

[54] SUBMARINE HOME

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[51] Int. Cl.B63c 11/00, B63b 35/44

[58] Field of Search.....61/69, 69 A, 81, 82, 46, 46.5;
114/.5 D, 121, 126

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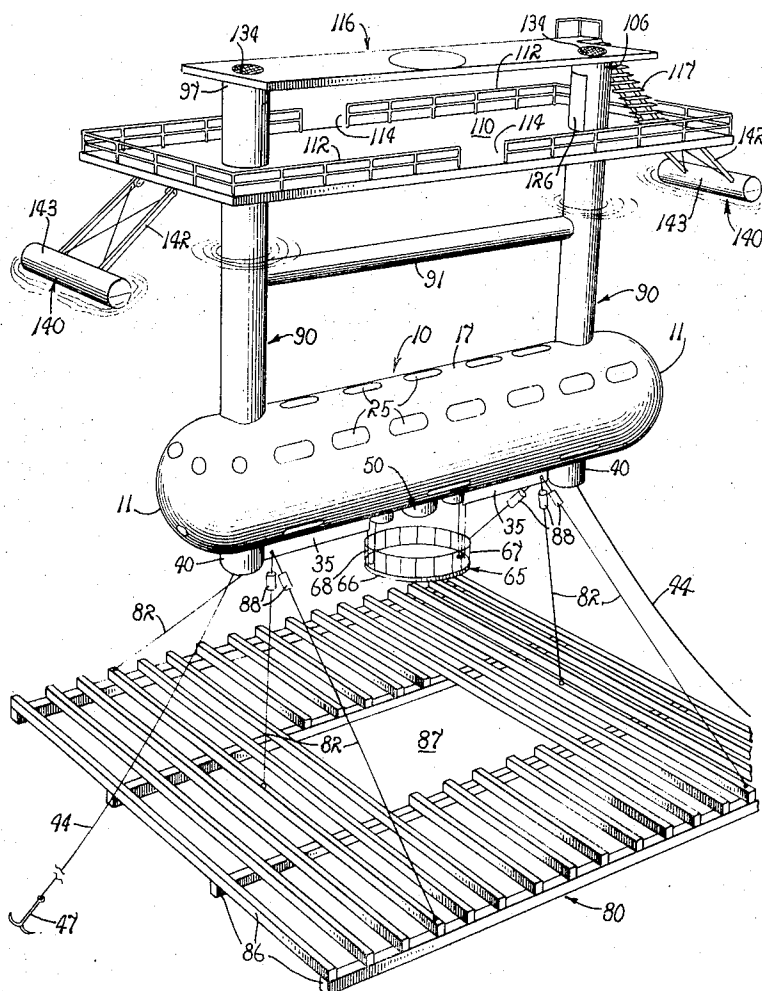
Primary Examiner—Jacob Shapiro

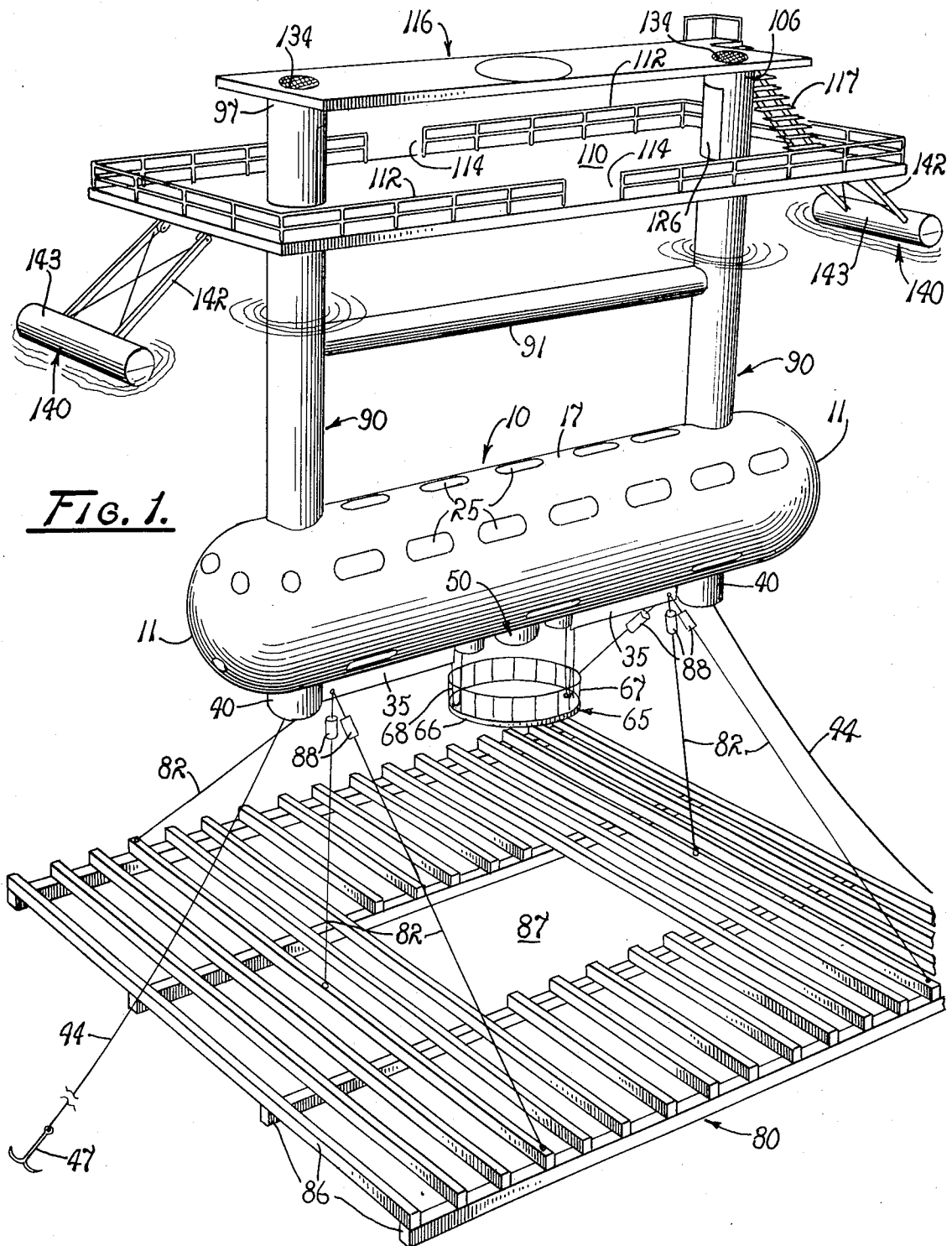
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[57] ABSTRACT

