March 11, 1969 P. VAN DILLARD REDMOND 3,431,881

BOAT WITH AIR PROPULSION AND SUPPORT MEANS

Filed Nov. 13, 1967 Sheet 1 of 2

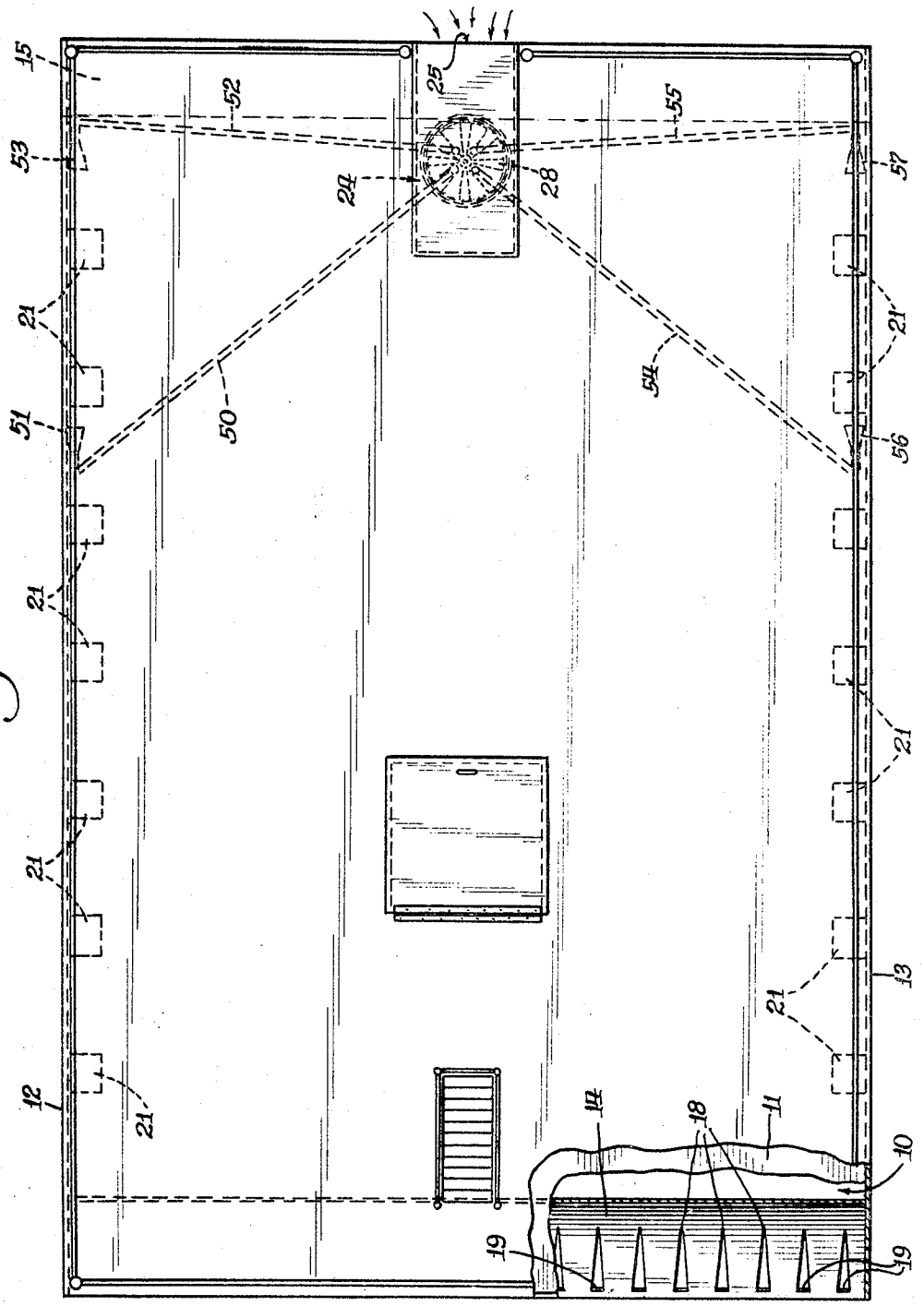


Fig. 1.

