United States Patent [19]

Taylor

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[54] **AMPHIBIOUS VEHICLE**

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[73] Assignee: **Design Dimension, Inc.,** Raleigh, N.C.

[22] Filed: **May 18, 1972**

[21] Appl. No.: **254,713**

[52] **U.S. Cl.** ..... **9/1 T,** 114/61, 114/66.5 F, 115/1 A

[51] **Int. Cl.** **B60f 3/00,** B63c 13/00

[58] **Field of Search** ..... 9/1 R, 1 T, 2 R, 2 F, 2 C, 9/2 S; 114/66.5 F, 61; 115/1 R, 1 A; 52/67, 69, 70

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Primary Examiner—George E. A. Halvosa
Assistant Examiner—Randolph A. Reese
Attorney, Agent, or Firm—John G. Mills, III

[57] **ABSTRACT**

In abstract, a preferred embodiment of this invention is a towable, land type vehicle which is launchable and expansible for use as a stable watercraft with roomy, trailer-like accommodations.

Basically the body of the vehicle comprises a central section having expandable wing sections disposed on each side thereof. Each wing section has a retractable wheel assembly incorporated therein. A retractable tow bar is provided about the front of the body which enables the tow bar to be moved inwardly relative to the body when the amphibious vehicle is used as a watercraft.