A submarine home adapted to be disposed within a body of water providing a buoyant, watertight main dwelling section having a weighted stabilizing member dependently mounted thereon to moor the main section at a predetermined submerged depth beneath the surface of the water which also serves as an artificial reef for the growth of biological plant life thereon such as seaweed, kelp and the like and including deck means elevationally spaced from said main section above the surface of the water with support means rigidly interconnecting the deck means and said main section affording a passage for supplying fresh air and human access to the main section of the submerged home.

15 Claims, 5 Drawing Figures





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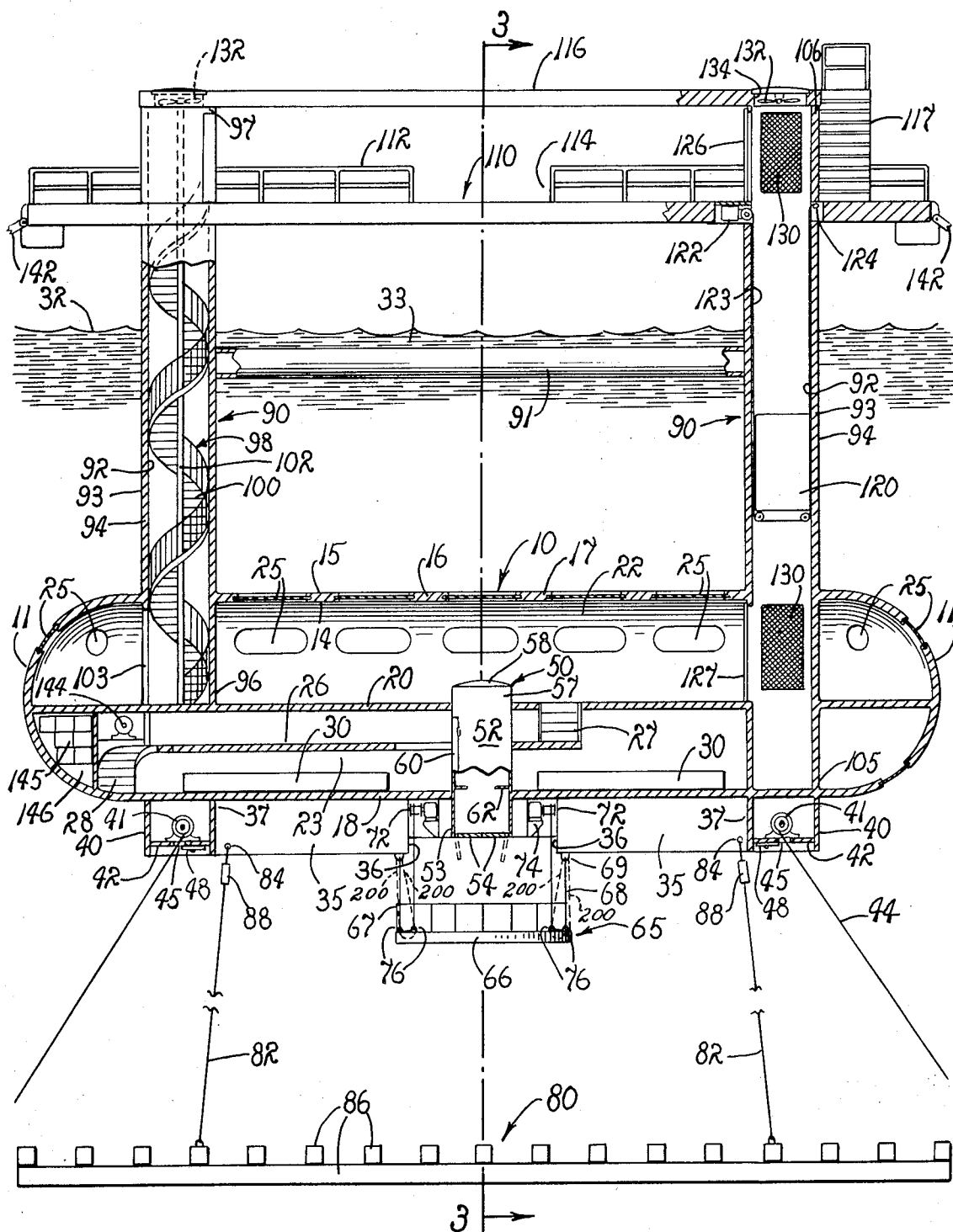
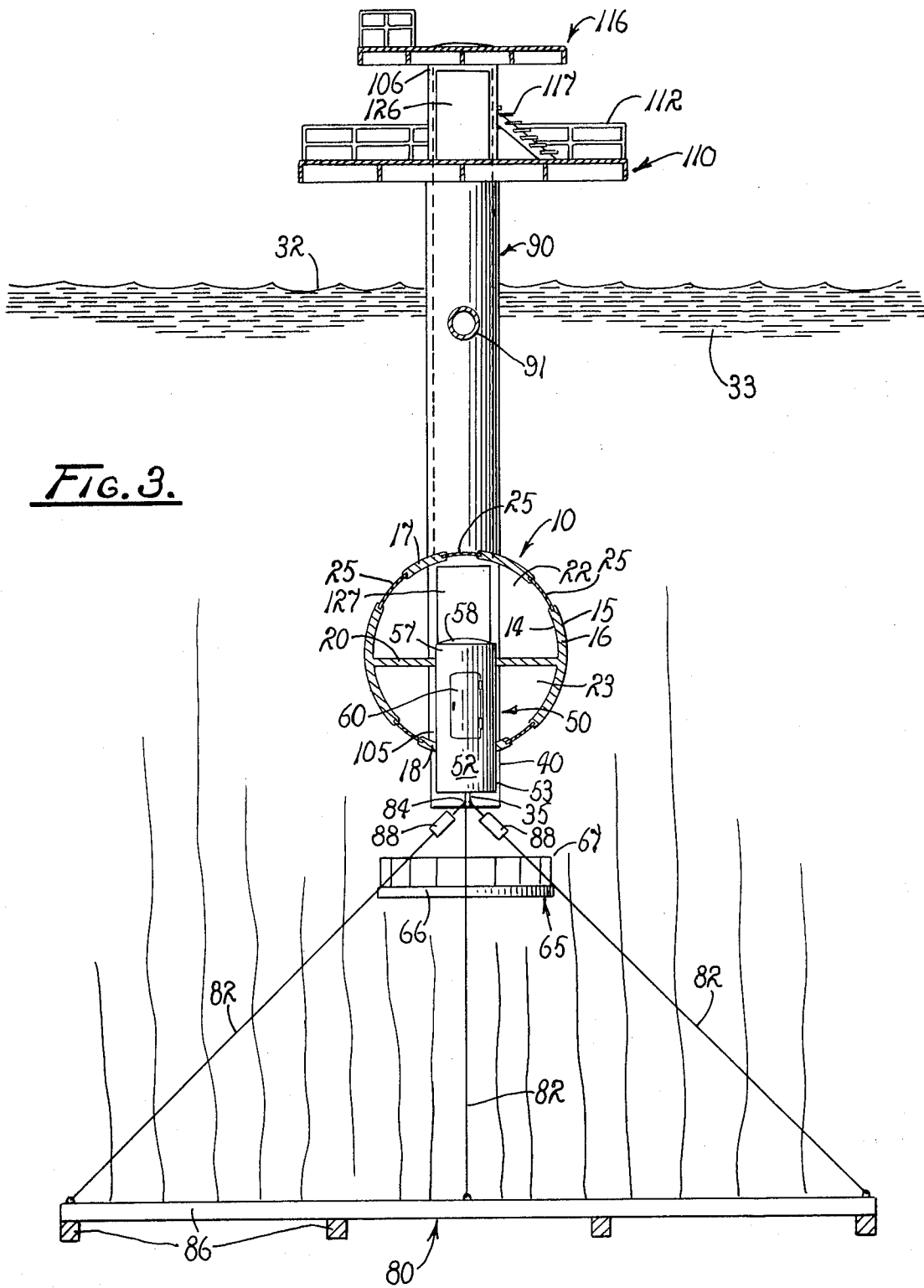


FIG. 2.

