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(54) **STEERING AND/OR PROPULSION DEVICE FOR A VESSEL**

STEUER- UND/ODER VORTRIEBSVORRICHTUNG FÜR EIN SCHIFF

DISPOSITIF DE DIRECTION ET/OU DE PROPULSION POUR NAVIRE

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(56) References cited:
**DE-B- 1 136 907 US-A- 3 517 633
US-A- 3 550 547 US-A- 5 522 335**

- **DERWENT'S ABSTRACT, No. J-3826D/36, week
J36; & SU,A,669 781 (OVSYANNIKOV M S) 15
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Description

[0001] The present invention relates to a steering and/or propulsion device for a vessel, preferably for installation in the bow portion of the vessel, comprising a propeller nozzle assembly adapted to be rotated 360° about its vertical axis. Drive power to the propeller and rotational force to the assembly are supplied from devices inside the vessel. The propeller may be of a fixed type or it may be a variable pitch propeller. Propeller/nozzle assemblies of this type are for instance disclosed in the Norwegian patent publication 136038. Such assemblies are commonly called "thrusters".

[0002] US 3517633 shows crossing channels in a hull, one channel in the longitudinal direction and one channel in the transverse direction. A propeller, which does not work inside a nozzle, has two active positions, one in each channel, but in the same height, whereby the propeller may work in the longitudinal as well as in the transverse direction of the vessel. A downward aperture is situated remote from the propeller, at the rearward exit from the longitudinal channel, for discharge of water for forward propulsion. The propeller is only to work in the two channels. The publication mentions as prior art a so-called "bow thruster", which works in a transverse channel in the vessel, a so-called "retractible thruster", which is lowered prior to use and which can be pulled up when not in use, and a so-called "steerable thruster", which works below the bottom of the vessel and which can be turned 360°.

[0003] US 4294186 shows a propeller which only has one active position, below the bottom of the vessel. The pull-up position is merely a "storing position". This is an assembly of the type "retractible thruster" mentioned above. The propeller can only work in the transverse direction of the vessel in the lowered position. The propeller cannot be turned in any of the positions. Therefore, the propeller must be symmetrical in order to be able to work in both of the rotational directions, i.e. in order to produce drive force in both of the transverse directions of the vessel. The propeller can only work in a single level, below the bottom of the vessel.

[0004] DE-B-1 130 907 discloses a combined steering and propulsion device for ships, according to the preamble of claim 1.

[0005] The present invention provides a steering and/or propulsion device for a vessel, as defined in claim 1.

[0006] By the present invention a steering and/or propulsion device of the type mentioned introductorily has been provided, in which the propeller/nozzle assembly is mounted for movement between two active drive positions, one position below the bottom of the vessel and one position in a transverse channel in the bottom portion of the vessel, whereby the direction of the rotational axis of the propeller is coincident with the longitudinal direction of the channel.

[0007] Thus, the present invention relates to a propeller/nozzle assembly which can be situated in two active

positions, a first active position pulled up/swung up in a downwardly open channel, and a second active position lowered/swung down below the bottom of the vessel. Both of these positions are active; i.e. that the propeller can work in both of these positions. In the pulled-up/swung-up position the assembly can also be used in shallow water, including to and from a quay or mooring site.

[0008] In an embodiment of the invention the propeller/nozzle assembly is adapted to be raised and lowered by pivoting the stem of the thruster up and down, respectively, about a horizontal axis, i.e. that the thruster is of a so-called "swing-up" type, whereby the propeller/nozzle assembly prior to the swinging up is pivoted about the stem axis in order that the propeller/nozzle axis be parallel to the channel axis.

[0009] In another embodiment of the invention the propeller/nozzle assembly is adapted to be raised and lowered by a translatory vertical movement, for instance when the stem is telescopic.

[0010] The invention will be described more detailed with reference to the accompanying drawings.

[0011] Figs. 1 and 3 diagrammatically show a "swing-up" version and a vertically movable version, respectively, of a thruster for conventional use, having only a lower operative position.

[0012] Figs. 2 and 4 diagrammatically show an embodiment of the invention in a "swing-up" version and a vertically movable version, respectively, the propeller/nozzle assembly being shown in the two operative positions.

[0013] In the Figs. 1 and 3 is indicated a thruster in a "swing-up" version and a vertically movable version, respectively, comprising a propeller/nozzle assembly 1 mounted on a stem indicated by its center line 2. Here, the thruster is adapted to be pivoted and moved vertically, respectively, from a lower, operative position O^N to an upper, not operative position S where the propeller/nozzle assembly is hidden in a recess R in the bottom portion of the vessel.

[0014] Fig. 2 shows diagrammatically an embodiment of the invention in which a thruster of a "swing-up" version, i.e. a thruster adapted to be pivoted about a horizontal axis A , has two operative positions, a lower operative position O^N below the bottom portion of the vessel and an upper operative position O^O in a downwardly open channel 3 in the bottom portion of the vessel. By turning the propeller/nozzle assembly 1, in the lower operative position, in such a manner that the propeller axis extends parallelly to the axis of the channel 3 the thruster will, when it reaches the upper operative position, mainly function in the same manner as a conventional tunnel thruster. With the thruster embodiment according to the invention it is, however, also possible to reverse the orientation of the propeller/nozzle assembly 1 in the upper operative position O^O . Thus, the propeller/nozzle assembly is oriented in accordance with the desired thrust direction.

[0015] The embodiment shown in Fig. 4 departs from that of Fig. 2 in that the thruster is of a so-called vertically movable version, while the functioning in other respects is identical, also as regards the orientation of the propeller/nozzle assembly in the upper operative position.

