Nov. 27, 1962 J. G. GREEN 3,065,722

TOWED UNDERWATER VEHICLE

Filed Dec. 1, 1959

2 Sheets-Sheet 1

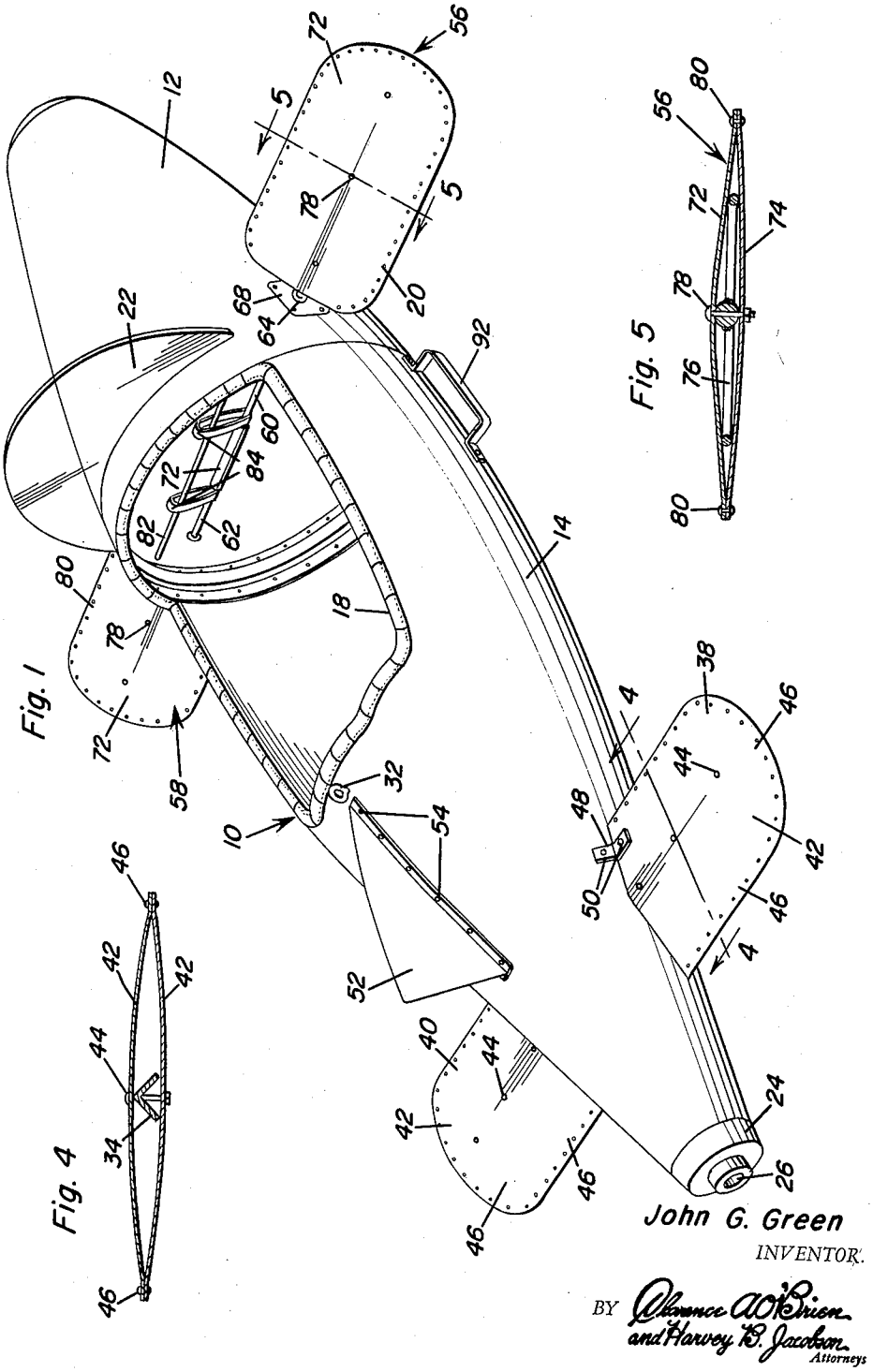


Fig. 1




Fig. 5




Fig. 4

John G. Green

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Nov. 27, 1962 J. G. GREEN 3,065,722

