PLEASURE BOAT FOR OBSERVATION IN THE SEA

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References Cited

UNITED STATES PATENTS
2,948,120 8/1960 Suderow........................... 61/46.5
3,093,867 6/1963 Ranney.............................. 52/65
3,388,513 6/1968 Bauer............................... 52/65
3,613,621 10/1971 McKinley.......................... 61/69 X
3,680,515 8/1972 Yoneda.............................. 114/66

FOREIGN PATENTS OR APPLICATIONS
22,335 12/1974 United Kingdom................ 114/66

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ABSTRACT

An observation vessel incapable of self-propulsion and anchored in the sea for observing underwater and sea-bottom ecology in a relaxed sightseeing atmosphere in an observation chamber of an undersea observation tower. The latter is mounted for vertical movement below the sea-level at the central portion of the vessel.

6 Claims, 6 Drawing Figures
Pleasure Boat for Observation in the Sea

This invention relates to a pleasure vessel for observation in the sea and more particularly to a vessel for undersea observation whereby the ecology or natural state in the sea and sea-bottom can be viewed in a sightseeing atmosphere through an observation tower suspended from the vessel into the sea.

Recently, with the large scale expansion of leisure time, attention has been directed to sea-oriented recreational activities, such as underwater observation and exploration. It has long been desired to observe undersea fauna, flora and the sea-bottom in the nature, undisturbed state. Undersea observation and exploration has been practiced in the past using submarine boats and diving apparatus has been extensively developed. However, pleasure boats or other facilities have not heretofore been developed whereby sightseers who wish to enjoy undersea observation can do so in comfort.

The undersea observation pleasure vessel according to the present invention has been devised so as to make possible such underwater observation of the sea and sea-bottom in a relaxed sightseeing atmosphere. Said vessel is unlike pleasure boats cruising on the sea at high speed or submarines in the sea. It provides large-scale facilities for observation on and under the sea and sea-bottom, while being anchored.

It is therefore the main object of the present invention to provide an observation pleasure vessel in the sea whereby the sea and sea-bottom, at a relatively shallow region of the sea, can be viewed and observed in a sightseeing atmosphere through an observation tower extending beneath the anchored floating vessel.

The observation pleasure boats which have heretofore been developed are completely self-propelled and are navigated to a predetermined region of the sea. They are then anchored for suspending therefrom an observation tower for undersea observation. Studies have also been made to determine the possibility for such pleasure boats to slowly cruise in the vicinity with the observation tower suspended in the sea and thereby increasing the effect of observation.

However, as a result of subsequent studies, including experiments and investigations on the observation vessels of marine environmental conditions, it has been found more desirable not to have such observation pleasure boats be self-propelling. It has also been found that in many cases, the self-propulsion of pleasure boats having undersea observation towers would be rather dangerous due to irregularity of the sea-bottom topography, such as a sharp drop due to the continental shelf or a reef, and that the pleasure vessel should be of a non-propelling type in order to prevent damage to the sea and sea-bottom environment.

The present invention is primarily characterized in providing a pleasure vessel without self-propelling ability having an observation tower suspended in the sea. Said vessel must be towed to a predetermined area of the sea and anchored there in a highly stable condition. It can be moved to a predetermined region of the sea by means of a tugboat, etc., and after positioning, anchoring to the sea-bottom in such a highly stable manner that the vessel will not be carried away due to wind and wave action.

The present invention is additionally characterized in that, with respect to the structure and function as an underwater observation pleasure vessel, a new technical concept having concrete details of importance has been provided, comprising a brake and a guide for the vertical movements of the observation tower which are important elements for maintenance of the stability of the vessel and a mechanism for revolving the undersea observation tower.

The above and other objects and features of the present invention will be apparent from the following description and claims taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of an undersea observation pleasure vessel of the present invention, partly broken away;
FIG. 2 is a plan view thereof;
FIG. 3 is a vertical sectional view thereof;
FIG. 4 is a plan view of the swivel-stopping mechanism on an observation tower of the present invention;
FIG. 5 is a detailed view of the observation tower revolving means; and
FIG. 6 illustrates overcoming plate means laid between a deck on the hull and a deck on the observation tower.

Referring now to the embodiment shown in the drawings, explanations are given below on the present invention.