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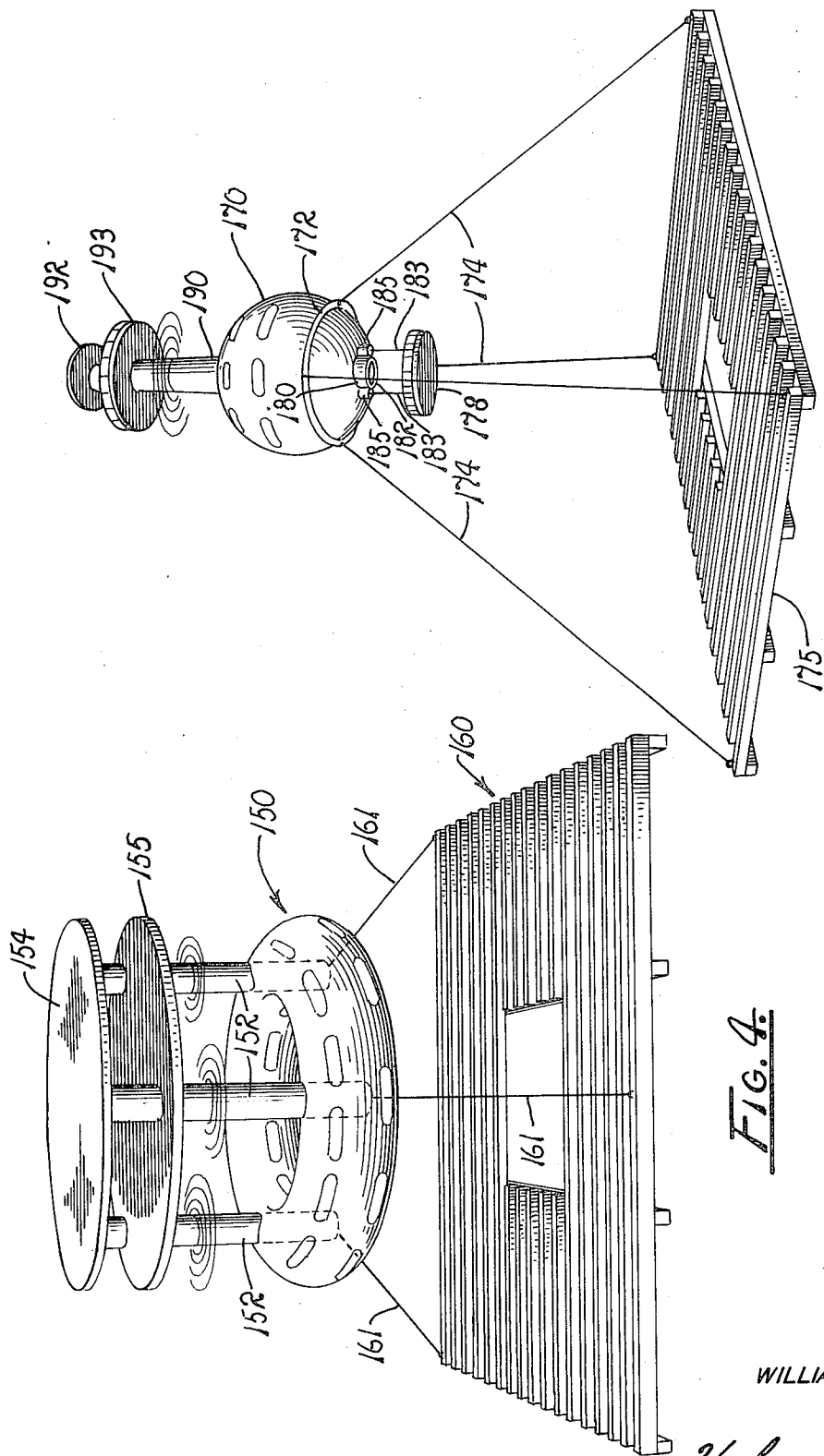


FIG. 5.

FIG. 4.

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SUBMARINE HOME

BACKGROUND OF THE INVENTION

Oceanography has become increasingly popular both for scientific and recreational purposes. The oceans of the world provide a vast territory of unused space and dormant resources which man has only begun to develop. Such regions, however, could be better utilized and more readily accessible for development if a practical method of housing relatively large numbers of people in substantially permanent structures capable of withstanding extreme weather conditions and rough seas were available.

Presently, offshore oil and gas drilling rigs have been employed which structures are adapted to house only a relatively small number of workmen required to operate the drill rig. There are no accommodations on such rigs for anyone other than the workmen who necessarily must endure long periods of separation from their families.

Commercial fishing fleets are also at sea for relatively long periods which operation could be made substantially more efficient if it were possible for the crews to live closer to the fishing grounds. There are also many groups of scientists and other individuals interested in organizing communities of people desiring permanently to live, work, and raise their families in an oceanic environment in order to escape the crowded, contaminated, land-borne large cities.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a submarine home which affords a self-contained dwelling unit for families and the like in an oceanic environment.

Another object is to provide such a submarine home which affords a relatively safe, substantially stable, oceanic dwelling.

Another object is to provide a submarine home of the character described which is substantially isolated from hazardous weather conditions on the surface of the ocean.

Another object is to provide a submarine home which has a buoyant main dwelling section maintained in submerged position by a stabilizing weight suspended therefrom and an upper deck disposed above the surface of the water for supplying fresh air and human access to the main section with the deck affording only a minimum of exposed surface to the environmental elements.

Another object is to provide a submarine home in which the stabilizer weight is capable of serving as an artificial reef for supporting the growth of biological plant life thereupon.

Another object is to provide a submarine home in which the entire structure, including the deck, is submersible during exceptionally rough sea conditions.

Another object is to provide a submarine home which has its own power-generating plant operable by a wave action device mounted on the deck of the home.

