A novel device comprised of two laterally spaced side-by-side connected pontoons mounting apparatus for lowering between them, a normally floating passenger seating structure to an underwater position, and means for releasing and maintaining said structure and a passenger seated thereon in such position. A motor driven compressor provides a continuous supply of breathing air to an associated reservoir, the passenger drawing on this supply via tubing and a thereto attached mouthpiece. Means for exhausting excess air from the reservoir, an outboard motor driven propeller, and manually operable rudder means are provided.

Summary of the invention

The present invention is designed for water sports entertainment purposes, but may be employed to great advantage also for scientific purposes in the realm of underwater exploration. Generally, the invention is comprised of a catamaran unit, an elevator assembly mounted on and supported from the spaced pontoons included in the catamaran unit, and a skeletal structure of integrated rod members that support a chair-like passenger seat having an associated footrest.

The framework also supports a novel air reservoir suspended in a plane that would approximate that occupied by the head of a seated passenger. A continuous or constant supply of air is supplied to the reservoir via a flexible tube that leads thereto from a conventional motor and compressor unit mounted on one of said pontoons, above the water line.

The novel breathing air reservoir includes three one-way valves, these being an intake valve, an output valve, and an exhaust valve for excess pressure developed in the reservoir in consequence of the constant supply delivered by the compressor via the intake valve aforesaid. The valves are automatically operative as will appear, and a spiral spring arrangement is provided within the air reservoir for automatically obviating its collapse whether or not air under pressure from the compressor is being supplied thereto, and whether or not said reservoir is submerged. The air supply from the compressor enters the reservoir via the intake valve and as required for proper breathing by the passenger, is withdrawn from the reservoir via a suitable mouthpiece attached to the free end of a flexible conduit in communication at its opposite end with said output valve.

The framework also supports a platform having a battery-enclosing container mounted thereon rearwardly of the backrest of the passenger seat. The platform also dependingly supports an outboard motor and its associated propeller, whereby the entire device comprising the invention may be driven forwardly at a selected speed up to approximately four miles per hour. A variable speed control box is provided within easy reach of the passenger. A manually operable rudder arrangement is mounted atop the platform, preferably above the outboard motor.

Included in the framework aforesaid, is a pair of transversely spaced upwardly projecting vertical post members, each of which is adapted to travel upwardly and downwardly between one of a pair of guide roller arrangements included in the elevator apparatus. The platform thereof functions as a raft, so that normally said framework and all the elements associated therewith above the platform, are floatingly disposed between the pontoons of the catamaran unit. In such position, the passenger seat would be approximately twelve inches below water level, and the vertical post members would extend ten feet or more above the guide roller arrangement aforesaid.

Axed to the upper extremity of one of the vertical post members is a pulley device. Trained over the pulley of said device is a rope or cable. One end of the cable is affixed to the structure rigid with the adjacent pontoon. The opposite end is equipped with means adapted to cooperate with complementary means on the framework to releasably maintain the seated passenger in underwater position. In order to submerge himself, a seated passenger pulls the free end of the rope downwardly until interengagement of said complementary submerged position means may be effected.

The invention includes various features that will be treated more elaborately hereinafter. For example, in the event the compressor or its associated motor should cease functioning, a two minute supply of breathing air is always stored in the reservoir, thus affording the passenger ample time to release the submerged position retaining means. In other words, instantaneously following such release, the framework will automatically rise in the water, of vertical post and guide wheel arrangements serving to insure a smooth ascent. It will, of course, be understood that passengers would wear appropriate apparel, and goggles for eye protection.

The primary object of the invention, therefore, is to provide a novel device encompassing the structure generically referred to above, and explained in more detail below.

The invention is illustrated on three sheets of drawings that accompanying this specification, and features not specifically mentioned thus far will be apparent or pointed out in the description that follows with reference to said drawings.