The numeral 1 is a circular platter-like hull having a relatively shallow draft, about 27m in diameter and about 4m in height.

The undersea observation pleasure vessel, according to the present invention, has no self-propelling ability and it is therefore towed to a suitable region of the sea by means of a tugboat, etc. where it is anchored. Passengers are taken to the vessel by means of lighters or barges which sail from the land as occasion demands. From three decks 26 on the hull 1, they can enjoy a long distance view of the sea and the land. It is also possible to enjoy a fine view of the sea and sea-bottom by looking down from the top deck 26.

Reference numeral 2 is an observation tower which is a completely watertight, pressure resistant hollow cylindrical body about 6m in diameter with an overall length of about 27m and which passes through the central portion of the hull 1 in a perpendicular fashion.

At the upper end of the observation tower 2 is provided a ballast tank 3 which receives sea water and acts as a weight for suspending the tower 2 in the sea. At the lower end thereof is provided an observation chamber 4 of a substantial size whereby passengers can relax at their ease and enjoy undersea observation. Chamber 4 is provided with suitable facilities to provide relaxation to passengers and with many large observation windows 5 in its side wall and floor, so that the passengers are free to observe the sea and sea-bottom in comfort.

Outside the observation windows 5 under-water lamps 51 are provided. These are suspended from the vicinity of the lowest deck on the hull 1, so that the area of the sea in the vicinity of the observation windows 5 and the observation chamber 4 can be clearly observed.

Within the cylindrical body of the observation tower 2, at its central portion, is an elevator shaft 6. Located therein is an elevator, and filling and drain pipes for the ballast tank 3 (not shown). At the outer periphery of the elevator shaft 6 are provided winding staircases 7,8,
respective, for ascent and descent, similar to a double thread screw.

The overall length of the observation tower 2 is, as mentioned above, about 27m. However, considering the stroke effective for vertical movement, the depth of observation tower 2 in the sea is preferably about 14m from the bottom 6 of the vessel. It is preferable not to contact the bottom of the observation tower 2 with the sea bottom for safety reasons and to avoid damage to the sea floor.

The observation tower 2 may be suspended at a desired depth within the limit of 14m under the vessel, depending on the condition of the ocean, etc. When suspended at the depth of 14m, it is possible to observe the condition and ecology in the sea about 20m under the sea level.

Right above the observation tower 2 is constructed a turret consisting of an optional number of perpendicularly disposed masts 9 and frames 10 which connect the top portions of the masts. A set of pulleys 11, 12, respectively, is mounted at the top central portion of the turret and at the top portion of any one of the masts 9. Ropes 14 and a power cable 15, which draw up the observation tower 2, are driven by a winch 13.

As will be described hereinafter, the observation tower 2 is designed to rotate. On the top of tower 2 and at the central portion thereof, is rotatably mounted a support member 16 connected to the ropes 14 and the power cable 15, as shown in FIG. 3. The ropes 14 are wound about sheaves 17 provided on the rotatable support 16, while the power cable 15 is connected to member 16 utilizing a swivel mounting 18.

A swivel-stop mechanism for restraining the swiveling motion of element 16 is shown in FIG. 4. Three arms 19 (only one shown in the Figure) extend from element 16 toward three of the masts 9. At the tip end of each of the arms 19 and engaging the mast is attached a swivel-stopper 20. The swivel-stopper 20 acts as a stabilizer for the ballast tank 3, and hence for the observation tower 2. Tower 2 is thus suspended from support 16 and can rotate relative thereto, as will be described in detail hereinafter.

The swivel-stopper 20 has a frame 21 of a shape adapted to fit between the mast 9 and the water ballast 3. Two guide rollers 22 are attached to the frame 21 in such a manner that they contact the mast 90° apart, and two rollers 23 circumferentially contact the surface of the outer periphery of the water ballast 3.

The bottom of the hull 1 is constructed as a ballast tank 24 and the upper portion 25 thereof is constructed as a machinery room for accommodating various installations and equipment necessary for the observation vessel such as power generation, air conditioning, power plants, etc.

Passengers enter the observation tower 2 from a deck 26 through a deck 28 fastened to the tower. Reference numeral 27 is an entrance into the tower. There is provided, as shown in FIG. 6, a hinged and wheel supported overpassing plate 52 across the space between the vertically movable deck 28 of the observation tower 2 and the first floor deck 26 on the hull 1, so that passengers can easily pass over the passage from deck 26 to deck 28. It is apparent that 52 can accommodate rotational motion and can be raised when not required.