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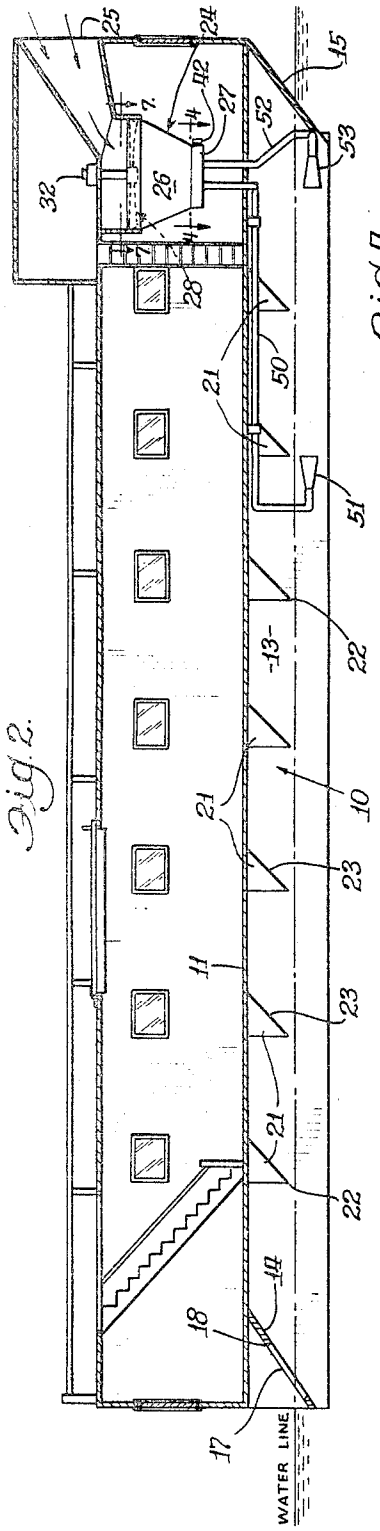


Fig. 2.

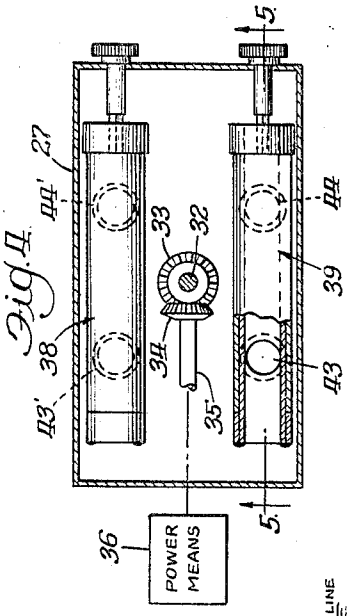


Fig. 4.

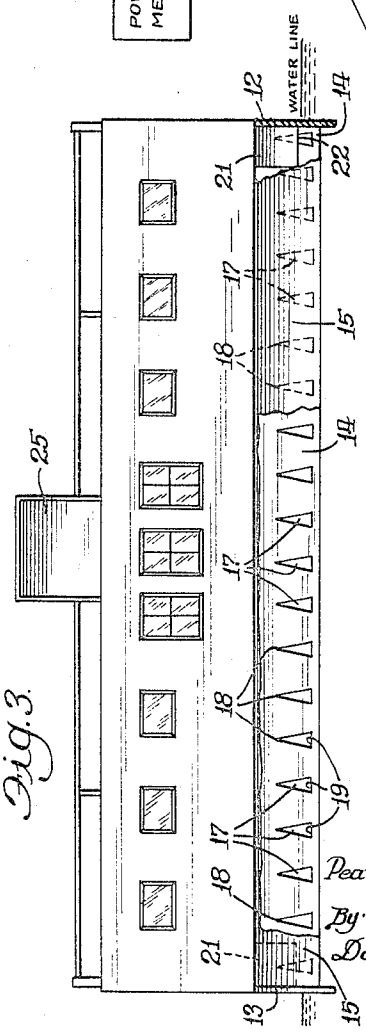


Fig. 3.

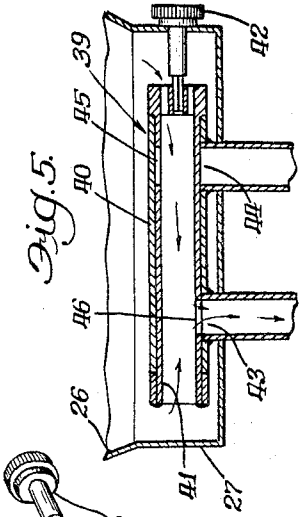


Fig. 5.