Another object is to provide a submarine home capable of immediately rising to the surface upon the deposit of a weighted object upon the stabilizing reef of sufficient weight ordinarily to cause the home to sink to an undesirable depth.

Another object is to provide a submarine home in which a plurality of support lines are extended between the main section of the home and the stabilizing reef with each line having a pressure sensitive line severing device mounted thereon to permit dropping of the stabilizing reef in the event the home is submerged too deeply by the inadvertent or accidental deposit of a weighted object thereon.

Other objects and advantages of the present invention will subsequently become more clearly apparent upon reference to the following description and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective of the submarine home embodying the principles of the present invention disposed in an oceanic environment.

FIG. 2 is a central longitudinal vertical section through the submarine home of FIG. 1.

FIG. 3 is a transverse vertical section through the submarine home, taken generally on line 3—3 of FIG. 2.

FIG. 4 is a perspective of a second form of submarine home embodying the principles of the present invention.

FIG. 5 is a perspective of a third form of submarine home embodying the principles of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring more particularly to FIGS. 1 through 3 of the drawings, a submarine home embodying the principles of the present invention is shown in an oceanic environment providing an elongated cylindrical main dwelling section 10 having opposite hemispherical ends 11. The main section is preferably approximately 15 feet in diameter and approximately 75 feet in length. Obviously, any suitable dimensions may be utilized. The main section is constructed of a pair of inner and outer hulls 14 and 15, respectively, of substantially rigid sheet metal material between which is disposed a suitable buoyant insulating material 16 providing positive buoyancy in the event the hull is completely flooded. The main section includes predetermined upper and lower walls 17 and 18, respectively, and an elongated floor 20 disposed within the inner hull 14 in intermediately spaced, substantially parallel relation between the upper and lower walls to divide the hull into upper and lower compartments 22 and 23, respectively. The upper and lower compartments can be partitioned off into a number of smaller rooms, as may be desired, with a plurality of watertight view ports 25 mounted in the hulls in circumferentially spaced rows. Accordingly, the upper and lower compartments can be divided to provide any desired floor plan by the individual owner. Access between the upper and lower compartments is provided by a stair and floor divider 26 through the lower compartment 23 having an upper stepped end 27 communicating with the upper compartment and an opposite circular stepped end 28 adjacent to the lower wall 18 of the hull.

A pair of elongated fresh water ballast tanks 30 are disposed upon the lower wall 18 of the inner hull 14 within the lower compartment 23. The tanks are con-

nected to a desalination system, not shown, for converting salt water to provide a supply of fresh water to the occupants of the submarine home with the tanks further serving as ballast for precisely controlling the depth of the main dwelling section beneath the surface 32 of the body of water 33 in which the home is located. The main dwelling section 10 is further weighted by an elongated detachable keel plate 35 disposed in edgewardly depending longitudinally extended relation along the lower wall 18 of the outer hull 15 and secured thereto by a plurality of explosive bolts, not shown. The keel plate is divided into two sections providing spaced inner ends 36 and opposite outer ends 37 which are integrally joined with the inner peripheries of a pair of cylindrical anchor winch mounting housings 40. A winch 41 is mounted in each of the housings on a platform 42 with an elongated anchor line 44 controllably extended from the winch through an opening 45 in the platform. An anchor 47 is mounted on the lower ends of each of the anchor lines 44. A pressure sensitive anchor line shearing device 48 is disposed on each of the platforms within their respective openings 45 in circumscribing relation to their respective anchor lines for shearing the same in the event the main dwelling hull sinks to a greater depth than is desired.

Underwater access to the main dwelling section 10 is provided through a diver's air lock 50 extended through the lower wall 18 of the inner and outer hulls 14 and 15, respectively. The air lock provides an elongated cylindrical tank 52 having a lower end 53 extended in downwardly depending relation from the lower wall 18 of the hulls between the inner ends 36 of the keel plate 35. The lower end of the tank is adapted to be selectively opened and closed by a pair of doors 54. The tank includes an upper end 57 extended through the floor 20 within the main section which has a domed transparent top panel 58 so that the occupants of the upper compartment 22 of the main section may observe divers within the air lock. A watertight hatch 60 is disposed in sidewardly opening relation to the tank within the lower compartment 23 of the main section and an annular seat 62 for the divers is disposed within the tank intermediate its ends. A suitable air compressor and water pump system, not shown, is operationally associated with the air lock tank in the usual manner.

An underwater elevator 65 is slung beneath the main dwelling section 10 of the present invention in order to transport divers to and from the bottom of the body of water 33 in which the submarine home is disposed. The underwater elevator provides a circular platform 66 having a circumscribing rail 67. The platform is dependently mounted for elevational movement relative to the main section by a pair of cables 68 individually secured at one of their ends to a pair of arcuate anchor bars 69 on the lower edge of the keel plate 35 adjacent to the inner ends 36 of the keel sections. The opposite ends of the cables are individually controllably wound about a rotatable drum of a pair of winches 72 each having a watertight housing individually mounted on a pair of associated platforms 74 suspended from the lower wall 18 of the hull between the inner ends 36 of the keel plate and the air lock 50. The intermediate portion of each of the cables is threaded through a pair of rollers 76 on the platform.