7 Claims, 15 Drawing Figures

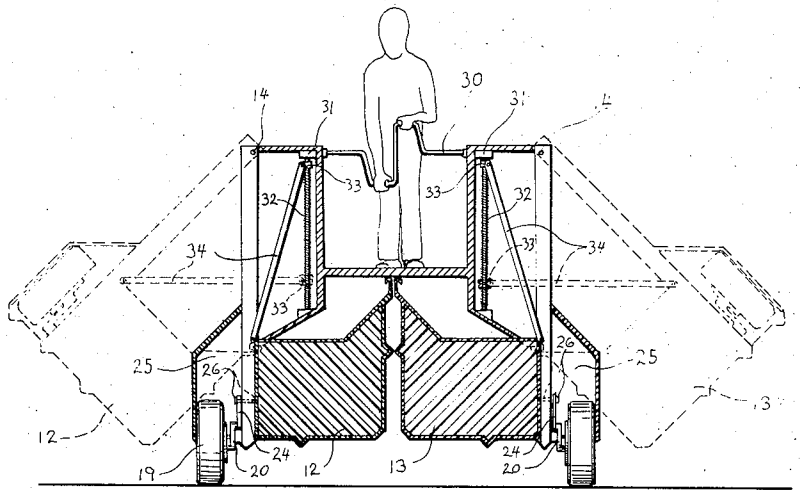


Fig. 1

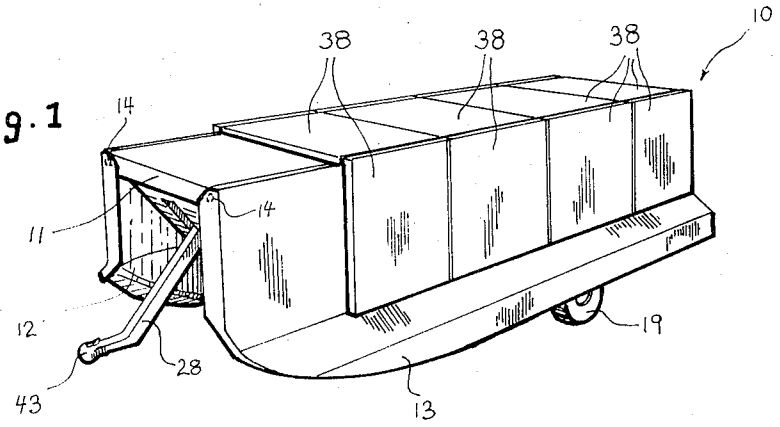


Fig. 5

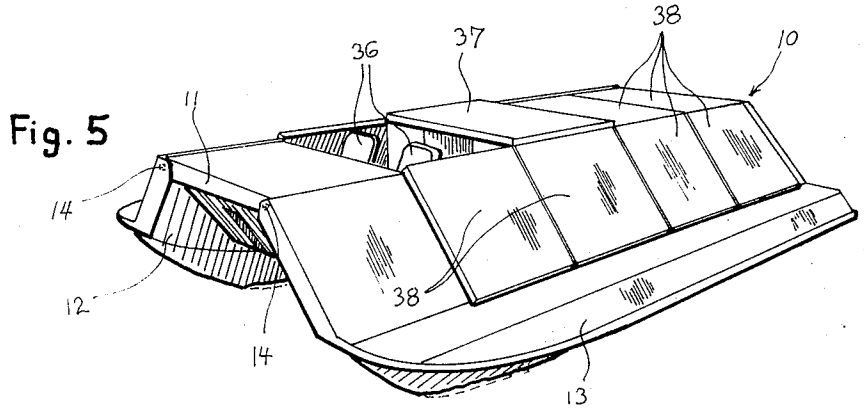
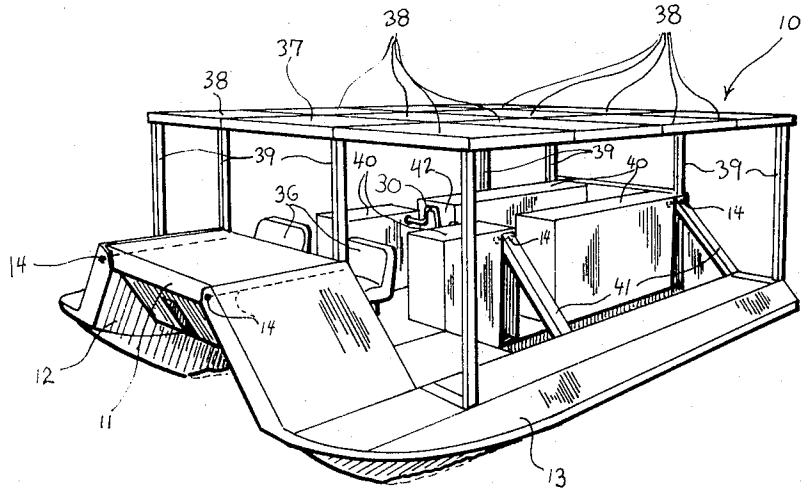


