

Rope stopper system

The present invention relates to a rope stopper system for
5 a fibre rope, where a rope stopper is placed on a deck of
an anchor handling vessel or the like, and is arranged to
grip and secure the fibre rope that runs through the rope
stopper, in connection with reshackling and the like.

10 On, for example, an anchor handling vessel, a towing pin
is often used to steer and guide a chain, wire, cable, or
the like to the mouth area of a shark jaw. A shark jaw is
normally used to grip and secure said chain or cable. Such
shark jaws are normally formed to hold and grip around the
15 chain or cable, for example, in connection with
reshackling or other operations.

Fibre ropes have gradually been used for the handling of
heavy loads in the form of, for example, anchors and
20 subsea equipment for the oil and gas industry. Fibre ropes
are now used more and more at great ocean depths, as such
ropes have a lower specific weight and thereby make the
heavy lifting easier. A shark jaw as described above is
not suited to be used on fibre ropes. Therefore, it is
25 possible to use the present invention instead of a shark
jaw, or alternatively in addition to such equipment.

From prior art, reference is made to WO 2007/021195A1,
which describes a centring device that is arranged to
30 guide and grip a wire, chain, cable, etc. The device
comprises a box mounted on a deck of a vessel, and which
is fitted with at least two rotary guiding plates, where
the guiding plates with contact surfaces can have an
eccentric or oval shape and can rotate about a bearing

point. The guiding plates are arranged so that they shall guide or grip the rope between the respective guiding plates. Contrary to the present invention, the guiding plates are, in the main, arranged transversely to said
5 wire, chain or cable, so that when the guiding plates are raised, the end edges of the guiding plates are arranged to lie against said wire, chain or cable to counteract the associated rotation.

10 Furthermore, reference is made to US 2004/187757 A1 which shows an example of a rope stopper that is commonly used on yachts. The rope stopper comprises a base with two stopper elements that can rotate about a bearing point. The stopper elements have a cylindrical or oval shape with
15 a contact surface for the gripping of the rope.

Consequently, it is an object of the present invention to provide a solution that can be used to grip and secure fibre ropes on a vessel, such as an anchor handling vessel
20 that is used in connection with offshore operations, and which is simple and easy to use.

A further object is also to provide a solution that can easily be moved around the deck of the vessel and can
25 simply be placed next to existing equipment on the deck.

The above mentioned objects are reached with a rope stopper system for a fibre rope, where a rope stopper is placed on the deck of an anchor handling vessel or the
30 like and is arranged to grip and secure the fibre rope that runs through the rope stopper, in connection with reshackling and the like. The rope stopper comprises a frame equipped with at least three rotary stopper elements, where the stopper elements are arranged in an

opening in the frame, said opening is an opening for the fibre rope to run through, and where the stopper elements in the opening are placed about the fibre rope running through, and also that the outer surface of said stopper element is equipped with a contact surface which, during rotation of the stopper element, is arranged to lock the fibre rope, and that the contact surface is arranged at a point on the outer surface that lies further away from the bearing point of the stopper element than at least most of the other points of the outer surface of the stopper element.

Alternative embodiments are given in the respective dependent claims.

Said stopper element can be supported eccentrically with respect to the contact surface of the stopper element with the fibre rope.

The stopper element can have an eccentric shape or an oval shape. Furthermore, the contact surface can have an external curved radius, and/or the contact surface can be equipped with a rubber covering. The curved shape of the contact surface, or the rubber covering, can change with the circumference about the stopper element.

The frame can be equipped with a number of back supports, whereby the rope stopper is arranged to be placed next to other equipment on the deck of the vessel.

Said back supports can be arranged to be placed between the cylinders of a towing pin.

Furthermore, the stopper elements can be arranged to be rotated in synchrony.

The frame can comprise a motor connected to one of the stopper elements, and said stopper element is preferably connected via a drive unit to the other stopper elements.

The invention shall now be described in more detail with the help of the enclosed figures, in which:

10 Figure 1 shows a principle drawing of an example of an anchor handling vessel that can use the present invention.

Figure 2 shows in more detail the aft end of the vessel shown in figure 1.

15 Figures 3 and 4 show a rope stopper according to the invention in an open and closed position, respectively, and placed next to a towing pin.

Figures 5 and 6 show schematics of the rope stopper according to the invention.

20 Figures 7, 8 and 9 show a front schematic of the rope stopper according to the invention and with stopper elements in different positions.

Figures 10, 11 and 12 show different schematics of a stopper element according to the invention.

25 Figure 13 show an alternative embodiment of a rope stopper according to the invention.

Figure 1 shows a principle drawing of an anchor handling vessel 50 that can be equipped with the solution according to the invention. Figure 2 shows in more detail an aft end 52 of the vessel 50, and shows a rope in the form of a fibre rope 30 that runs on a deck 54, from a winch (not shown) placed further forward on the deck, and over, for example, a roller at the aft end and down into

the sea. The fibre rope 30 can, in this connection, be used for handling of heavy loads in the form of, for example, anchors and subsea equipment for the oil and gas industry. At great ocean depths fibre ropes are being used more and more, as such ropes have a lower specific weight and thus make heavy lifts easier.