In order to maintain the main dwelling section 10 at a predetermined depth below the surface 32 of the body of water 33, a substantially square grid 80 is suspended below the main section by a plurality of elongated support lines 82. The support lines are connected at their lower ends in spaced relation on the grid and at their upper ends are connected to a plurality of anchor members 84 mounted on the keel plate 35. The grid is constructed of a plurality of elongated reinforced concrete rails or the like which are disposed in interconnected criss-cross relation which are arranged to provide a central opening 87 permitting the passage of the underwater elevator 65 therethrough. The grid affords additional ballast for the main dwelling section 10 and serves as a primary stabilizer to minimize rolling of the main section due to wave action adjacent to the surface 32. In addition, the grid also serves as an artificial reef for supporting the growth of biological plants such as seaweed, kelp and the like thereon so as to provide shelter for oceanic animal life and aesthetically to afford a visual oasis for the occupants of the submarine home in an otherwise substantially barren ocean environment. A pressure sensitive line shearing device 88, similar to the shearing devices 48, is mounted on each of the grid support lines 82 for dropping the grid in the event a weighted object such as a submarine or the like lands upon the grid to preclude sinking of the main section 10 to a noticeably lower depth so as to permit its immediate rise to the surface.

A pair of elongated, substantially upright spaced parallel tubular ingress-egress members 90 are upwardly extended from the main dwelling section 10 of the submarine home of the present invention individually adjacent to the opposite ends 11 thereof and are interconnected by an elongated buoyant brace 91. Each of the tubular members is constructed of material similar to that previously described in connection with the hull structure of the main section 10 by providing inner and outer hulls 92 and 93, respectively, between which is disposed a suitable buoyant insulating material 94. As best shown in FIG. 2, the left-hand tubular member has a lower end 96 supported on the floor 20 within the main section 10 and an opposite upper end 97 disposed in elevationally spaced relation to the upper surface 32 of the body of water 33. An elongated spiral staircase 98 is supported within the tubular member and provides a plurality of stair treads 100 upwardly spiralling around a centrally located support pole 102. An arched doorway 103 is disposed in the lower end of the tubular member communicating the lower end of the staircase with the upper compartment 22 in the main section 10.

The right-hand tubular member 90, as viewed in FIG. 2, provides a lower end 105 supported upon the lower wall 18 of the main section and an opposite upper end 106 upwardly extended above the surface 32 of the body of water 33 in coplanar relation with the upper end 97 of the left-hand tubular member 90. An elongated substantially rectangular flat main deck 110 is mounted on the tubular members 90 adjacent to their upper ends above the surface of the water and in spaced substantially parallel relation to the main dwelling section 10. The deck has an edgewardly disposed railing 112 providing opposite side openings 114 adjacent to which boats and the like can be moored for providing access to the main deck. An

upper deck 116 of substantially elongated rectangular configuration somewhat smaller than the main deck 110 is mounted in upwardly spaced relation therefrom in covering relation to the upper ends of the tubular members 90. The upper deck serves as a partial roof for the main deck and may function as a helicopter landing surface for transporting the occupants of the submarine home to and from the mainland. A stairway 117 is provided at the right-hand end of the upper deck for access to the lower main deck 110 permitting safe, convenient pedestrian traffic therebetween.

An levator 120 is disposed within the right-hand tubular member 90, as shown in FIG. 2, for elevational travel between the upper and lower ends 106 and 105 thereof between the main deck 110 and the main dwelling section 10. A power winch 122 is disposed adjacent to the tubular member within the main deck and has a plurality of elevator actuating cables 123 controllably extended therefrom in wrap-around cradling relation to the elevator. The opposite ends of the cables are upwardly extended for connection to a plurality of suitable anchors 124 on the main deck in diametrically opposed relation to the winch. An upper door 126 connects the elevator passage with the main deck 110 and a lower door 127 opens from the elevator passage into the upper compartment 22 of the main dwelling section. A pair of upper and lower air filtering screens 130 are mounted adjacent to the corresponding ends of the right-hand tubular member 90 in suitably hatched openings to provide a continuous supply of fresh air downwardly through the elevator passage and into the main section 10. In order further to insure a continuous supply of fresh air downwardly through the tubular members, a pair of fans 132 are installed in openings 134 in the upper deck 116 adjacent to the upper ends of the tubular member which provide a continuous downdraft through the tubular members and into the upper and lower compartments of the main dwelling section 10.

As best shown in FIG. 1, a pair of floats 140 are oppositely endwardly extended from the opposite ends of the main deck 110. Each of the floats includes a frame 142 pivotally mounted at its inner end on the deck and at its outer end supports an elongated cylindrical drum 143. The drum is elevationally movable in response to wave action thereagainst and is drivingly connected to a power generating system, indicated by the reference numeral 144, in the main dwelling section 10. The generating system is effective to generate electrical power for storage within a plurality of batteries generally indicated by the reference numeral 145 within a compartment 146 at one end of the main section 10.

