United States Patent

[11] **3,590,766**

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[54] **STEERING UNIT FOR BARGES AND THE LIKE**
1 Claim, 5 Drawing Figs.

[52] **U.S. Cl.** **114/151,** 115/42
[51] **Int. Cl.** **B63h 25/46**
[50] **Field of Search** 114/151, 147, 148; 115/16

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ABSTRACT: Steering unit for barges and the like having bottom and upstanding sides. Tube carried by barge extends transversely thereof with intermediate portion of tube communicating with downwardly and outwardly extending end portions terminating adjacent elevation of barge bottom. Propeller unit within tube moves water selectively in opposite directions to move adjacent portion of barge in opposite directions. Baffles adjacent side of propeller direct water toward the leading faces or propeller as water flows in direction to position baffle on suction side of propeller.

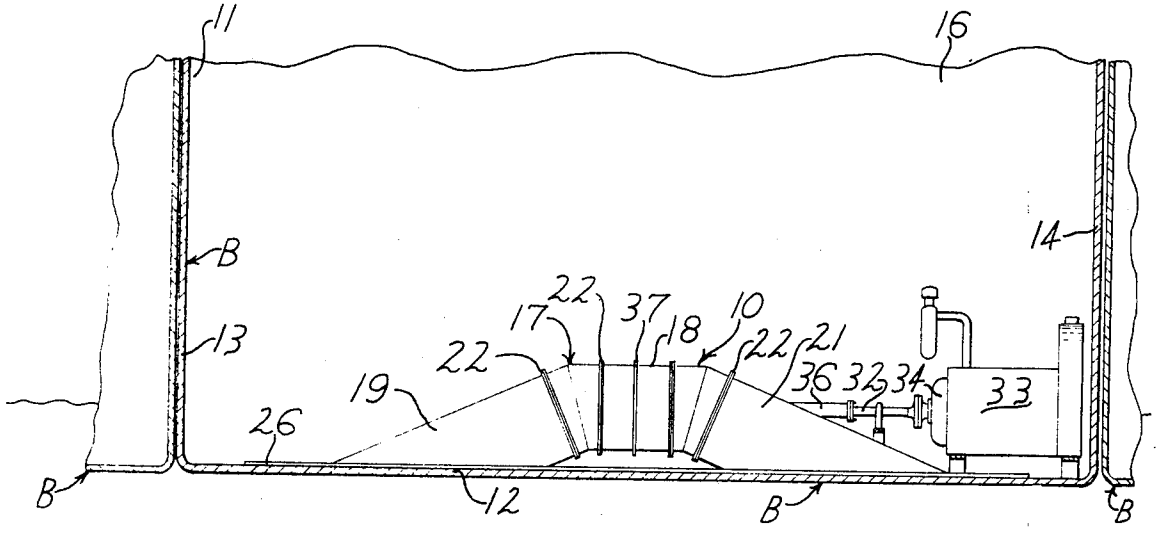


FIG 2

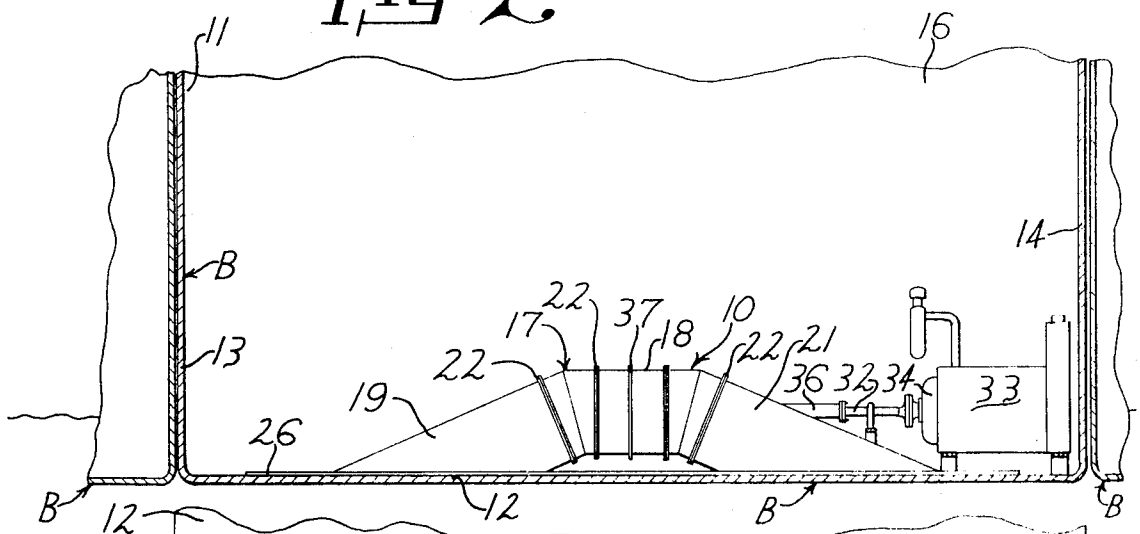


FIG 5

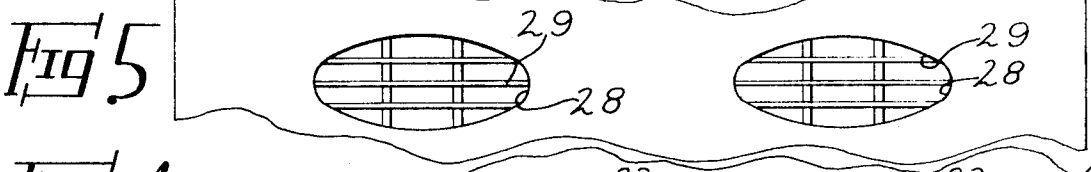
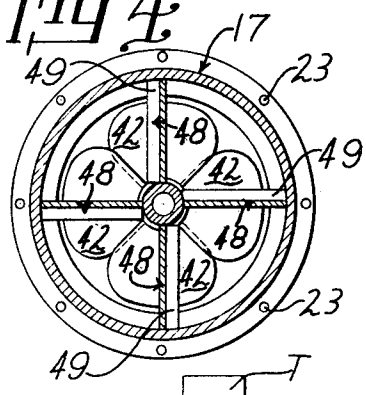


FIG 4



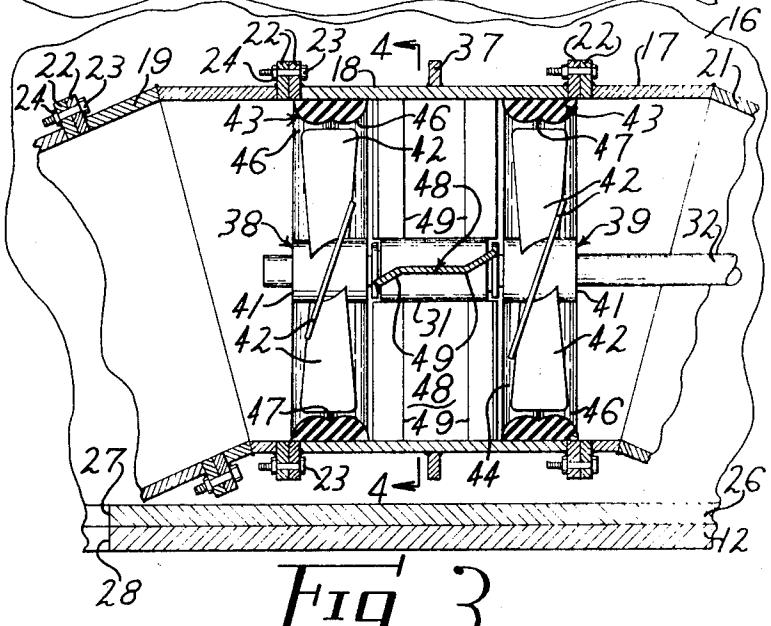


FIG 3

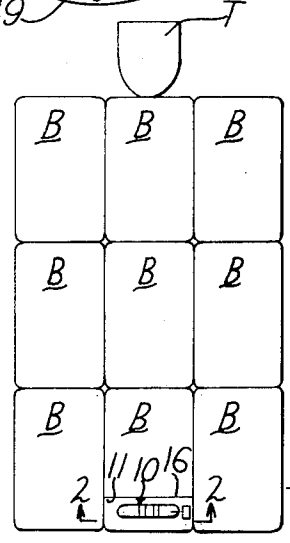


FIG 1

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STEERING UNIT FOR BARGES AND THE LIKE