The observation tower 2 is rotated slowly at the position of its maximum descent limit, namely, in the state shown in FIG. 3, so that the passengers can enjoy observations at different fields of vision.

The deck 28 is utilized as a part of rotating mechanism and is driven by a rotating device 30 mounted on a deck 29. This rotating mechanism is exemplified in FIG. 5. As shown therein, a hydraulic motor or an electric motor is mounted in a power room 31 which also serves as a base. The power room 31 is utilized as a part of the supporting body, on which is circularly mounted a guide rail 32 concentric with the observation tower 2. A plurality of conical rollers 33 which roll on the guide rail 32 are placed in a ring-like frame 34 mounted also in a concentric circle with the observation tower 2. The frame 34 has an outwardly opened groove in which is constructed a pin rack 35 which engages a pinion 36 of a prime mover output shaft 37.

A circular bearing plate 38 fixed to the bottom of the deck 28 sits on the frame 34 so as to have transmitted to it the rotating force, whereby the observation tower 2 is rotated at a speed of 5 to 10 revolutions per hour.

A damper 39 is fixed inside the frame 34 for restraining any swaying motion of the tower relative to the hull, so that the observation tower 2 may be rotated at any height. To a damper shaft 39' is pin-connected a clamp 40 which is in sliding contact with the outer periphery of the observation tower 2, whereby any relative motion between the frame 34 and the observation tower 2 will be restrained.

Another damper 42 is secured to a stand 41 on the deck 29 so that the rotation and vertical movement of the observation tower 2 may be effected in a stable condition. The damper 42 has a shaft 43, to which is connected the shaft of a guide roller 44 adapted to be changed in direction both longitudinally and transversely. A plurality of such guide mechanisms are provided circumferentially in a fixed arrangement on the deck, although they are not shown. They are also arranged on each of the decks 26 and reference numeral 45 in FIG. 3 is an example of such a guide mechanism.

The numeral 46 in FIGS. 1 and 2 is a control cabin for the control of the whole ship. The control chain 46 also effects the operation of vertical movement of the observation tower 2.

As shown in FIG. 3, the hull 1 has in its central portion a recess 49 which receives the observation chamber 4 mounted at the lower end of the observation tower 2. Stops 50 project from the deck 29 into the recess and contact the upper portion of chamber 4 in the withdrawn position. In towing the vessel, it is desirable that the observation chamber 4 be received in the recess 49 for safety reasons and to reduce the towing effort required. On the circumference of the deck of the hull 1 are mounted a plurality of winches 47 for anchors 48 whereby the ship is anchored.

The pleasure vessel of the present invention having the construction set forth hereinafter enables passengers to have an anchored viewing in the sea and seabottom at any desired position in a comfortable sightseeing atmosphere through the observation chamber of the lowered observation tower.

What is claimed:

1. A vessel for undersea observation comprising a hull means having deck means, an observation tower means located at the central portion of said hull means and movable vertically therethrough, ballast means at the upper portion of said observation tower means, a watertight undersea observation chamber at the lower
portion of said observation tower means, passage means connecting the deck means to the observation chamber, turret means on the hull means and positioned above said observation tower means in both its raised and towerd positions, means mounted in the turret means for raising and lowering the observation tower means, said hull means and said tower means being circular in plan view and the hull means being substantially larger in plan than said tower means.

2. The vessel of claim 1 wherein said vessel includes means for rotating the observation tower means.

3. The vessel of claim 2 wherein the vessel contains multiple decks and the observation tower means passes therethrough.

4. The vessel of claim 3 wherein said vessel includes means for restraining swaying motion of the observation tower means.

5. The vessel of claim 4 wherein the hull means has a recessed section at the bottom thereof, and said recess section having slightly larger dimensions that the observation chamber whereby said observation chamber may be drawn up into said recess section when the vessel is towed.

6. The vessel of claim 1 wherein said vessel includes means for rotating said observation tower means, said means including a rack means affixed to said tower means, a prime mover means with a pinion thereon, said pinion engaging said rack when said tower means is in its lowered position and adapted to slowly turn it.