TOWED UNDERWATER VEHICLE

Filed Dec. 1, 1959 2 Sheets-Sheet 2

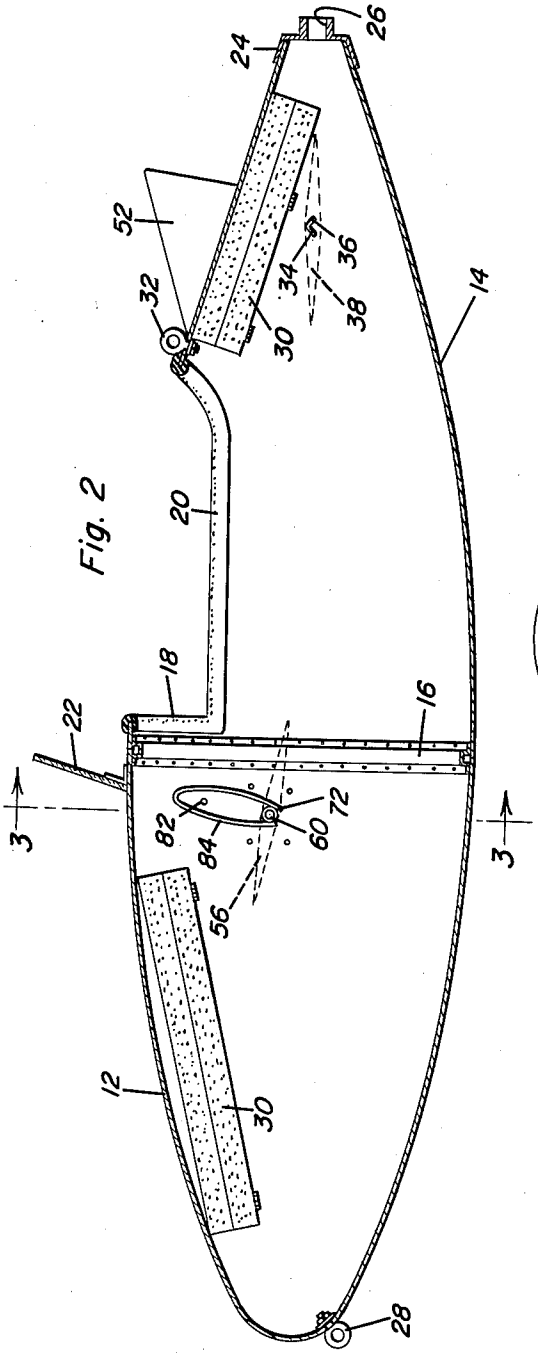


Fig. 2

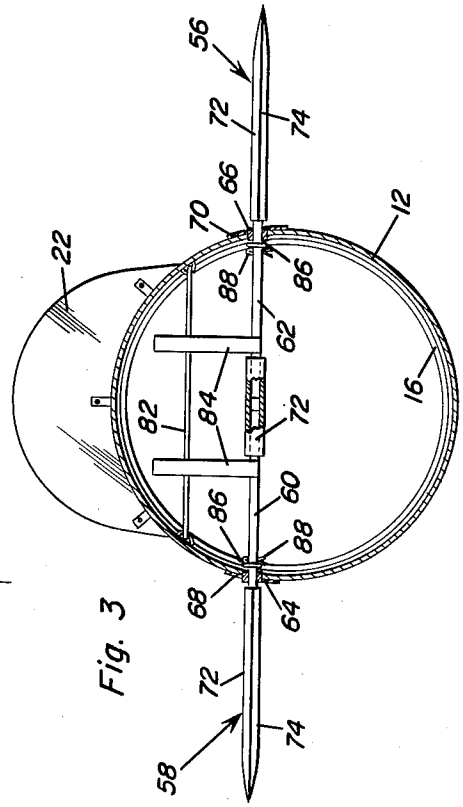


Fig. 3

John G. Green

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

United States Patent Office 3,065,722 Patented Nov. 27, 1962



3,065,722

# TOWED UNDERWATER VEHICLE

John G. Green, 774 W. 34th St., Hialeah, Fla.

Filed Dec. 1, 1959, Ser. No. 856,498
2 Claims. (Cl. 114—16)

This invention relates to a towed underwater vehicle, and more particularly to a vehicle having a hull which can, if desired, resemble the hull of a submarine, the hull being provided with horizontally disposed stern stabilizing fins and a pair of forwardly positioned adjustable diving fins.

Water sports and skin diving are becoming increasingly popular each season and many new devices have been designed to afford the water enthusiast a greater variety of ways in which he may enjoy different forms of water sports. The present invention encompasses a vehicle having a hull quite similar to that of a miniature submarine which is provided with a means on the forward end thereof adapting the vehicle to be secured to the end of a tow line.

