July 25, 1967 J. VAN VELDHUIZEN ETAL 3,332,389

AIR-PROPELLED BOAT WITH MOUNTED FAN

Filed June 24, 1966 4 Sheets-Sheet 1

Fig. 1

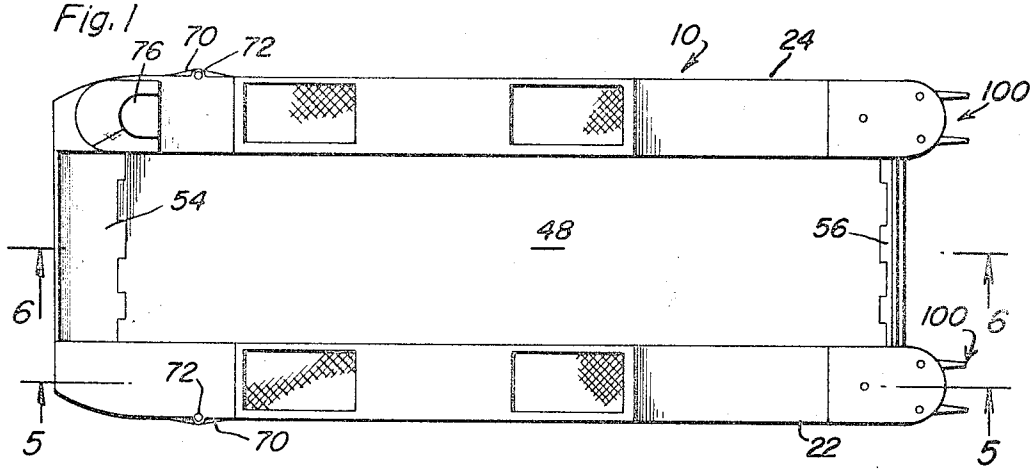


Fig. 2

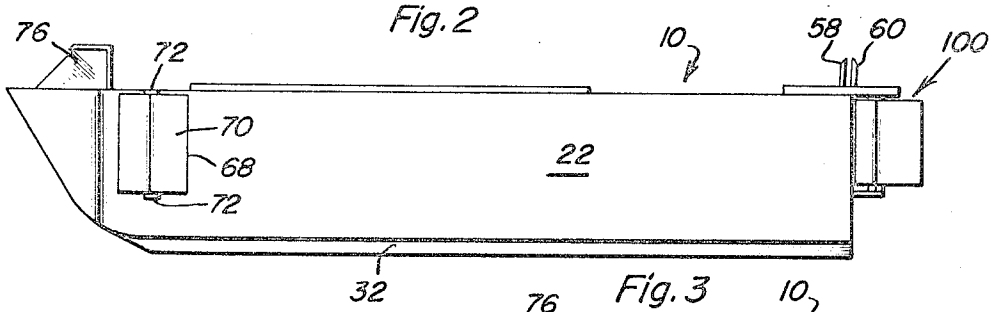


Fig. 3

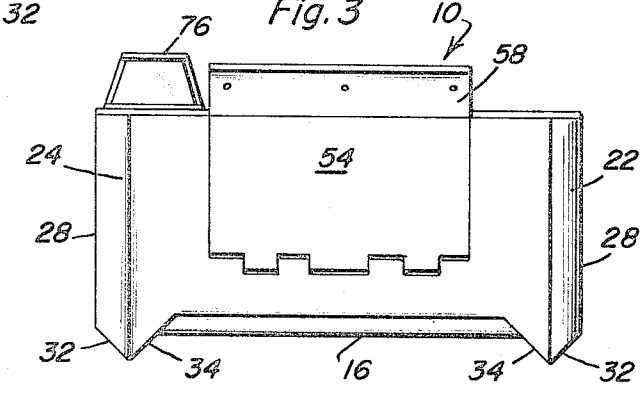
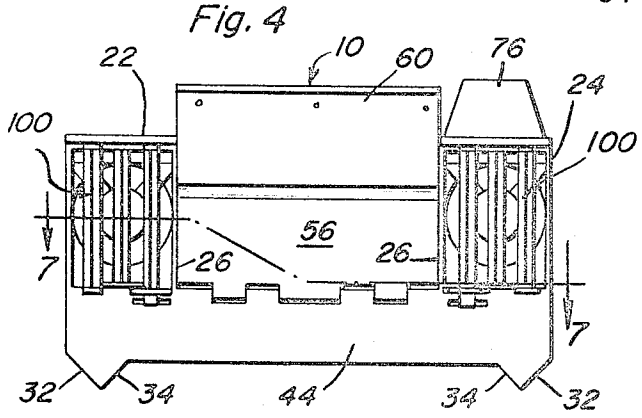


