room is in the upper position. When moving the propulsion device (Canister), the lifted mass is extremely large, because in the system the whole machine room is lifted with its propulsion device and required components. The lifting distance is also great, because the whole structure alongside the propulsion device has to be lifted above the waterline. Such a propulsion machine room is extremely difficult to realise in vessels low of their structure. The propulsion machine room being lifted within the hull, the open shaft constitutes a discontinuity point with the bottom of the vessel or floating structure causing additional resistance when in motion.

Document EP 613 817 is considered to be the closest prior art, and discloses a boat propulsion unit having a propeller which can be withdrawn into a sleeve to a position above the plane of the boat's bottom and enclosed by a cover plate. The water in the closed sleeve can then be pumped out, so that the emptied sleeve is accessible for inspection and maintenance operations,

SUMMARY OF INVENTION

The object of the present invention is to provide a novel arrangement for a service space of a retractable propulsion device or corresponding system in a vessel or corresponding floating structure. For achieving this object, the invention is mainly characterised by that the service space is located at least mainly below the waterline of the vessel or corresponding floating structure and is provided with at least one watertight closing device arranged substantially on the level of the bottom of the vessel or corresponding floating structure which closing device/devices when unlocked constitutes/constitute a direct access from the service space to water via the bottom of the vessel or corresponding floating structure for lowering the propulsion device or corresponding system from the service space to water into an operating position i.e. operating mode and correspondingly for lifting it from water within the service space into a

service/storage position i.e. service/storage mode, and which can, when closed, constitute together with the top and wall structures of the service space a watertight space from which water is removable after having closed the closing devices.

The propulsion device or corresponding system being in the operating mode, the closing devices of the service space are unlocked and the propulsion device or corresponding system is mechanically locked in the hull structures of the vessel or corresponding floating structure so that a support structure of the propulsion device or corresponding system constitutes a watertight contact surface and joint with the hull of the vessel or corresponding floating structure. Forces resulting from the motions of the vessel or corresponding floating structure and the hydrodynamics of a propeller of the propulsion device are arranged to convey via the locking devices of the propulsion device to the hull structures of the vessel or corresponding floating structure. The closing devices are then positioned within the service space so that the propulsion device or corresponding system is retractable unobstructed within the service space into the service/storage mode.

The service space is provided with remote-controlled locking devices with which, the propulsion device or corresponding system being in the operating mode or the service/storage mode, the support structure of the propulsion device or corresponding system is fastened and mechanically locked in the hull of the vessel or corresponding floating structure, and further the service space is provided with lifting devices for lifting the propulsion device or corresponding system from water to the service space and for lowering it from there to water. Furthermore, in the service space is arranged at least one ventilation pipe provided with closing valves.

A driving mechanism of the propulsion device or corresponding system is located in a compartment separated from the service space with a watertight bulkhead or deck, whereby for retracting the propulsion device or corresponding system from

the operating mode into the service/storage mode, a coupling between the propulsion device or corresponding system and its driving mechanism is decoupled where required.

The invention provides considerable advantages in relation to known prior art. In the new invention, the propulsion device or corresponding is lifted within the vessel, the watertight closing devices at the vessel bottom are closed and water having come within in connection with the retraction of the device is pumped out of the space. Thus, an engineering room is provided within the vessel in which the propulsion device or corresponding can be stored, serviced etc. In this invention, it is not required to lift the propulsion device or corresponding above the waterline for access. The lifting distance is thus relatively small and, compared to prior-art watertight propulsion machine room arrangements, the movable mass is also considerably smaller. Space saving is considerable. It is not of necessity to construct in the vessel a shaft going through the vessel in the vertical direction, even though it might be advantageous to arrange the shaft for hauling large components. It is also possible to run the vessel when the propulsion device or corresponding is locked in the service position. The arrangement according to the invention enables performing servicing measures in the most difficult wind and wave conditions. In the arrangement according to the invention, the underwater device being retracted, the closing devices constitute a uniform surface with the floating structure. This causes less flow resistance (energy saving) when moving the floating structure compared to prior-art arrangements. In the arrangement according to the invention, the harmful heaving of water in the shaft is not possible.

Other advantages and characteristics of the invention will become evident in the following detailed description of the invention in which the invention is depicted with reference to the figures of the enclosed drawing which show an advantageous embodiment of the invention to the details of which the invention is not solely limited.

BRIEF DESCRIPTION OF FIGURES

The figures of the drawing show an embodiment of the invention in connection with a propulsion device so that

Fig. 1 generally shows a propulsion device installed in a vessel and an engineering room according to the invention seen from the side of the vessel the propulsion device being in an operating position,

Fig. 2 correspondingly shows the arrangement according to Fig. 1 seen from the right-hand side of Fig. 1,

Fig. 3 corresponds Fig. 1 the propulsion device being in a service position, and

Fig. 4 shows the arrangement according to Fig. 3 seen from the right-hand side of Fig. 3.