BACKGROUND OF THE INVENTION

This invention relates to a steering unit for barges and the like and more particularly to positive means for steering the forward end of a barge.

Heretofore in the art to which my invention relates, difficulties have been encountered in steering barges along rivers for the reason that rivers fluctuate in depth and do not follow a straight line. Also, rivers have currents and usually contain snags, logs and other underwater obstacles that can shear off or damage equipment extending beyond the sides or bottom of barges. Furthermore, barges must clear supporting structures for railroad and highway bridges and must be steered accurately through locks and during docking and undocking. Another difficulty encountered in steering barges and the like is compensating for the effects of winds on the barge, especially when barges are riding high and bridges or other structures are located in the curve of the river. Due to the foregoing difficulties in steering barges and the like along rivers, insurance rates and damages to bridges and other structures are extremely high.

BRIEF SUMMARY OF INVENTION

To overcome the above and other difficulties, I provide a steering unit which is mounted wholly within the confines of the barge and comprises a transversely extending tube having an intermediate portion connected to downwardly and outwardly extending end portions which terminate adjacent the elevation of the bottom of the barge. A propeller unit is mounted for rotation within the tube for conveying water therethrough selectively in opposite directions whereby the adjacent portion of the barge is moved selectively in opposite directions.

Apparatus embodying features of my invention is illustrated in the accompanying drawing, forming a part of this application, in which:

FIG. 1 is a top plan view showing a plurality of barges moving as a unit with my improved steering unit mounted at the bow of a lead barge;

FIG. 2 is an enlarged, sectional view taken generally along the line 2–2 of FIG. 1;

FIG. 3 is an enlarged, longitudinal sectional view taken through the central portion of the steering unit;

FIG. 4 is a sectional view taken generally along the line 4–4 of FIG. 3, drawn to a smaller scale; and,

FIG. 5 is a fragmental, bottom view showing the openings in the bottom of the barge which communicate with the steering unit.

Referring now to the drawing for a better understanding of my invention, I show a plurality of barges, indicated at B, which are tied together in a manner well understood in the art to which my invention relates to move as a unit and be propelled by a tug T. My improved steering unit 10 is mounted within a forward compartment 11 carried by a lead barge B, as shown in FIG. 1. While I have shown one barge at each side of the barge B carrying the steering unit 10 and show two additional barges behind each lead barge B, it will be apparent that the number and arrangement of the barges may be varied in the usual manner. The compartment 11 having the steering unit 10 mounted therein comprises a bottom wall 12 connected to upstanding sidewalls 13 and 14, as shown in FIG. 2. Also, a vertical wall 16 separates the compartment 11 from the remainder of the barge B carrying the steering unit 10.

My improved steering unit comprises a large tube 17 which extends transversely of the bow of the center, lead barge B, as shown in FIGS. 1 and 2. The tube 17 is provided with a cylindrical intermediate portion 18 which is connected to downwardly and outwardly extending end portions 19 and 21. To facilitate manufacture and installation of the tube 17, the tube is made in sections with an annular flange 22 at each end of each section. Adjacent flanges 22 are connected to each other by bolts 23 having retaining nuts 24, as shown in FIG. 3. The lower ends of the downwardly and outwardly extending end portions 19 and 21 are secured to a horizontal plate 26 having openings 27 therethrough in communication with the open, lowermost ends of the downwardly and outwardly extending portions. Also, openings 28 are provided through the bottom wall 12 in vertical alignment with the openings 27 whereby water may be received or discharged through the aligned openings 27 and 28 selectively, depending upon the direction of flow of water through the tube 17. As shown in FIG. 5, a protective grille 29 is carried by the bottom wall 12 over the openings 28 to prevent the entrance of large obstacles into the tube 17.

