

- 1 -

Device for securing a chain, wire rope, cable or the like to a vessel or structure and a vessel or offshore structure incorporating the device.

This invention relates to a cable securing device for securing a cable, chain, wire rope or the like to a vessel or structure, for example for securing an anchor chain or wire rope to an offshore vessel or structure.

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The device is particularly suited for use in securing a pendant wire to a buoy when securing or casting off, an anchor chain.

Securing a buoy on board a service vessel when the buoy has to be winched on board can be a rather dangerous operation. The wire must be secured in some way when the buoy wire is shackled off. Usually, a so-called pelican hook has been used to this purpose, and this hook is operated manually.

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The object of one aspect of the present invention is to provide a device, which enables a chain, wire rope, cable or the like to be quickly and safely secured on board a vessel or to an offshore platform structure, or to an onshore structure.

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According to this aspect of the invention, such a device comprises an elongate substantially cylindrical housing containing a fluid pressure operated jack having a cylinder and a piston rod which are mounted substantially co-axially in the housing and one of which is rigidly fixed to the housing and the other of which is connected to a securing jaw mechanism having a pair of jaws which project from the housing and which are movable towards and away from each other for arresting and releasing the chain or the like by retracting

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- and extending the piston rod into and out of the cylinder respectively, the housing being mounted within a correspondingly shaped well and being retractable in an axial direction into an inoperative position within the well and being extensible in an axial direction from the well into an operative position by further fluid pressure operated jack means.
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- Preferably, there are two guide ribs extending in the longitudinal direction of the housing, the ribs being fixed to and projecting inwardly from the housing wall, the end portions of the ribs adjacent the jaws being shaped as cams which, when the piston rod is retracted, force the jaws inwardly towards one another for arresting the chain or the like which is positioned between the jaws.
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Preferably, the jaws are pivotably mounted between guide plates having means for forcing the jaws to move away from one another when the piston rod is extended.

20. The further jack means may comprise two fluid pressure operated jacks mounted one on each side of the jack which operates the jaws, the two lifting jacks each having a cylinder structure and a piston rod one of which is connected to the housing and the other of which is adapted to be connected to a structure in which the device is incorporated. Preferably, the cylinder of each lifting jack is connected to the housing and an end portion of each piston rod is adapted to be connected to the structure.
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30. Preferably, the jack and the further jack means are hydraulically operated.

- The invention also consists according to another of its aspects, in a vessel or offshore structure having a deck, a winch mounted on the deck for winching in and paying out a chain, wire rope, cable or the like,
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- guide means for guiding the chain or the like as it is winched in or payed out and a device in accordance with the invention described above, the well of the device being mounted substantially vertically in
5. the deck structure between the guide means and the winch, the well having a top opening from which the housing is extensible in the deck surface.

- Examples of a device and of a vessel or structure in accordance with the invention will now
10. be described with reference to the accompanying drawings in which:-

- Figure 1 is a vertical sectional view of the device mounted in the after deck of a ship, the section extending in a plane which extends
15. across the ship;

Figure 2 is a view corresponding to Figure 1 but taken in a plane which extends in the fore and aft

direction of the ship;

Figure 3 is a plan view of a locking jaw cylinder and locking jaws forming part of the device;

5. Figure 4 is a sectional plan on the line IV-IV in Figure 2;

Figure 5 is a view similar to Figure 2 but showing a second example of the device; and

10. Figure 6 is a diagrammatic plan view of a ship fitted with a device in accordance with the invention in its deck.

Referring to Figures 1, 2 and 6, a portion of the after deck of a service ship is indicated at 1 in Figures 1 and 2 and 101 in Figure 6. A vertical
15. cylindrical well 2, 102 is provided in the deck structure. The well is located on the longitudinal centre plane of the ship and ahead of an after fairlead 154 or an open hawse pipe for a pendant wire extending
20. therethrough (see Figure 6). As shown in Figures 1 and 2, below the well 2 at a distance from the deck 1 a support plate 3 is secured to the deck by supporting rods 4. The plate 3 can of course be secured to the deck in any other suitable way, or be a part of the deck structure itself. The supporting
25. plate 3 carries on its upper side a pair of fixing brackets 5 with pivot pins 6.