DETAILED DESCRIPTION OF AN ADVANTAGEOUS EMBODIMENT ACCORDING TO FIGURES

The figures of the drawing thus show an arrangement in which in a vessel is installed a propulsion device retractable within the vessel and for this propulsion device in the vessel is arranged an engineering room, a service space or corresponding. In the figures, the level of a vessel deck is designated with reference number 10' and correspondingly the level of a vessel bottom is designated with reference number 2. A space above the deck 10' is totally dry space and correspondingly in a space below the deck 10' is composed an engineering room 11 which is used as a service space for a propulsion device 4 in the example of the figures.

In Figs. 1 and 2, the propulsion device 4 is in an operating position i.e. it is lowered down in an operating mode. In the operating mode, the propulsion device 4 is mechanically locked and fastened with remote-controlled locking devices 8 in the hull structures of the vessel. A support structure 4a of the propulsion device 4 then constitutes with the vessel hull a watertight contact surface and joint. Forces resulting from the motions of the vessel or other floating structure and the hydrodynamics of a propeller of the propulsion device 4 are conveyed via the locking devices 8 of the propulsion device 4 to the hull structures of the vessel. A driving mechanism 5 of the propulsion device 4 can be located either on the side of the propulsion device 4 or above the propulsion device 4 as shown with dashed lines and designation 5'. The driving mechanism 5 being on the side of the propulsion device 4, the propulsion device 4 is provided with an angled gear 7 and a drive shaft 6. The driving mechanism 5' being above the propulsion device 4, the transmission is implemented via a line shaft 6'. In both cases, the driving mechanism 5, 5' is located in its own compartment 12, 12' which is separated of the engineering room 11 i.e. the service space with a watertight bulkhead 10 or deck 10'. In the engineering room 11 are installed closing devices 14 with which the bottom of the engineering room 11 is watertightly closeable from below when the propulsion device 4 is retracted. In the operating mode of Figs. 1 and 2, the closing device/devices 14 of the bottom are positioned within the engineering room 11 so that they form no obstruction in the retraction stage of the propulsion device 4.

In Figs. 3 and 4, the propulsion device 4 is in a service/storage mode retracted within the vessel. Into this service/storage mode, the propulsion device 4 is lifted, inter alia, when the vessel enters shallow water, for the time of transfer run or when the propulsion device 4 requires servicing. Before retracting the propulsion device 4, propulsion shafts between the propulsion device and the driving mechanism 5, 5' driving it are detached or removed where required. For example, the driving mechanism 5 being located on the side of the propulsion device 4, the drive shaft 6 between the driving mechanism 5 and the propulsion device 4 is

removed or detached. Cablings, hosings etc. of the propulsion device 4 are detached where required. On top of the propulsion device 4 and in other required places are installed watertight protective caps (not shown in the figures) according to the instructions of the supplier if such protective caps are required. If necessary, the underwater removal of the propulsion device is performed according to the instructions of the supplier.

The mechanical lockings between the support structure 4a of the propulsion device 4 and the vessel hull are unlocked. The propulsion device 4 with its support structure 4a is still in this stage fastened with the remote-controlled locking devices 8 in the vessel hull further constituting a watertight joint. After this, the crew C exits the engineering room 11 and closes the watertight structures of the compartment including closing valves 13' of ventilation pipes 13 of the engineering room 11 on top of the watertight deck 10'. The remote-controlled locking devices 8 are unlocked and the lifting of the propulsion device unit comprising the propulsion device 4 and the support structure 4a of the propulsion device can be started with lifting devices 15. In the example of Figs. 2 and 4, the lifting devices 15 are hydraulic, particularly hydraulic cylinders 15. As the lifting devices, it is also possible to use pneumatic or mechanical lifting devices. It should yet be understood that also other lifting devices can be used and the above-described uses are only advantageous examples. The propulsion device 4, particularly the support structure 4a of the propulsion device having lifted up from the sealing surfaces, water is able to access the engineering room 11. Due to the closing valves 13' of the ventilation pipes 13 of the engineering room 11, the water surface does not rise up to the waterline of the vessel, because an airbed has been formed in the engineering room 11. Thus, the volume of water pumped out is smaller. For minimising the water volume, the space can also be pre-pressurised. It is also possible to leave the ventilation pipes 13 or corresponding air channels unclosed, whereby the space is filled with water up to the waterline WL. The watertight top structure i.e. the deck 10' of the engineering room 11 is slightly above the construction water line WL of the vessel. The propulsion device 4

reaching its upper position, the watertight closing device/devices 14 of the vessel bottom 2 are closed and the propulsion device 4 is locked in its upper position by means of the remote-controlled locking devices 8'. Due to the closing device/devices 14, the engineering room 11 becomes a totally watertight space. After the opening of the closing valves 13' of the ventilation pipes 13, the engineering room 11 is emptied of water. The crew C then enters the engineering room 11 and locks the closing device/devices 14 mechanically. Bringing the propulsion device 4 in the drive position i.e. operating mode occurs in the opposite order.