Brief description of the drawings

FIGURE 1 is a side elevational view of a device constructed in accordance with the teachings of the present invention, some of the included structure being shown in underwater or operative disposition;

FIGURE 2 is a top plan view thereof partly in section, the view being taken as indicated by the line 2—2 of FIGURE 1;

FIGURE 3 is a view similar to FIGURE 1, all of the structure being shown in floating or inoperative disposition;

FIGURE 4 is a front elevational view of the device as it appears in FIGURE 3;

FIGURE 5 is a rear elevational view of the device as it appears in FIGURE 3;

FIGURE 6 is an enlarged fragmentary vertical sectional view taken on the line 6—6 of FIGURE 2;

FIGURE 7 is an enlarged vertical sectional view taken on the line 7—7 of FIGURE 1;

FIGURE 8 is an enlarged reproduction of the uppermost portion of FIGURE 1;

FIGURE 9 is an enlarged transverse sectional view taken on the line 9—9 of FIGURE 3;

FIGURE 10 an an enlarged longitudinal sectional view through the air reservoir structure of the invention;
FIGURE 11 is an enlarged reproduction of the left end portion of FIGURE 10; FIGURE 12 is a transverse sectional view taken on the line 12—12 of FIGURE 10; FIGURE 13 is an enlarged reproduction of the upper central portion of FIGURE 10; FIGURE 14 is an enlarged vertical sectional view of the exhaust or relief valve appearing in the lower portion of FIGURE 10; and FIGURE 15 is a top plan view on a reduced scale, of the bottom plate included in the air reservoir structure.

Description of the preferred embodiment

The complete device of the present invention is indicated by the numeral 20 in FIGURES 1–5. The device 20 includes as its major components: a catamaran unit generally designated 22, what will be termed an elevator assembly 24, and a skeletal framework 26 associated with the elevator assembly.

As shown particularly in FIGURES 1, 4, and 5, the unit 22 includes a pair of spaced side-by-side pontoons 28 that are connected near their front ends by a transverse bar 30 and near their rear ends by a similar bar 32. Preferably, the pontoons 28 are of the configuration of an elongated generally cylindrical thin metallic shell 34 having closed rounded ends 36, and a flat upper surface portion or deck 38. The pontoons are filled with lightweight plastic material 40 such as high density foamed polyurethane or the like.

The elevator assembly 24 includes a pair of identical transversely spaced guide wheel mechanisms each designated generally by the numeral 42. With attention directed particularly to FIGURES 6 and 9, each mechanism 42 is comprised of a pair of inner and outer rectangular plates 44 and 45, respectively, that are maintained in horizontally spaced status by rivets or the like 46. Rotatably mounted between the plates on shafts 48 is a pair of upper horizontally spaced guide wheels 50, and a pair of lower horizontally spaced guide wheels 52. All of the guide wheels have arcuate grooves 53 of a determined radius.

The elevator assembly 24 further includes the vertical leg members 56 and 58 of a U-shaped rod 60, the height portion 62 of which supports the skeletal framework 26 in a deformed position associated, as will be more fully explained. The leg members 56 and 58 comprise guide posts and each of them extend through one of the guide wheel mechanisms 42 in engagement with the arcuate grooves 53 aforesaid of an upper and lower pair of guide wheels 50 and 52, respectively, as best seen in FIGURE 6.

Reverting to FIGURE 9, it will be noted that the guide posts 56 and 58 and the roller mechanisms 42 that guide the vertical movements thereof, are disposed slightly inwardly of the pontoons 28. To this end of the outer plate 45 of each guide roller mechanism is rigidly secured by welding as suggested, or otherwise, to the inner downturned vertical flange 64 of an angle bracket 66. The horizontal segment 68 of each bracket is secured to the deck 38 of the therebelow pontoon 28 by screws 70, and terminates in an arcuate depending flange 72 in firm engagement against a portion of the outermost peripheral surface of said pontoon, as shown. Numerals 74 each designate an angularly disposed brace plate having one end portion thereof welded to the upper region of a plate 45, and its other end portion welded to the outer region of the mounting 68 of a bracket 66.

In view of the immediately foregoing, the rigid mounting arrangement of the guide roller mechanisms 42 should be apparent. It will, of course, be understood that these mounting arrangements may be modified somewhat and are not limited to the precise structural details illustrated and described. Rigid mounting arrangements, however, are most important to insure smooth up and down movements of the posts 56 and 58, downward movements of them being limited by a pair of transverse stop pins 76, each press-fitted into the upper end portion of each of said posts.

The elevator assembly 24 also includes the pulley and cable mechanism, generally designated 78, that appears in FIGURE 1 and is best seen in FIGURE 8. It includes a circular base 80, a forwardly projecting inverted U-shaped arm 82 integral therewith, a pulley 84, and a rope or flexible cable 86 trained over said pulley. The base 80 is welded to the top face of the upper extremity of the post 58, and the arm 82 terminates in a bifurcated end segment 88 that supports a pivot pin 90 whereon the pulley 84 is rotatably mounted, as should be understood without additional illustration.

