

A TOW LINE CONTROLLING DEVICE AND METHOD OF CONTROLLING SAME

There is provided a tow line controlling device. More precisely, there is provided a tow line controlling device that is positioned in a deck of a vessel where the tow line controlling device includes at least two tow pins that are movable between a passive position and at least one active position and where a gap between two of the tow pins is spanned by a bridge at least when the tow pins are in one of their active positions.

There is also provided a method for operation of a tow pin controlling device.

Below, the terms "upper" and "lower" refer to the actual items in their operational positions.

10 A tow line controlling device may be referred to also as a towbox, shark jaws and tow pins. The device is typically used to steer, control and lock a tow line from a tug ship. It is normally located close to the stern on the ship. One or two devices are used for each ship and one prior art device includes two tow pins and one shark jaw. According to prior art the tow pins control and steer the tow line and the shark jaw stops and
15 lock items on the tow line such as chain, shackles or sockets. The shark jaw and tow pins are placed in line, with the shark jaw in front of the pair of tow pins. The tow pins and shark jaw do not interfere with each other.

Recognized regulation for ships demands that the shark jaw is able to release the load from the tow line relatively quickly, say in a few seconds "emergency release". This is
20 traditionally solved by either pushing chain up from the shark jaw or pulling the shark jaw down, both this ways the chain is sheared towards the shark jaw. The shark jaw is normally open upwards.

The object of the invention is to remedy or reduce at least one of the disadvantages of the prior art.

25 The object is achieved according to the invention by virtue of the features disclosed in the description below and in the subsequent claims.

According to a first aspect of the invention there is provided a tow line controlling device that is positioned in a deck of a vessel where the tow line controlling device includes at least two tow pins that are movable between a passive position and at least one active position, and where a gap between two of the tow pins is spanned by a
5 bridge at least when the tow pins are in one of their active positions, wherein a lower stopper, that is movable between a passive position and at least one active position, is positioned between two of the tow pins.

The device including the towing pin and the lower stopper may be produced as a unit within a cage that is intended to be positioned in a deck of the actual vessel. It is ob-
10 vious that the disclosed functions may be present also when the different items are positioned in the same relative positions but separately built into the hull of the ship.

The position of the lower stopper in the space between two tow pins gives the device features that are previously unknown for such devices, see below.

The lower stopper, the two tow pins and the bridge may surround a tow line, preferably as a closed opening. The tow line is thus held in one position relative the deck, and
15 tow line letting out and pulling in operations may be carried out safely even in heavy seas.

In one of the active positions the tow line may be held between the lower stopper and the bridge. The tow line, typically a horizontal link, may be clamped or just be posi-
20 tioned so that the next vertical link may bear on the lower stopper and the bridge.

A cutter may be operable on the tow line when the tow line is held between the lower stopper and the bridge. The cutter may include a knife that is operable with the lower stopper. When the knife is inactive, it may follow the movement of the lower stopper.

In one embodiment the cutter has the form of a knife blade that is included in the
25 lower stopper. When inoperative, the knife blade moves with the lower stopper as it is kept in position by a shear pin.

When the tow line is to be cut, the lower stopper forces the tow line towards the bridge. As the force is increased, the shear pin shears, where after the knife moves out from the lower stopper and cut the tow line.

The knife may be operated by a lower stopper actuator that also operates the lower
30 stopper.

The bridge may include more than one bridge part where each of bridge part is fixed to one tow pin. In one embodiment the bridge is divided in two equal parts, each fixed to one tow pin. The tow pins are turnable about the vertical axis and the bridge part may be turned out of the way, for instance when the tow line is to be positioned between the tow pins.

The tow pin may have a rotational stopper that in its active position bears against the lower stopper.

According to a second aspect of the invention there is provided a method for operation of a tow line controlling device that is positioned in a deck of a vessel, and where the
10 tow line controlling device includes at least two tow pins that are movable between a passive position and at least one active position, and where a gap between two of the tow pins is spanned by a bridge at least when the tow pins are in one of their active positions, wherein the method includes positioning a lower stopper, that is movable
15 between a passive position and at least one active position, between two of the tow pins.

The method may further include surrounding a tow line with the lower stopper, the two tow pins and the bridge.

The method may further include holding the tow line between the lower stopper and the bridge when the tow pins are in one of the active positions.

20 The method may further include operating a cutter on the tow line when the tow line is held between the lower stopper and the bridge.