A rope stopper 10 according to the invention can be placed at the aft end 52, or anywhere on the deck 54 for that matter. However, in the embodiment example shown the rope stopper 10 is shown placed adjoining a towing pin 40 which is normally used to steer and guide a chain, wire, cable or the like to the mouth area of a shark jaw (not shown). A shark jaw 42 is indicated driven down into the deck, and is normally used for gripping and securing of said chain or cable. Such shark jaws are normally shaped to grip the chain or the cable, and are therefore not suited to be used with fibre ropes. Therefore, it will be possible to use the present invention instead of a such shark jaw, or alternatively in addition to such equipment.

As figures 3 and 4 show in more detail, the rope stopper 10 according to the invention is, for example, placed next to the towing pin 40, i.e. in more detail the rope stopper 10 rests against the two driven up cylinders 40a, 40b of the towing pin. To secure the rope stopper 10 when it is placed in this way, the rope stopper can be equipped with two back supports 22 (best shown in figure 5) that can lie internally between the cylinders 40a, 40b of the towing pin 40. Thus, the towing pin 10 can be loose or fastened between the cylinders so that it can become loose and the towing pin arrangement will thereby be able to take up the forces from the load, i.e. when the rope stopper 10 engages with the fibre rope 30. The back supports 22 can also comprise appliances for a secure fastening of

different equipment, such as said towing pin or the like. Alternatively, the rope stopper 10 can be placed in a box on the deck (not shown) and in a way corresponding to the towing pin or shark jaw be arranged to be driven up from
5 and down into the deck 54.

In the embodiment shown, the rope stopper 10 comprises a frame 12 which, among other things, the back supports 22 are fastened to. Furthermore, the frame 12 is equipped
10 with a downwardly directed opening 16 where several stopper elements 14, also called friction wheels, are mounted so that they can rotate. Thereby, the rope stopper 10 can be threaded over the fibre rope 30 and rest against the cylinders 40a, 40b of the towing pin 40. In the case
15 of the rope stopper being driven up or down as described, the opening will naturally be directed upwards.

The rope stopper 10 is shown in an open position in figure 3, i.e. the stopper elements 14 are rotated so that they
20 do not engage with the fibre rope 30, while figure 4 shows the wheels rotated so that they engage with the fibre rope 30. The corresponding is shown in the figures 7-9, where figure 7 shows the stopper elements 14 in an open position, figure 8 shows the stopper elements in partially
25 closed position or closed position in the case of fibre ropes of a large diameter, and figure 9 shows the stopper elements in a closed position in the case of fibre ropes with smaller diameters. As the figures show, the stopper elements 14 (which are, as mentioned, also called friction
30 wheels) are mounted mutually spaced apart in the frame 12 about a central, imaginary longitudinally running axis through the opening 16. The opening 16 is an opening through which the fibre rope 30 will run and where the stopper elements 14 in the opening are placed radially

about the fibre rope 30 that runs through. This axis will be able to correspond to the longitudinal axis of the fibre rope when the fibre rope runs through the opening. Thus, the rope stopper 10 can hold different fibre ropes of different diameters. Furthermore, preferably three or more stopper elements are used so that the fibre rope can be optimally held tight. The use of, for example, three stopper elements will, of course, centre the fibre rope.

10 The frame shown in the figures 3-9 can also be closed at the bottom of the opening 16 with the help of stays, bolts or the like so that the frame is given an increased strength against torsion and the like.

15 So that the stopper elements 14 shall grip about the fibre rope 30 when they are rotated, they are preferably formed so that a contact surface 24 meets the fibre rope 30, and where the contact surface 24 moves eccentrically with regard to a bearing point 20 for the stopper element 14.

20 Thus, the stopper elements 14 are rotated in the longitudinal direction of the fibre rope. This is shown in figure 10 in that the stopper element has an eccentric form, as opposed to the circular form shown by the partial circle arch S, i.e. for example an approximate oval form and with the bearing point 20 placed eccentrically with regard to the centre of the form. This will be the best solution that provides the most power, but the stopper element 14 can alternatively also have an approximately circular shape and with the bearing point eccentrically in relation to the centre, or also in an oval or the like with the bearing point centrally. Most importantly is that the contact surface 24 of the stopper element 14 is arranged at a point that lies further away from the

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bearing point 20 of the stopper element than at least most of the outer surface 26 of the stopper element.