SECOND FORM

A second form of submarine home embodying the principles of the present invention is shown in FIG. 4 which is basically similar in purpose to the submarine home of the first form. The home of the second form, however, provides a torus-shaped main dwelling section 150 which utilizes three deck supporting tubular members 152 substantially identical to the tubular members 90 of the first form but which are circumferentially equally spaced around the main section in upstanding parallel relation. The upper ends of the tu-

bular members mount a pair of spaced upper and lower circular decks 154 and 155, respectively, which serve the same function as the upper and lower decks 110 and 116 of the first form. A substantially square grid 160 identical to the grid 80 of the first form is suspended below the torus-shaped main section 150 by a plurality of support lines 161.

THIRD FORM

A third form of submarine home embodying the principles of the present invention is shown in FIG. 5 which utilizes a spherical main dwelling section 70. An annular line mounting ring 172 is formed around the lower portion of the main section to which is connected a plurality of depending grid support lines 174. A grid 17 which is substantially identical to the grids 80 and 160 of the first and second forms is dependently suspended on the lower ends of the support lines for the same purposes as before. An underwater elevator 178 is suspended beneath the spherical main section below a diver's air lock 180 having a lower end 182 downwardly extended a short distance below the main section. The elevator is suspended on a pair of support lines 183 which are elevationally adjustably wound upon a drum of a pair of winches, not shown, individually disposed within a pair of cylindrical housings 185 on diametrically opposite sides of the air lock. A single tubular member 190 is axially upwardly extended from the upper portion of the spherical main section 170 which has an upper end mounting a pair of spaced upper and lower decks 192 and 193, respectively, elevationally spaced above the surface of the body of water in which the submarine home is located.

OPERATION

The operation of the described embodiments of the subject invention is believed to be clearly apparent and is briefly summarized at this point. The submarine home can be substantially completely assembled in a dry dock or the like and either carried or towed by a suitable surface craft to the desired location in the ocean or other body of water of sufficient depth to permit submergence of the main dwelling section 10 with the grid 80 suspended therebelow, as shown in the drawings. Upon reaching such desired location, the anchor lines 44 are played out by manipulation of the winches 41 to lower the anchors 47 to the ocean floor. The main dwelling section 10 is maintained in its desired submerged position by obtaining a balance between the weighted grid 80 suspended therebelow and the amount of fresh water carried in the fresh water ballast tanks 30 relative to the normal buoyancy of the main section. Suitable controls, not shown, are provided for admitting or exhausting fresh water from the tanks in order precisely to balance and to maintain the main section at the desired depth.

In such preferred position, it will be noted that approximately one-half of the tubular members 90 are extended above the surface 32 of the body of water 33 so that the main deck 110 thereof is sufficiently spaced above the surface of the water to preclude the washing of even relatively high waves across the decks. The upper ends 97 and 106 of the tubular members and the upper and lower decks 110 and 116, respectively, present a minimum of exposed surface above the water

subject to rolling by wave action thereagainst. Such rolling movement is minimized by the substantially larger weighted grid 80 suspended from the main section 10. Accordingly, the grid provides an effective stabilizing device which substantially precludes any movement of the main section from wave action against the upper ends of the tubular members.

Wave action is, however, utilized by the operation of the auxiliary stabilizer floats 143 which, as previously described, are operationally connected to the power-generating system 144 within the main section 10 of the submarine home. Ready access to the submarine home may be had by way of the helicopter port on the upper deck 116 or by the use of watercraft which may be conveniently moored along the sides of the lower deck 110. The main dwelling section 10 is easily accessible by way of the elevator 120 within the right-hand tubular member 90, as shown in FIG. 2, or in the event of a power failure by way of the spiral staircase 98 disposed in the left-hand tubular member 90.

Under certain conditions, it may be desirable to provide a longer lever arm between the main dwelling section 10 and the point of attachment of the anchor line 82. Correspondingly, the length of the support lines may be shortened or lengthened as desired. In order to accomplish this transition, the cables 68 of the underwater elevation winches 72 may be utilized by detaching such cables from the elevator platform 74 disposed below the main section 10. The winch cables are replaced by relatively short hanger cables 200, as shown in dashed lines, FIG. 2 and the winch cables downwardly extended for temporary attachment to the grid. The grid is then elevationally raised or lowered, as desired, and support cables of the desired length attached as the previously described support lines 82 for the grid. After such attachment, the winch cables are reconnected to the underwater elevator platform 74 for use in transporting divers to and from the bottom of the ocean by way of the opening 87 centrally within the grid.

As previously described, the grid 80 also serves as an artificial reef which provides a substrate for the attachment of seaweed, kelp and the like, and for the planting of biological marine plants thereupon to simulate the natural reef-like environment surrounding the submarine home. Such submarine biological garden thus provides substantial shelter for marine animal life for improved propagation of all species of plant life in the area around the submarine home. The upper and lower decks 110 and 116 afford ample space for open air recreation and an opportunity to raise the more conventional potted plants in the ocean environment.

It is noted that all the hatchways and doors in the submarine home are watertight so that in the event of a severe surface storm, the entire submarine home, including the upper decks, can be submerged below the surface to the relatively calmer waters therebelow. This is accomplished by energizing the anchor line winches 41 which, assuming that the anchors are sufficiently engaged with the bottom of the ocean, draw the submarine home downwardly to a lower submerged depth. The torus-shaped and spherical embodiments of the second and third forms of the present invention function substantially the same as that described for the first form. The spherical embodiment of FIG. 5 is primarily

intended for families or other inhabitants requiring less living space than those utilizing the relatively larger embodiment of the cylindrical first form.