As shown in FIGURE 1 and more particularly in FIGURE 6, the guide roller mechanism 42 associated with the guide post 58 is provided with a cross bar 92 whereeto the rearward end of the cable 86 is appropriately anchored, as indicated at 94. The crossbar 92 spans the space obtaining therebetween and has its ends welded to the top surfaces respectively of the inner plate 44 and the outer plate 45 of that guide roller mechanism 42. The forward normally free lower end of the rope or cable 86 is equipped with a ring 96 as shown in FIGURES 1 and 4.

The framework 26 includes the height portion 62 of the U-shaped rod 60, the adjacent portions of its upwardly projecting legs or posts 56 and 58, a pair of transversely spaced side frame members 98, a pair of similarly spaced arm extensions 100, a forward inverted U-shaped member 102, a rearward inverted U-shaped member 104, and a crossrod 106.

The side frame members 98 each include a horizontal upper segment 108 having a rounded end portion 110 that merges into an angularly downwardly and forwardly extending segment 112. The segment 112 merges into a forwardly extending horizontal segment 114 that in turn merges into an angularly downwardly and forwardly projecting segment 116. As best seen in FIGURES 2 and 4, a crossbar 118 integral with the lower end portions of the segments 116 provides a footrest for a passenger occupying the seat 120 also included in the framework 26.

The sent 120 has an integral backrest 122.

It will be understood that all of the described components of the framework, including the seat structure, are integrated to form a rigid unitary structure. Thus, as suggested for example in FIGURE 9, the arms 100 are welded to the post 58, the horizontal segments 114 are welded to said posts and to the height portion 62 of the U-shaped rod 60, and depending legs 123 of the seat 120 are also welded to said height portion 62. As shown in FIGURE 5, the crossrod 106 extends between the posts 56 and 58, and has the backrest 122 welded thereto. A hook 107 rigidly therewith projects upwardly from the front extremity of one of the arm extensions 100.

Extending between the horizontal segments 108 and rigidly secured to them is a rectangular platform 124. Mounted on said platform slightly rearwardly of the backrest 122 is a watertight or sealed container 126 that encloses a storage battery B (FIGURE 1). Also mounted on the platform 124 rearwardly of said container is a rudder mechanism generally designated 128 that includes a rudder 130 rotatably mounted on a standpipe 132. A short compression spring 134 secured at one end to a lug on the container 126 and at its opposite end to a forward extension 136 of the rudder 130, normally serves to maintain said rudder in non-steering position. Numerals 138 indicates a lug depending from the rudder extension 136, said lug having attached thereto the rearward ends of a pair of cables each designated 140 and having end linking handle 142 (FIGURE 1) affixed to its forward end. As should be clear from an inspection of FIGURE 5, the cables 140 extend forwardly from the lug 138 in divergent fashion and each passes freely through one of a pair of oppositely disposed guide lugs 144 that project inwardly from the vertical leg segments of the inverted U-shaped member 102.

The platform 124 also dependingly supports an out-
board motor 146 equipped with a propeller 148, whereby the entire device 20 may be driven forwardly when desired, at variable speeds up to approximately four miles per hour. A control box 150 within easy reach of the passenger is affixed to one of the arm members 100 and appropriate electrical wiring leads therefrom to the battery B and the motor 146. Necessarily, all of the wiring is encased. In waterproof sheathing 152, only some portions thereof appearing in the drawings. It will also be understood that watertight sealing means (not shown) are provided about the sheathing at the point of exit from the control box 150 at the point of entrance into the battery enclosing container 126 at the point of entry into the elbow 154 at the standard 142, 66, in fact, wherever necessary to protect the wiring from the water. The standpipe 132 provides a passage for the wiring leading to the motor 146. The control box 152 is also waterproof and contains a start and stop switch for the motor 146 and a rheostat device for varying the speed thereof.

One of the most important features of the present invention is the provision of means adapted to enable a passenger to breathe normally while submerged.

Accordingly, incorporated in the device 20 are the following: a motor 160 and a compressor 162 comprising a unit mounted on a base plate 164; a novel air reservoir device 174 in its entirety also a conventional item and no claim thereto per se is made. It incorporates valving for first inhaling and thereafter exhaling breathing air supplied thereto via said second flexible hose 172. The entire device 174 is also a conventional item and no claim thereto per se is made. It incorporates exhaust valving only, said valving being adapted to function whenever an excessive volume of air pressure existent within the reservoir 166 is delivered to said device via said third flexible hose 176.

