Jan. 11, 1955 H. B. DYER 2,699,138

VESSEL, INCLUDING A SCREW PROPELLER STEERING ASSEMBLY

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FIG. 1

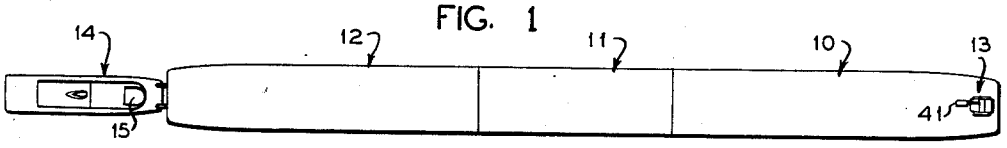


FIG. 2

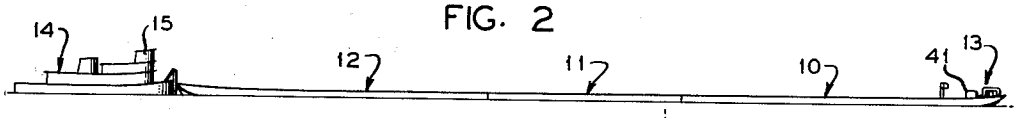


FIG. 3

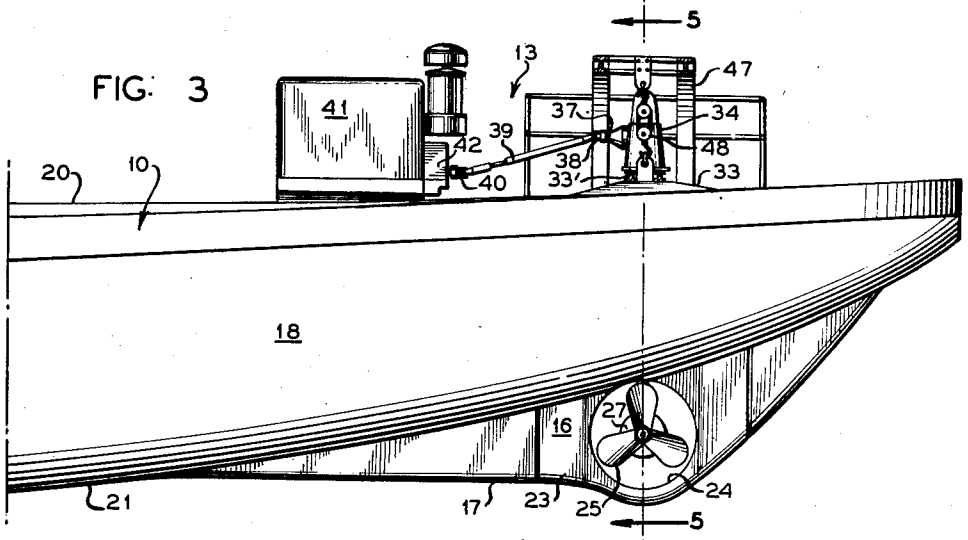
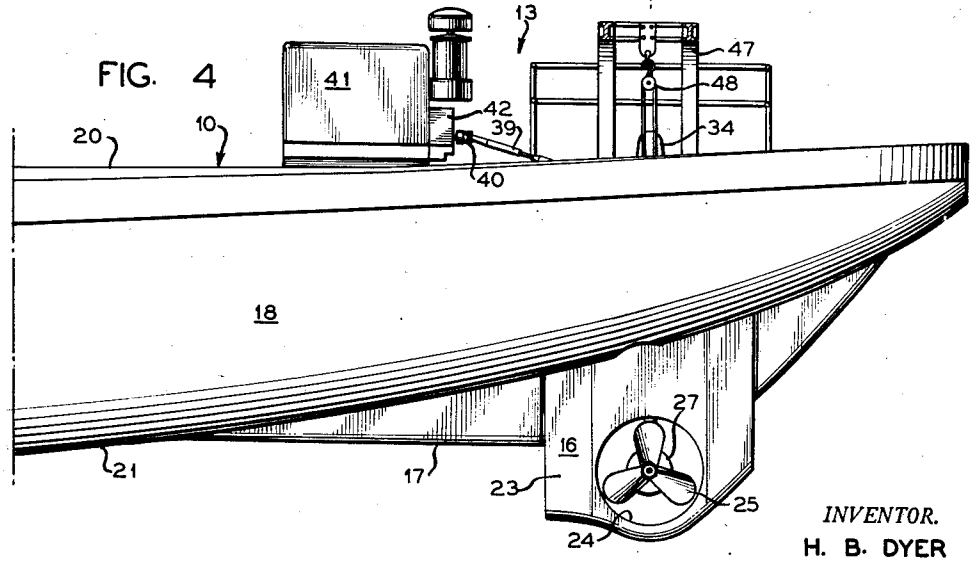


