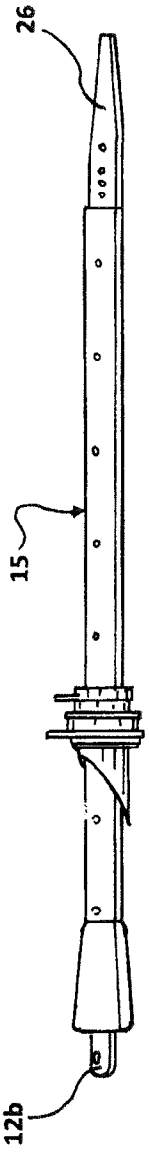


FIG.7

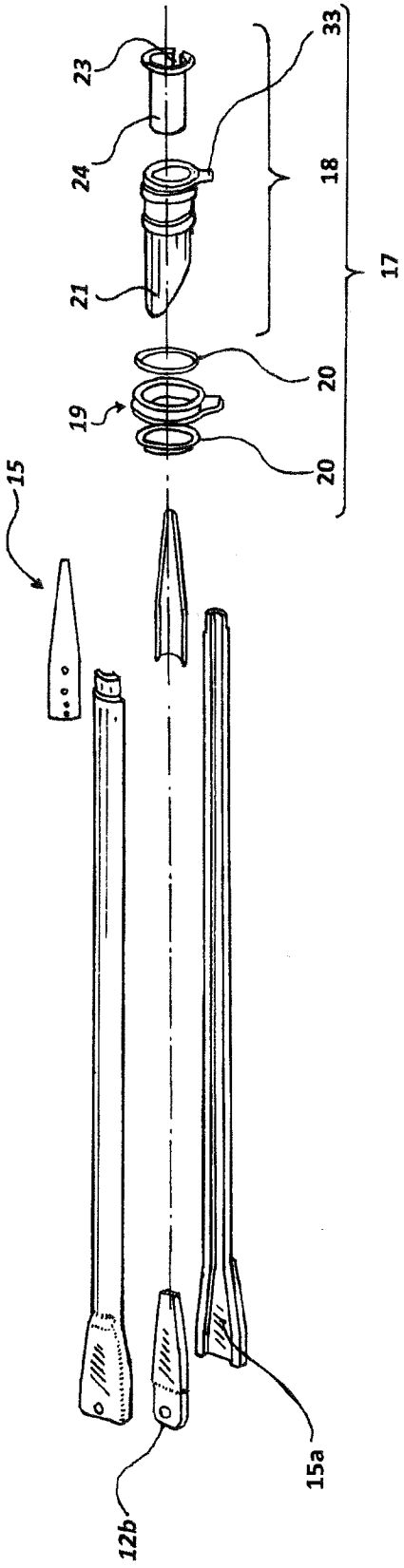


FIG.8

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/060753

A. CLASSIFICATION OF SUBJECT MATTER
INV. B63H9/10
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B63H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 267 791 A (INGOUF JEAN-PIERRE) 19 May 1981 (1981-05-19) column 4, lines 10-62; figures 3-17	1-12
X	US 5 899 163 A (KYLE JAMES H [US]) 4 May 1999 (1999-05-04) column 3, lines 4-34; figures 1-6	1-12
X	US 5 014 637 A (STEVENSON IV WILLIAM H [US]) 14 May 1991 (1991-05-14) column 4, lines 14-68; figures 1, 2	1-12
X	US 3 938 460 A (WALES WALTER M ET AL) 17 February 1976 (1976-02-17) column 2, lines 4-40; figures 1-4	1-12
X	FR 2 441 539 A1 (POLLET JACQUES) 13 June 1980 (1980-06-13) page 3, lines 11-36; claims 2, 3	1-12

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 May 2014	06/06/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Brumer, Alexandre

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2014/060753

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4267791 A	19-05-1981	AU 532894 B2	20-10-1983
		AU 4959979 A	07-02-1980
		DE 2962142 D1	25-03-1982
		EP 0008560 A1	05-03-1980
		FR 2432432 A1	29-02-1980
		JP S56160294 A	09-12-1981
		US 4267791 A	19-05-1981
US 5899163 A	04-05-1999	NONE	
US 5014637 A	14-05-1991	NONE	
US 3938460 A	17-02-1976	NONE	
FR 2441539 A1	13-06-1980	NONE	