The components of the air reservoir device 166 together with the hereinbefore numerically designated elements associated therewith are illustrated on an enlarged scale in FIGURES 10-14. As shown in these views, the device 166 includes: a rectangular internal metallic upper plate 180; a similar lower plate 182; a forward hinged wall generally designated 184; a U-shaped rearward wall generally designated 186; opposite hinged side walls each generally designated 188; a rectangular wooden external top plate 190; a similar bottom plate 192; a plurality of compression springs 194; an air intake valve mechanism 196, FIGURE 15; additional means for the novel compression elements 202; the means of opening and closing said opening means and associated parts; and means ofrefs. and enclosures thereto, all of which are illustrated and described in greater detail in FIGURE 11. The envelope 160 comprises a flat bag of pliable plastic material, the dimensions thereof are determined by the size of said device. Included in the bag are an upper layer 234, a lower layer 236, and an open end portion 238. Opposed rectangular openings 240 and 242 are provided in the upper and lower layers 234 and 236, respectively.

As should be apparent from the drawings (particularly FIGURE 11), the envelope 202 is applied over the internal structure of the device 166 prior to the application thereto of the top and bottom wooden plates 190 and 192. When in place, pointed setcrews 244 that extend through said top plate 190, the adjacent regions of the upper layer 234 that define the rectangular openings 240 therein, and the horizontal sections of the lower hinges 212 and 220, engage in the tapped openings 205 of the internal upper plate 190. In like fashion, pointed setcrews 246 that extend through said bottom plate 212, the adjacent regions of the lower layer 236 that define the rectangular openings 242 therein, and the horizontal sections of the lower hinges 212 and 220, engage in the tapped openings 205 of the internal lower plate 210. As illustrated at 245 in FIGURE 11, the aforesaid open end portion 238 of the envelope is heatseamed about the adjacent plastic hinge 210. From the foregoing description directed thereto, it should be apparent that the plastic envelope 202 together with the external top and bottom plates 190 and 192, combine to prevent entry of water into the device 166 even when it occupies a completely submerged position.

It should be observed with attention directed especially to FIGURES 12, 13, 15, 16, the setcrews 244 also extend through the pair of transversely spaced strap members 178 whereby to suspend the air reservoir device 166 therefrom as hereinbefore indicated. The strap members 178 terminate in arcuate end segments 250 that overlie the bight portions of the inverted U-shaped members 102 and 104, and are rigidly secured thereto as previously setcrews 252 of FIGURE 15. Each of said plate has a plurality of correspondingly spaced cup elements 204 rigidly secured thereto by welding or otherwise, and is provided near each end with a transverse row of tapped holes 205. In the assembled status of the device 166, the compression springs 194 each have their opposite end portions seated in one of a pair of aligned cup elements 204, thus preventing collapse of the device, even when increasing water pressure is exerted thereagainst as it descends to submerged disposition.

The forward and rearward walls 184 and 186 are identical, each being composed of a pair of divergently disposed rectangular thin metallic plates 206 and 208, each plate being rigid at one end with a transverse piano hinge 210, and at its opposite end with one of a pair of transverse piano hinges 212, as clearly illustrated in FIGURE 11.

The side walls 188 are also identical, each being comprised of a pair of divergently disposed rectangular thin metallic plates 214 and 216, each plate being rigid at one end with a longitudinal piano hinge 218, and at its opposite end with one of a pair of longitudinal piano hinges 220.

The wooden external top and bottom plates 190 and 192 are each provided with a pattern of apertures in correspondence with that of the tapped holes 205 formed in said upper and lower internal metallic plates 180 and 182. Furthermore, the top plate 190 has formed therein a pair of longitudinally spaced circular openings 224 and 226, in correspondence with a similar pair of openings 228 and 230 formed in the plate 180. Also, the bottom plate 192 has formed therein a circular opening 232 in alignment with a similar opening 233 formed in the plate 182.

Prior to presenting a detailed description of the valve mechanisms 196, 198 and 200, attention is directed to the novel means whereby the internal elements included in the air reservoir 166 are waterproofed in consequence of being enclosed within the envelope 202. The envelope 202 before its incorporation into the assembly of the device 166 comprises a flat bag of pliable plastic material, the dimensions whereof are determined by the size of said device. Included in the bag are an upper layer 234, a lower layer 236, and an open end portion 238. Opposed rectangular openings 240 and 242 are provided in the upper and lower layers 234 and 236, respectively.
best seen in FIGURE 10 a small plate 254 is secured to the rearward end of the external top plate 190 as by a screw 256. Passing through an opening 258 in the projecting end of said plate and fastened to the device 174 is a length of flexible wire or the like 260. It will be understood that other suitable means may be substituted for the arrangement shown.