In the well 2 in the deck structure 1, a cylindrical housing 7 is located displaceably in a vertical direction. The housing has an apertured
30. top wall 8 and an apertured bottom wall 9. The peripheral or side wall of the housing is indicated at 10. Centrally in the cylindrical housing 7 a hydraulic jack 11 is located and has a cylinder 12 and a piston rod 13. In the upper portion of the
35. housing 7 and in a diametral plane of the cylinder a

5. bracket 14 is located providing a support for the
jack cylinder 12, as it can be seen in Figure 1.
The bracket 14 has a mid portion which is widened
upwardly to accommodate a jaw mechanism 15 of the
device which will be more fully described later.
As appears from Figure 2, the bracket 14 has two
parallel side plates 16 extending transversely to
the main plane of the bracket 14, i.e. across the
ship. The plates 16 are fixed by welding to the
10. top wall 8 of the locking jaw housing 7 and they are
additionally stiffened by means of corner plates
17 so that the support bracket with the top
portion of the housing 7 provides a very rigid
structural unit. The side plates 16 extend a
15. substantial distance above the top wall 8.

In the cylindrical housing 7, and in the
plane of and aligned with the corner plates 17, two
diametrically opposed plates 18 are provided extending
from the bottom wall 9 and connected with the outer
20. sides of the side plates 16 and the under side of the
top wall 8. The plates 18 serve to stiffen the
cylindrical housing 7 to provide a still more rigid
structural unit.

Between the side plates 16 two guide
25. members 19 are rigidly secured to the upwardly widened
portion of the bracket 14. Each guide member has a
rounded cam portion which faces the central axis
of the device and has a suitable cam profile for guiding
and closing jaws 21 of the locking jaw mechanism 15.
30. The guide members 19 with their cam portions are
supported by extended portions 20 of the housing wall
10 and are welded to the wall 10 and to the top wall
8 to provide a very rigid structure.

The jaw mechanism 15 comprises a pair of
35. co-operating jaws 21 which as shown in Figure 1, when

closed, provide between them an opening 22 corresponding to the cross sectional exterior shape of an anchor chain link. The jaws 21 are exchangeable so that jaws suitably shaped e.g. for clamping a wire rope can also be mounted in the device. The jaws 21, which are symmetrically arranged, are at their lower ends pivotably connected to a substantially triangular support 23 provided with spaced pivots 24 for supporting the jaws 21 and also provided with a lower pivot 25 for connecting the support 23 to the piston rod 13 of the hydraulic jack 11. The lower portions of the jaws 21 are provided with obliquely upwardly and outwardly extending slots 26 for guiding pins 27 which are secured in side plates which lie above the side plates 16. The outwardly facing profile of the jaws 21 is so shaped that the jaws are forced towards one another by the cam portions of the members 19 when the locking jaw mechanism is moved downwardly. Also, the guide pins 27 force the jaws to move away from one another to open when the piston rod 13 raises the jaw mechanism 15. The top portion of the support 23 supports a chain or wire which extends through the space between the jaws 21 when the jaws are open. Figures 2 and 5 show the locking jaw mechanism of the device located above the level of the ship deck 1 and the jaws are closed about a chain link 29 so securing the chain safely to the deck of the vessel. Also one link of the chain 29 is indicated in Figure 1. When the chain is to be released, the jack 11 is actuated to extend the piston rod 13 to open the jaws 21.

