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【Disclosure】

【Technical Problem】

Accordingly, the embodiments of the present invention are to provide a canister type thruster capable of smoothly realizing installation and upward/downward movement of a canister and a method of installing the same.

Further, the embodiments of the present invention are to provide a canister type thruster capable of easily performing precision management and a method of installing the same.

Further, the embodiments of the present invention are to provide a canister type thruster capable of stably forming a waterproof structure between a canister and a hull and a method of installing the same.

In addition, the embodiments of the present invention are to provide a canister type thruster that allows a canister to be stably supported in a trunk and a method of installing the same.

【Technical Solution】

~~In order to achieve the above object, according~~ According to an aspect of the present invention, there is provided a canister type thruster mounted in a trunk of a ship, which includes at least one guide module configured to guide upward/downward movement of a canister. The guide module includes: a lower guide unit that is mounted at a lower portion of the trunk facing a rack installed on an outer surface of the canister in parallel with a lifting direction and guides the rack in a downward direction of the trunk when the canister moves down; an upper guide unit that is mounted at an upper portion of the trunk facing the rack and guides the rack in an upward direction of the trunk when the canister moves up; and a lift unit that is located opposite to the rack between the lower and upper guide units and moves the rack in the upward or downward direction.

Here, each of the lower and upper guide units may include: a guide bracket that is

the lateral guide.

The support step may be inserted into a support groove formed in a front surface of each of the toothed-part guide or the lateral guide and a rear surface of the sliding pad to a predetermined depth so as to support the sliding pad.

Further, at least one of the support steps may be provided between each of the toothed-part guide and the sliding pad or between the lateral guide and the sliding pad.

~~According to still another aspect of the present invention, there~~ There is also provided a canister type thruster mounted in a trunk of a ship, which includes: a canister configured to move up and down in the trunk; a canister seat provided at a lower end of an inner surface of the trunk and on which the canister is placed; a lift unit configured to move the canister up and down; and a sealing device configured to waterproof a space between the canister and the trunk. The canister seat and the sealing device come into contact with each other.

Here, the canister seat may include a support seat that supports the canister in a vertical direction and a sealing seat that comes into contact with the sealing device.

The sealing seat may be tapered such that a cross section of the trunk is reduced toward a lower side of the trunk.

The sealing device may be provided at a lower end of an outer surface of the canister to come into contact with the sealing seat.

Further, the sealing device may include: a sealing member that is elastically deformable to form a waterproof structure; a fixing bracket that fixedly supports the sealing member on the canister; a sealing limiter that is provided above the fixing bracket to prevent excessive compression of the sealing member; and a support protrusion that is formed to protrude outward from the lower end of the outer surface of the canister so as to support a lower surface of the sealing member.

The sealing limiter may be provided such that a surface thereof facing the sealing seat is

tapered in correspondence to the tapered sealing seat.

The fixing bracket may include a coupler that is coupled to the canister and a fixture that fixedly supports the sealing member.

Further, the fixing bracket may be decouplable from and couplable to the canister.

The coupler of the fixing bracket and the outer surface of the canister may be coupled by a bolting method.

The support protrusion may be decouplable from and couplable to the canister.

The canister may include a reinforced plate on an inner surface thereof which corresponds to a position at which the fixing bracket is coupled so as to secure a bearing force for the outer surface thereof.

Further, the canister may include at least one reinforced plate on an inner surface thereof which corresponds to a position at which the sealing limiter is coupled so as to secure a bearing force for the outer surface thereof.

The sealing seat may include at least one reinforced plate on a rear surface thereof which is opposite to a position at which the sealing limiter is provided in a state in which the canister is placed on the support seat of the canister seat so as to secure a bearing force thereof.