The method may further include letting the cutter include a knife that is included in the lower stopper.

The method may further include that the knife when inactive, follows the movement of
25 the lower stopper.

The method may further include operating the knife by use of a lower stopper actuator.

The method may further include letting the bridge include more than one bridge part where each bridge part is fixed to one tow pin.

30 The tow pins may have machinery that is designed to turn the tow pins about their longitudinal axis. Both the tow pins and the lower stopper may have locks that are

intended to lock the respective items to the cage. As these items are known to a skilled person they are not further discussed.

An obvious difference to traditional chain stopping devices is that the disclosed device stops and locks the vertically standing link instead of the horizontal link of a chain.

5 This is important for the possibility to cut the tow line. The design is believed to provide a more controlled emergency release.

There is thus provided a device where the lower stopper and tow pins are generally mounted in a plane that is perpendicular to the general length axis of the tow line, they interact and use each other for various reasons. The benefits above prior art devices are for instance:

- Better load case for emergency release.
- Higher overall safety, the tow line is locked in a closed opening and no inserts are needed for switching between different chain sizes, shackles or sockets.
- 15 • Possibility to cut off the tow line while in the closed opening.

Below, an example of a preferred tow line controlling device is explained under reference to the enclosed drawings, where:

- Fig. 1 shows a tow line controlling device according to the invention in a perspective view;
- 20 Fig. 2 shows the same as in fig. 1, but in another operational position;
- Fig. 3 shows a side view of the device in fig. 1, but with a wall plate removed;
- Fig. 4 shows a section III-III in fig. 3;
- Fig. 5 shows the same as in fig. 3 but with the device in the same operational position as shown in fig. 2;
- 25 Fig. 6 shows the same as in fig. 3, but with the device in a cutting position;
- Fig. 7 shows the same as in fig. 3, but with the device in a passive operational position; and
- Fig. 8 shows the same as in fig. 3, but with the device in a guiding position.

On the drawings the reference number 1 denotes a tow line controlling device that in

one embodiment includes a cage 2 having a top surface that forms part of a deck 4 of a stern portion of a vessel not shown.

Two vertically movable tow pins 6 are positioned in the cage 2 at a distance between them. Each of the tow pins 6 is pivotable about their vertical axis 8 and has a bridge
 5 part 10 extending radially from the tow pin 6. When turned towards each other, the two bridge parts 10 form a bridge 12 as shown in fig. 1. The tow pins 6 are equipped with a rotation stopper 14 as shown in figs 3 and 4, and are individually moved by pin actuators 16.

A vertically movable lower stopper 18 is positioned in the cage 2 between the tow pins
 10 6. The lower stopper 18 is in one embodiment actuated by four lower stopper actuators 20.

Both the tow pins 6 and the lower stopper 18 is located by relatively low friction guides, not shown, in the cage 2.

The lower stopper 18 has on each side facing the tow pins 6, a protrusion 22 that in-
 15 terfere with the respective rotation stopper 14. When the vertical position of a rotation stopper 14 and a protrusion 22 coincide, the tow pin 6 is prevented from further rotation in the pull direction of a tow line 24.

A cutter 26 as shown in figs. 4 and 6 is provided in the lower stopper 18. In one embodiment the cutter 26 includes a blade formed knife 28 that is vertically movable
 20 within the lower stopper 18. In its passive position the knife 28 is fixed to the lower stopper 18 by a shear pin 30 as shown in fig. 4.

An actuator pin 32 extends between a pair of the lower stopper actuators 20, through the knife 28 and through elongated openings 34 in the lower stopper 18. The force set up by the lower stopper actuators 20 is directed to the knife 28 via the actuator pins
 25 32. When the knife 28 is in its passive position, the force from the lower stopper actuators 20 is transferred to the lower stopper 18 via the shear pin 30.

All actuators 16, 20, that are pivotably fixed to the cage 2, are in one embodiment hydraulically activated.

Figs. 1 and 3 show the tow line controlling device 1 in a position with a locked tow line
 30 24. A horizontal link 36 is positioned between the bridge 12 and the lower stopper 18.

The lower stopper 18, the two tow pins 6 and the bridge 12 surrounds the tow line 24. A vertical link 38 of the tow line 24 abuts the bridge 12 and the lower stopper 18, the

lower stopper 18 being in one active position, and prevents the tow line 24 from moving in the pull direction of the tow line 24. In this position the rotation stoppers 14 engage with the protrusions 22. The lower stopper 18 may be positioned into several active positions according to different dimensions of the horizontal link 36.