Fig. 9



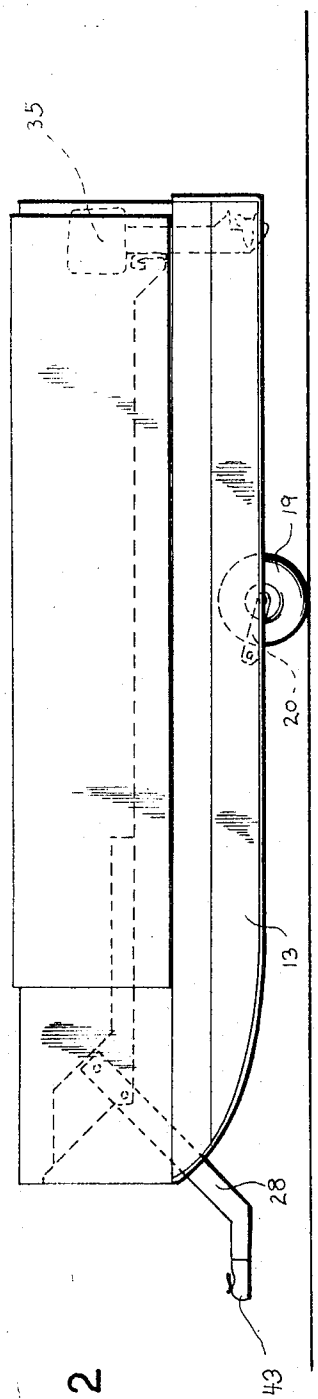


Fig. 2

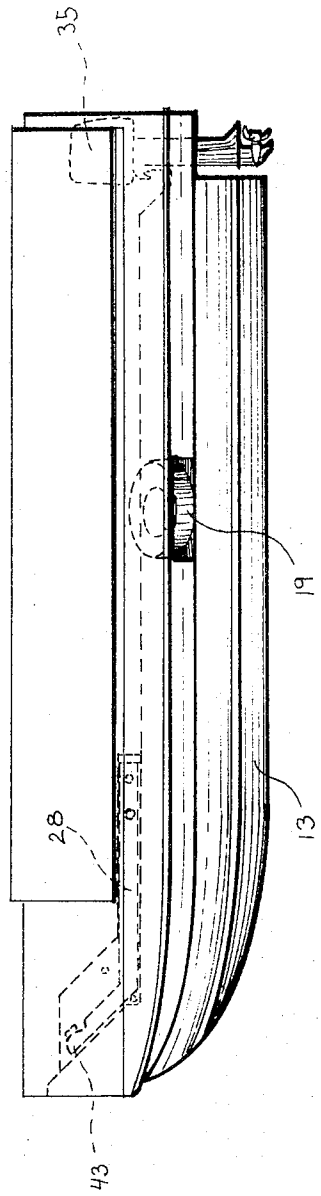


Fig. 6

Fig. 3

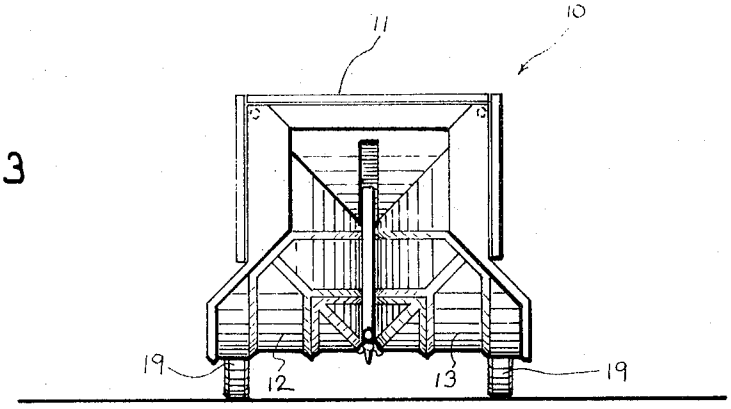


Fig. 7

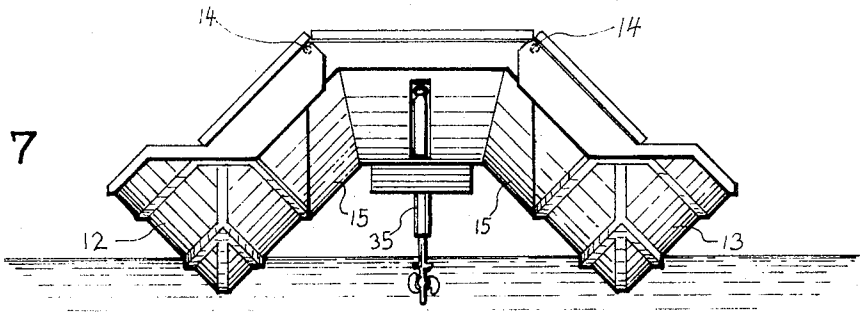


Fig. 11

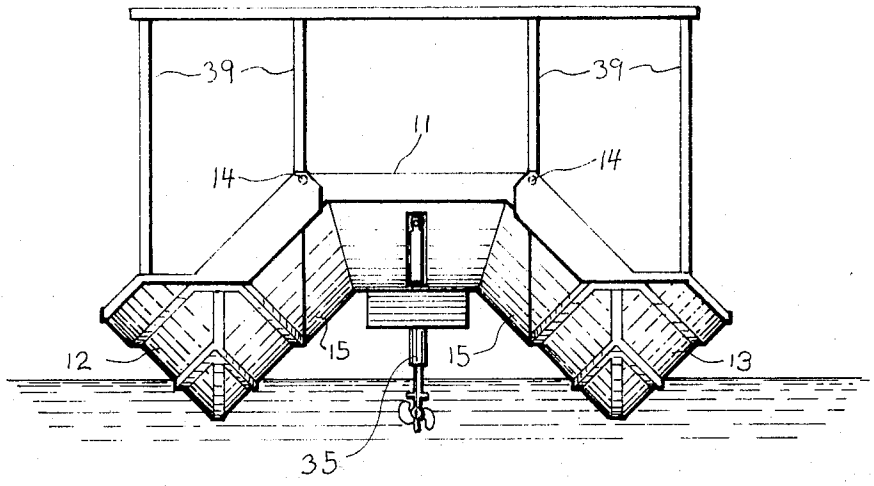


Fig. 4

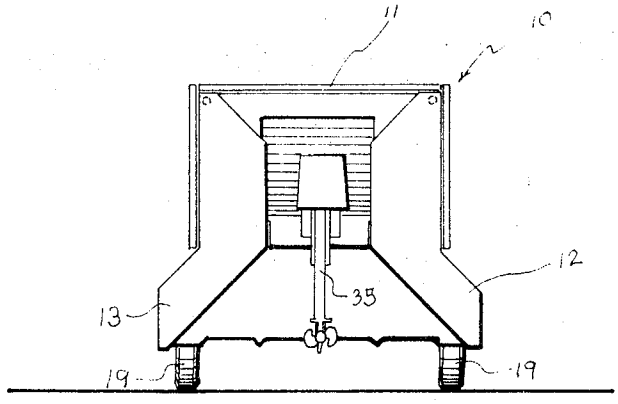
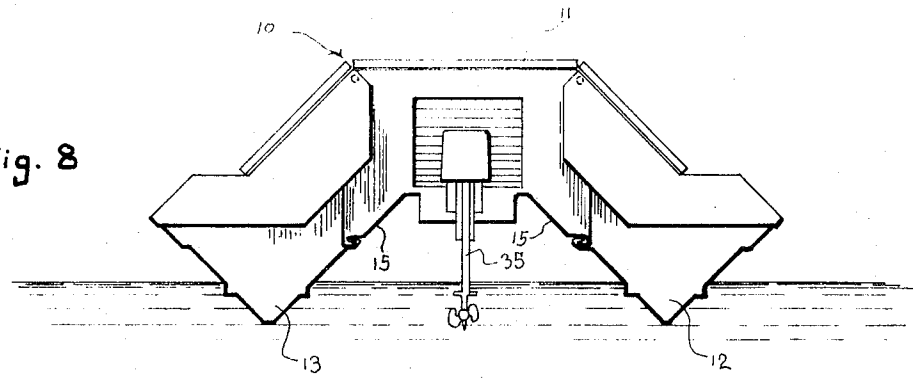