Although many persons desire to use skin diving equipment for the purpose of hunting and killing marine life beneath the surface of various types of bodies of water, other persons enjoy merely witnessing the wonders nature provides in the way of marine life. The underwater vehicle comprising the instant invention may, however, be used both for the convenience of the underwater sportsman and for the convenience of those who wish merely to view the wonders of underwater nature. If it is desired, persons using the underwater vehicle may also use underwater breathing apparatus so as to enable their stay beneath the surface of water to be prolonged substantially as long as they wish.

Although submarines and similar vessels are limited to either diving and surfacing or turning to either the right or left, the construction of the present invention also enables the vehicle to rotate about its longitudinal axis, thereby enabling enjoyment merely from performing underwater acrobatics.

The main object of this invention is to provide a towed underwater vehicle having controls therefor which will allow controlled descent or ascent of the vehicle.

A further object of this invention is to provide what might be called an open hulled vehicle so that water may entirely fill the interior thereof, thereby enabling the device to be substantially weightless when under water.

A further object of this invention is to provide a means for resiliently urging the diving fins to a position whereby forward motion of the vehicle in the water will cause its ascent to the surface of the water.

Still another object of this invention, in accordance with the immediately preceding object, is to provide an opening in the rear end of the vehicle so as to provide a means for draining the water therefrom as the vehicle is being towed along the surface of the water, the hull being otherwise closed with the exception of an upwardly opening cockpit.

A still further object of this invention is to provide buoyant supports secured to the inside of the hull which are sufficient to equalize the total weight of the vehicle when immersed in water.

A final object to be specifically enumerated herein is to provide an underwater vehicle which is relatively simple in construction and easy to operate so as to provide a device that will be economically feasible and long lasting as well as operable by substantially every underwater sportsman.

These, together with other objects and advantages which will become subsequently apparent, reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:



FIGURE 1 is a perspective view of the underwater vehicle with the diving planes thereof being shown in their normal upwardly inclined position;

FIGURE 2 is a longitudinal vertical sectional view taken substantially upon a plane passing through the longitudinal center line of the vehicle;

FIGURE 3 is a transverse vertical sectional view taken substantially upon the plane indicated by the section line 3—3 of FIGURE 2;

FIGURE 4 is an enlarged longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 4—4 of FIGURE 1; and

FIGURE 5 is an enlarged longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 5—5 of FIGURE 1.

Referring now more specifically to the drawings, the numeral 10 generally designates the hull of an underwater vehicle comprising the present invention which may conveniently include two half hull sections 12 and 14 which may be joined together by means of circular brace member 16. It is to be understood that the brace member 16 may be secured to the confronting edges of the hull halves 12 and 14 in any convenient manner. The hull 10 is most conveniently constructed in the form of a teardrop shaped tank having an upwardly opening cockpit 18 formed in its upper surfaces intermediate the ends thereof. If it is desired, a suitable resilient molding 20 may be secured to the edges of the hull 10 defining the cockpit 18. Secured to the upper surfaces of the forward portion of the hull 10 is a water and wind shield 22 which is in longitudinal alignment with the cockpit opening 18.

The rear portion of the hull 10 tapers to a circular stern plate 24 which is provided with a suitable outlet opening 26 for a purpose hereinafter to be set forth. The forward portion of the hull 10 is provided with a suitable eye 28 which is secured to the hull 10 and is adapted to have secured thereto one end of a tow line (not shown). Inasmuch as the hull 10 is generally teardrop shaped in outline, the eye 28 is secured to the hull 10 at a point spaced below the longitudinal center line of the hull. This lower positioning of the tow eye 28 has a tendency to lift the forward portion of the hull 10 when it is being towed whereby it is assured that an unattended vehicle will not submerge while being towed over the surface of a body of water.

Secured within the interior of the hull 10 is a pair of buoyant support members 30 which are so positioned in the interior of the hull to balance the same. The buoyant support members 30 are sufficient to offset the weight of the hull 10 when it is submerged, thereby providing a vehicle which is substantially weightless when submerged in water.

Secured through the upper surface of the hull 10, aft of the cockpit 18, is a second eye 32 which may be used with eye 28 to raise the vehicle 10 out of the water when it is desired to do so.