Mounted for rotation within the intermediate portion 18 of the tube 17 within a suitable bearing 31 is a shaft 32 which is operatively connected to a power unit 33, such as an internal combustion engine. A suitable gear unit 34 is interposed between the shaft 32 and the power unit 33 whereby the shaft 32 is driven in the proper direction and at the desired revolutions per minute. In actual practice, I have found that the apparatus operates satisfactory in every respect where the shaft is driven at 600 to 800 revolutions per minute.

As shown in FIG. 2, a suitable seal unit 36 is carried by the downwardly and outwardly extending portion 21 in position to surround the shaft and provide a fluidtight seal between the shaft and the tube 17. To add strength to the intermediate portion 18, a reinforcing ring 37 is secured to the outer surface of the intermediate portion 18, as shown in FIGS. 2 and 3.

Mounted on the shaft 32 within the intermediate portion 18 of the tube 17 are propeller units 38 and 39 which are spaced axially from each other, as shown in FIG. 3. Each propeller unit 38 and 39 comprises a hub 41 which is keyed to the shaft 32 whereby it rotates therewith. Each hub 41 carries radially extending propeller blades 42 which are preferably mounted at a 24-inch pitch. The gear unit 34 of the power unit 33 is provided with conventional means for reversing the direction of rotation of shaft 32 whereby the propeller units 38 and 39 may be driven in opposite directions to move water in opposite directions through the tube 17. While I have described the propeller units as being driven selectively in opposite directions, it will be apparent that the direction of flow of water through tube 17 may be reversed by changing the pitch of the propeller blades. That is, a conventional type reversible pitch propeller may be employed whereby, upon reversing the pitch of the propeller, the direction of flow would be reversed without changing the direction of rotation of shaft 32.

Surrounding each of the propeller units 38 and 39 is a shroud structure 43 having two axially juxtaposed, annular inwardly directed convex surfaces 44 and 46 which define adjacent venturi sections with a common axis and an annular depression 47 therebetween. The shrouds 43 are annular in shape, as shown and are formed of a suitable resilient material, such as chloroprene rubber sold under the trade name "NEOPRENE." By providing the resilient shroud 43 around each of the propeller units 38 and 39, I reduce slippage to a minimum. Accordingly, the propeller units 38 and 39 are very efficient in operation and substantially immediate power is available upon rotation of the propeller units. Also, immediate power is available upon reversing the direction of flow of water through tube 17.

To facilitate movement of the water through tube 17 and at the same time support the bearing member 31, I provide a plurality of radially extending deflector baffles 48 between the bearing member 31 and the inner surface of the intermediate portion 18 of tube 17. The deflector baffles 48 are secured to the bearing 31 and the intermediate portion 18 by suitable means, such as by welding. As shown in FIGS. 3 and 4, the deflector baffles 48 extend radially and are bent laterally as at 49 adjacent the inner sides of the propeller units 38 and 39 in a direction to direct the flow of water toward the leading faces of propeller blades 42 of the adjacent propeller unit while water is flowing in a direction to position the deflector baffle on the suction side of the adjacent propeller unit. While I have

shown four deflector baffles 48, it will be apparent that the number of deflector baffles may be varied. It will also be apparent that the deflector baffles 48 could be positioned at both sides of the blades 42. Also, while I have shown the propeller units 38 and 39 as having four propeller blades 42, it will be apparent that the number of blades may be varied.