Fig. 4



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AIR-PROPELLED BOAT WITH MOUNTED FAN

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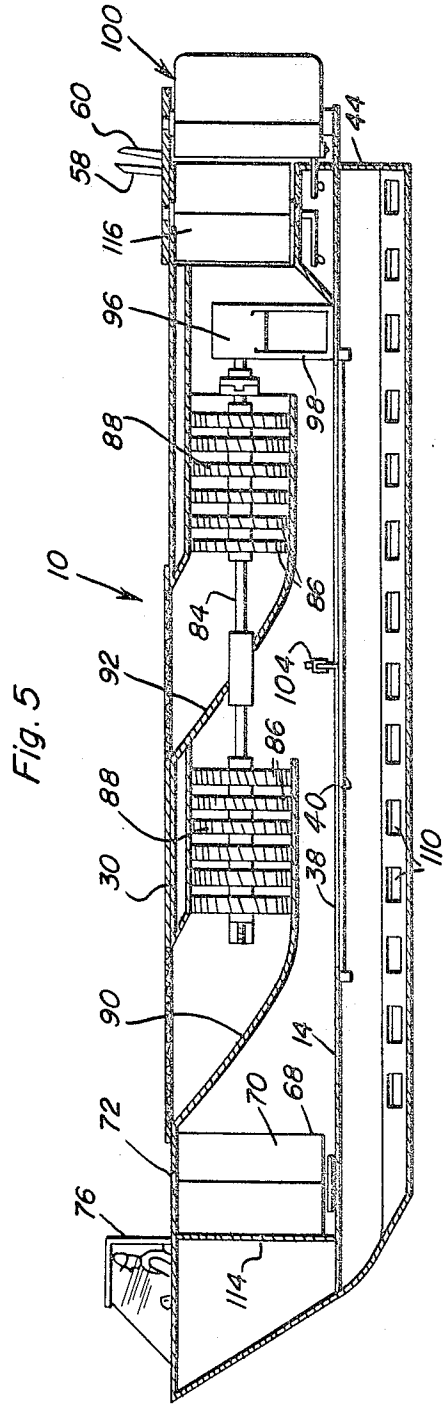


Fig. 5

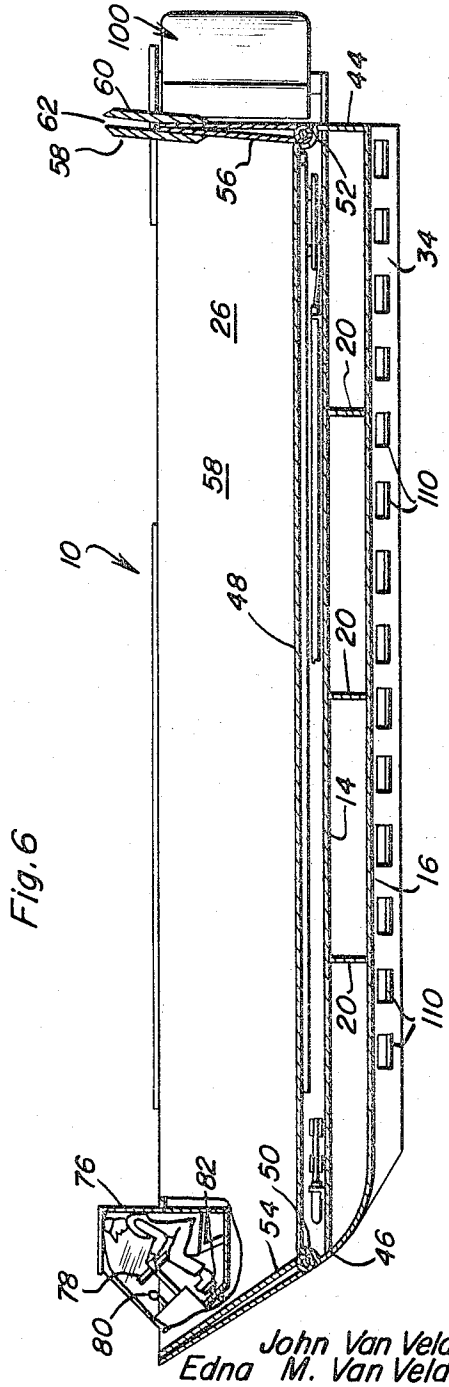


Fig. 6

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AIR-PROPELLED BOAT WITH MOUNTED FAN