Fig. 8



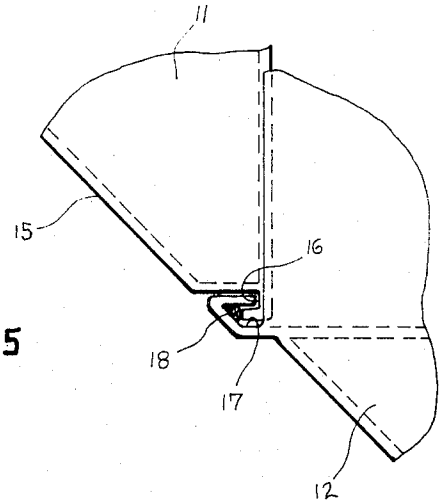


Fig. 15

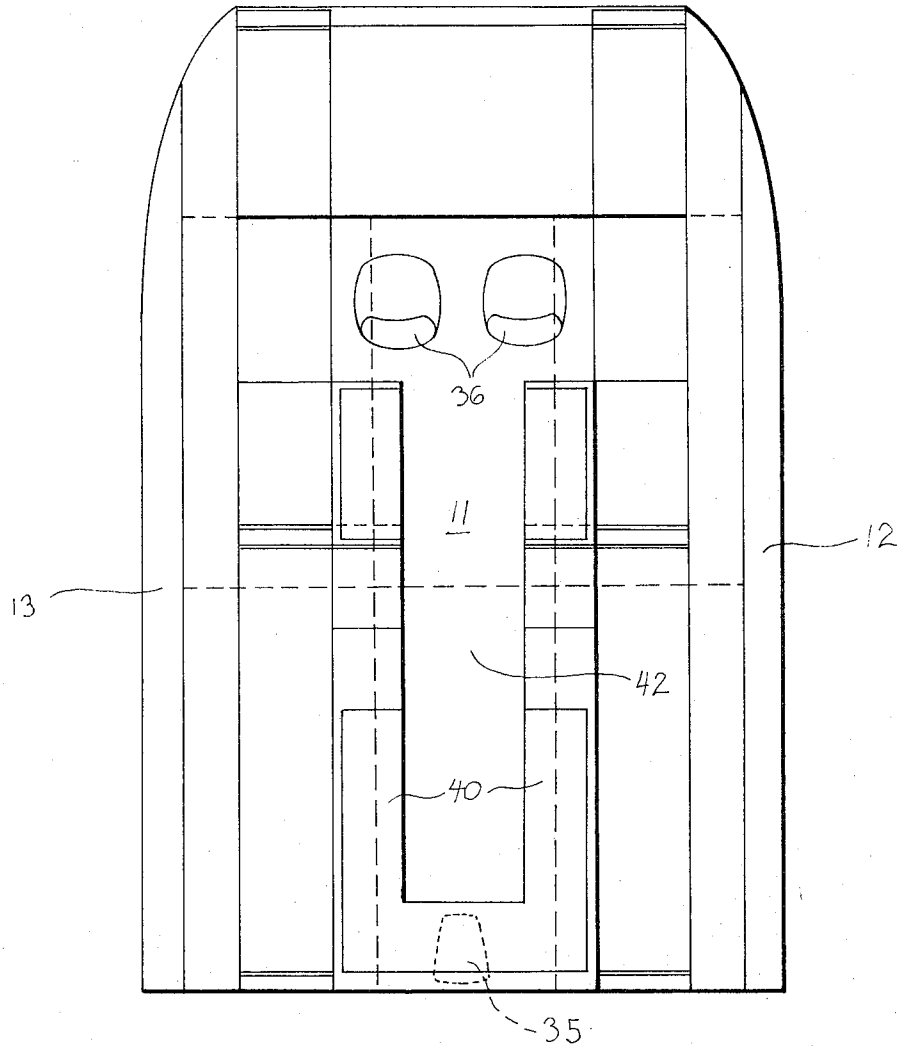


Fig. 10

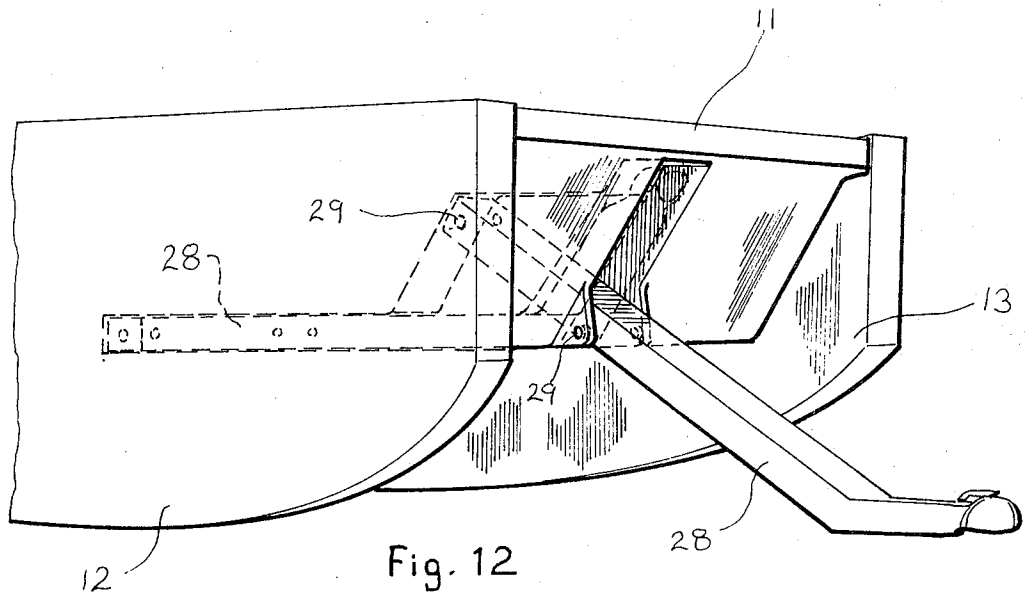


Fig. 12

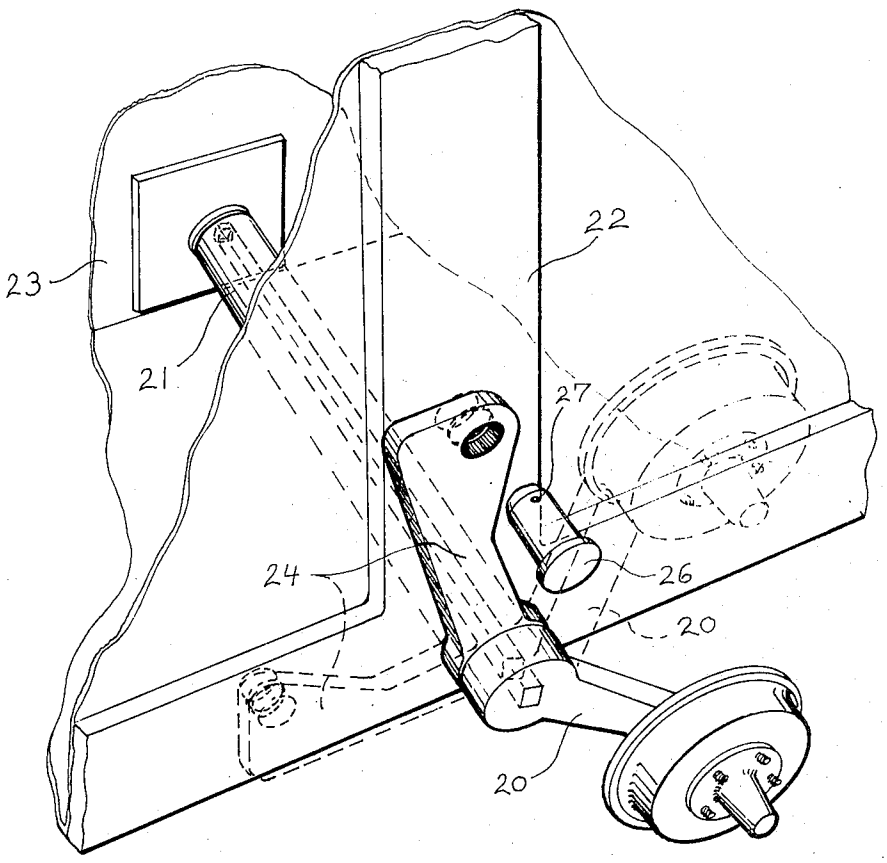


Fig. 13

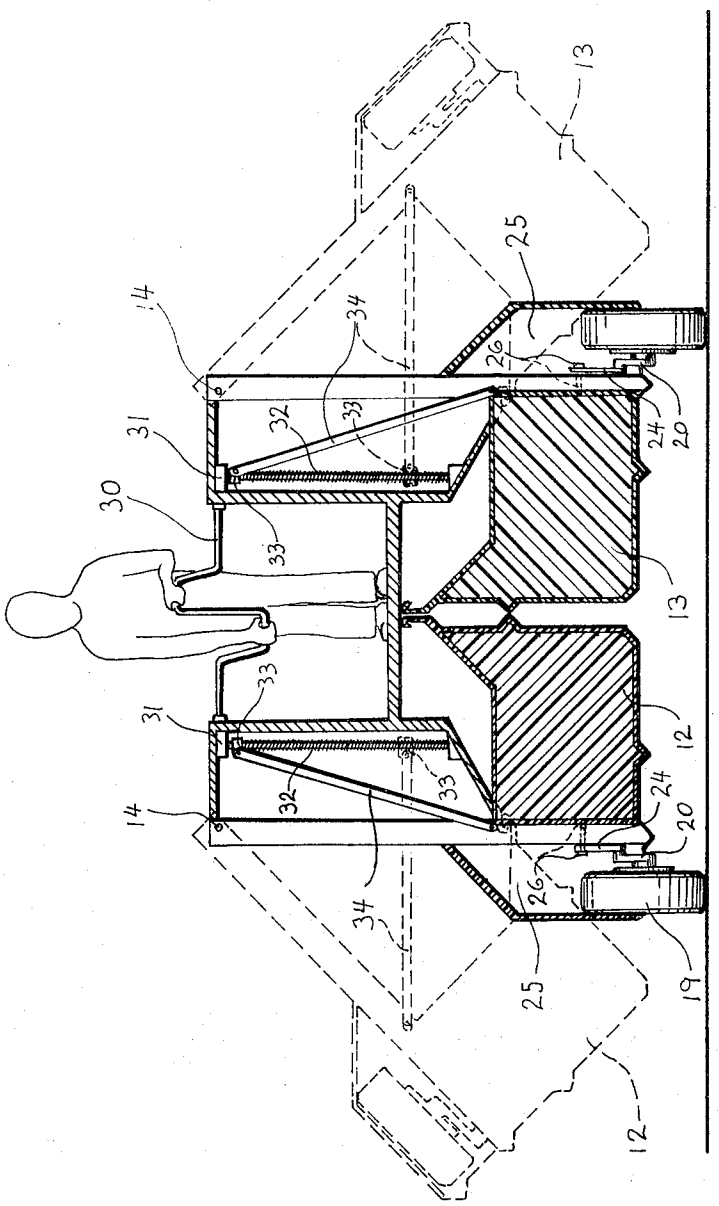

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Fig. 14

AMPHIBIOUS VEHICLE

This invention relates to vehicles and more particularly to amphibious vehicles with trailer type accommodations. The device is expansible for stable, high speed, self-propelled water operations and yet is contractable for safe highway use.

In the past, numerous attempts have been made to provide trailer type amphibious vehicles to meet the needs of both land and water accommodations. These attempts have included houseboat like hulls with wheels mounted thereunder, trailer like vehicles with foldable floats and various combinations thereof. None of these prior attempts at producing an amphibious, trailer type vehicle has proved successful because each, in solving a specific problem, has created additional difficulties.

After much study and research into the above mentioned problems, the present invention has been developed to provide an amphibious type vehicle which falls clearly within a legal width requirement for highway travel with the wider portion thereof being in the lower portion thereof. This gives land travel stability while allowing good visibility therearound. Additionally, a low profile vehicle is provided through the use of an integral wheel suspension system.