From the foregoing description, the operation of my improved steering unit for barges and the like will be readily understood. When it is desired to move the bow of the barge laterally toward one side, the gear unit 34 is actuated to drive the shaft 32 and the propeller units 38 and 39 carried thereby in the proper direction to cause water to flow through the tube 17 in the opposite direction from the desired direction of movement of the bow. That is, when the propeller units 38 and 39 are driven in a direction to discharge water through downwardly and outwardly extending portion 19, water is received through downwardly and outwardly extending portion 21 to thus cause the tube 17 and the bow of the barge to move toward the right, as viewed in FIG. 3. When it is desired to move the bow of the barge in the opposite direction, the direction of rotation of the shaft 32 and propeller units 38 and 39 is reversed whereby water is discharged through the downwardly and outwardly extending portion 21 and water is then received through downwardly and outwardly extending portion 19.

The openings 27 and 28 in the plate 26 and bottom wall 12, respectively, define continuations for the downwardly and outwardly extending portions 19 and 21 whereby the lower ends of the downwardly and outwardly extending conduits actually terminate adjacent the bottom of the barge. That is, a fluidtight seal is provided between the lower ends of the downwardly and outwardly extending portions 19 and 21 and the plate 26 and a fluidtight joint is provided between the plate 26 and the bottom wall 12 adjacent the openings 27 and 28. The water discharged at one end of the tube 17 exerts a thrust which forces the bow of the barge in the opposite direction. Since the water enters the opposite ends of the tube 17, water is displaced at that side of the barge and drawn inwardly of the tube 17 at the same rate that it is discharged from the other end, thus further aiding in moving the bow of the barge in a direction opposite the direction of movement of water through the tube 17. The efficiency of the steering unit is thus increased since water is removed from the side toward which the barge moves whereby a negative pressure exists at the receiving end of tube 17 while a positive pressure is exerted at the discharge end of tube 17.

As shown in FIGS. 1 and 2, the lower ends of the downwardly and outwardly extending end portions 19 and 21 terminate inwardly of the sides 13 and 14 of the barge B carrying the unit 10 whereby water is drawn into and discharged from the tube 17 at positions inwardly of upstanding planes passing through the sides 13 and 14. Accordingly, other barges B may be positioned directly adjacent the barge B carrying the steering unit 10, as shown in FIGS. 1 and 2 without interferring with the operation of the steering unit.

From the foregoing, it will be seen that I have devised improved means for steering barges and the like. By providing a steering unit which is positioned wholly within the confines of the barge carrying the same, the steering unit cannot be damaged by floating debris or underwater obstructions and at the same time other barges may be positioned closely adjacent the sides of the barge carrying the steering unit. Also, by providing a steering unit which receives and discharges water adjacent the bottom of the barge, the apparatus operates efficiently in water that is deep enough to float the barge. Furthermore, by providing positive means for accurately controlling the movement of the barge, my improved apparatus is adapted to equalize or cancel the effects of winds and currents, especially when the barges are unloaded and riding high. Furthermore, by providing positive means for moving the bow of the barge laterally in either direction, the barge may be pulled into an adjacent bank to allow another vessel to pass and then move laterally back into the main river channel. In actual practice, I have found that my improved bow-steering unit reduces greatly the time required to move a barge from one location to another and at the same time reduces greatly the chances of the barge damaging bridges, locks, docks and the like.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof.

What I claim is:

1. In a steering unit for barges and the like having a bottom wall and upwardly extending sidewalls.

a. a tube carried by said barge and extending in a direction transversely thereof with an intermediate portion of said tube communicating with downwardly and outwardly extending end portions which terminate at an elevation adjacent the elevation of said bottom wall whereby water is drawn into said tube and discharged therefrom at an elevation adjacent the elevation of said bottom wall,

b. at least one propeller unit mounted for rotation within said tube for conveying water therethrough and comprising an axial flow pump having radially extending blades mounted for rotation inwardly of a shroud structure having two axially juxtaposed, annular inwardly directed convex surfaces defining adjacent venturi sections with a common axis and an annular depression therebetween,

c. means to rotate said propeller unit, and

d. means to reverse the direction of flow of water through said tube selectively in opposite directions to move adjacent portion of the barge selectively in opposite directions.