Accordingly, it is readily apparent that each of the three forms of the present invention provides a submarine home which may be disposed in a relatively clean oceanic environment far from the metropolitan pollution encountered in most contemporary land-borne cities and the like. The submarine home provides a self-contained, relatively safe, substantially stable oceanic dwelling which, in its submerged position, is substantially isolated from any hazardous weather conditions on the surface with the stabilizing grid thereof being effective to simulate a substantially reef-like environment around the home.

Although the invention has been herein shown and described in what are conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of the invention.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A submarine home adapted to be disposed within a body of water comprising a buoyant watertight main dwelling section; weighted stabilizing means of a planar configuration including a plurality of mutually spaced rails arranged in interconnected criss-cross relation dependently mounted on said main section to moor the same at a predetermined submerged depth beneath the surface of the water and to serve as an artificial reef for the growth of biological plant life thereon such as seaweed, kelp and the like; deck means elevationally spaced from said main section above the surface of the water; and means interconnecting said deck means and said main section providing fresh air and human access to said main section.

2. The submarine home of claim 1 in which said deck means and said interconnecting means provide a plurality of watertight hatches, and anchor means on said main section for completely submerging the entire home including the deck means to avoid relatively rough wave action thereagainst during storms and the like.

3. The submarine home of claim 2 in which said anchor means includes a pair of anchors releasably engageable with the bottom of said body of water, a pair of flexible tether lines individually connected to the anchors, and a pair of winching devices mounted on said main section operatively associated with said tether lines for elevationally adjusting said home relative to the surface of said body of water.

4. The submarine home of claim 3 including a diver's air lock in the main section of the home providing underwater ingress-egress thereto, said stabilizing means having means defining a central opening therethrough, and an underwater elevator suspended beneath the main section below said air lock and above said opening to transport divers to the bottom of said body of water.

5. The submarine home of claim 4 in which said means interconnecting said main section and said deck means comprises a pair of spaced substantially upright parallel tubular members, a powered elevator operationally disposed in one of said tubular members for travel between said deck means and said main section,

and a spiral stairway dispose in the other of said tubular members providing communication between said main section and said deck means in the event of a power failure to said elevator.

6. The submarine home of claim 5 including winch means on the main section having operative connection to said underwater elevator but being releasable therefrom for alternate attachment to said stabilizing means for elevational adjustment thereof relative to the main section, and means for supporting said underwater elevator during said adjustment of said stabilizing means.

7. The submarine home of claim 6 including power-generating means disposed within said main section, and auxiliary stabilizer means having outer flotation members pivotally mounted in outwardly extended relation from said deck means and having motion transmitting connection to said power-generating means during elevational reciprocation of said flotation members by wave action thereupon to drive said power-generating means.

8. The submarine home of claim 7 including a plurality of elongated lines supportably extended between said stabilizing means and said main section of the home, and a pressure sensitive line shearing device mounted on each of said lines for severing the same incident to downward movement of the stabilizing means by a weighted object such as a submarine or the line engaging the stabilizing means to permit the home immediately to rise to the surface of said body of water.

9. A submarine home adapted to be disposed within a body of water comprising a buoyant watertight main dwelling section, a substantially flat grid of a planar configuration formed of a plurality of mutually spaced rails arranged in interconnected criss-cross relation,

means mounting the grid in suspended relation from said main section and providing sufficient weight to moor said main section at a predetermined submerged depth beneath the surface of the water and to serve as an artificial reef for the growth of biological plant life thereon such as seaweed, kelp and the like, a pair of elevationally spaced decks disposed above said main section and above said surface of the water, and a plurality of elongated tubular members disposed in upright spaced substantially parallel relation interconnecting said decks and said main section to provide fresh air and human access passages to the main section.

10. The submarine home of claim 9 in which said main section comprises an elongated cylindrical housing having opposite hemispherical ends with said tubular members being upwardly extended therefrom individually adjacent to said opposite ends, and said decks are substantially rectangular.

11. The submarine home of claim 9 in which said main section comprises a spherical housing having a single tubular member axially upwardly extended therefrom mounting a pair of elevationally spaced substantially circular decks above said main section.

12. The submarine home of claim 9 in which said main section comprises a torus-shaped housing.

13. The submarine home of claim 9 wherein said rails are formed of reinforced concrete.

14. A grid of a planar configuration adapted to be suspended within a body of water and employed as an artificial reef for propagating marine life, comprising a plurality of mutually spaced rails arranged in interconnected criss-cross relation, and means for suspending the grid above the bottom of said body of water.

15. The grid of claim 14 wherein said rails are formed of reinforced concrete.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,708,991 Dated January 9, 1973

Inventor(s) William Barkley

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 28, "lie" should be changed to ---live---.

Column 5, line 12, "levator" should be changed to ---elevator---

Column 6, line 12, "70" should be changed to ---170---.

Column 6, line 15, "17" should be changed to ---175---.

Column 7, line 24, "line" should be changed to ---lines---.

Column 9, line 1, "dispose" should be changed to ---disposed---

Column 9, line 29, "line" should be changed to ---like---

Signed and sealed this 29th day of May 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents