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BOAT

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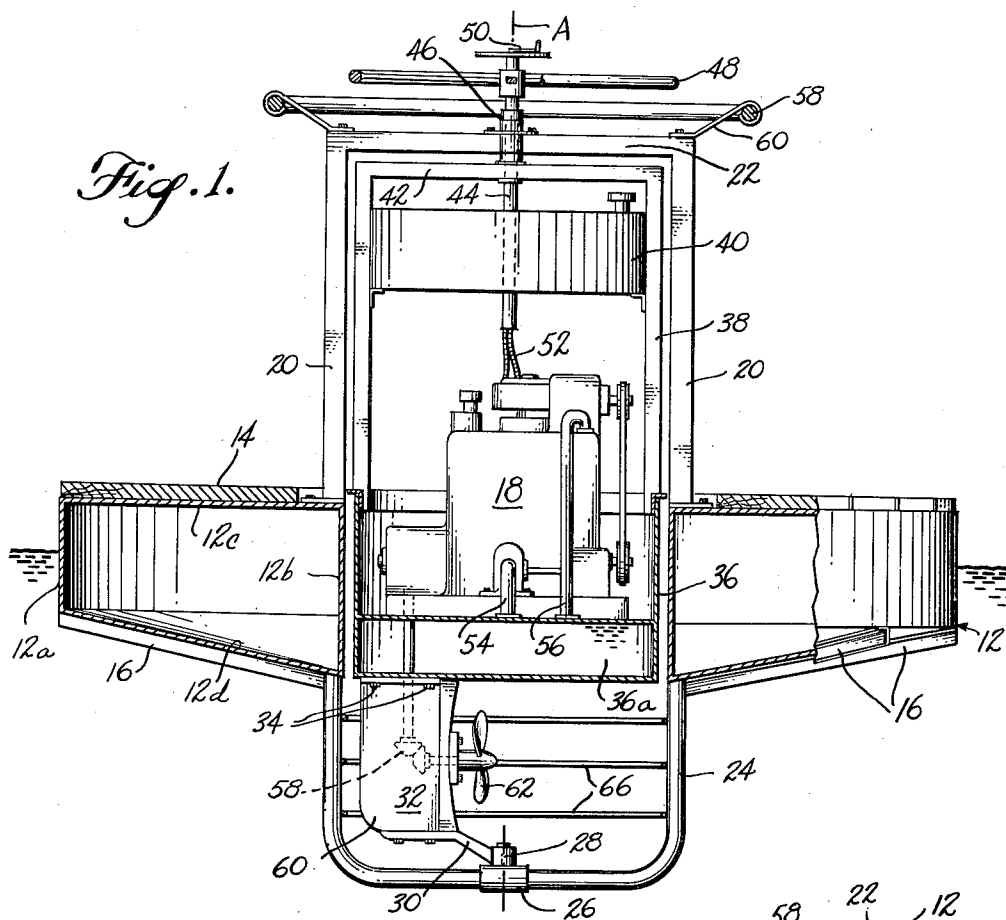
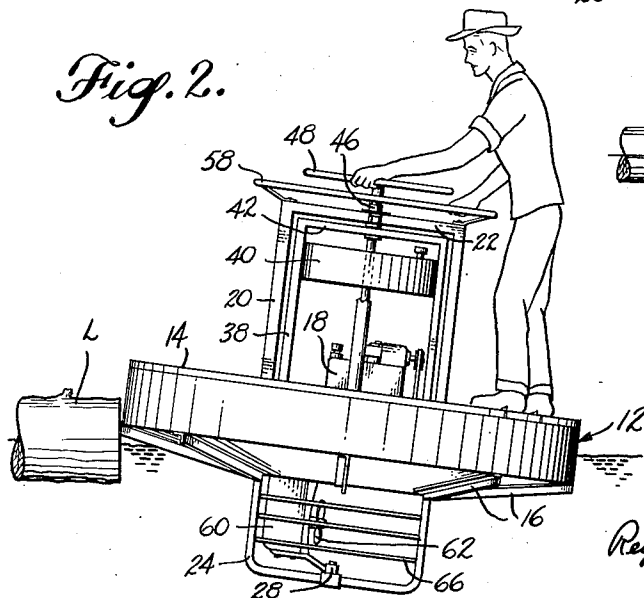
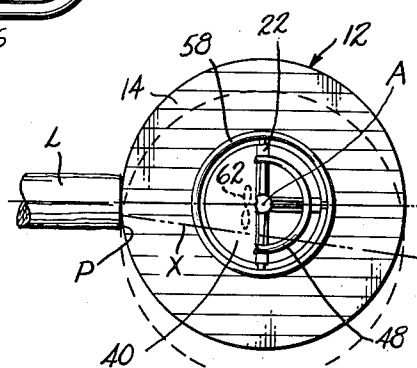


Fig. 3.

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BOAT

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This invention relates to a novel type of boat and more especially to a power boat having useful purposes not satisfied by any known or existing type. More particularly, the invention is concerned with and is herein illustratively described as a work boat intended primarily for use in the maneuvering of floating logs in mill ponds and other bodies of water. However, it will be recognized that in various aspects the invention is not necessarily limited to the illustrative details nor to the illustrative application thereof.

The job of boom men in sawmill ponds is difficult and at times dangerous. Ordinary boats, rowboats, outboard motorboats, etc., are cumbersome because of the problems of maneuvering in confined spaces along discontinuous courses. Their use to transport the men about on the pond and to push or tow logs to the mill slip or into segregated groups is time consuming. When the mill is operating the timing of delivery of selected logs to the slip is important to the over-all efficiency and economy of the mill. These and various other factors amounting to well known problems in most mill pond operations inspired the present invention, directed toward reducing costs, dangers and unduly strenuous labor in such work.

Another object of this invention is a work boat which is compact so as to be maneuverable in confined spaces and which is highly maneuverable for threading its way between and around floating logs to permit separation and segregation of logs and carrying out many of the other operations incident to mill pond operations.

Another object of the invention is a work boat by which logs or other floating objects may be pushed conveniently and quickly from one place to another without necessity of connecting or tying the log to the boat. More specifically it is an object to provide a type of power boat wherein the shape of the hull and the relative location therein of the propulsion unit are such that the boat may be advanced in any selected direction of abutment against a log to push the same ahead of the boat, with an inherent tendency for the boat to maintain itself squarely abutted against the side or end of a log in the selected heading.

Still another object of the invention is a power boat or the like having such a hull shape and propulsion unit arrangement that the direction of heading of the boat may be changed at any instant and throughout a 360° range. Thus, from a given heading the boat may be caused immediately to assume any new heading merely by proper repositioning of a steering mechanism, and will perform (as to steering, speed, stability, etc.) in the same manner in the new direction as in the old without requiring the boat hull itself to become reoriented.

A related object is a power boat having the above-described characteristics which is nevertheless relatively stable in the water and which may be maneuvered abruptly in practically any manner with substantially perfect safety to the operator and any passengers which the boat is capable of carrying. Moreover, the novel boat may be manufactured at relatively low cost and to with-

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stand rough treatment as necessary for mill pond operations and the like.

The advantages of stability and exceptional maneuverability of the boat give it a versatility for different applications not heretofore available in any existing type of boat.

In its presently preferred and disclosed form the novel boat has a round cylindrical hull with a sloping bottom, with a central well formed along the vertical axis of symmetry of the hull to receive the power unit which is suspended on thrust bearings for rotational movement about such axis throughout a continuous 360° range. A propeller unit supported and driven by the power source is located beneath the well with the propeller situated in the vicinity of the central vertical axis of the hull and directed in a plane containing such axis, said power unit being rotatable with the motive power source. A steering wheel mounted at convenient elevation above deck level on the hull is provided for turning the entire powered propulsion unit about the central vertical axis so that the direction of thrust of the propeller may be changed to any new heading at will. Preferably the propeller is situated forwardly of the vertical axis so as to minimize any tendency for the boat to whip. Structural vanes mounted on the exterior of the sloping bottom portion of the hull provide reinforcing to the hull and impart rotary damping action thereto minimizing any spinning tendency of the hull.

Because of the continuously rotatable powered propulsion unit controlled as to angular position by the steering wheel the operator may cause the boat to follow any desired new course from any given heading whether the boat is then at rest or in motion. A change of heading neither requires nor produces a change of hull orientation, hence the turning radius is reduced to a minimum. The circular form of the hull and the relatively low center of gravity of the boat due to the mounting of the power unit in the well formed centrally in the hull assures maximum stability and maneuverability. The boat is provided with a planked deck extending around the well so that the operator may change his position as necessary in order to face in any new direction of heading.