~~According to still another aspect of the present invention, there~~ There is further provided a canister type thruster mounted in a trunk of a ship, which includes: a canister configured to move up and down in the trunk; a thruster provided at a lower portion of the canister and configured to move up and down along with the canister; and a restrainer configured to restrain the canister in the trunk. The restrainer includes locked rods that horizontally protrude outward from the canister to be locked, and a plurality of locking members that are fixed to an inner surface of the trunk and are provided at position at which the locked rods enter to be locked. The plurality of locking members include a first locking member that has a locking recess into which the locked rod is fitted when the thruster is located below a hull, and a second locking member on which the locked rod rests when the

~~According to still another aspect of the present invention, there~~ There is also provided a method of installing a canister type thruster mounted in a trunk of a ship. The method includes: (a) installing guide modules for guiding upward/downward movement of a canister equipped with at least one rack at preset positions of inner surfaces of trunk blocks of a hull or a floating structure which are manufactured in a plurality of block units; (b) assembling the trunk blocks; (c) measuring positions at which the guide modules are installed; and (d) adjusting thicknesses of the guide modules based on an error value between each of the measured installed positions and a preset position to correct the installed position of each of the guide modules.

Here, the racks may be installed at opposite sides of outer surface of the canister in a lifting direction, and are each provided such that toothed parts engaged with pinions are symmetrical. Each of the guide modules may include a support bracket that is fixed to the inner surface of each of the trunk blocks, toothed-part guides that are symmetrically provided at opposite sides of the support bracket so as to guide the opposite toothed parts of the rack, and a lateral guide that comes into contact with a lateral surface of the rack to guide upward/downward movement of the rack. The step (d) may include adjusting thicknesses of the toothed-part guides and the lateral guide based on the error value to correct the installed position of each of the guide modules.

The toothed-part guides and the lateral guide may include entry guides that maintain an inclination with respect to a lifting direction of the rack, and the step (a) may include fixing the support bracket to the inner surface of each of the trunk blocks, and installing the entry guides at a front portion and opposite sides of the support bracket.

Further, the step (d) may include: manufacturing a thickness adjusting plate having a design thickness based on the error value or processing a previously manufactured thickness adjusting plate; installing the thickness adjusting plate in the front of the entry guides; and installing a sliding pad, which comes into contact with the rack to guide the upward/downward movement of the rack, in the front of the thickness adjusting plate.

the rack has the toothed parts symmetrically formed at opposite sides thereof in a width direction thereof; and

the toothed-part guides are symmetrically formed at opposite sides of the support bracket so as to guide the toothed parts of the rack.

【Claim 14】

The canister type thruster according to claim 12 or 13, wherein the sliding pads are provided at portions at which the toothed-part guides and the lateral guide come into contact with the rack to guide the upward/downward movement of the rack so as to be able to be decoupled and coupled.

【Claim 15】

The canister type thruster according to claim 14, wherein the support steps are provided in the front of each of the toothed-part guides or the lateral guide so as to protrude from each of the toothed-part guides or the lateral guide to support the sliding pad.

~~【Claim 16】~~

~~The canister type thruster according to claim 15, wherein the support step is provided at a front lower end of each of the toothed-part guides or the lateral guide such that a lower end of the sliding pad is caught thereon.~~

~~【Claim 17】~~

~~The canister type thruster according to claim 15, wherein the support step is formed to be integrated with each of the toothed-part guides or the lateral guide or to be able to be decoupled from or coupled to each of the toothed-part guides or the lateral guide.~~

~~【Claim 18】~~

~~The canister type thruster according to claim 14, wherein the support step is inserted into a support groove formed in a front surface of each of the toothed-part guides or the lateral guide and a rear surface of the sliding pad to a predetermined depth so as to support the sliding pad.~~

~~[Claim 19]~~

~~The canister type thruster according to claim 17 or 18, wherein at least one of the support steps is provided between each of the toothed-part guides and the sliding pad or between the lateral guide and the sliding pad.~~

~~[Claim 20]~~

~~A canister type thruster mounted in a trunk of a ship, comprising:~~

~~a canister configured to move up and down in the trunk;~~

~~a canister seat provided at a lower end of an inner surface of the trunk and on which the canister is placed;~~

~~a lift unit configured to move the canister up and down; and~~

~~a sealing device configured to waterproof a space between the canister and the trunk,~~

~~wherein the canister seat and the sealing device come into contact with each other.~~

~~[Claim 21]~~

~~The canister type thruster according to claim 20, wherein the canister seat includes a support seat that supports the canister in a vertical direction and a sealing seat that comes into contact with the sealing device.~~

~~[Claim 22]~~

~~The canister type thruster according to claim 21, wherein the sealing seat is tapered such that a cross section of the trunk is reduced toward a lower side of the trunk.~~