The details of the intake valve mechanism 196 appear in FIGURE 13. As there illustrated said mechanism includes an inverted cup-shaped housing 262 having a laterally projecting lower annular flange portion 264 secured atop the plate 190, and an upper boss portion 266 wherein the delivery end of a relatively short pipe 267 is pressfittedly mounted. The housing 262 is concentric with the pipe 267 and a short delivery pipe 268 that is pressfittedly mounted in the spaced openings 222 and 230. A cup-shaped valve member 270 molded of flexible plastic material and having the head portion of a guide stem 272 imbedded therein, is biased to sealing position about the discharge end of the pipe 267 by a compression spring 274.

The spring 274 is interposed within the housing 262 about the guide stem 272 between the valve member 270 and the external plate 190 as shown. The upper or inlet end of the pipe 267 is pressfittedly inserted into the discharge end portion of the housing 168. Consequently, air under pressure from the compressor 162 will depress the valve member 270 against the upward bias of the spring 274 thus enabling said air to enter and permeate the interior expansion of the device 166 as should be apparent.

The details of the valve mechanism 198 also appear in FIGURE 13. As there illustrated, said mechanism includes an inverted cup-shaped housing 276 having a lower annular flange portion 278 secured atop the plate 190, and an upper boss portion 280 wherein the intake end of a relatively short pipe 282 is pressfittedly mounted. The housing 276 is concentric with the pipe 282 and another relatively short pipe 284 that is pressfittedly mounted in the spaced openings 222 and 228. An inverted cup-shaped valve member 286 molded of flexible plastic material and having the head portion of a guide pin 288 imbedded therein is biased to sealing position about the outlet or discharge end of the pipe 284 by a compression spring 290.

The spring 290 is interposed within the housing 276 about the guide stem 288 between the valve member 286 and the top wall 292 of the housing as shown. The upper or outlet end of the pipe 282 is pressfittedly inserted into the intake end portion of the hose 172. Air pressure built up within the device 166 via the valve mechanism 196 is insufficient to unseat the valve member 286 insomuch as will be explained below with respect to the valve mechanism 200, the volume of air under pressure within the device 166 is limited. However, each time the passenger inhales via the mouthpiece 170, the suction thus engendered within the housing 276 will unseat the valve member 286, thus allowing a deep breath air escape via the pipe 282 to the hose 172 and thence to said mouthpiece.

At this point it is believed apropos to direct attention to the compression springs 274 and 290. In accordance with this invention, the biasing forces of these two springs are equal. Insomuch, however, as the compressor 162 operates continuously, the buildup of air pressure within the device 166 would overcome the resistance of the spring 290 and consequently unseat the valve member 286 were it not for the provision of the valve mechanism 200.

The details of the spring mechanism 200 appear in FIGURE 14. As there illustrated, said mechanism includes a cup-shaped housing 294 having an upper annular flange portion 295 secured to the bottom plate 192 and a lower boss portion 296 wherein the intake end of a relatively short pipe 298 is pressfittedly mounted. The housing 294 is concentric with the pipe 298 and another relatively short pipe 300 that is pressfittedly mounted in the spaced openings 232 and 233. A cup-shaped valve member 302 molded of flexible plastic material and having the head portion of a guide pin 304 imbedded therein is biased to sealing position about the outlet or discharge end of the pipe 300 by a compression spring 306. The spring 306 is interposed within the housing 294 about the guide stem 304 between the valve member 302 and the bottom wall 308 of the housing as shown.

Attention is directed to the spring 306. In accordance with the present invention, this spring is lighter than the spring 290 and consequently its biasing force is reduced relatively to that of the aforesaid spring. As a result the determined air pressure buildup within the device 166 will be controlled automatically by the valve mechanism 200. In other words, any excess air pressure that would otherwise tend to unseat the valve member 286 is delivered to the venting device 174 via the hose 176 as should be apparent.