A transversely extending, horizontally disposed brace member 34 which is generally inverted V-shaped in cross-section is secured through the opposite sides of the aft portion of the hull 10 by means of complementary shaped inverted V-shaped openings 36. The stabilizing fins 38 and 40 are secured to the opposite end portions of the brace member 34 and it will be seen that each of the stabilizing fins 38 and 40 comprises a pair of sheet-like plate sections 42 which are disposed on opposite sides of brace member 34 and secured thereto at their mid-portions by means of suitable fasteners 44. The opposite surfaces of the sheet-like sections 42 are convexly curved and the peripheral edges thereof are aligned and secured

together by means of suitable fasteners 46. In this manner, it will be noted that the stabilizing fins 38 and 40 are fixedly secured to the hull 10. If it is desired, additional angle brackets 48 may be secured between the hull 10 and the stabilizer fins 38 and 40 by means of suitable fasteners 50, see FIGURE 1.

The rear end of the hull 10 is also provided with an upstanding rudder fin 52 which may be secured to the hull 10 in any convenient manner such as by fasteners 54. Although it is not shown, it is to be noted that the rudder fin 52 could be provided with a rear section pivotally secured thereto for swinging movement about a vertical axis in order to afford a means for steering the vehicle from one side to the other.

A pair of diving fins, generally referred to by the reference numerals 56 and 58, are pivotally secured to the forward portion of the hull 10 by means of a pair of aligned pivot shafts 60 and 62 which are journalled through opposite sides of the hull 10 by means of bearing journals 64 and 66, respectively. With particular attention now directed to FIGURE 1 of the drawings, it will be noted that the sides of the hull 10 adjacent the bearing journals 64 and 66 are provided with reinforcing plates 68 and 70, respectively. The inner ends of the pivot shafts 60 and 62 are slightly spaced from each other and a connecting sleeve 72 rotatably receives the adjacent ends of the pivot shafts 60 and 62 whereby they are relatively rotatable. The sleeve 72 snugly and rotatably receives the adjacent end portions of the pivot shafts 60 and 62 so as to provide a means for maintaining those opposite ends in longitudinal alignment. Each of the diving planes 56 and 58 comprise a pair of sheet-like sections 72 and 74 which are disposed on opposite sides of the remote ends of the pivot shafts 60 and 62. It is to be noted that each of the remote ends portions of the pivot shafts 60 and 62 is provided with a frame-like element 76 beyond which the peripheral edges of the sheet-like sections 72 and 74 extend. Each of the plates 72 and 74 is secured to the pivot shafts by means of suitable fasteners 78 and the peripheral edges of the sheet-like sections 72 and 74 are secured together by means of suitable fasteners 80. It will thus be seen that rotation of either of the pivot shafts 60 and 62 will effect a similar inclination of the corresponding diving fin 56 or 58.

Secured between the opposite sides of the forward portion of the hull 10 in parallel relation to the pivot shafts 60 and 62 is a resilient member 82. Each of the pivot shafts 60 and 62 has one end of an elongated rigid loop 84 secured thereto adjacent the sleeve 72 and the other end of the loops 84 encircles the resilient member 82. With attention now directed more particularly to FIGURE 2 of the drawings, it will be noted that the resilient member 82 is spaced a distance above the shafts 60 and 62 and that the loops 84 are positioned about the pivot shafts to position the diving fins 56 and 58 so that they are upwardly and forwardly inclined. Therefore, should the vehicle 10 become unattended while travelling under water, the resilient member 82 will urge the diving fins 56 and 58 towards a position which will bring the vehicle 10 to the surface of the water.

With attention now directed more particularly to FIGURE 3 of the drawings, if it is desired to provide a means for retaining the pivot shafts 60 and 62 in longitudinal adjusted position, a retaining washer 86 may be secured about each of the pivot shafts and retained in closely spaced relation with the opposite inner surfaces of the hull 10 by means of cotter pins 88. Of course, if it is desired, any other suitable means may be provided for retaining the pivot shafts 60 and 62 in longitudinal position.

It is to be understood that each of the frames 76 secured within the diving planes 56 and 58 may be of any shape, but that rectangular frames are preferred. Further, if it is desired, boarding steps 92 may be secured to the opposite sides of the hull 10 disposed below the cockpit opening 18 to afford a footing for a person entering or exiting from the interior of the vehicle 10.