~~[Claim 23]~~

~~The canister type thruster according to claim 22, wherein the sealing device is provided at a lower end of an outer surface of the canister to come into contact with the sealing seat.~~

~~[Claim 24]~~

~~The canister type thruster according to claim 23, wherein the sealing device includes:~~

~~a sealing member that is elastically deformable to form a waterproof structure;~~

~~a fixing bracket that fixedly supports the sealing member on the canister;~~

~~a sealing limiter that is provided above the fixing bracket to prevent excessive compression of the sealing member; and~~

~~a support protrusion that is formed to protrude outward from the lower end of the outer surface of the canister so as to support a lower surface of the sealing member.~~

~~[Claim 25]~~

~~The canister type thruster according to claim 24, wherein the sealing limiter is provided such that a surface thereof facing the sealing seat is tapered in correspondence to the tapered sealing seat.~~

~~[Claim 26]~~

~~The canister type thruster according to claim 24, wherein the fixing bracket includes a coupler that is coupled to the canister and a fixture that fixedly supports the sealing member.~~

~~[Claim 27]~~

~~The canister type thruster according to claim 26, wherein the fixing bracket is decouplable from and couplable to the canister.~~

~~[Claim 28]~~

~~The canister type thruster according to claim 27, wherein the coupler of the fixing bracket and the outer surface of the canister are coupled by a bolting method.~~

~~[Claim 29]~~

~~The canister type thruster according to claim 24, wherein the support protrusion is decouplable from and couplable to the canister.~~

~~[Claim 30]~~

~~The canister type thruster according to claim 24, wherein the canister includes a reinforced plate on an inner surface thereof which corresponds to a position at which the fixing bracket is coupled so as to secure a bearing force for the outer surface thereof.~~

~~[Claim 31]~~

~~The canister-type thruster according to claim 24 or 30, wherein the canister includes at least one reinforced plate on an inner surface thereof which corresponds to a position at which the sealing limiter is coupled so as to secure a bearing force for the outer surface thereof.~~

~~[Claim 32]~~

~~The canister-type thruster according to claim 31, wherein the sealing seat includes at least one reinforced plate on a rear surface thereof which is opposite to a position at which the sealing limiter is provided in a state in which the canister is placed on the support seat of the canister seat so as to secure a bearing force thereof.~~

~~[Claim 33]~~

~~A canister type thruster mounted in a trunk of a ship, comprising:~~

~~a canister configured to move up and down in the trunk;~~

~~a thruster provided at a lower portion of the canister and configured to move up and down along with the canister; and~~

~~a restrainer configured to restrain the canister in the trunk,~~

~~wherein the restrainer includes~~

~~locked rods that horizontally protrude outward from the canister to be locked, and~~

~~a plurality of locking members that are fixed to an inner surface of the trunk and are provided at position at which the locked rods enter to be locked,~~

~~the plurality of locking members include~~

~~a first locking member that has a locking recess into which the locked rod is fitted when the thruster is located below a hull, and~~

~~a second locking member on which the locked rod rests when the thruster is pulled up into the trunk,~~

~~the first locking member has an open lower surface and is provided such that an upper~~

~~surface of the locking recess is inclined downward with the approach to the inner surface of the trunk,~~

~~the locked rod is provided such that an upper surface of the locked rod is inclined downward with the approach to the inner surface of the trunk in correspondence to a shape of the locking recess, and is fitted into the locking recess of the first locking member.~~

~~[Claim 34]~~

~~The canister type thruster according to claim 33, wherein, when the locked rod enters the second locking member, a lower surface of the locked rod rests on an upper surface of the second locking member.~~

~~[Claim 35]~~

~~The canister type thruster according to claim 34, wherein the upper surface of the second locking member and the lower surface of the locked rod are horizontally provided flat.~~

~~[Claim 36]~~

~~The canister type thruster according to claim 34, wherein a support rib for securing a bearing force is provided between an upper surface of the first locking member and the inner surface of the trunk or between a lower surface of the second locking member and the inner surface of the trunk.~~

~~[Claim 37]~~

~~The canister type thruster according to claim 33, further comprising a motor or a hydraulic cylinder for supplying power such that the locked rod protrudes outward from the canister.~~

~~[Claim 38]~~

~~The canister type thruster according to claim 33, further comprising a sealing device that forms a waterproof structure between the canister and a canister seat on which the canister is placed when the thruster is located below a bottom of the hull.~~