The invention was described above by way of examples with reference to the figures of the enclosed drawing. The invention is not, however, solely limited to the embodiments shown in the figures, but the various embodiments of the invention can vary within the scope of the inventive idea presented in the enclosed claims.

CLAIMS

1. A service space of a retractable propulsion device or corresponding system in a vessel or corresponding floating structure, which service space (11) comprises a closed or closeable space limited by walls, a top structure and a bottom, in which space an access is arranged for the crew (C) from the other parts of the vessel or corresponding floating structure, and which service space (11) is constructed into connection with the bottom (2) of the vessel or corresponding floating structure, whereby the propulsion device (4) or corresponding system is retractable from an operating position into a service/storage position in the service space (11) and correspondingly lowerable from the service space (11) down into the operating position, c h a r a c t e r i s e d in that the service space (11) is located at least mainly below a waterline (WL) of the vessel or floating structure and is provided with at least one watertight closing device (14) arranged substantially on the level of the bottom (2) of the vessel or corresponding floating structure which device/devices when unlocked constitutes/constitute a direct access from the service space (11) to water via the bottom (2) of the vessel or corresponding floating structure for lowering the propulsion device (4) or corresponding system from the service space (11) to water into the operation position i.e. operation mode and correspondingly for lifting it from the water within the service space (11) into the service/storage position i.e. service/storage mode, and which when locked constitutes/constitute together with the top and wall structures of the service space (11) a watertight space from which the water is removable after having closed the closing devices (14)~~.~~, and

~~2. A service space of a retractable propulsion device or corresponding system according to claim 1, c h a r a c t e r i s e d~~ in that, the propulsion device (4) or corresponding system being in the operating mode, the closing devices (14) of the service space (11) are unlocked and the propulsion device (4) or corresponding system is mechanically locked in the hull structures of the vessel or corresponding floating structure so that a support structure (4a) of the propulsion device (4) or

corresponding system constitutes a watertight contact surface and joint with the hull of the vessel or corresponding floating structure.

~~3~~2. A service space of a retractable propulsion device or corresponding system according to claim ~~2~~1, characterised in that forces resulting from the motions of the vessel or corresponding floating structure and the hydrodynamics of a propeller of the propulsion device (4) are arranged to convey via locking devices (8) of the propulsion device (4) to the hull structures of the vessel or corresponding floating structure.

~~4~~3. A service space of a retractable propulsion device or corresponding system according to any one of preceding claims, characterised in that, the propulsion device (4) or corresponding system being in the operating mode, the closing devices (14) are positioned within the service space (11) so that the propulsion device (4) or corresponding system is retractable unobstructed within the service space (11) into the service/storage mode.

~~5~~4. A service space of a retractable propulsion device or corresponding system according to any one of preceding claims, characterised in that the service space (11) is provided with remote-controlled locking devices (8, 8') by means of which, the propulsion device (4) or corresponding system being in the operating mode or service/storage mode, the support structure (4a) of the propulsion device (4) or corresponding system is fastened and mechanically locked in the hull of the vessel or corresponding floating structure.

~~6~~5. A service space of a retractable propulsion device or corresponding system according to any one of preceding claims, characterised in that the service space (11) is provided with lifting devices (15) for lifting the propulsion device (4) or corresponding system from water within the service space (11) and for lowering it to water.

~~7~~6. A service space of a retractable propulsion device or corresponding system according to any one of preceding claims, c h a r a c t e r i s e d in that in the service space (11) is arranged at least one ventilation pipe (13) provided with closing valves (13').

~~8~~7. A service space of a retractable propulsion device or corresponding system according to any one of preceding claims, c h a r a c t e r i s e d in that a driving mechanism (5, 5') of the propulsion device (4) or corresponding system is located in a compartment (12) separated from the service space (11) with a watertight bulkhead (10) or deck (10').

~~9~~8. A service space of a retractable propulsion device or corresponding system according to any one of preceding claims, c h a r a c t e r i s e d in that, for retracting the propulsion device (4) or corresponding system from the operating mode into the service/storage mode, a coupling between the propulsion device (4) or corresponding system and its driving mechanism (5, 5') is detached where required.