Submersible heavy lift catamaran.

The invention concerns a submersible heavy lift barge comprising:

- at least one floating body;
- an essentially rectangular deck box arranged on and carried by the at least one floating body;
- at each corner of the deck box a stability tower;
- water ballast tanks arranged in the at least one floating body and/or in the stability towers;
- one or more ballast water pumps and/or air compressors for ballasting or deballasting the water ballast tanks.

Such submersible barges are known. They are used as dry dock or floating dock as well as for transporting heavy loads, such as submersible drilling platforms. The known barges consist of a so called 'deck box' supported on one floating body extending under essentially the entire deck box. In order to load a ship on the barge, one fills the water ballast tanks with water to lower the deck box to some metres below the water plane or surface. Subsequently one manoeuvres the ship to above the deck box and lifts the barge by emptying the water ballast tanks. In this manner, generally the ship will be raised to above the water plane to transport it and/or to do some work, such as repairs, on it. Conventional barges have as disadvantage caused by their beams that their speed is relatively limited, their sea behaviour is relatively poor and unfavourable, especially in the case of heavy sea, and their manoeuvrability is relatively poor. In genereal, the larger the barge the more significant the problems will be. Also the width of such barges is generally limiting the loading of heavy and large semi-submersibles or other objects to objects which fit within the width of the barge. This results in large loads in the semi-submersible and barge, large sea fastenings and susceptability to wave slamming.

The object of the present invention is to provide an improved submersible heavy lift barge, overcoming the above mentioned problems.

According to the present invention this object is reached by providing a submersible heavy lift barge according to claim 1. By providing a submersible heavy lift barge of a catamaran type, tri-maran type or multi-maran type (which could also be indicated as multi hull type), the transport speed, the behaviour, the manoeuvrability

and the ability to safely carry a load or work on a load are considerably improved. Further, the width of the deck box can be considerably enlarged, while the total weight of the barge will increase only a relatively small amount or can even be kept essentially the same, the last implying that the total amount of steel and thus the total amount of material used is not increased proportional to the increase in width.

The multi-floater hull possesses a good seakeeping behaviour due to the optimal combination between waterplane intertia and hull damping. More damping can be generated from these floaters than from one hull. Also wide beamy ships have the tendancy to be very 'cruel' due to their extreme high transverse moment of intertia. With the catamaran hull type this effect can be decreased, whilst stability is maintained.

According to a preferred embodiment the barge will comprise two or possibly three of said floating bodies.

The multi hull principle can be applied to a submersible heavy lift barge wider than 60 meters without negatively influencing its qualities. A barge with a width of for example 80 metres, which can easily be made according to the invention, provides for example a much better possibility for transporting so called semi-submersible drilling platforms having two or more parallel floating hulls. With larger drilling platforms, the distance between the outermost hulls is in general larger than 50 metres, while their length is in general easily about 80 metres or more. On conventional barges which have a width of at the most about 50 metres, such drilling platforms are transported in transverse orientation, i.e. the longitudinal direction of the submersible floating hulls of the platform extend transverse to the longitudinal direction of the barge. In such orientation the support columns of the drilling platform will lie close to or even outside the deck box, so that a bending moment will be introduced into the hulls of the drilling platforms. The hulls are, however, not really designed on such bending moments, which makes that transporting a drilling platform on this manner in heavy seas involve the risk of damage to the platform to be transported.

For sufficient floating capacity and stability, the width of the floating bodies is according to the present invention more than 10 metres, preferably in the range of about 20 to about 25 metres.

In order to assist in manoeuvring a load, such as a ship or drilling platform, into its right position on the deck box - while the deck box is lowered to below the water

plane - it is according to the invention advantageous if each stability tower is provided with positioning winch means for positioning a load on the deck box.

In order to enable the barge self supporting in loading, for example supplies, it is according to the invention preferred that on top of one or more of the stability towers a crane is provided.

In order to have a good view over the barge, for example during loading or unloading a heavy and/or large load, such as a ship or drilling platform, on the deck box, it is according to the invention preferred that a central command is arranged on top of one of the stability towers, preferably the starboard forward tower. In case a crane is provided on top of this tower, it will be clear that the crane is arranged preferably on top of the same tower.

In order to improve the manoeuvrability of the barge, it is according to the invention advantageous if it is provided with propulsion means.

The present invention will be explained further with reference to the drawing showing by way of example a preferred embodiment of the barge according to the invention. In the drawing:

Figure 1 shows schematically a perspective view of a barge according to the invention on which for example a drilling platform is loaded;

Figure 2 shows schematically a side view on a longitudinal side of the barge of figure 1; and

Figure 3 shows schematically a side view on a transverse side of the barge of figure 1.

Figure 1 shows schematic in perspective view a submersible heavy lift barge according to the present invention. The barge 1 comprises a rectangular deck box 4 supported on two floating bodies 2 and 3. The floating bodies 2 and 3 extend in the longitudinal direction L of the barge 1. In the transverse direction T of the barge 1, the floating bodies 2 and 3 are spaced with respect to each other. Between the two spaced floating bodies 2 and 3, there is formed an interspace 18, which opens in downward direction as well as in forward direction and aftward direction. The deck box 4 has an essentially rectangular form with longitudinal sides 12, 13 and is provided with four so called stability towers 5, 6 and 7 (the fourth one is lying behind drilling platform 20). It is, however, noted that the barge does not necessarily has a rectangular form in top plan view. For example the forward and if desired also the aftward end could be formed

tapered, in which case the stability towers could, within the scope of the claims, be arranged on the tapered part(s) instead of literally on each corner of each deck box.