As shown in Figures 2 and 4 two hydraulic lifting jacks 33 are mounted in a common diametral plane one on each side of the jack 11 in the cylindrical jaw housing 7. The jacks 33 each have a cylinder 34 and a piston rod 35. Two diametrically located hollow

- cylindrical brackets 36 extend upwardly from the bottom wall 9 of the housing 7 and reach nearly the top wall 8 of the housing 7. In the upper end portions of the brackets 36 the cylinders 34 of the
5. jacks 33 are suspended pivotally with their piston rods 35 extending downwardly and pivotally connected to the base plate brackets 5 by means of the pivot pins 6.

- Under the bottom 9 of the housing 7 two reinforcing ribs 37 are fixed and are connected to a
10. yoke by means of a bolt 38. The yoke consists of two rail members 39. Two guides 40 are secured between the end portions of the members 39 by means of bolts 41. The guides 40 slide on the support rods 4
15. 33. When the two pins 6 and the bolt 38 are removed the housing 7 with the jack 11 and the jaw mechanism 15 can be lifted from the well 2 for repair or servicing. The assembly 37-41 prevents the housing 7 from rotating due to unsymmetrical loading from a
20. chain or wire rope on the jaws.

- As shown in the drawings, the jacks 11, 33 and the rods 4 are located on the longitudinal central plane of the ship, but they can be arranged in any other suitable substantially vertical plane of the
25. ship.

- Figure 5 corresponds to Figure 2 and shows a presently preferred embodiment of the invention. Instead of the support rods 4 of the example of Figure 2, a box structure 104 is provided having a bottom
30. wall 103 carrying brackets 105 which are pivotably connected at 136 to the piston rods 135 of the jacks 133 for lifting and lowering the jaw housing 107, which is located in a well 102 arranged in the ship deck, by means of jacks 133.

35. The jaw mechanism 115 with the jaw opening. jack 112 is similar to that of Figures 1 and 2. The

67
cylinders 134 of the lifting jacks 133 are at their lower ends secured to the bottom wall 109 of the housing 107, thus providing a more simple and less expensive construction.

5. The guides 40 of Figure 2 are not necessary in this embodiment. If the housing 107 and the well 102 are cylindrical, at least one radial groove 139 is provided extending longitudinally in the peripheral wall 110 of the housing. On the inner side of the wall of the well 102 a corresponding guide key 140 is provided. The members 139 and 140 have the same function as the members 4, 40 in the first example which is to prevent turning of the housing 107 about the central axis of the well 102.
10. The embodiment of Figure 5 actually has a cylindrical well and a cylindrical housing, but Figure 5 may also represent a vertical-sectional view of an arrangement fitted with a well and housing having substantially square cross-sections. The square has rounded corners. Then, the groove 139 and the key 140 can be dispensed with. It should also be noted that the peripheral walls of the housing (7,107) and of the well 2, 102 need not be continuous and can be provided with apertures, if desirable.
15. The device in accordance with the invention can be produced as a ready-to-fit assembly in a factory for mounting by welding in the deck structure of a ship or structure. The welding seam is indicated at 150 in Figure 5.
20. In Figure 6 a plan view of a ship is shown having an after deck portion 101 wherein a device in accordance with the invention is mounted. The deck well is designated 102. An anchor chain 129 extends through a fairlead 154 at the after end of the ship deck

- 9 -

and passes between the jaws of a jaw mechanism 115 on its path towards a cable winch 153. A wire pendant 151 is connected to the chain by a shackle 155 and the opposite end of the wire pendant 151 is connected to a sheave block 152 of a winch cable 156.