The vehicle of the present invention will float in the land vehicle configuration thus providing a shallow draft hull for use in narrow, shallow water areas. In deeper, open water, the configuration can be changed to provide a pair of spaced, generally V-shaped catamaran hull types for stability and speed.

Both the wheels and the towing tongue of the unit of the present invention are readily retractable as is the expansion and retraction of the hull portions thus providing a smoothly operated, readily changeable configuration utilizing, to the best advantage, the configurations of both land and water vehicles.

Accommodations are provided in a minimum area for six people in three separate sleeping areas with an additional galley and private head.

In view of the above, it is an object of the present invention to provide an amphibious type vehicle that is as adapt when being used as a land vehicle as it is as a water vehicle.

Another object of the present invention is to provide an amphibious type expansible trailer which falls within the legal width limits for unrestricted highway travel and yet is expansible to double its original width to provide a highly stable, high speed watercraft.

A further object of the present invention is to provide an amphibious type vehicle with readily retractable trailer tongue and highway wheels.

An even further object of the present invention is to provide an amphibious type vehicle wherein the floatation means thereof can be used at any one of an infinite number of positions between folded, flat bottom type configuration to expanded, double V-hull catamaran high speed type configuration.

An additional object of the present invention is to provide a simple, yet efficient hull, expanding and contracting mechanism for converting to and from a water operation configuration.

Another object of the present invention is to provide an amphibious vehicle water configuration expanding system including a jack screw type motivation means.

Another object of the present invention is to provide an expansible, amphibious type hull having pivot points above the center of buoyancy of such hulls to minimize resistance during expansion and contraction.

Another object of the present invention is to provide a joint seal between expanding hull section of an amphibious type vehicle to prevent water from entering the interior of such vehicle.

Another object of the present invention is to provide a generally rectangular, land type vehicle which is convertible into a multi-hull, V-section watercraft.

Another object of the present invention is to provide an amphibious type vehicle which expansively folds to provide a unit with all fixtures, locks and seats located along the sides of a center section thus giving a walkway for easy access to all areas.

Other objects and advantages of the present invention will become apparent and obvious from a study of the following description and the accompanying drawings which are merely illustrative of such invention.