In the embodiment as shown in the figures, the width B of the deck box is about 80 metres. The length of the deck box (in longitudinal direction L), measured within the stability towers is about 125 metres and the total length of the deck box from for aftward to the forward and is about 150 metres. The width c of the floating bodies is about 20 metres

In order to load for example a drilling platform 20 onto the deck box 4 of the barge 1, the barge 1 is provided with water ballast tanks 8 in the floating bodies 2 and 3 and with water ballast tanks 9 in each stability tower 5,6,7. Although the ballasting or filling of the water ballast tanks could be done without the help of any pumping installation, in practice it can be preferred to do this under the control on/or with the assistance of two or more ballast water pumps 10. This in order to ensure that the ballast water is evenly distributed over the water ballast tanks 8,9. Further the pumps can help shortening the time needed for submerging the barge. For this purpose also air compressors can be used. The barge according to the embodiment shown has a depth of about 15 metres. In submerged condition the barge will have a draft of about 27 metres, which means that the top plane of the deck box 4 will be about 12 metres below the water plane.

After the barge has been submerged, a load, such as the drilling platform 20, can be manoeuvred in place on the deck box 4. This manoeuvring in place can be done by means of or with the assistance of positioning winches 14 provided on each of the four stability towers 5,6,7. (only three can be shown, one is hidden behind the load). In order to be able to co-ordinate this manoeuvring the starboard forward stability tower 6 is provided with a central command centre 16.

After the load, such as the drilling platform 20, has been manoeuvred in place on top of the deck box 4, the ballast water pumps 10 are operated to deballast or empty the water ballast tanks 8,9 to lift the load 20 to above the water plane.

With reference to figure 3, the water plane in unloaded condition of the barge is indicated with by reference number 30 and the water plane in submerged condition is indicated by reference number 31. In case the barge 1 is loaded with a load 20, which is lifted to above the water level, the barge lies essential at the same depth as in the fully unloaded condition.

The drilling platform 20, by way of an example only, has two hulls 21,22 supporting each three columns 23, which in turn carry a deck 24 provided with inter alia a derrick 25. Such drilling platforms 20 quite commonly have hulls 21, 22 with a length of about 80-120 metres. The distance between the most forward and most backward column 23 on a hull 21 will in such case easily be over 60 metres. Commonly barges according to the prior art have a width (comparable with B from figure 3) of up to generally not more than about 50 metres. As the transverse distance between the hulls 21 and 22 of drilling platforms is often more than 50 metres, such drilling platforms 20 are, according to the prior art, transported in transverse orientation (i.e. with their hulls 21,22 extending in the transverse direction T of the barge). This means that the outermost columns 23 of each hull will lie outside the deck box 4, which creates bending moments in the hulls 21, 22 which are unfavourable and could involve the risk of damage to the drilling platform 20.

Loading of rigs athwartships causes not only bending in the rigs themselves, but might also induce extra loads in the deck of the carrying vessel. Both local and global bending effects are experienced. More seafastening will be required and access will be restricted.

Contrary to barges according to the prior art, the barge according to the present invention can be made with a width B of more than 60 metres, for example 80 metres or more, enabling a drilling platform 20 to be transported in longitudinal orientation as shown in figure 1. This means that the hulls 21 and 22 are evenly supported over their length and will not be subjected to bending moments. In this respect it is further to be noted that bending moments around an axis 11 to which the barge might be subjected have no harmful effect on the drilling platform 20 if this is orientated in longitudinal direction on the barge. This because the drilling platform 20 is designed to be subjected to such bending moments during use. With a rig loaded longitudinally on board the carrying vessel, all global and local stresses are reduced, integrity of the rig pontoon and its carrying column strength is not effected as much and the possibility for wave slamming is much reduced. Finally the rig will be accessible on all sides for inspection or work before and during ocean transport at all times.

Although a barge according to the present invention will for transport purposes generally be towed by towing vessels, it is according to the invention advantageous to

provide the barge with a propulsion means 17. This increases the manoeuvrability of the barge.

******

CLAIMS:

1. Submersible heavy lift barge (1), comprising:

- at least one floating body (2,3);
- an essentially rectangular deck box (4) arranged on and carried by the at least one floating body (2,3);
- at each corner of the deck box (4) a stability tower (5,6,7);
- water ballast tanks (8,9) arranged in the at least one floating body (2,3) and/or in the stability towers (5,6,7);
- one or more ballast water pumps (10) and/or compressors for ballasting or deballasting the water ballast tanks (8,9)

characterised in that

the barge (1) comprises two or more of said floating bodies (2,3), which extend in the longitudinal direction (L) of the barge, are spaced with respect to each other in the transverse direction T of the barge to have an interspace (18) in between and are arranged symmetrically with respect to the central longitudinal axis (11) of the barge (1), the interspace (18) being open in the forward and aftward direction.

2. Barge according to claim 1, characterised in that it comprises two of said floating bodies (2,3).

3. Barge according to claim 1, characterised in that it comprises three of said floating bodies.

4. Barge according to one of the preceding claims, characterised in that the width (B) of the deck box (4) is 60 metres or more.

5. Barge according to one of the preceding claims, characterised in that the width (C) of the floating bodies (2,3) is more than 10 metres, preferably in the range of about 15 to about 25 metres.

6. Barge according to one of the preceding claims, characterised in that the longitudinal sides (12,13) of the deck box are each supported by one of said floating bodies (2,3).

7. Barge according to one of the preceding claims, characterised in that each stability tower (5,6,7) is provided with positioning winch means (14) for positioning a load (20) on the deck box (4).

8. Barge according to one of the preceding claims, characterised in that on top of one or more of the stability towers (5,6,7)a crane (15) is provided.

9. Barge according to one of the preceding claims, characterised in that a central command centre (16) is arranged on top of one of the stability towers (6), preferably the starboard forward tower.

10. Barge according to one of the preceding claims, characterised in that it is provided with propulsion means (17).

******