5. As already mentioned, Figures 1, 2 and 5 show the device in its operative position. When the device is to be taken out of operation, the lifting jacks 33, 133 are acted upon by fluid pressure to retract the piston rods 35, 135 and the lifting cylinders 34, 134 and the entire housing 7, 107 move downwardly until the housing and the jaw mechanism 15, 115 are located beneath the top surface of the ship deck 1, 101. The well, 2, 102 can then be covered by a lid which is not shown.
10. The lifting and lowering movement is controlled by control valves (not shown) controlling the supply and shut-off of hydraulic fluid to the jack cylinders.
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- When the device is used for securing a wire rope, normally a shackle, a "Talurit" splice, a grommet or some other connecting member will abut the jaws of the jaw mechanism in the same manner as a link of a chain.
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- Again, when the device is used, e.g. to secure a pendant wire, the jaw housing is lifted up from the well with the jaws open, the piston rod 13 being extended, so that the wire can be placed between the jaws. Then the jaws are closed about the wire by retracting the piston rod of the jack 11, 111. At the same time the lifting jacks 33, 133 are adjusted so that the jaw mechanism 15, 115 is maintained at a correct level in relation to the wire. The control is carried out manually, but it can also be performed automatically. The same procedure is followed when securing a chain.
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- The drawings show embodiments with the jacks for lifting and lowering the jaw housing provided in the
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housing itself. In this way a rigid, compact unit having a small overall depth is provided. However, the possibility also exists for mounting the lifting cylinders outside the jaw housing e.g. between the

5. bottom wall 109 of the housing 107 and the base plate structure 103, but this arrangement is less practicable because of the additional space and additional strengthening members needed.

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- 11 -

CLAIMS

1. A device for securing a chain, wire rope, cable or the like to a vessel or structure, the device comprising an elongate substantially cylindrical housing containing a fluid pressure operated jack
5. having a cylinder and a piston rod which are mounted substantially co-axially in the housing and one of which is rigidly fixed to the housing and the other of which is connected to a securing jaw mechanism having a pair of jaws which project from
10. the housing and which are movable towards and away from each other for arresting and releasing the chain or the like by retracting and extending the piston rod into and out of the cylinder respectively, the housing being mounted within a correspondingly
15. shaped well and being retractable in an axial direction into an inoperative position within the well and being extensible in an axial direction from the well into an operative position by further fluid pressure operated jack means.
20. 2. A device according to Claim 1, in which there are two guide ribs extending in the longitudinal direction of the housing, the ribs being fixed to and projecting inwardly from the housing wall, the end portions of the ribs adjacent the
25. jaws being shaped as cams which, when the piston rod is retracted, force the jaws inwardly towards one another for arresting the chain or the like which is positioned between the jaws.
30. 3. A device according to Claim 1 or Claim 2, in which the jaws are pivotably mounted between guide plates having means for forcing the jaws to move away from one another when the piston rod is extended.



- 12 -

4. A device according to any one of the preceding Claims, in which the further jack means comprises two fluid pressure operated jacks mounted one on each side of the jack which operates the jaws,
5. the two lifting jacks each having a cylinder structure and a piston rod one of which is connected to the housing and the other of which is adapted to be connected to a structure in which the device is incorporated.
10. 5. A device according to Claim 4, in which the cylinder of each lifting jack is connected to the housing and an end portion of each piston rod is adapted to be connected to the structure.
6. A device according to any one of the preceding Claims, in which the cylinder is rigidly fixed to the housing and the piston rod is connected to the jaw mechanism.
15. 6. A device according to any one of Claims 1 to 6, in which the jack and further jack means are hydraulically operated.
20. 7. A device according to Claim 1, substantially as described with reference to Figures 1 to 4 or Figure 5 of the accompanying drawings.
8. A vessel or offshore structure having a deck, a winch mounted on the deck for winching in and paying out a chain, wire rope, cable or the like, guide means for guiding the chain or the like as it is winched in or payed out and a device in accordance with any one of Claims 1 to 8, the well of the device being mounted substantially vertically in the deck structure between the guide means and the winch,
25. the well having a top opening from which the housing is extensible in the deck surface.
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26

- 13 -

10. A vessel or structure according to Claim 9, substantially as described with reference to Figures 1 to 4 and 6, or Figures 5 and 6 of the accompanying drawings.