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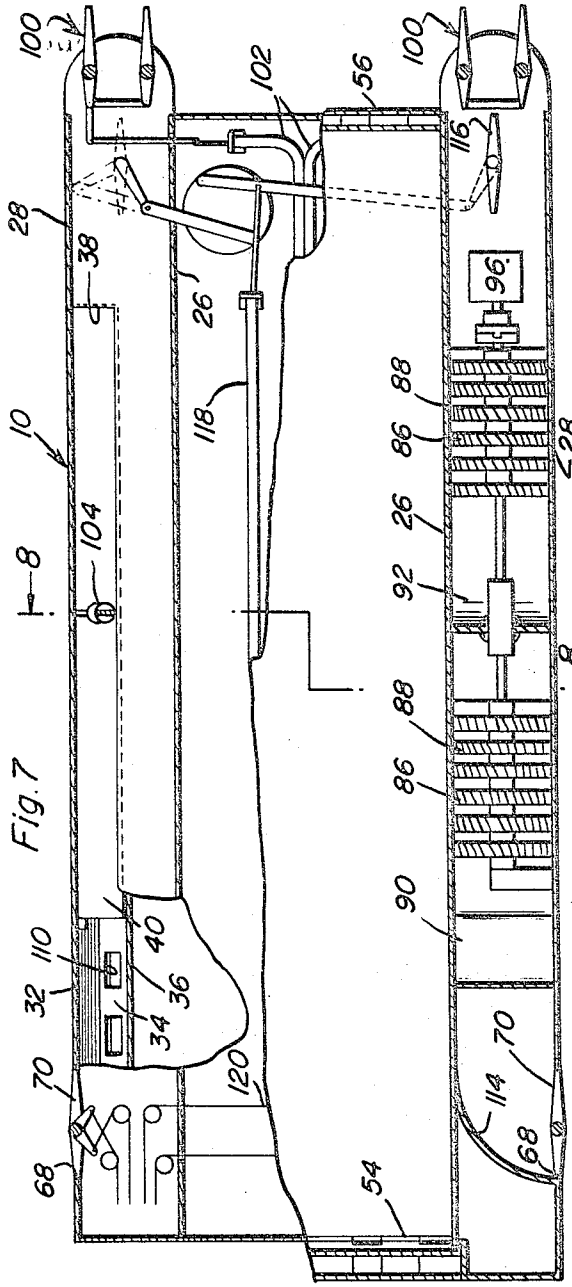


Fig. 7

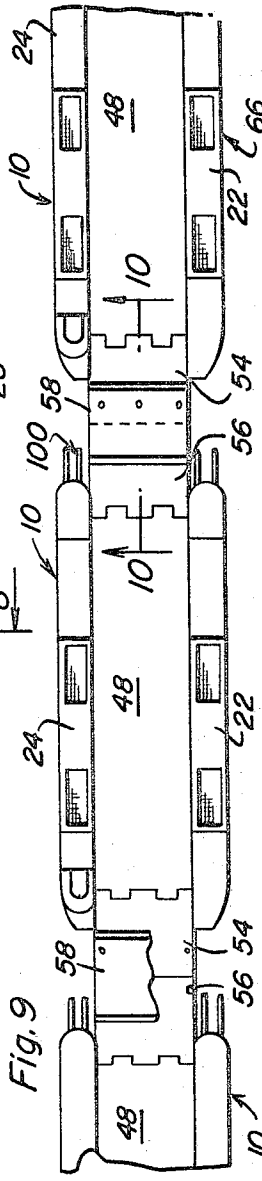


Fig. 9

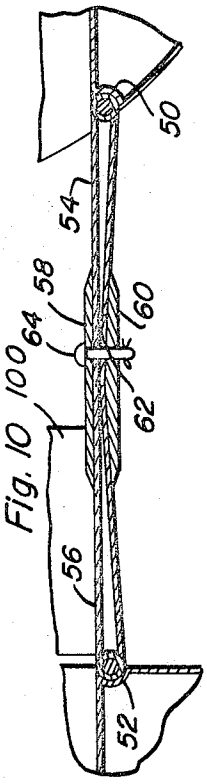


Fig. 10

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AIR-PROPELLED BOAT WITH MOUNTED FAN

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Fig. 8

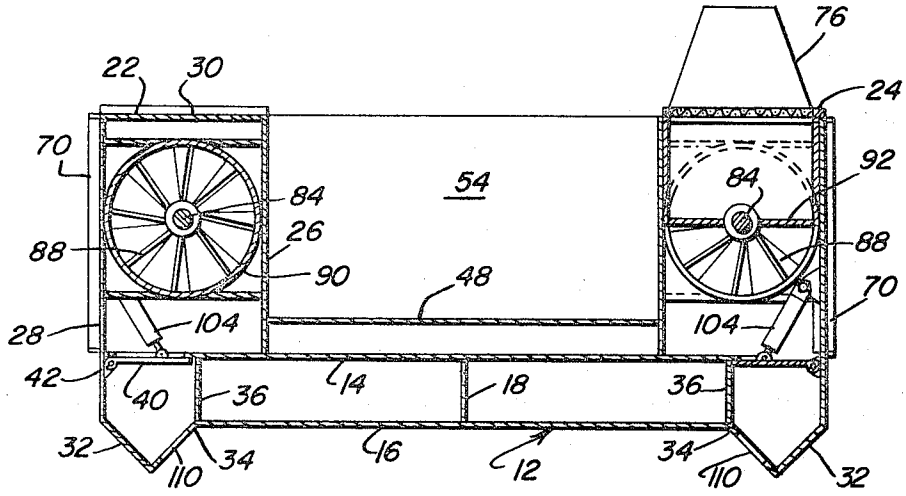


Fig. 11

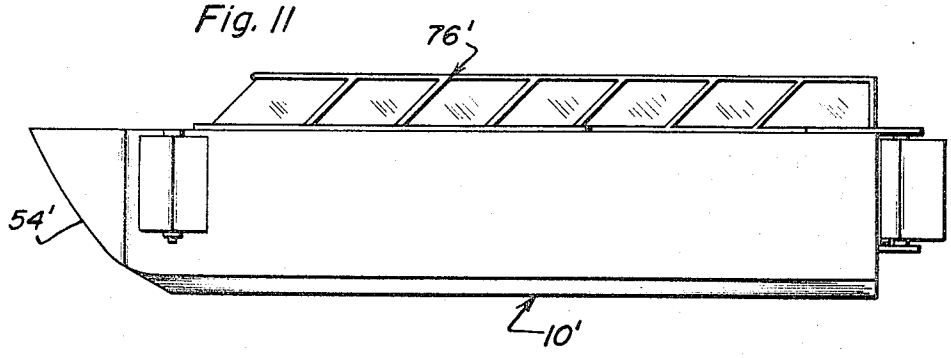
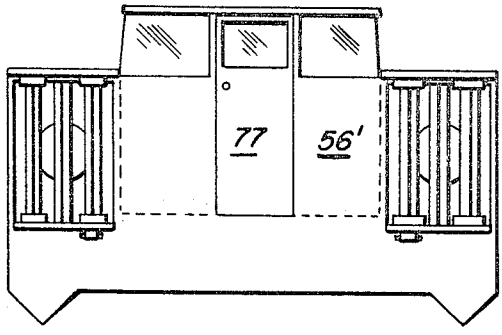


Fig. 12



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3,332,389

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AIR-PROPELLED BOAT WITH MOUNTED FAN

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Filed June 24, 1966, Ser. No. 560,257

18 Claims. (Cl. 115—11)

This invention relates to a novel and useful air-propelled boat and more specifically to a boat designed to be propelled by air, to be buoyed up by air, and to be steered by laterally deflecting or discharging the boat propelling airflow.

The air-propelled boat of the instant invention comprises an improvement over the air-propelled boat disclosed in our copending application U.S. Ser. No. 381,693 now patent No. 3,259,097.

The air-propelled boat of the instant invention includes improved air propelling means adapted to move the boat over the surface of a body of water at higher speeds and is constructed whereby a plurality of the air-propelled boats of the instant invention may be coupled together to form a floating bridge and/or barge equal in length to the combined length of the air-propelled boats which are coupled together.

The basic structural and operational features of the air-propelled boat of the instant invention are similar in many respects to the air-propelled boat disclosed in our above mentioned copending application and therefore has as its objects those objects set forth in our copending application.

In addition to the object set forth in our copending application, the air-propelled boat of the instant invention has a further object to provide a means whereby a floating bridge and/or barge may be formed from a plurality of and aligned air-propelled boats of the instant invention coupled together.

Still another object of this invention is to provide an air-propelled boat which may be readily constructed so as to include a large enclosed longitudinally extending central area thereof for carrying passengers in addition to being constructed in a manner so as to define a large open ended centrally disposed cargo area through which cargos such as vehicles may be moved when a plurality of the air-propelled boats are coupled together in end to end aligned relation.

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 top plan view of the air-propelled boat of the instant invention;

FIGURE 2 is a side elevational view of the assemblage illustrated in FIGURE 1;

FIGURE 3 is a front elevational view of the assemblage illustrated in FIGURES 1 and 2;

FIGURE 4 is a rear elevational view of the assemblage illustrated in FIGURES 1–3;

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

FIGURE 6 is an enlarged longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 6—6 of FIGURE 1;

FIGURE 7 is an enlarged fragmentary horizontal sectional view taken substantially upon the plane indicated by the section line 7—7 of FIGURE 4 and with parts thereof being broken away;

FIGURE 8 is an enlarged transverse vertical sectional view taken substantially upon the plane indicated by the section line 8—8 of FIGURE 7;

FIGURE 9 is a top plan view of a plurality of air propelled boats of the instant invention coupled together in end to end aligned relation so as to form a floating bridge and/or barge, portions of the endmost boats being broken away;

FIGURE 10 is an enlarged fragmentary longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 10—10 of FIGURE 9;

FIGURE 11 is a side elevational view of a modified form of air-propelled boat constructed in accordance with the present invention and including an enclosed area for carrying passengers; and

FIGURE 12 is a rear elevational view of the assemblage illustrated in FIGURE 11.

Referring now more specifically to the drawings the numeral 10 generally designates the air-propelled boat of the instant invention. The boat 10 includes an airtight bottom assembly or section generally referred to by the reference numeral 12 including an upper bottom member 14 and a lower bottom member 16 suitably braced from one another by means of a central longitudinal upstanding web 18 and a plurality of similar upstand-transverse webs 20. The boat 10 also includes a pair of opposite side assemblies 22 and 24 each including inner and outer walls 26 and 28.

The upper edge portions of corresponding pairs of inner and outer walls 26 and 28 are interconnected by means of a top wall 30 and the outer walls 28 project below the lower ends of the inner walls 26, the latter abutting against the corresponding marginal edge portions of the upper bottom 14 and the former terminating in inwardly and downwardly directed wall sections 32. The lower bottom 16 includes opposite side downwardly and outwardly inclined wall sections 34 whose lower marginal edge portions are joined to the lower marginal edge portions of the sections 32 in watertight sealed engagement therewith.

The bottom section or assembly 12 also includes opposite side upstanding stringers or webs 36 which extend between the upper and lower bottoms 14 and 16 and the opposite marginal edge portions of the upper bottom 14 extend outwardly beyond the webs 36 and are secured to the corresponding outer walls 28. However, the opposite longitudinal marginal edge portions of the upper bottom 14 disposed above the corresponding sections 32 and 34 have openings 38 provided therein with which hydraulically actuated flap valves 40 pivotally supported from the corresponding outer walls 28 as at 42 are operatively associated.

The rear end of the bottom section or assembly 12 is closed by means of a rear wall 44 also enclosing the rear ends of the side assemblies 22 and 24 horizontally aligned with the bottom section 12. Further, the forward ends of the upper and lower bottoms 14 and 16 are joined as at 46 where the lower bottom 16 curves upwardly to join with the upper bottom 14 and a flooring or false bottom 48 extends between the inner walls 26 and is joined to the upwardly curving forward portion of the lower bottom 16 at its forward end in a manner defining the forwardly and upwardly opening generally semi-cylindrical recess 50. The rear end of the flooring 48 is joined with the upper marginal edge portion of the rear wall 44 in a similar manner forming an upwardly and rearwardly opening semi-cylindrical recess 52.

Front and rear upstanding loading ramps 54 and 56 are pivotally supported at their lower edge portions within the recesses 50 and 52. The loading ramps 54 and 56 are swingable between the horizontally disposed positions thereof illustrated in FIGURE 10 of the drawings and the upstanding positions thereof illustrated in FIGURE 6 of the drawings closing the open front and rear ends

of the cargo area 58 disposed between the side assemblies 22 and 24. In addition, the loading ramps 54 and 56 may be provided with any suitable means adapted for substantially fluidtight sealed engagement with the corresponding end portions of the inner walls 26.

The free end of the rear loading ramp 56 is sandwiched between a pair of embracing plates 58 and 60 which are secured to the inner and outer surfaces of the loading ramp 56 and which project beyond the free edge portion of the ramp 54 so as to define a recess 62 in which the free end of a front loading ramp 54 of another boat 10 is receivable, the plates 58 and 60 as well as the front ramp 54 being provided with registrable apertures for the reception of removable locking pins 64 therethrough for securing the adjacent front and rear ramps 54 and 56 of a pair of end aligned boats 10 together against pivotal movement relative to each other. In this manner an elongated floating bridge or powered barge assembly such as that illustrated in FIGURE 9 of the drawings and generally designated by reference numeral 66 may be provided by securing a plurality of the boats 10 together. Of course, inasmuch as the loading ramps 54 and 56 are substantially coplanar with the flooring 48, vehicles may be driven through the assembly 66 as desired.

Each of the side assemblies 22 and 24 defines an air passage extending longitudinally thereof through the portion of the side assembly disposed above the upper bottom 14 and below the top wall 30. The forward portion of each outer wall 28 is provided with an exhaust port 68 in which control flap means in the form of a panel-like flap member 70 is disposed. The flap members 70 are of a size and shape receivable in and adapted to close the exhaust ports 68 and are pivotally supported from the outer walls 28 as at 72 for oscillation about axes passing through the flap members 70 and extending along approximate vertical center lines of the ports 68. Further, the forward end of the side assembly 24 includes a driver's compartment 76 provided with suitable hand and foot control actuators 78, 80, 82, and other actuators not shown.

In each of the side assemblies 22 and 24 there is rotatably journaled a shaft 84 upon which front and rear bladed rotary members 86 of front and rear air propelling assemblies 88 are mounted. The front and rear air propelling assemblies 88 include air inlet ducts 90 and 92, respectively, opening upwardly through the corresponding top walls 30 at points spaced longitudinally therealong and it may be seen from FIGURE 8 of the drawings that the ducts 90 and 92 are of a cross-sectional area appreciably less than the total cross-sectional area of the corresponding air passage means defined between the corresponding top wall 30 and the upper bottom 14. Each of the shafts 84 has drivingly coupled thereto a suitable motor 96 supported from the upper bottom 14 by means of any suitable mount 98 and the rear ends of the air passage means above referred to open through the rear ends of the side assemblies 22 and 24, there being provided double rudder assemblies generally referred to by the reference numerals 100 for the rear ends of the side assemblies 22 and 24 operative to selectively laterally deflect the air being discharged rearwardly from the side assemblies 22 and 24. The double rudder assemblies are operatively connected to the hand actuator 78 by means of suitable control means 102 and suitable fluid motors 104 are provided for opening and closing the flap valves 40 and controlled by the hand actuator 80 suitably connected thereto in any convenient manner (not shown).

The wall sections 34 include outlet openings 110 spaced longitudinally thereof and through which air may be exhausted from the air passage means defined by the side assemblies 22 and 24 when flap valves 40 are open. In addition, the forward ends of the air passage means include air deflection baffles 114 for ducting reversing air outwardly of the exhaust ports 80. Finally, a pair of control flaps 116 are disposed within the rear ends of the air passage means and are mounted for oscillation about upstanding axes and

have control means 118 operatively connected thereto which may be actuated by the foot actuator 82. The control flaps 116 are pivotable from longitudinally straight positions such as those illustrated in FIGURE 7 of the drawings to transversely extending positions blocking the rear ends of the air passage means. When the control flaps 116 are transversely disposed, the exhaust ports 68 may be opened by pivoting the flap valves 70 to transversely extending positions. Then, the flap members 70 may be suitably controlled to steer the boat 10 in reverse or in a lateral direction.

It is of course to be understood that suitable control means 120 are provided for the flap members 70 and may be suitably controlled from the driver's compartment 76 by means of the aforementioned other actuator (not shown).

With attention now directed more specifically to FIGURES 11 and 12 of the drawings there may be seen a modified form of air propelled boat generally designated by the reference numeral 10' and which is substantially identical to the air-propelled boat 10 except that it does not include the driver's compartment 76, or the ramps 54 and 56, the latter being replaced by upstanding permanent front and rear walls 54' and 56'. In addition, the air-propelled boat 10' includes a passenger enclosure generally referred to by the reference numeral 76' which also houses the operator's station of the boat 10' and which includes an access door 77 in the rear wall 56' for entrance into the passenger compartment enclosure 76'.

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. An air-propelled boat including an elongated transversely extending bottom section defining a cargo area thereabove, a pair of upstanding sides extending along and projecting upwardly from opposite longitudinal edge portions of said bottom section, defining upstanding sides for said area and including longitudinally extending hollow portions disposed above said bottom section and defining air passage means extending longitudinally of said boat, said air passage means including forward air inlet means and opening rearwardly through the rear end portions of said sides above said bottom section, and air pump means operatively associated with said air passage means to pump air therethrough, said air passage means, said air inlet means and said air pump means being disposed laterally outwardly of corresponding vertical planes extending longitudinally of said boat adjacent the inner surfaces of said sides.

2. The combination of claim 1 wherein said boat includes front and rear loading ramps supported for movement relative to said bottom section and said sides between upstanding positions closing the front and rear ends of said cargo area and lowered generally horizontal positions projecting outwardly from the opposite ends of said bottom section, the outer ends of said front and rear ramps, when in the horizontal positions include means operative for connection to corresponding rear and front ramps of similar boats for securing each pair of front and rear ramps together in generally coplanar relation.

3. The combination of claim 1 wherein said sides include portions projecting slightly below said bottom section, said sides including air outlets communicated with said air passage means and opening inwardly through the portions of said sides which depend below said bottom section.

4. The combination of claim 3 wherein said sides include valve means operable to selectively communicate said air outlets with said air passage means.

5. The combination of claim 1 wherein said boat includes airflow control means operable to controllably laterally deflect the air discharged from the rear ends of said air passage means.

6. The combination of claim 1 wherein said sides include outwardly opening exhaust ports adjacent their forward ends communicated with said air passage means, and control flap means carried by each of said sides and operable to selectively open and close said exhaust ports.

7. The combination of claim 6 wherein said control flap means also includes means operable to controllably laterally deflect the air discharged from said exhaust ports.

8. The combination of claim 1 wherein said sides include outwardly opening exhaust ports adjacent their forward ends communicated with said air passage means, and control flap means carried by each of said sides and operable to selectively open and close said exhaust ports, said control flap means including panel-like flap members complementary to and disposed in said ports and supported for oscillation about upstanding axes.

9. The combination of claim 8 wherein said axes pass through said flaps and extend along the approximate vertical center lines of said ports.

10. The combination of claim 1 wherein said bottom section is buoyant.

11. The combination of claim 2 wherein said front and rear ramps are pivotally secured, along their lower marginal edge portions, for movement about axes extending transversely of the corresponding ends of said bottom section.

12. The combination of claim 1 wherein said cargo area is at least partially covered and is adapted to house passengers.

13. The combination of claim 1 wherein said sides include outwardly opening exhaust ports adjacent their forward ends communicated with said air passage means, and control flap means carried by each of said sides and operable to selectively open and close said exhaust ports, said

air passage means including means spaced forwardly of the rear ends thereof operable to selectively block air from being discharged outwardly of the rear ends of said air passage means.

14. The combination of claim 1 wherein said air pump means comprises axial flow rotary air propelling bladed members disposed in said air passage means downstream of the air inlet means thereof.

15. The combination of claim 1 wherein said air inlet means open upwardly and outwardly of the forward end portions of said sides.

16. The combination of claim 15 wherein said air pump means comprises axial flow rotary air propelling bladed members disposed in said air passage means downstream of the air inlet means thereof, said bladed member occupying appreciably less than the total cross-sectional area of said air passage means, said sides include outwardly opening exhaust ports adjacent their forward ends communicated with said air passage means, and control flap means carried by each of said sides and operable to selectively open and close said exhaust ports, said exhaust ports being disposed forward of said bladed members.

17. The combination of claim 16 wherein said exhaust ports are also disposed forward of said air inlet means.

18. The combination of claim 17, wherein said air passage means includes means spaced forwardly of the rear ends thereof operable to selectively block air from being discharged outwardly of the rear ends of said air passage means.

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