From the foregoing description augmented by inspection of the drawings, it is believed that an adequate disclosure has been presented. Although not illustrated in detail nor deemed necessary, it is to be understood with reference, for example, to FIGURE 1, that the battery B and all of the electrical wiring leading from the control box 150 to said battery and to the motor 146 is appropriately waterproofed as is the internal mechanism of said control box. Furthermore, suitable sealing material is applied about the entry and exit regions of the flexible conduits 168, 172 and 176 and so on.

Stated otherwise, it should be understood that wherever required suitable sealing means against water contact are contemplated within the purview of the present invention relatively to structure and elements associated therewith subject to immersion below the water level WL. The floating disposition of the pontoons 28 included in the catamaran unit 22 will, of course, always remain partially above and below the water level WL, as shown. It will also be understood that seat belts of conventional design (not illustrated in the drawings) would be associated with the seat 120.

Use

With the device 29 in the normal position thereof illustrated in FIGURES 3–5, a passenger would seat himself with his feet braced against the footrest bar 118 and his back against the backrest 122. The passenger would, of course, be wearing appropriate attire and goggles. After fastening the seat belts, he would next insert the device 170 into his mouth and familiarize himself with its mode of operation, it being understood that the motor 160-compressor 162 unit had been energized.

At this time, of course, the ring 96 would be free of the hook element 107, and the pulley 84 would be disposed in a relatively high plane above the catamaran unit 22. Although such disposition of the pulley 84 is not illustrated, it should be apparent from a comparison of FIGURES 1 and 3. In other words, the ring 96, and adjacent free end of the rope or cable 86 whereeto it is secured, would hang within easy reach of the passenger.

Assuming now that the passenger were ready for submergence, he would first grasp the ring 96 and the adjacent portion of the cable 86, and then pull them downward until the stop pins 76 would arrest further downward movement of the posts 56 and 58. At this point, the passenger would effect the interengagement of the ring 96 and the hook 107, such interengagement being clearly shown in FIGURE 1. Consequently, both hands of the passenger would be free. Should he desire to explore other areas he can effect energization of the motor 146 via the control box 150 thus initiating a forward movement of the entire device driven by the propeller 148 as is understood. The passenger can furthermore vary the speed of travel via said control box, it being re-
memorized that the size and power of the motor 146 is such that travel speeds of the device 20 up to approximately four miles per hour may be effected. Having the free use of both hands, the passenger by means of the operating handles 142 may also vary the disposition of the rudder 130 whereby to steer the advance of the entire device 20 in a selected direction.

Should the passenger desire to linger in order to more intently observe a particular area, he may do so by de-energizing the motor 146 via the control box 150. Should the passenger at any time and for any reason desire to change from his underwater position to an above the water position, he would simply disengage the ring 96 from the hook element 107. Thereupon his ascent would be automatic as is understood. The provision of the elevator assembly 24 with its included guide wheel mechanisms 42 insures the passenger against injury as his head approaches the water level WL and thereafter.

The novel air reservoir device 166 and the one-way valve mechanisms 196, 198 and 200 associated therewith constitute a prominent feature of the present invention. So long as the motor 160-compressor 162 unit is in operation, a two minute supply of breathing air is present within said reservoir 166, and consequently available for use by the passenger via the conduit 172 and mouthpiece 170. Therefore, in the event that for any reason motor-compressor operation should cease, the passenger would have ample time wherein to shut off the propeller motor 146, release the ring 96, and ascend without interruption of normal breathing.

Various changes and modifications may be made within the purview of this invention as will be readily apparent to those skilled in the art. Such changes and modifications are within the scope and teaching of this invention as defined by the claims appended hereto.

What is claimed is:

1. A catamaran for underwater exploration comprising a frame, buoyant means for floating the frame on a body of water, a passenger support, means to vertically reciprocate the passenger support relative to the frame to move the support through selectively different levels of submersion under water on which the frame floats while maintaining the passenger support joined to the frame, an air reservoir supported by the support, means to supply air to the air reservoir, means to permit inhalation of air from the air reservoir by a person carried by the support, and means to vary air pressure within the air reservoir according to variation in depth of the air reservoir below the surface of the water, the compressor mechanism comprising a pressure regulating outlet valve communicating with the reservoir, the reservoir having means in its construction permitting alternate expanding and collapsing of the net internal volume of the reservoir with changing external pressures on the reservoir; with means to resist collapsing of the reservoir, the means to permit inhalation of air from the air reservoir including another outlet valve operable in response to a pressure difference inside and outside the reservoir greater than the pressure difference required to open the first-named valve.