In figs. 2 and 5 the tow line controlling device 1 is shown in a released position where the lower stopper 18 has been moved downwards relative the position shown in fig. 1. The protrusions 22 are thus moved out of engagement with the rotation stoppers 14 and the tow pins 6 are turned, thereby moving the bridge parts 10 out of engagement with the tow line 24.

- 10 If an emergency cut off of the tow line 6 is to be performed, the force from the lower stopper actuators 20 is increased to break the shear pin 30. The knife 28 is then free to move relatively the lower stopper 18. The knife 30 is moved upwards and into the tow line 24 cutting the tow line 24 as the actuator pins 32 move in the elongate openings 34 of the lower stopper 18, see fig. 6.
- 15 The tow pins 6 and the lower stopper 18 may be retracted into the deck 4 to a passive position as shown in fig. 7. The tow pins 6 may be fully erected as shown in fig. 8. This position is mainly used for steering the tow line 24.

C l a i m s

1. A tow line controlling device (1) adapted to be positioned in a deck (4) of a vessel, the tow line controlling device (1) comprising two or more tow pins (6) movable between a passive position and at least one active position, wherein a gap
5 between two of the tow pins (6) is spanned by a bridge (12) at least when the tow pins (6) are in one of their active positions, c h a r a c t e r i z e d i n that that the towline controlling device further comprises a lower stopper (18) movable between a passive position and at least one active position, the lower stopper (18) being positioned between two of the tow pins (6) so that the
10 lower stopper (18) and the tow pins (6) are generally mounted in a plane perpendicular to the general length axis of a tow line (24) adapted to be guided therebetween.
2. A device according to claim 1, wherein the lower stopper (18), the two tow pins (6) and the bridge (12) is adapted to surround the tow line (24).
- 15 3. A device according to claim 1, wherein in one of the active positions the tow line (24) is adapted to be held between the lower stopper (18) and the bridge (12).
4. A device according to claim 3, wherein a cutter (26) is operable on the tow line (24) when the tow line (24) is held between the lower stopper (18) and the bridge (12).
- 20 5. A device according to claim 4, wherein the cutter (26) includes a knife (28) that is operable with the lower stopper (18).
6. A device according to claim 5, wherein the knife (28), when inactive, follows the movement of the lower stopper (18).
7. A device according to claim 5, wherein the knife (28) is operated by a lower
25 stopper actuator (20).
8. A device according to claim 1, wherein the bridge (12) includes more than one bridge part (10) and where each bridge part (10) is fixed to one tow pin (6).
9. A device according to claim 1, wherein a vertical link (38) of a tow line (24) is abutting the lower stopper (18) and the bridge (12).
- 30 10. Method for operating a tow line controlling device (1) adapted to be positioned in a deck (4) of a vessel, the tow line controlling device (1) comprising two or more

tow pins (6) movable between a passive position and at least one active position, wherein a gap between two of the tow pins (6) is spanned by a bridge (12) at least when the tow pins (6) are in one of their active positions, characterized in that the method includes the step of positioning a lower stopper (18), movable between a passive position and at least one active position, between two of the tow pins (6) so that the lower stopper (18) and the tow pins (6) are generally mounted in a plane perpendicular to the general length axis of a tow line (24) adapted to be guided therebetween.

11. Method according to claim 10, wherein the method further includes surrounding a tow line (24) with the lower stopper (18), the two tow pins (6) and the bridge (12).
12. Method according to claim 10, wherein that the method further includes holding a tow line (24) between the lower stopper (18) and the bridge (12) when the tow pins (6) are in one of the active positions.
13. Method according to claim 12, wherein the method further includes operating a cutter (26) on the tow line (24) when the tow line (24) is held between the lower stopper (18) and the bridge (12).
14. Method according to claim 13, wherein the method further includes letting the cutter (26) include a knife (28) that is included in the lower stopper (18).
15. Method according to claim 14, wherein method further includes letting the knife (28) when inactive, follow the movement of the lower stopper (18).
16. Method according to claim 14, wherein the method further includes operating the knife (28) by use of a lower stopper actuator (20).
17. Method according to claim 10, wherein the method further includes letting the bridge (12) include more than one bridge part (10) where each bridge part (10) is fixed to one tow pin (6).