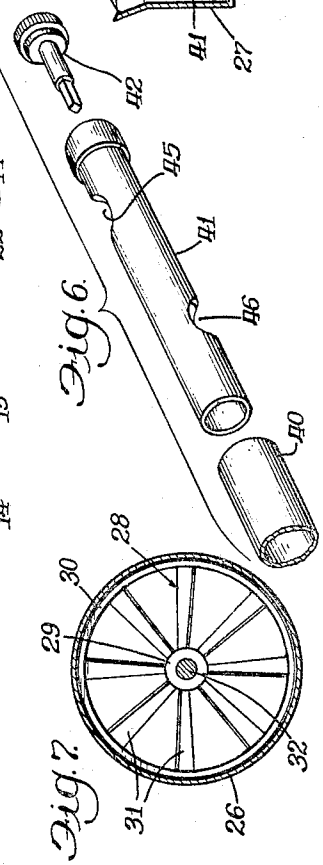


Fig. 6.

Fig. 7.

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BOAT WITH AIR PROPULSION AND SUPPORT MEANS

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U.S. Cl. 115—11 13 Claims
Int. Cl. B63h 11/00

ABSTRACT OF THE DISCLOSURE

A boat has downwardly extending sides defining an open bottom air compartment. Within the compartment are a plurality of buoyancy tanks. The portion defining the rear of the compartment is a panel slanting upwardly and forwardly. The top of this panel is solid while the lower part of the panel has a plurality of triangular openings with the bases of the triangles at the bottom. The fan type air compressor has an air intake above the water level and feeds four nozzles pesitioned below the water and below the compartment so that air released from the nozzles will be trapped within a compartment. One pair of the four nozzles is positioned adjacent one side of the boat and a second pair of the four nozzles is positioned adjacent the other side of the boat. One nozzle of each pair is directed rearwardly so that air released therefrom will propel the boat forwardly and the other nozzle of each pair is directed forwardly so that air released therefrom will propel the boat rearwardly. Between each pair of nozzles and the compressor is a valve comprising an outer casing member having two ports spaced along the longitudinal axis of the casing and with the same radial position. Within the cylindrical casing member is a cylindrical sleeve member having two ports with the same longitudinal position as the ports of the casing member but positioned 180 degrees apart radially. The sleeve and casing are open at one end and are positioned in a plenum communicating with the compressor so that air from the compressor will enter the plenum and the open end of the members. A handle is connected to the sleeve so that the sleeve may be rotated within the casing to permit the operator to align one port of the sleeve member with the corresponding port of the casing member or align the other port of the sleeve member with the corresponding port of the casing member. Thus, the air may be directed into one or the other of the nozzles of a pair.

Description of the figures

FIGURE 1 is a plan view partially broken away of an embodiment of the invention;

FIGURE 2 is a longitudinal section of the embodiment of FIGURE 1;

FIGURE 3 is a front view of the embodiment of FIGURE 1 with portions broken away and with the air nozzles omitted;

FIGURE 4 is a partial section as viewed at line 4—4 of FIGURE 2;

FIGURE 5 is a partial section as viewed at line 5—5 of FIGURE 4;

FIGURE 6 is a perspective view of an exploded valve; and

FIGURE 7 is a partial section as viewed at line 7—7 of FIGURE 2.

Description of the specific embodiment

FIGURES 1–3 illustrate a boat (the term being used in its broad sense to include the larger craft generally identified by the term ships). The superstructure of this boat is unimportant so far as the present invention is concerned, except so far as it is hereinafter specifically described. At the bottom, the boat has an air compartment generally **10** formed by the horizontal first deck **11** and downwardly extending walls including the opposed sides **12** and **13**, a rear panel **14**, and a front panel **15**. The front and rear panels **15** and **14** respectively slant upwardly and forwardly. The rear panel has a plurality of triangular openings **17** therethrough. These openings have a top **18** which is below the top of compartment **10** (as defined by first deck **11**). The base **19** of openings **17** are above the bottom of panel **14** although in some embodiments they might extend to the bottom of the panel. The bottom of openings **19** also are substantially above the bottom of sides **12** and **13** as best seen in FIGURES 2 and 3.

Within compartment **10** are a plurality of buoyancy tanks **21** of sufficient capacity to support the boat even though the water level is at or above the tops **18** of openings **17**. Because the tops of openings **18** are below the top of compartment **10** there will, in that event, be some trapped air in compartment **10** to assist in supporting the boat. The bottoms **22** of tanks **21** are above the normal water line when the boat is operated, as hereinafter described.

An air compressor generally **24** has an air intake **25** at the front of the boat. Compressor **24** includes an outer casing **26**, the bottom of which forms a rectangular air plenum **27**. Within casing **24** is the rotary compressor member in the form of fan **28**. Fan **28** comprises a hub **29** and an outer annular band **30**. Connected between hub **29** and band **30** are a plurality of generally radial fan blades **31**. Hub **29** is secured to a shaft **32** suitably journaled in the frame of the boat. Interengaging gears **33** and **34** operatively connect shaft **32** to a shaft **35** driven by a power means **36**. The rotation of fan **28** draws air into intake **25** and forces that air under pressure into plenum **27**.

Within plenum **27** are a pair of control valves **28** and **29**. These valves are identical and only valve **29** will be described in detail. Valve **29** includes an outer, cylindrical, casing member **40** within which is a cylindrical sleeve member **41**. A handle **42** connected to sleeve **41** permits an operator to rotate the sleeve within the casing. Casing **40** has two outlet ports **43** and **44**. These are spaced along the longitudinal axis of the casing and have the same radial position with respect to that axis. Sleeve **41** has two ports **45** and **46** having the same longitudinal position as ports **43** and **44** but having radial positions which are 180 degrees apart. The ends of the sleeves and casings have openings therethrough through which the air from plenum **27** may enter the inside of the sleeve. The air is directed to one, the other, or neither of the outlet ports **43** and **44** depending upon the radial position of the sleeve within the casing. Similarly valve **28** has a plurality of outlet ports **43'** and **44'**.

A pipe **50** connects outlet port **43'** with a forwardly directed air discharge nozzle **51** while a pipe **52** connects discharge port **44'** with a rearwardly directed discharge nozzle **53**. Similarly pipes **54** and **55** connect discharge ports **43** and **44** with forwardly and rearwardly directed discharge nozzles **56** and **57** respectively. If valves **28** and **29** are set so that the air is released through nozzles **53** and **57** the boat will be propelled forwardly by the reaction force of the released air against the water. Conversely the opposite setting of the valves will release air through nozzles **51** and **56** to propel the baot rearwardly. If the boat is to be turned to port, valve **29** would be set to release air through nozzle **57** and valve **28** would be set to release air through nozzle **51**. The opposite setting of valves **28** and **29** would turn the boat

to starboard by the release of air through nozzles 53 and 56. If the valves are set with ports 45 and 46 out of registry with ports 43 and 44, no air will be released.

Nozzles 51, 53, 56 and 57 are positioned so that the air released therefrom will be trapped in compartment 10. This trapped air will support the boat on a layer of compressed air resulting in little resistance to its travel over the water. The trapped air is discharged from compartment 10 through openings 17. Because of the configurations of opening 17 there will be a measure of self-regulation as to the height of the first deck 11 above the water. Should conditions (e.g. weight of load in the boat or volume of air discharged through the nozzles) vary, more or less of openings 17 will be exposed to result in a greater or less release of air through these openings and thus adjust the height. With the boat higher upon the water, more of openings 17 will be exposed resulting in a greater release of air and permitting the boat to settle. Conversely if the boat settles too much, less air will be released and more of the air from the nozzles will be trapped within compartment 10. Under normal conditions the proportions are adjusted so that the bottoms 22 of the buoyancy tanks will be above the normal level of the water line. Should there be any tendency of the boat to roll this will be counteracted by the buoyancy tanks 21 with the buoyancy tanks on the low side effecting additional support for the low side of the boat. It will be noted that the fronts 23 of the buoyancy tanks 21 are sloped upwardly and forwardly so that there will be less resistance to forward movement as the buoyancy tanks enter the water and to provide an upward force by the pressure of the water against the forward faces 23 of the tanks. The buoyancy tanks 21 also afford support when air is not being released from any of the nozzles and only that part of compartment above the tops 18 of openings 17 is closed against the release of air and the size of the tanks, in relation to the weight to be supported, would be designed accordingly.

I claim:

1. A boat for traveling on water comprising: first means at the bottom of the boat and including downwardly extending fixed walls and defining an air compartment closed on the sides and fore and aft and with an open bottom; and second means to intake air from above the water, compress the air and release it under the water below said compartment, said second means including an air discharge nozzle means through which the air is released in a given orientation with respect to the boat so as to move the boat in a given direction by reaction force with the water and allow the air so released to rise through the water into the compartment to be trapped therein; said compartment being of such a size that the air trapped therein after being released from said nozzle means will support the boat on the water; one of said walls having a plurality of triangular controlled air release openings with the top of said openings being spaced downwardly from the top of the compartment so as to have an air chamber in the compartment and above the water when the water level is at the top of the opening closing it off, the top of said opening being substantially smaller than the bottom of said opening.

2. A boat as set forth in claim 1, wherein the wall having said opening is the aft wall of the boat.

3. A boat as set forth in claim 2, wherein the aft wall of the boat slants upwardly towards the front of the boat.

4. A boat as set forth in claim 3, wherein said nozzle means includes a manually operable control device whereby the air may be selectively released toward the front or the back of the boat to propel the boat rearwardly or forwardly respectively.

5. A boat as set forth in claim 4, wherein said nozzle means includes four nozzles, one pair of nozzles being at the port side of the boat and a second pair of nozzles being at the starboard side of the boat, one nozzle of each pair being directed toward the back and the other nozzle of each pair being directed toward the front, and said device includes valves for each pair connected to the pair so that air may alternatively be directed to one or the other of each pair independently of the manner in which the air is being directed to the nozzles of the other pair.

6. A boat as set forth in claim 5, including buoyancy tanks below the top of the compartment and above the normal level of the water with respect to the boat at times when air is continuously being released from said nozzle means and trapped within said compartment, said tanks being of sufficient capacity to support said boat in conjunction with the portion of the compartment above said openings when the water level is at and above the top of said openings.

7. A boat as set forth in claim 6, wherein said second means includes a power driven fan having a hub, an annular band concentric with the hub and a plurality of generally radial fan blades connecting the hub and the band.

8. A boat as set forth in claim 5, wherein each valve includes an annular casing member open at one end and an annular valve sleeve member within said casing and rotatable therein about the longitudinal axis of the two, said casing member having a first discharge port communicating with one nozzle of the respective pair of nozzles and a second discharge port communicating with the other nozzle of the respective pair, said sleeve member having two ports therethrough with one in the same longitudinal position along said axis as one of the casing member ports and the other having the same longitudinal position along the axis as the other of the casing member ports, the ports of one member having a different radial position with respect to each other so that by rotation of the sleeve only one port of the sleeve member may at any time be aligned with one port of the casing member.

9. A boat as set forth in claim 1, wherein said nozzle means includes a manually operable control device whereby the air may be selectively released toward the front or the back of the boat to propel the boat rearwardly or forwardly respectively.

10. A boat as set forth in claim 9, wherein said nozzle means includes four nozzles, one pair of nozzles being at the port side of the boat and a second pair of nozzles being at the starboard side of the boat, one nozzle of each pair being directed toward the back and the other nozzle of each pair being directed toward the front, and said device includes valves for each pair connected to the pair so that air may alternatively be directed to one or the other of each pair independently of the manner in which the air is being directed to the nozzles of the other pair.

11. A boat as set forth in claim 10, wherein each valve includes an annular casing member open at one end and an annular valve sleeve member within said casing and rotatable therein about the longitudinal axis of the two, said casing member having a first discharge port communicating with one nozzle of the respective pair of nozzles and a second discharge port communicating with the other nozzle of the respective pair, said sleeve member having two ports therethrough with one in the same longitudinal position along said axis as one of the casing member ports and the other having the same longitudinal position along the axis as the other of the casing member ports, the ports of one member having a different radial position with respect to each other so that by rotation of the sleeve only one port of the sleeve member may at any time be aligned with one port of the casing member.

12. A boat as set forth in claim 10, including buoyancy tanks below the top of the compartment and above the normal level of the water when air is continuously being released from said nozzle means and trapped within said compartment, said tanks being of sufficient capacity to support said boat in conjunction with the portion of the

compartment above said opening when the water level is at and above the top of said opening.

13. A boat as set forth in claim 1, including buoyancy tanks below the top of the compartment and above the normal level of the water when air is continuously being released from said nozzle means and trapped within said compartment, said tanks being of sufficient capacity to support said boat in conjunction with the portion of the compartment above said opening when the water level is at and above the top of said opening.

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U.S. Cl. X.R.

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