These and other features, objects and advantages of the invention together with certain details of construction of the presently preferred form will become more fully evident from the following description thereof by reference to the accompanying drawings.

Figure 1 is a sectional side elevation of the novel power boat.

Figure 2 is a side elevation view of the boat in operation pushing a log.

Figure 3 is a simplified plan view illustrating an operating principle of the invention.

Referring to the drawings, the boat's hull structure 12 is of annular form and is preferably manufactured of sheet steel or other suitable material which can be welded together to form the completely sealed ring-like hull. The hull proper comprises the outer cylindrical sheet metal ring 12a, the inner cylindrical sheet metal ring 12b concentric to ring 12a, the flat sheet metal annular top or deck plate 12c welded at outside and inside edges to the respective rings 12a and 12b, and the conical-annular sheet metal bottom ring 12d, likewise welded continuously at its outside and inside edges to the respective cylindrical rings 12a and 12b. If desired the hull proper may be compartmented or may be partially filled with cork blocks or other lightweight buoyant material or hollow containers assuring buoyancy of the hull in case of leakage.

The hull top is substantially flat and in the rest position of the hull assumes a horizontal attitude. It is decked over by planking 14 so that in the illustrated case it may

be walked upon safely by loggers with spiked boots. The hull bottom plate 12b is reinforced and protected externally by the angle iron ribs 16 which extend radially between the inside and outside edges of the bottom member 12b at different angular positions therearound. These ribs in addition to reinforcing and protecting the hull bottom act as anti-spin vanes adding stability to the hull.

In the illustration the motive power source comprises the internal combustion engine 18 mounted partially within the well in the hull formed by the inner cylindrical ring plate 12b. For this purpose a supporting cage structure is mounted on the top of the hull above the well, comprising the upright members 20 secured at their lower ends to the top plate 12c in a suitable laterally spaced arrangement and interconnected at their tops by cross members 22. A second cage-like supporting structure is also mounted on the hull below the well therein, comprising the L-shaped members 24 secured by their upper ends to the bottom plate 12d and interconnected at their inner, lower ends by the fitting 26. In the illustration there are four each of the members 20, 22 and 24, spaced apart respectively by 90° about the central vertical axis A of the hull.

The powered propulsion assembly is rotatively mounted between and within the upper and lower frameworks described. The fitting 26 serves as a support for a thrust bearing 28 supportingly connected to the swinging arm 30 which provides support for the lower end of the propeller assembly 32. The propeller assembly 32 in turn is rigidly connected, as by bolts 34, to the lower end of the motor unit 18. The motor unit, or at least the lower portion thereof is protectively surrounded by the drum-like container 36 suspended within the well by the upright frame members 38 so as to permit parts of the motor to be below water level at times without becoming wet. The suspension structure frame members 38 are rigidly interconnected by the cylindrical fuel tank 40 above the motor proper, and by the framework cross members 42. This motor unit suspension structure is rotatively supported at the top by a central upright shaft 44 rigidly connected to the frame cross members 42 and journaled in a thrust bearing 46 carried by the stationary frame cross members 22.

The two thrust bearings 46 and 28 aligned with the central vertical axis of the hull structure thus carry the weight of the powered propulsion unit comprising the motor 18, the propeller assembly 32 and the associated suspension structure thereof, to permit free rotation of the entire structure about the central vertical axis of the boat. The upper end portion of the shaft 46 fixedly carries a horizontally disposed steering wheel 48 by which the entire assembly may be turned relative to the hull. Preferably the necessary engine controls and indicators are mounted in the control assembly 50 above the steering wheel for accessibility and visibility and are connected to the engine by suitable cables and the like 52 passing downwardly through the tubular shaft 44. The latter extends through the fuel tank 40.

The cooling system of the engine preferably comprises the cylindrical bottom compartment 36a of the drum structure 36, which compartment comprises a cooling chamber for water flowing through the cooling pipes 52 and 54 respectively leading to and from the cooling jacket of the engine.

For convenience and safety a circular hand rail 58 of somewhat larger diameter than the steering wheel 48 is mounted on brackets 60 at the top of the stationary frame structure comprising the members 20 and 22. Thus the operator and any passengers standing on the deck planking 14 may face in any direction in which the vessel may be heading relative to the hull structure and may walk around the deck to face in a new direction when the heading is changed and still have direct and convenient access to the hand rail and to the steering wheel as well as to the controls 50.

As previously mentioned, the propeller assembly is rigidly connected to the lower side of the power unit structure. The hub guard or housing for the propeller drive gears 58 is designated 60. The propeller 62, driven through the gears 58, is situated in the vicinity of the central axis A and preferably slightly forwardly of such axis in the direction of heading of the boat. The direction of heading of the boat is, of course, defined by the instantaneous angular position of the line of thrust of the propeller about the vertical axis A. A protective cage is formed by the lower frame structure members 24 and the horizontal rings 66 of bar stock preventing large objects from coming into contact with the rotating propeller.

Referring to Figures 2 and 3, one important use of the novel boat is in the maneuvering of logs and rafts of logs in mill ponds or the like. It is in effect a work boat for the boom men. In Figure 2 the boat is abutted against the end of a log L in order to push the same forwardly in the line of heading of the boat. Figure 3 illustrates the principle by which the boat with a given heading of the propeller relative to the hull structure tends to remain in abutted relationship to the end of a log or any other object against which it is pushing. In the solid-line view of the hull periphery the circular outline of the hull is tangential to the end face of the log at the intersection between such end face and the line of heading of the boat. If for any reason the hull tends to roll out of contact with the end face of the log so as to disturb the above-described relationship, as into the dotted line position of the hull, then the heading or line of thrust of the propeller shaft, designed as the line X, no longer passes through the point of contact between the hull and the log, but instead is offset from such point of contact P in a certain sense. It is noted however that the very existence of this offset establishes a torque about such point of contact so as to roll the hull back into the original normal position of abutment with the log end face. In other words, if the operator holds the steering wheel stationary relative to the hull, or if this is done by a suitable clamp (not shown), then the boat has an inherent tendency to remain abutted against an object so that the line of thrust of the boat against such object will always tend to remain perpendicular to the surface being contacted. Any tendency for rapid oscillation or rolling of the hull back and forth along the abutment surface of the object about a normal position, represents a spinning movement of the hull about its vertical axis, and as such is suppressed or damped by the rib-like vanes 16 which create turbulence to a high degree for that type of motion.

In some instances the ribs 16 may be omitted or may be placed in an internal location so as to minimize resistance to forward movement in the water.

When the boat is in operation the operator normally stands behind the center of buoyancy so as to trim the boat with the forward side raised slightly and thereby further reduce the resistance to movement. It is found by experience that the boat handles well and assumes a stable course which can be changed abruptly to any new direction at will, whether sideways or backwards in relation to an existing heading. Since the hull itself need not assume any new orientation the turning radius is zero if the effect of forward momentum and finite rotation time of the steering wheel are neglected. With a stationarily mounted motor and a separately rotatable propulsion unit of relatively light weight, hence low moment of inertia about the axis A, even more abrupt turning is possible. By looking at the controls or some other index of propeller heading the operator can determine the direction in which the boat will start out from rest position, or its existing heading.

Various other details and aspects of the invention and of the illustrated form thereof will be evident to those skilled in the art, and it will be recognized that the novel features presented are not confined to a particular set of details such as those herein shown and described.

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I claim as my invention:

1. A power boat comprising a hull structure having a bottom of substantially symmetrical form in different horizontal cross sections about the central vertical axis thereof, said hull structure having a central well extending through the bottom thereof, a source of motive power mounted generally centrally on said hull structure, propulsion means having a propulsive element driven by said power source to drive the boat across the water and having supporting connections thereto extending upwardly through said well and connected to said hull structure to permit bodily rotation of said propulsive element relative to said hull structure about the central vertical axis of said hull structure, the propulsive direction of said propulsive element extending in a line passing through said central vertical axis, and steering means connected to said propulsion means and operable to permit effecting such rotation of said propulsive element for steering purposes by an operator reacting directly against said hull structure, whereby said propulsive element may be re-directed by any amount and in any direction immediately relative to said hull structure for immediately changing the latter's direction of heading accordingly, the resistance to turning of the hull being materially greater than that to turning of the propulsion means about said axis, whereby said hull remains substantially in the same rotated position during rotational displacement of said propulsion means.

2. The power boat defined in claim 1, wherein the motive power source is generally centrally mounted in the hull structure well for bodily rotation thereof about the vertical central axis of such hull structure, and wherein the power source and the propulsion means are interconnected for bodily rotation thereof conjointly about the hull structure axis.

3. The power boat defined in claim 1, wherein the propulsive element is supported in a position located slightly forward of the vertical central axis of the hull structure in any rotational position of said propulsive element.

4. A power boat comprising a circular ring-like hull having a vertical well in the center thereof and having a deck on the top thereof extending around the edge of said well, powered propulsion means comprising a motive power source and a propeller assembly producing generally horizontally directed thrust in a desired line of heading and dependently mounted from and operatively connected to said motive power source, support means at top and bottom of said hull including bearing elements rotatively supporting said powered propulsion means for bodily rotation thereof about the central vertical axis of said hull, said propulsion means being materially easier to rotate in the water than said hull, and steering means for effecting bodily rotation of said motive power source and propeller assembly directly relative to said hull at will about the central vertical axis of the hull to provide powered propulsion of said hull in any selected direction, the propulsive direction of said powered propulsion means extending in a generally horizontal line passing substantially through the central vertical axis of the hull in all rotational positions of said powered propulsion means relative to said hull.

5. The power boat defined in claim 4, wherein the steering means comprises a circular steering wheel mounted on the powered propulsion means at a height above the deck conveniently to be grasped and operated by persons standing on the deck and facing in any selected direction thereon relative to the hull.

6. A power boat comprising a hull structure having a sloping bottom portion which is round in different horizontal cross sections symmetrically with respect to the central vertical axis of said hull structure, said hull structure including a plurality of radially extending rib members secured to the exterior of the bottom portion of said hull structure at angularly spaced locations therearound, a source of motive power carried by said hull

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structure, propulsion means connected to be driven by said motive power source to propel the boat in a selected direction of heading, said propulsion means being mounted in the vicinity of the central vertical axis of the hull structure and being rotatable bodily relative to said hull structure about said axis to exert propulsion thrust on the hull structure for directing the same in any of a plurality of directions through a continuous 360° range relative thereto passing through the central vertical axis, and steering means connected to said propulsion means and operable directly by force reaction from said hull structure to permit changing the bodily rotated position of said propulsion means at will and thereby immediately thereupon the direction of heading of the boat without appreciable bodily rotation of the hull structure itself.

7. A power boat comprising a hull structure of integral construction providing substantially the full buoyancy of the boat and having a bottom portion which is substantially round in different horizontal cross sections, said hull structure having a central vertical axis of symmetry, propulsion means for propelling said boat in a selected direction of heading, and means rotatively mounting said propulsion means on said hull structure in the vicinity of said central vertical axis to permit rotation of the line of thrust of said propulsion means directly relative to said hull structure throughout a continuous 360° range, said line of thrust passing substantially through said vertical axis in all rotated positions of said propulsion means, thereby to change the heading of said boat without bodily rotation of said hull structure.

8. The power boat defined in claim 7, wherein the hull structure additionally comprises vane members mounted externally on the bottom portion thereof in substantially radially extending positions providing damping action minimizing any spinning tendency of the hull about the vertical central axis thereof.

9. A power boat comprising a hull structure having a bottom of substantially symmetrical round form in different horizontal cross sections about the central vertical axis of symmetry thereof, a source of motive power carried by said hull structure, propulsion means connected to be driven by said motive power source for propelling said boat across the water in a given direction, rotative support means on said hull structure supporting said propulsion means therefrom to permit rotational displacement of said propulsion means about said axis of symmetry in either direction and through any displacement angle, and steering means connected to said propulsion means and adapted to permit rotatively displacing the same relative to the hull structure by reaction from the latter for changing the propulsion direction of said propulsion means with respect to the hull structure at will to effect steered propulsion of the boat in any direction of heading without rotating said hull structure about said symmetry axis when changing from one heading to a different heading, the resistance to turning of the hull being materially greater than that to turning of the propulsion means about said axis, whereby said hull remains substantially in the same rotated position during rotational displacement of said propulsion means.

10. The power boat defined in claim 9, wherein the propulsion means are disposed by the rotative support means generally centrally of the hull structure, with the direction of propulsion of said propulsion means substantially passing through the central vertical axis of the boat in all rotationally displaced positions of said propulsion means relative to the hull structure.

11. The power boat defined in claim 10, wherein the propulsion means comprises a propulsive element thereon mounted slightly forwardly of the central vertical axis of the boat hull structure in all rotationally displaced positions of said propulsion means relative to the hull structure.

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