2. The apparatus of claim 1 wherein the air reservoir is mounted on the support at substantially the same elevation as the general elevation of the head and chest of a person carried by the support to provide substantially the same water pressure against the reservoir as is applied against the head and chest of the person regardless of the depth of submersion of the apparatus.

3. A device for use in underwater exploration, including in combination a catamaran unit comprising a pontoon means, an elevator assembly mounted on and supported from the pontoon means, a guide wheel mechanism incorporated in the elevator assembly, a framework including an integrally projected post extending through the guide wheel mechanism of the elevator assembly, means to vertically reciprocate the elevator assembly relative to the pontoon means while the guide post is guided vertically by the guide wheel mechanism, a passenger support on the elevator assembly and movable to varying submerged positions beneath the surface of a body of water on which the pontoon means floats, an air reservoir device supported by the elevator assembly, a motor-compression unit and a conduit leading from the compressor to the air reservoir device for delivering thereto a continuous supply of air, means for limiting the air under pressure built up within the reservoir device to a determined value, a mouthpiece employable by a person occupying said passenger support for breathing when submerged, and means responsive to an inhalation action for delivering to said mouthpiece and thus to the lungs of said person a normal supply of breathing air from said reservoir device.

4. The combination of claim 3 including a pulley assembly rigidly mounted atop said guide post, said assembly including a freely rotatable pulley having a cable of determined length trained thereover, one end of the cable being anchored to said pontoon means, the other free end of the cable being equipped with a ring element, an upwardly projecting hook element on the elevator assembly for interengagement with said ring element when the elevator assembly is in submerged status.

5. The combination of claim 3 including a battery supported by the pontoon means, a motor and propeller supported by the elevator assembly, and a control box supported by the elevator assembly accessible to a passenger on the passenger support for actuating and deactuating the motor and propeller.

6. A device for use in underwater exploration, including in combination a catamaran unit comprising of two laterally spaced side-by-side pontoons connected by a pair of transverse bars, an elevator assembly mounted on and supported from the pontoons, said assembly being disposed between said pontoons, a pair of identical transversely spaced guide wheel mechanisms incorporated in the elevator assembly, a skeletal framework of integrated rod members supporting a pair of transversely spaced upwardly projecting guide posts each extending through one of the guide wheel mechanisms of the elevator assembly, a pulley assembly rigidly mounted atop one of said guide posts, said assembly including a freely rotatable pulley having a cable of determined length trained thereover, one end of the cable being anchored to one of said pontoons, the other free end of the cable being equipped with a ring element, a passenger seat having an integral backrest integrated with the frame, said frame including a pair of support bars, the said bars extending forwardly from said backrest, an upwardly projecting hook element on the forward extremity of one arm rest extension for interengagement with said ring element when the skeletal framework is in submerged status, a horizontally disposed platform supported by the framework between a pair of longitudinally spaced inverted U-shaped members of the framework, a battery enclosed in a waterproof container mounted atop said platform, a motor equipped with a propeller dependently supported from said platform, a control box mounted on one of said armrest extensions and waterproofed wiring leading from the control box to said battery and to said motor whereby the motor may be energized to drive the propeller and thus advance the device in the water, rudder mechanism mounted atop the platform above said depending motor, and manual means for operating the rudder mechanism when said motor is driving the device.
1. A reservoir device comprising a determined volume, a mouthpiece employable by a person occupying said reservoir device to a determined volume, a mouthpiece employable by a person occupying said reservoir device to a determined volume, and means responsive to an inhalation action for delivering said mouthpiece to the lungs of said person, said reservoir device comprising a determined volume, a mouthpiece employable by a person occupying said reservoir device to a determined volume, and means responsive to an inhalation action for delivering said mouthpiece to the lungs of said person.

2. The structure and elements associated therewith recited in claim 1 wherein at least one of said two pontoon walls includes a flat upper surface deck portion wherein each of said guide wheel mechanisms of the elevator assembly is supported from said lower horizontal spaced guide wheels rotatably mounted between said plates on a shaft having its ends supported by said plates, and a pair of lower horizontal spaced guide wheels rotatably mounted between said plates on a shaft also having its ends supported by said plates, said upper and lower guide wheels being disposed in vertical alignment, and having arcuate peripheral grooves adapted to engage against diametrically opposed surfaces of the pair of transversely spaced upwardly projecting guide posts included in said skeletal framework.