IN THE DRAWINGS

FIG. **1** is a perspective view of the amphibious vehicle of the present invention in highway and launch configuration;

FIG. **2** is a side elevational view of such vehicle in such configuration;

FIG. **3** is a front elevational view of the same;

FIG. **4** is a rear elevational view thereof;

FIG. **5** is a perspective view of the amphibious vehicle of the present invention in expanded hull configuration;

FIG. **6** is a side elevational view of such vehicle in such configuration;

FIG. **7** is a front elevational view of the same;

FIG. **8** is a rear elevational view thereof;

FIG. **9** is a perspective view of the amphibious vehicle of the present invention in full expanded configuration;

FIG. **10** is a top plan view of such vehicle in such configuration;

FIG. **11** is a front elevational view of the same;

FIG. **12** is an enlarged perspective view of the tow tongue in operational and retracted positions;

FIG. **13** is an enlarged perspective view of one of the wheels of the vehicle of the present invention in both extended and retracted positions, the wheel being shown without a tire mounted thereon for clarity;

FIG. **14** is a sectional view of the amphibious vehicle of the present invention showing the hand operated hull expanding and retracting mechanism; and

FIG. **15** is an enlarged sectional view of the joint seal between vehicle body and expansible hull portions.

With further reference to the drawings, the vehicle of the present invention, indicated generally at **10**, is composed of three main portions referred to generally as central section **11** and wing sections **12** and **13**. These sections are connected to each other through the use of a plurality of pins **14** in axial alignment to form hinge connections. All three of the main sections of the vehicle are preferably constructed of molded, reinforced fiberglas produced by conventional methods.

The bottom portion **15** of the central section is composed of three generally flat portions with the outer extremities or edges thereof terminating in a longitudinal groove **16** which is generally hooked shaped in cross section.

The upper, inner longitudinal edge of each of the wing portions terminates in a groove group **17** which

sealingly engages groove **16** when the vehicle is in fully expanded, water operative configuration. This seal is made water tight by gasket **18** which is disposed within the hook portion of groove **17** as can clearly be seen in FIG. **15.**

Wheels **19** used during land travel are rotatively mounted on pivotable axle arm **20.** This arm is fixedly secured to shaft **21** which is rotatively mounted through frames **22** and **23** which are integrally secured within the wing section of the present invention.

Pivot arm **24** is fixedly secured to axle arm **20** and its associated shaft **21** so that leverage can be obtained to swing wheel **19** into and out of wheel well **25.**

Pivot locking pin **26** is adapted to pass through pivot arm **24** and frame **22** at either of the two positions shown in FIG. **13.** An opening **27** is provided in pin **26** so that a cotter key or other keeper means (not shown) can be used to prevent accidental dislodgement of such pin.

From the above, it can be seen that when wheel **19** is in the position shown in solid lines of FIG. **13,** the unit of the present invention can be used for land travel. When the locking pin **26** is removed and such wheel is moved to the position shown in dotted lines of FIG. **13,** such wheel is then retracted and full water operation can be accomplished without hinderance.

Since unit **10** is adapted to be used for both land and water travel, a retractable tongue **28** is provided. A pair of removable pins **29** are used to secure tongue **28** in land travel position as shown clearly in FIG. **12.** When it is desired to use the unit of the present invention in the water configuration, pins **29** are removed and the outer end of tongue **28** is swung upwardly so that the entire tongue can slide rearwardly to the position shown in dotted lines in FIG. **12.** This extension and retraction of the tongue is also clearly seen in FIGS. **2** and **6.** Any convenient retainer means (not shown) can be used to hold tongue **28** in the retracted position as hereinabove mentioned.

The wing sections **12** and **13** of unit **10** are generally boat shaped in longitudinal cross section when in the fully extended position. Because of this shape, the vehicle of the present invention can be driven at high speeds across water.

To aid in the hinged, expanded and folding of the wing sections, a mechanical system such as that shown in FIG. **14** can be used. In this portion of the disclosure, a hand crank **30** is provided which terminates in a gear box **31** at each end thereof. Each of these gear boxes are operatively connected to a helically threaded shaft **32.** Thus it can be seen that as a hand crank **30** is turned, rotative motion is transmitted through gear box **31** (in the standard manner) to rotate shaft **32.**

Threaded followers **33** are operatively mounted on shaft **32** and each has pivotably connected to it a push arm **34.** Each of the push arms are pivotably secured at their end opposite follower **33** to their respective wing section. Thus it can be seen in FIG. **14** that as hand crank **30** causes shaft **32** to rotate, followers **33** move downwardly thus moving push arms **34** to swing wing sections **12** and **13** outwardly about their respective pivot pins **14.**

To convert the unit of the present invention from its extended, watercraft configuration into its compact, highway configuration, the procedure hereinabove described is simply reversed.