[0016] Driving of the propeller, the turning of the propeller about the stem axis of the thruster and the pivoting, i.e. the vertical movement of the thruster, takes place in a known manner.

[0017] Tunnel thrusters of a conventional type have a propeller which works in a tunnel of circular cross section extending through the underwater portion of the vessel, along or transversely of the longitudinal direction of the vessel. In order to achieve equal propeller action in both directions of the tunnel the propeller blades must be shaped with a symmetrical profile, i.e. without curved profile, whereby the action of the propeller is the same for both of the rotational directions. From the same reason it has not been possible to introduce a radial pitch distribution, which among else would have reduced the load on the propeller blade tips. Such a propeller blade shape is in fact contradictory to prevailing circulation theories and well established aero- and hydrodynamical principles. The drawbacks of these known tunnel thruster embodiments are avoided by use of the present invention, in which the propeller/nozzle assembly can be oriented in one direction or in the other direction prior to being brought into the channel, and the propeller blades may, consequently, be shaped with an optimal profile curvature and radial pitch distribution, respectively.

Claims

1. A steering and/or propulsion device for a vessel, preferably for installation in the bow portion of the vessel, comprising a propeller/nozzle assembly (1) adapted to be rotated 360° about its vertical axis (2), the propeller/nozzle assembly (1) being mounted for movement between two active drive positions, one position (O^N) below the bottom of the vessel and one position (O^O) in a transverse channel (3) in the bottom portion of the vessel, whereby the direction of the rotational axis of the propeller is coincident with the longitudinal direction of the channel, **characterized in that** a clearance exists between the nozzle and the channel wall in order to permit flow of water along the outer periphery of the nozzle also in its position in the channel(3).
2. A device according to claim 1, **characterized in that** the propeller/nozzle assembly (1) is adapted to be raised and lowered by being pivoted about a horizontal axis (A) in the bottom portion of the vessel.
3. A device according to claim 1, **characterized in that** the propeller/nozzle assembly (1) is adapted

to be raised and lowered by being moved vertically.

4. A device according to claim 3, **characterized in that** the propeller/nozzle assembly (1) is constructed with a telescopically movable stem (2).
5. A device according to the claims 1 - 4, **characterized in that** the channel cross section is dimensioned in such a manner that the propeller/nozzle assembly (1) can be reversed in the channel (3).

Patentansprüche

1. Steuer- und/oder Antriebsvorrichtung für ein Schiff, vorzugsweise für Installation in dem Bugteil des Schiffs, die eine Schrauben/Düsenbaugruppe (1) ausgelegt für 360°-Drehung um ihre vertikale Achse (2) aufweist, wobei die Schrauben/Düsenbaugruppe (1) für Bewegung zwischen zwei aktiven Antriebspositionen angebracht ist, einer Position (O^N) unter dem Boden des Schiffs, und einer Position (O^O) in einem Querkanal (3) im Bodenteil des Schiffs, wodurch die Richtung der Drehachse der Schraube mit der Längsrichtung des Kanals zusammenfällt, **dadurch gekennzeichnet, dass** ein Zwischenraum zwischen der Düse und der Kanalwand vorliegt, um Fluss von Wasser entlang des äußersten Umfangs der Düse auch in ihrer Position im Kanal (3) zuzulassen.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Schrauben/Düsenbaugruppe (1) ausgelegt ist, um durch Schwenken derselben um eine horizontale Achse (A) im Bodenteil des Schiffs angehoben und abgesenkt zu werden.
3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das die Schrauben/Düsenbaugruppe (1) auslegt ist, um durch vertikale Bewegung derselben angehoben und abgesenkt zu werden.
4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** die Schrauben/Düsenbaugruppe (1) mit einem teleskopisch bewegbaren Schaft (2) aufgebaut ist.
5. Vorrichtung nach den Ansprüchen 1-4, **dadurch gekennzeichnet, dass** das der Kanalquerschnitt in einer solchen Weise dimensioniert ist, dass die Schrauben/Düsenbaugruppe (1) in dem Kanal (3) umgedreht werden kann.

Revendications

1. Dispositif de direction et/ou propulsion d'un navire, de préférence destiné à être installé dans la partie

de proue du navire, comprenant un ensemble hélice/buse (1) adapté pour être tourné de 360° autour de son axe vertical (2), l'ensemble hélice/buse (1) étant monté pour se déplacer entre deux positions de commande actives, une position (0^N) en dessous du fond du navire et une position (0^O) dans une gorge transversale (3) dans la partie de fond du navire, de telle sorte que le sens de l'axe de rotation de l'hélice coïncide avec le sens longitudinal de la gorge, **caractérisé en ce qu'**un dégagement existe entre la buse et la paroi de gorge afin de permettre l'écoulement d'eau le long de la périphérie externe de la buse également dans sa position dans la gorge (3).

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2. Dispositif selon la revendication 1, **caractérisé en ce que** l'ensemble hélice/buse (1) est adapté pour être remonté et abaissé par pivotement autour d'un axe longitudinal (A) dans la partie de fond du navire.

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3. Dispositif selon la revendication 1, **caractérisé en ce que** l'ensemble hélice/buse (1) est adapté pour être remonté et abaissé par déplacement vertical.

4. Dispositif selon la revendication 3, **caractérisé en ce que** l'ensemble hélice/buse (1) est construit avec une tige déplaçable télescopiquement (2).

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5. Dispositif selon les revendications 1 à 4, **caractérisé en ce que** la coupe transversale de la gorge est dimensionnée de telle manière que l'ensemble hélice/buse (1) puisse être inversé dans la gorge (3).

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