3. The structure and elements associated therewith recited in claim 1 and a pair of transverse stop pins pres... the delivery of the air reservoir device a continuous supply of air by means of a flexible conduit leading from the motor-compressor unit includes an inverted cup-shaped housing having a laterally projecting lower annular flange portion secured to said side plate included in said device, and an upper boss portion wherein the delivery end of a first pipe is press... in said skeletal framework for limiting downward movement of said posts and framework to a determined under-water position.

4. The structure and elements associated therewith recited in claim 1 wherein the rudder mechanism mounted atop said platform and the means for operating said mechanism includes a rudder rotatably mounted on a standpipe and having a forward extension integral therewith, a relatively short compression spring secured at one end to said extension and at its opposite end to a lug provided thereon for said battery enclosing container, said spring normally serving to maintain said rudder in non-steering position, a lug depending from said rudder extension, a pair of cables each having their rearward ends attached to said lug and extending forwardly therefrom in divergent fashion, each to pass freely through a pair of oppositely disposed guide hooks that project inwardly from the vertical leg segments of the forward one of said pair of longitudinally spaced inverted U-shaped members of the framework, and an operating handle affixed to the forward extremity of each cable.

5. The structure and elements associated therewith recited in claim 1 wherein the air reservoir device includes a rectangular internal metallic upper plate, a rectangular internal metallic lower plate, a forward hinged wall, a rearward hinged wall, and opposed hinged side walls, each of said walls being comprised of a pair of divergently disposed rectangular plates rigidly mounted together at one end with a common piano hinge, and at the opposite end with one of a pair of vertically spaced upper and lower piano hinges, said upper hinges being rigid with the metallic upper plate, said lower hinges being rigid with the metallic lower plate, a plurality of corresponding spaced cup elements rigidly secured to said upper and lower plates, the cup elements on the upper plate being in vertical alignment with the cup elements on the lower plate, a plurality of compression springs each having its opposite end portions seated in one of a pair of aligned cup elements, a rectangular wooden external top plate, a rectangular wooden external bottom plate, sealing means enclosing all of the internal elements of said air reservoir device whereby to prevent entry of water thereinto, and a plurality of fastening elements securing said external top and bottom plates to the device.

6. The air reservoir device of claim 5 wherein the sealing means enclosing all of the internal elements thereof comprises an original flat rectangular envelope of pliable plastic material including integral superimposed upper and lower layers having corresponding rectangular openings formed therein, and having one open end portion, said open end portion being heat-sealed about one of the common piano hinges aforesaid, said fastening elements that secure the external top and bottom plates to the device passing through the adjacent regions of the upper and lower layers of said envelope that define the rectangular openings thereof.

7. The structure and elements associated therewith recited in claim 1 wherein the air intake valve mechanism for delivering to the air reservoir device a continuous supply of air by means of a flexible conduit leading from the motor-compressor unit includes an inverted cup-shaped housing having a laterally projecting lower annular flange portion secured to said side plate included in said device, and an upper boss portion wherein the delivery end of a first pipe is press... in said skeletal framework for limiting downward movement of said posts and framework to a determined under-water position.

8. The structure and elements associated therewith recited in claim 1 wherein the housing being concentric with both pipes, and the outlet end of the first pipe being press... in a first flexible conduit having an excess air venting device associated with its free opposite end, means for maintaining said venting device in a determined plane above the valve mechanism, a cup-shaped valve member molded of flexible plastic material and having the head portion of a guide stem imbedded therein, and a light compression spring interposed within the housing about said guide stem biasing the valve member to sealing disposition about the outlet end of said second pipe.

9. The structure and elements associated therewith recited in claim 1 wherein the means for limiting the air under pressure built up within the reservoir device to a predetermined volume comprises an exhaust valve mechanism that includes a cup-shaped housing having an upper annular flange portion secured to an external wooden bottom plate included in said device, and a lower boss portion wherein the intake end of a first pipe is press... in vertical alignment with a second pipe leading from the interior of the air reservoir device, the housing being concentric with both pipes, and the outlet end of the first pipe being press... in a second flexible conduit having an excess air venting device associated with its opposite end, means for maintaining said venting device in a determined plane above the valve mechanism, a cup-shaped valve member molded of flexible plastic material and having the head portion of a guide stem imbedded therein, and a compression spring interposed within the housing about said guide stem biasing the valve member to sealing disposition about the outlet end of said second pipe.
13 member to sealing disposition about the outlet end of said second pipe.

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