When in the land vehicle configuration, the unit of the present invention is launched and can immediately be used with or without retracting the tongue **28** and wheels **19.** This is particularly beneficial if shallow water is encountered around the ramp where the unit is launched. In other words, since the tongue **28** does not protrude below the bottom of the hull, when in folded condition, the unit can be moved as a watercraft without retracting the tongue. With the engine or motor **35** being used, sandbars or other shallow water can be traversed by wheels **19** riding up over such shallow area. Also in the enclosed or road configuration, the unit of the present invention can be maneuvered in relatively narrow channels since it is not as wide as in the open water configuration. Additionally, the land travel shape is similar to a flat bottom boat and thus is shallow draft.

All of the controls (not shown) for steering and operating the motor **35** are in the cockpit area of the forward portion of the unit adjacent seats **36.** When panel or hatch **37** is removed or folded back as shown in FIG. **5,** the cockpit is exposed and the operator of the craft can board the same and pilot the unit as desired. Once deep, wide water is reached, wing sections **12** and **13** are cranked out to the configurations seen in the FIGS. Tongue **28** and wheels **19** at this point can also be retracted to reduce drag and to protect the same against wave action. It should be noted that when wing sections **12** and **13** are in their fully extended position, a pair of V-hulls are formed with the central section **11** connecting the same. The sides of the hulls slope at approximately **45** degrees to give a balanced, well riding configuration.

The boat in the extended position seen in FIG. **5** can be operated as such and under heavy sea conditions would not be unfolded further. In relatively protected waters, for either cruising or laying at an anchor, cover panels **38** can be opened and held by supports **39** as seen clearly in FIG. **9.** Braces **41,** which are used to support panels **38** when in the folded position, are, of course, left in position since they give integral strength to their respective wing portions **12** and **13.**

Although variations in internal layout and design can obviously be made, the provision of permanent storage cabinets in bulkheads **40** along each side of passageway **42** has been found advantageous. Canvas, plastic screen or other material (not shown) can obviously be secured to supports **39** and respective panels **38** to provide an enclosed, weather proof compartment of relative large size. Folding beds (not shown) are used within the expanded enclosure hereinabove described so that sleeping accommodations for a number of people are provided. Also gally and head facilities (not shown) are provided within the interior of said expanded compartment.

From the above, it can be seen that an expanded, houseboat type watercraft is provided which is extremely stable and capable of high speed over water and yet which is foldable into a compact, land trailerable vehicle.

Whenever it is desired to convert the unit of the present invention from one configuration to another, the procedures hereinabove described are either followed or reversed. Simplicity of structure and smoothness of operation are distant advantages of the present invention, particularly when coupled with the roomy, high

speed, catamaran type hull structure that is readily convertible into a high speed land vehicle.

From the above, it is obvious that the present invention has the advantage of providing an amphibious type vehicle in the form of a foldable unit which is readily trailable as a high speed land vehicle and yet is readily convertible into the high speed, highly sea worthy watercraft. Another advantage of the present invention is the fact that its construction is extremely serviceable and yet costs of manufacturing and maintenance are low. An even further advantage of the present invention is that it can be operated in multiple configurations on water and is convertible from a streamline unit to an extended, roomy, stable, houseboat type configuration.

The present invention may, of course, be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

What is claimed is:

1. An amphibious type unit comprising: a generally elongated central section having outwardly extending sides with the outer lower edge extremities of said sides formed into a generally hooked shaped longitudinal groove; a pair of wing sections hingedly attached on opposite sides of said central section with each wing section having a V-bottom boat shape when in a hingedly extending position relative to said central section, each wing section having generally hooked shaped groove formed about the inner side thereof and spaced so as to engage and mate with the respective groove formed in the outwardly extending sides of said central section when the respective wing section is hingedly extended thereby effectively limiting the outward movement of the wing section and generally forming a continuous structure between said central section and a respective wing section; and means for hingedly extending and retracting said wing sections relative to said central section.

2. The amphibious type unit of claim **1** wherein said means for hingedly extending and retracting said wing sections comprises: threaded helical shaft means; follower means threaded on said helical shaft means and axially movable thereon in response to the rotation of said threaded shaft; push arm means interconnected between said follower means and a respective wing section; and means for rotating said threaded helical shaft means so as to axially move said follower means thereby resulting in said wing sections being expanded or retracted depending on the direction of rotation of said helical shaft means.

3. The amphibious type unit of claim **2** wherein said helical shaft means comprises a pair of generally upright laterally spaced helical screw shafts and wherein said means for rotating said helical shaft means comprises a handcrank extending between said screw shafts and operatively connected to each.

4. The amphibious type unit of claim **3** wherein a water tight gasket seal is secured within said groove formed within each wing section.

5. The unit of claim **4** including tow bar means retractingly attached to the central section of said unit for connecting the same to a self-propelled vehicle whereby a trailer type unit is provided.

6. The unit of claim **5** including at least one retractable wheel rotatively attached to each of said wing sections.

7. The unit of claim **6,** therein locking means are provided for each of said retractable wheels whereby the same may be locked in either retracted or extended positions.

* * * * *