Feb. 6, 1973 J. VAN. VELDHUIZEN 3,714,918

AIR BOAT WITH AIR CUSHION

Filed July 6, 1970 2 Sheets-Sheet 1

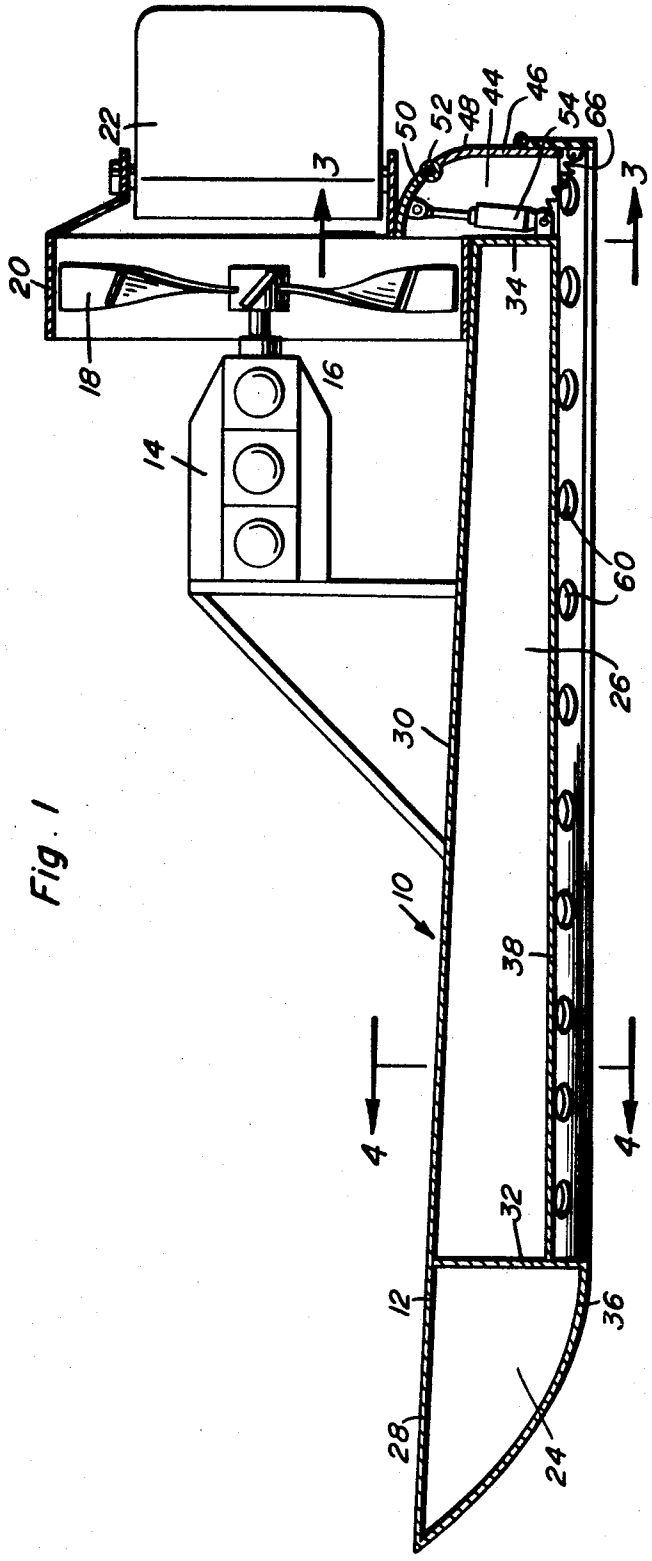


Fig. 1

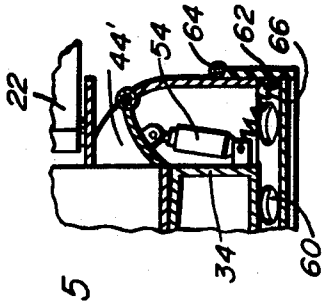


Fig. 5

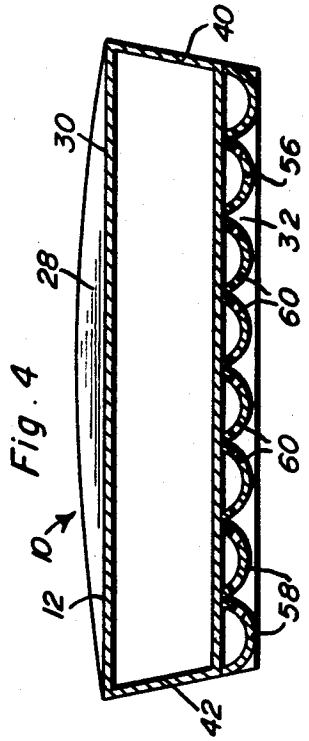


Fig. 4

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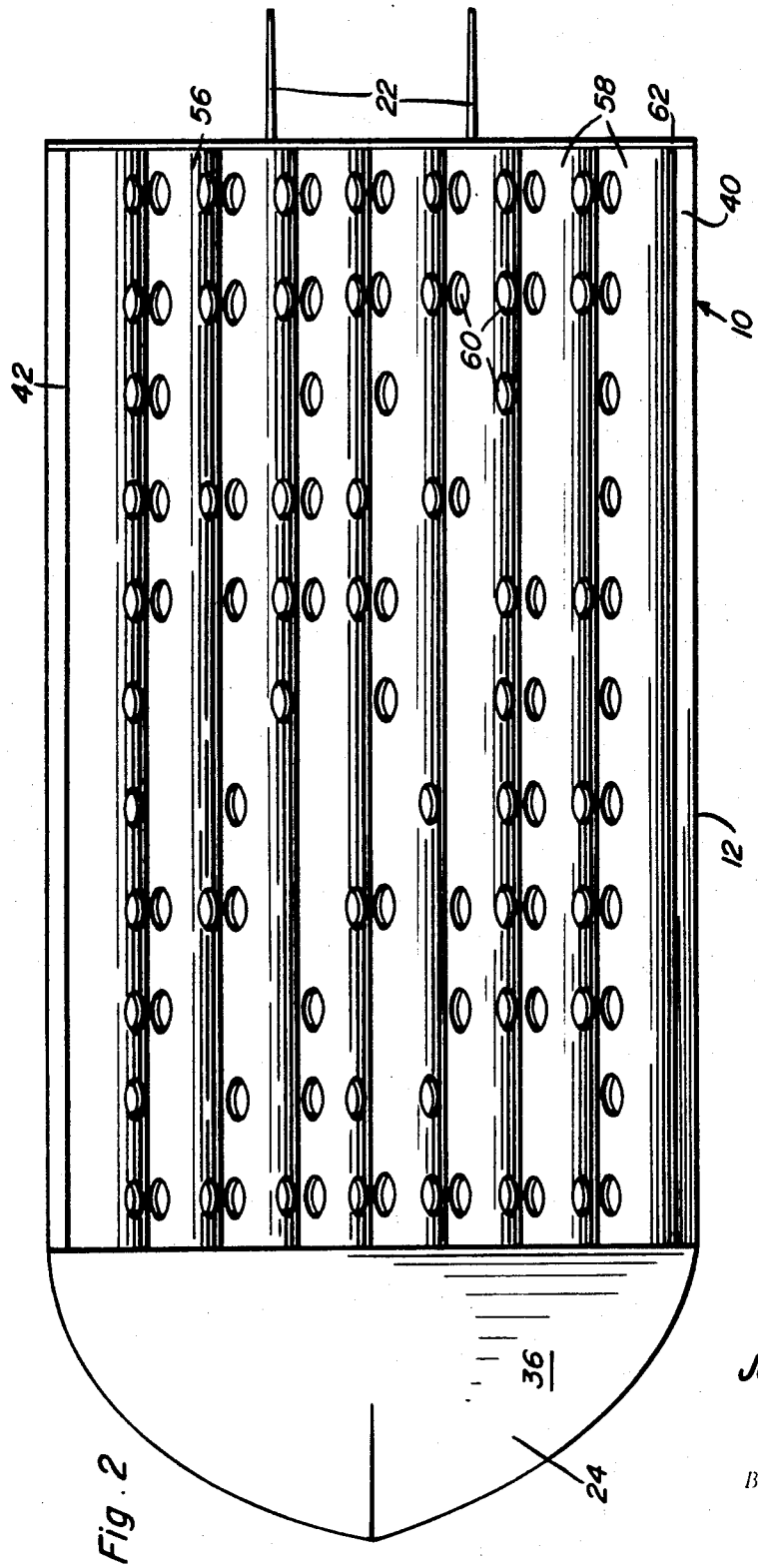


Fig. 2

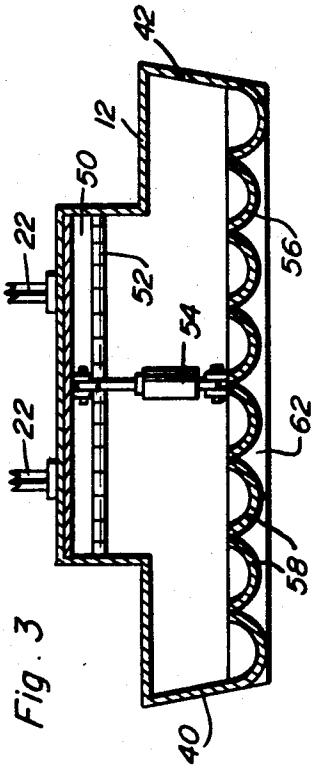


Fig. 3

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AIR BOAT WITH AIR CUSHION

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U.S. Cl. 114—67 A 12 Claims

ABSTRACT OF THE DISCLOSURE

A water surface planing craft including a hull having a bottom surface provided with a plurality of air outlets opening downwardly therethrough. A motor driven air propeller is carried by the hull for discharging air rearwardly propelling the hull forwardly. Further, structure is provided for trapping and ducting a portion of the rearward discharge of air from propeller to the air outlets, whereby the trapped inducted portion of the rearward air discharged from the air propeller is used to form at least a partial blanket of air between the bottom surface of the hull and the surface of the water over which the hull is moving.

The air boat construction of the instant invention has been specifically designed for use in shallow water and travel over marsh and swamp grasses.

The basic configuration and operation of the air boat construction of the instant invention is quite similar to conventional propeller driven air boats provided with generally flat bottom planing surfaces. However, the air boat of the instant invention is provided with a false bottom planing surface spaced below the air-tight bottom and air outlet holes are provided in the false bottom. An air trapping and ducting structure is provided on the hull and is operable to trap a portion of the rearward discharge of air from the air propeller and duct the trapped air into the area between the water-tight bottom of the hull and the false bottom of the hull for discharge through the holes or openings formed in the false bottom. In this manner, a blanket or thin layer of air is formed between the bottom planing surface of the hull and the surface of the water over which the hull is moving. This of course results in reduced skin friction and slightly higher riding of the boat hull on the water and in turn affords for higher speed of the hull with less power.

The false bottom surface of the hull is corrugated whereby the air discharged downwardly through the false bottom is for the most part retained in longitudinal downwardly opening channels so as to reduce the amount of air which moves laterally outwardly from the beneath the false bottom of the hull.

The main object of this invention is to provide an air boat construction which will be capable of travel in even shallower water than may be crossed by a conventional air boat and an air boat which at the same time will be capable of higher speeds with less power.

Another object of this invention is to provide an improved air boat construction which may be readily incorporated into the manufacture of conventional air boats.

Still another object of this invention is to provide an improved air boat construction which will conform to conventional forms of manufacture, be of simple construction and easy to operate so as to provide a device that will be economically feasible, long lasting and relatively trouble-free in operation.

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:

FIG. 1 is a longitudinal vertical sectional view taken substantially upon a plane passing through the longitudinal center line of an air boat constructed in accordance with the present invention;

FIG. 2 is a bottom plan view of the air boat construction;

FIG. 3 is a vertical transverse sectional view taken substantially upon the plane indicated by section line 3—3 of FIG. 1.

FIG. 4 is a transverse vertical sectional view taken substantially upon a plane indicated by section line 4—4 of FIG. 1; and

FIG. 5 is a fragmentary longitudinal vertical sectional view similar to the lower right-hand portion of FIG. 1 but illustrating the air trapping shutter of the instant invention in a closed position.

Referring now more specifically to the drawings the numeral **10** generally designates an air boat constructed in accordance with the present invention and which includes a hull **12** above whose aft portion a motor **14** is supported in elevated position. The motor **14** includes a rearwardly projecting rotary output shaft **16** upon which an air propeller **18** is mounted. Further, an air shroud **20** is supported from the hull **12** and closely embraces the air propeller **18**. In additional, a pair of opposite side air rudders **22** are supported for oscillation about parallel upstanding axes and the air rudders **22** are interconnected for simultaneous and equal oscillation and suitable controls (not shown) are provided for oscillating the air rudders **22**.

The hull **12** includes a sealed forward chamber **24** and a sealed longitudinally extending main hull chamber **26** forward of whose front end of the bow chamber **24** is disposed.

The bow and main hull chambers **24** and **26** include coextensive upper walls or deck surfaces **28** and **30** and the motor **14** and shroud **20** are supported from the deck surface **30**. An upstanding partition **32** separate the bow chamber **24** from the main hull chamber **26** and the rear end of the main hull chamber **26** is closed by means of a rear wall **34**. The bow chamber **24** includes an upwardly curving transverse bottom surface or wall **36** and the main hull chamber **26** includes a bottom wall **38** whose forward end is stepped above the rear end of the bottom wall **36**. Of course, the hull **12** includes opposite side walls **40** and **42** interconnecting corresponding marginal edge portions of the walls **30** and **38** and the bow compartment **24** also includes side wall portions extending between the walls **28** and **36**.

The rear ends of the side walls **40** and **42** include extensions **44** which project rearwardly of the rear wall **34** and the rear ends of the extensions **44** are interconnected by means of a transverse upstanding wall **46** which curves forwardly at its upper end portion as at **48**. It will be noted that the wall **46** projects upwardly above the top deck or wall **30** of the main hull chamber **26** and also above the lower peripheral portion of the air propeller **18**.

A partial cylindrical air shutter or gate **50** is pivotally secured to the upper marginal edge portion of the wall **46** by means of a hinge construction **52** and an extendable fluid motor **54** is operatively connected between the wall **34** and the air shutter **50** and may be extended and retracted to raise and lower the air shutter **50** between the upper open position thereof illustrated in FIG. 1 of the drawings and the lowered closed position thereof illustrated in FIG. 5 of the drawings.

From FIG. 5 of the drawings it may further be seen that the extensions **44** include upper portions **44'** which

conform to the upper open position of the air shutter **50** in order to define a forwardly opening air duct immediately behind the lower peripheral portion of the air propeller **18**. Further, from FIGS. 1 and 5 of the drawings it may be seen that the free swinging edge portion of the air shutter **50** forms a reasonably good seal with the rear marginal edge portion of the top deck or wall **30** when the air shutter **50** is in the closed position.

The hull **12** includes a corrugated false bottom wall **56** disposed beneath the bottom wall **38** and the false bottom wall **56** includes a plurality of side-by-side upwardly opening and longitudinally extending semi-cylindrical members **58** secured to the bottom wall **38**. The semi-cylindrical members **58** extend rearwardly of the rear transverse wall **34** and thus open up into the air plenum defined between the extensions **44**, the wall **46** and the wall **34**. The semi-cylindrical members **58** also form a bottom for the plenum and each of the semi-cylindrical members **58** has a plurality of air outlet openings **60** formed therein through which air may be exhausted from within the semi-cylindrical members **58** outwardly through the false bottom **56**.

The rear ends of the semi-cylindrical members **58** are closed by means of an upstanding transverse flexible panel member or flap **62** hinged along its upper marginal edge portion as at **64** to the wall **46** a spaced distance above the lower marginal edge portion thereof. The flap **62** terminates downwardly in a horizontal plane generally aligned with the lower extremities of the semi-cylindrical members **58**. Although it will be noted from FIG. 4 of the drawings that the lower extremities of the semi-cylindrical members **58** are disposed along a transversely bowed path extending longitudinally of the hull **10** and opening downwardly. This disposition of the lower extremities of the semi-cylindrical members **58** further insures that most of the air discharged from the opening **60** will be trapped between the extreme opposite side semi-cylindrical members **50**.

In operation, when the hull **12** is being propelled at high speeds by the air propeller **18**, variable portions of the rear discharge of the air from the air propeller **18** may be trapped and ducted into the plenum disposed rearwardly of the wall **34** and into the rear ends of the upwardly opening semi-cylindrical members **58** for forward movement therein and outward discharge through the various openings **60** formed in the semi-cylindrical members **58**. The amount of air to be trapped and ducted into the semi-cylindrical members **58** may of course be controlled by actuation of the extendable fluid motor **54**. A maximum amount of air is ducted to the semi-cylindrical members **58** with the air shutter **50** as in the raised opened position illustrated in FIG. 1 of the drawings and substantially no air is trapped and ducted to the semi-cylindrical members **58** when the air shutter **50** is in the closed position illustrated in FIG. 5 of the drawings.

It will of course be noted that only the lower portion of the rear discharge of the air from the air propeller **18** can be trapped and ducted to the semi-cylindrical members **58**. Accordingly, a great majority of the rearward discharge of air from the air propeller **18** is still utilized for forward propulsion of the boat **10**. However, the quantity of air which is trapped and ducted to the semi-cylindrical members **58** when the air shutter **50** is in the open position thereof illustrated in FIG. 1 of the drawings is sufficient to cause a considerable discharge of air to be passed through the opening **60** and beneath the false bottom wall **56** in order to form an air blanket or layer between the false bottom **56** and the surface of the water over which the boat **10** is planing.

It will also be noted that the greater air pressure within the semi-cylindrical members **58** is realized at the rear ends of the members **58** and therefore that a greater amount of air will be discharged from the rear opening

60 than will be discharged from the forward opening **60**. Inasmuch as the boat **10**, when planing over the water at high speeds, has a major portion of its weight supported by its aft end, this greater amount of air discharged through the aft openings **60** compensates for the heavier loading of the boat **10** at its rear end.

The shutter or flap **62** is utilized to restrict the flow of air outwardly from beneath the rear ends of the semi-cylindrical members **58**. However, the flap is pivoted rearward as the boat **10** planes over the water at high speeds and only the extreme lower marginal edge portion of the flap **62** contacts the water with the result that the flap **62** does not offer appreciable drag on the boat **10**, even though urged toward a closed position by spring **66**.

As hereinbefore set forth, the powering and controlling of the boat **10** may be substantially the same as the powering and control of a conventional air boat, except for actuation of the extendable fluid motor **54** which may be accomplished by any suitable fluid pressure system (not shown).

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 boat construction comprising a hull including a false bottom adapted to plane over the surface of a body of water, said false bottom having a plurality of air outlets opening downwardly therethrough, air propulsion means carried by said hull for discharging propulsion air rearwardly from said hull, and means operative to trap and duct a portion of the rear discharge of propulsion air from said air propulsion means to said air outlets, whereby said trapped and ducted portion of the rear discharge of air from said air propulsion means may be used to form at least a partial blanket of air between the surface of said water and the bottom surface of said hull, said false bottom being longitudinally corrugated.

2. The combination of claim **1** wherein said air outlets open downwardly through said false bottom above the lowest depending ridges defined by said corrugated false bottom.

3. The combination of claim **2** wherein said hull includes a water-tight inner bottom structure above said false bottom.

4. The combination of claim **1** wherein the depending ridge forming portions of the corrugated false bottom disposed adjacent and extending along the opposite side longitudinal marginal portions of said false bottom project downwardly below the other ridge forming portions of said corrugated false bottom.

5. The combination of claim **2** wherein said hull includes a water-tight inner bottom structure above said false bottom, said false bottom projecting rearwardly of said inner bottom, said means comprising an upstanding air plenum disposed behind said inner bottom closed at its lower end by means of said false bottom and including a forwardly opening upper end disposed in horizontal registry with and behind the lower portion of the rear discharge of propulsion air.

6. The combination of claim **5** wherein said forwardly opening upper end of said plenum includes gate means shiftable between open and closed positions opening and closing the upper end of said plenum.

7. The combination of claim **6** wherein said gate means, when in said open position, comprises an upper extension of the rear wall of said plenum.

8. An air boat construction comprising a hull including a false bottom adapted to plane over the surface of a

body of water, said false bottom having a plurality of air outlets opening downwardly therethrough, air propulsion means carried by said hull for discharging propulsion air rearwardly from said hull, and means operative to trap and duct a portion of the rear discharge of propulsion air from said air propulsion means to said air outlets, whereby said trapped and ducted portion of the rear discharge of air from said air propulsion means may be used to form at least a partial blanket of air between the surface of said water and the bottom surface of hull, an upstanding flap member carried by the rear end of said hull and extending transversely thereacross, the lower marginal edge portion of said flap member projecting slightly below at least portions of the rear marginal edge portion of said false bottom.

9. The combination of claim **8** wherein the upper marginal edge portion of said flap member is pivotally supported from said hull for swinging about a horizontal transverse axis, whereby the lower free edge portion of said flap member may be swung rearwardly and upwardly to at least a partially retracted position in response to rapid forward movement of said hull over water.

10. The combination of claim **9** wherein said flap is constructed of resilient material and is spring urged toward a fully extended position abutting at least portions of the rear marginal edge of said false bottom.

11. An air boat construction comprising a hull including a bottom adapted to plane over the surface of a body of water, said bottom having a plurality of air outlets opening downwardly therethrough, air propulsion means carried by said hull for discharging propulsion air

rearwardly from said hull, and means operative to trap and duct a portion of the rear discharge of propulsion air from said air propulsion means to said air outlets, whereby said trapped and ducted portion of the rear discharge of air from said air propulsion means may be used to form at least a partial blanket of air between the surface of said water and the bottom surface of said hull, said bottom being longitudinally corrugated, said means operative to trap and duct a portion of the rear discharge of propulsion air including an upstanding air plenum having a forwardly opening upper end disposed in horizontal registry with and behind the lower portion of rear discharge of propulsion air, the lower end of said plenum being communicated with said air outlets, and gate means operatively associated with the forwardly opening upper end of said plenum shiftable between open and closed positions opening and closing the upper end of said plenum.

12. The combination of claim **11** wherein the opposite side marginal portions of said bottom include portions thereof extending longitudinally of said hull which project downwardly and define barriers to lateral outward movement of air from beneath said bottom.

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