During reshackling or the like, or when tension arises in
5 the fibre rope 30, the stopper elements 14 will thereby be
able to be rotated in a controlled way, for example,
counter-clockwise, (as shown in the figures), so that the
contact surfaces 24 of every element will be forced
10 against the fibre rope for the rope to be gripped, and
during pulling in or after reshackling of the fibre rope
30, the stopper elements 14 will, for example, be able to
be rotated in a controlled way clockwise so that the
contact surfaces 24 disengage with the fibre rope, and
15 also so that the rest of the outer surface, indicated by
26, does not come into contact with the fibre rope 30
either. The rope stopper 10 can be equipped with means for
controlled rotation of the stopper elements 14.
Furthermore, the rope stopper 10 can be equipped with
means to lock the stopper elements 14 in any desired
20 position.

Figure 13 shows a further variant of the rope stopper 10
and comprises, in a corresponding way, a frame 12 with
several stopper elements 14 placed about an opening 16a
25 where the fibre rope 30 runs. Here, the rope stopper 10 is
in closed form so that the opening 16a is only a through-
running opening, contrary to the earlier variants that
show an upwardly or downwardly open and through-running
opening 16. In this version, the frame can be connected by
30 an upper hinge 28a, and can be opened in two frame part
halves that can be opened and be threaded over the fibre
rope 30. The two frame half parts can be locked in a lower
connection 28b, for example, with the help of a through-
running bolt or the like. Figure 13 shows further that the

contact surfaces can be formed as a sole 24a fitted externally onto the stopper elements 14. The sole 24a can be serrated externally, and correspondingly the contact surfaces 24 as described previously can alternatively be
5 serrated also.

However, it is preferred that the contact surfaces described for both the variants are formed in an arch and have a smooth outer surface, and/or alternatively they can
10 be equipped with a layer in the form of, for example, a rubber covering. The arched shape of the contact surface or the covering can change with circumference to adjust to the fibre rope for both large and small diameters, i.e. that the radius of the arched shape changes along the
15 circumference of the stopper element.

For both variants, the stopper elements can also be controlled by a motor so that a controlled rotation and locking is provided. The stopper elements can be equipped
20 with, or connected to, cogwheels or other drive appliances/drive units, for example, placed inside the frame 12, for synchronous rotation of the elements. For this purpose, a hydraulic motor, for example, can be used, indicated by the reference number 32 in figure 13, which
25 is connected to the shaft of one of the stopper elements. Thereby, in activating the motor the other stopper elements will also be activated and rotated via the cogwheels or the drive appliance. Linear transmission can also be used.

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The bearing 20 can be in the form of a shaft that is connected to said cogwheels or drive unit.

C L A I M S

1. Rope stopper system for a fibre rope (30), where a rope stopper (10) is placed on a deck of an anchor handling vessel (50) or the like, and is arranged to grip and secure the fibre rope (30), that runs through the rope stopper (10), in connection with reshackling and the like, characterised in that

- the rope stopper (10) comprises a frame (12) equipped with at least three rotary stopper elements (14), where the stopper elements (14) are arranged in an opening (16) in the frame (12), said opening (16) being a through-running opening to receive the fibre rope (30), and where the stopper elements (14) in the opening are placed about the through-running fibre rope (30), and also

- that an outer surface of said stopper elements (14) is equipped with a contact surface (24) which, during rotation of the stopper elements, is arranged to lock the fibre rope (30), and that the contact surface is arranged at a point on the outer surface (26) that lies further away from the bearing point (20) of the stopper element than at least the most of the other points in the outer surface (26) of the stopper element.

2. System according to claim 1, characterised in that said stopper element (14) is supported (20) eccentrically with regard to the contact surface (24) of the stopper element (14) with the fibre rope (16).

3. System according to claim 1, characterised in that the stopper element (14) has an eccentric shape or an oval shape.

4. System according to claim 1,
c h a r a c t e r i s e d i n that the contact surface
(24) is shaped externally with an arched radius.
- 5 5. System according to claim 1,
c h a r a c t e r i s e d i n that the contact surface
(24) is equipped with a rubber covering.
6. System according to claims 4 or 5,
10 c h a r a c t e r i s e d i n that the arched shape of the
contact surface (24), or the rubber covering, changes
around the circumference about the stopper element (14).
7. System according to claim 1,
15 c h a r a c t e r i s e d i n that the frame (12) is
equipped with a number of back supports (22), whereby the
rope stopper (10) is arranged to be placed next to other
equipment on the deck (54) of the vessel.
- 20 8. System according to claim 7,
c h a r a c t e r i s e d i n that said back supports (22)
are arranged to be placed between the cylinders (40a, 40b)
of a towing pin (40).
- 25 9. System according to claim 1,
c h a r a c t e r i s e d i n that the stopper elements
(14) are arranged for synchronous rotation.
10. System according to claim 1,
30 c h a r a c t e r i s e d i n that the frame comprises a
motor (32) connected to one of the stopper elements (14)
and that said stopper element is connected via a drive
unit with the other stopper elements.