In operation, a tow line is fixedly secured to the eye 28 and the interior of the hull 10 is allowed to fill with water which will enter through the outlet opening 26 when the vehicle is motionless in the water. After the interior of the hull 10 has been filled with water, the driver of the vehicle may then incline the leading edges of the diving planes downwardly whereby the vehicle 10 will descend into the water as it is pulled forward. When the desired depth is reached, the diving fins 56 and 58 may be returned to a horizontal position to retain the vehicle 10 at that depth. Should a skin diver desire to leave the vehicle and proceed on his own, he merely needs to release the loops 84, whereupon the resilient member 82 will urge the leading edges of the diving fins 56 and 58 to an upwardly inclined position which will raise the hull 10 to the surface of the water. It is to be understood that the diving fins 56 and 58 pivot about their longitudinal center line whereby it will not require any force to maintain them in any adjusted rotated positions. When the hull 10 reaches the surface of the water, the connection of the tow rope to the eye 28 below the longitudinal center line of the hull 10 will upwardly incline the forward portion of the hull 10 wherein the water contained therein will exit through the outlet opening 26 until substantially all of the water within the hull is removed therefrom. The diving fins 56 and 58 will also afford stability to the craft while it is being towed on the surface of the water. Further, the water and wind shield will assist in insuring that water will not enter the cockpit as the water within the hull 10 is being discharged through the opening 26 during the movement of the hull 10 over the surface of a body of water.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A towed underwater vehicle including a body adapted to be towed across the surface and below the surface of a body of water and for carrying one or more persons, diving plane means movably mounted on said body for movement between surfacing and diving positions for surfacing and diving said vehicle respectively and maintaining a constant depth of the latter, said diving plane means being adapted for engagement with said body of water, control means on said body operatively connected with said diving plane means for effecting movement of the latter, means for resiliently urging each of said diving plane means toward a forwardly and upwardly inclined position, a pair of horizontally disposed and aligned pivot shafts journaled through opposite sides of said hull with the inner ends thereof being slightly spaced apart from each other, said diving plane means being carried by the remote ends of said pivot shafts disposed outwardly of said body, a sleeve disposed about and rotatably journaling the adjacent ends of said shafts, said resilient means comprising a resilient member secured between opposite sides of said hull in parallel relation to but spaced from said shafts, said control means comprising an elongated loop secured the adjacent end portion of each of said shafts and encircling said resilient member, said loops being positioned about said shafts whereby said resilient member will urge said shafts toward a position inclining said diving plane means forwardly and upwardly.

2. A towed underwater vehicle comprising a hull having a tapered rear end, a cockpit opening formed in said hull, a pair of horizontally disposed stabilizing fins, means fixedly securing said stabilizing fins to opposite sides of said hull adjacent the rear thereof, a pair of diving fins,

means pivotally securing said diving fins to opposite sides of said hull for rotation about aligned horizontal axes, means on said pivotal securing means adapting the latter for manipulation from within said hull to pivot said diving fins about said axes relative to each other or in unison, means secured to the front of said hull adapting the latter for securement to the end of a tow rope, a water outlet opening in the rear end of said hull, means for resiliently urging each of said diving fins toward a forwardly and upwardly inclined position, said pivotal securing means comprising a pair of horizontally disposed and aligned pivot shafts journaled through opposite sides of said hull with the inner ends thereof being slightly spaced from each other, a sleeve disposed about and rotatably journaling the adjacent ends of said shaft, said manipulating means comprising a resilient member secured between the opposite sides of said hull in parallel relation to but spaced from said shafts, an elongated loop secured to the adjacent end portion of each of said shafts and encircling said resilient member, said loops being positioned about said shafts whereby said resilient member will urge



said shafts towards a position inclining said diving fins upwardly and forwardly.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,603,051 | Hall | Oct. 12, 1926 |
| 1,329,225 | Burke | Jan. 27, 1920 |
| 2,726,622 | Daniels | Dec. 13, 1955 |
| 2,823,635 | Hagemann | Feb. 18, 1958 |
| 2,823,636 | Gongwer et al. | Feb. 18, 1958 |
| 2,826,001 | Presnell | Mar. 11, 1958 |
| 2,918,889 | Rebikoff | Dec. 29, 1959 |
| 2,928,367 | McCormick | Mar. 15, 1960 |
| 2,936,466 | Szymczk et al. | May 17, 1960 |
| 2,948,251 | Replogle | Aug. 9, 1960 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 477,321 | France | July 12, 1915 |
| 1,148,743 | France | Dec. 13, 1957 |
| 801,000 | Great Britain | Sept. 3, 1958 |