~~[Claim 39]~~

~~The canister type thruster according to claim 38, wherein:~~

~~the sealing device includes a sealing member that is elastically deformable to form the waterproof structure; and~~

~~the sealing member is formed to protrude from a lower surface of the canister at an inner side of a skirt provided around a lower end of the canister, and is provided between the canister seat and the lower surface of the canister.~~

~~[Claim 40]~~

~~The canister type thruster according to claim 39, wherein, when the locked rod enters the locking recess of the first locking member, a degree of compression of the sealing member is adjustable according to a length by which the locked rod enters.~~

~~[Claim 41]~~

~~A method of installing a canister type thruster mounted in a trunk of a ship, the method comprising:~~

~~(a) installing guide modules for guiding upward/downward movement of a canister equipped with at least one rack at preset positions of inner surfaces of trunk blocks of a hull or a floating structure which are manufactured in a plurality of block units;~~

~~(b) assembling the trunk blocks;~~

~~(c) measuring positions at which the guide modules are installed; and~~

~~(d) adjusting thicknesses of the guide modules based on an error value between each of the measured installed positions and a preset position to correct the installed position of each of the guide modules.~~

~~[Claim 42]~~

~~The method according to claim 41, wherein:~~

~~the racks are installed at opposite sides of outer surface of the canister in a lifting direction,~~

and are each provided such that toothed parts engaged with pinions are symmetrical;

each of the guide modules includes a support bracket that is fixed to the inner surface of each of the trunk blocks, toothed-part guides that are symmetrically provided at opposite sides of the support bracket so as to guide the opposite toothed parts of the rack, and a lateral guide that comes into contact with a lateral surface of the rack to guide upward/downward movement of the rack; and

the step (d) includes adjusting thicknesses of the toothed-part guides and the lateral guide based on the error value to correct the installed position of each of the guide modules.

[Claim 43]

The method according to claim 42, wherein:

the toothed-part guides and the lateral guide include entry guides that maintain an inclination with respect to a lifting direction of the rack; and

the step (a) includes fixing the support bracket to the inner surface of each of the trunk blocks, and installing the entry guides at a front portion and opposite sides of the support bracket.

[Claim 44]

The method according to claim 43, wherein the step (d) includes:

manufacturing a thickness-adjusting plate having a design thickness based on the error value or processing a previously manufactured thickness adjusting plate;

installing the thickness adjusting plate in the front of the entry guides; and

installing a sliding pad, which comes into contact with the rack to guide the upward/downward movement of the rack, in the front of the thickness adjusting plate.

[Claim 45]

The method according to claim 43, wherein the step (d) includes:

combining previously manufactured thickness adjusting plates having various thicknesses based on the error value to install the combined thickness adjusting plates in the front of the entry

guides; and

installing sliding pads, which come into contact with the rack to guide the upward/downward movement of the rack, in the front of the thickness adjusting plates.

[Claim 46]

The method according to claim 45, wherein the support bracket is fixed by a welding method, and the thickness adjusting plates and sliding pads are decouplable and couplable by a bolting method.

[Claim 47]

The method according to claim 43, wherein the step (d) includes:

manufacturing a sliding pad having a design thickness based on the error value or processing a previously manufactured sliding pad; and

installing the sliding pad in the front of each of the entry guides.

[Claim 48]

The method according to claim 41, further comprising:

installing a lift drive equipped with the pinions engaged with the rack and a driving source driving the pinions on the inner surface of at least one of the trunk blocks; and

correcting an installed position of the lift drive based on an error value between the installed position of the lift drive and a preset position,

wherein two or more of the guide modules are installed at upper and lower sides of the lift drive.

[Claim 49]

The method according to claim 41, wherein the step (c) includes applying light to the installed position of each of the guide modules, and extracting information on the position of each of the guide modules based on at least one of a time, distance, and angle of reflected light.

[Claim 50]

~~The method according to any one of claims 41 to 49, wherein two or more of the guide modules are installed on the inner surfaces of the trunk blocks such that a spaced distance between an uppermost guide module and a lowermost guide module is shorter than a full length of the rack.~~

~~[Claim 51]~~

~~The method according to any one of claims 41 to 49, wherein the guide module is installed on the same line as the rack.~~