FIG. 4



INVENTOR.
H. B. DYER

BY

A. Yates Dowell
ATTORNEY

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FIG. 5

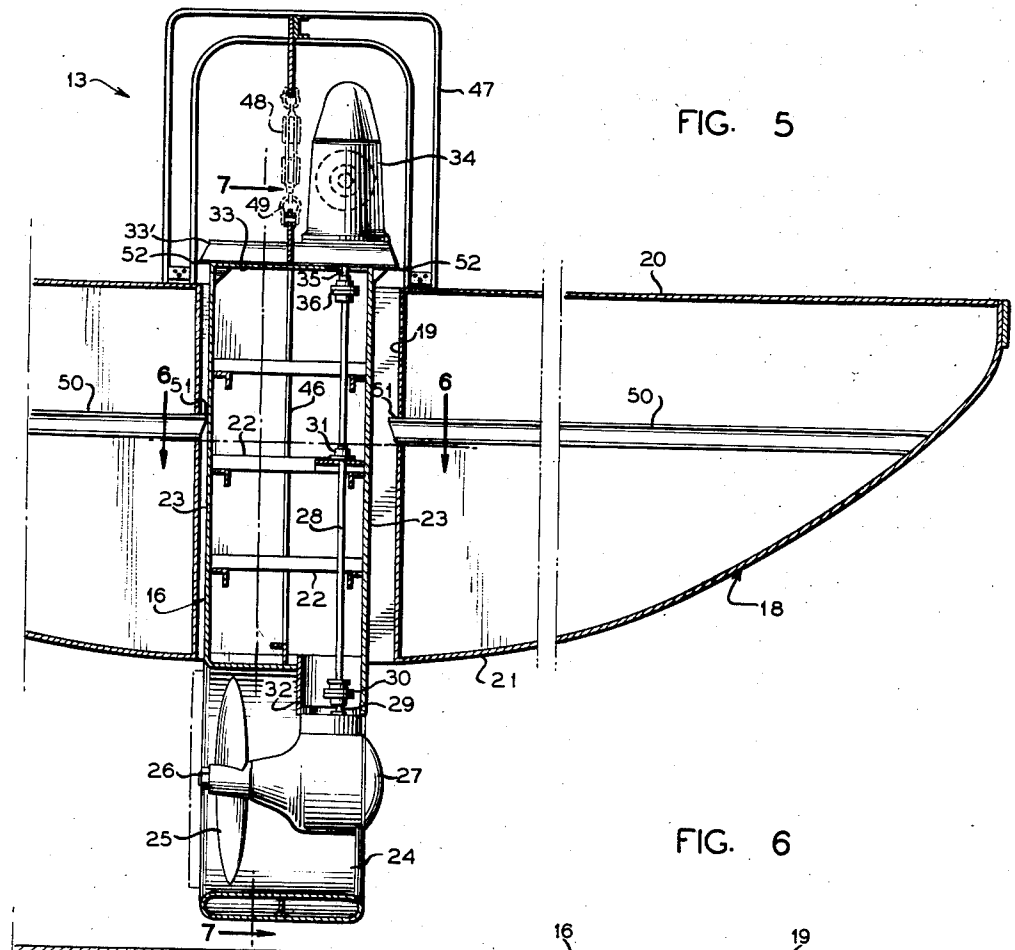
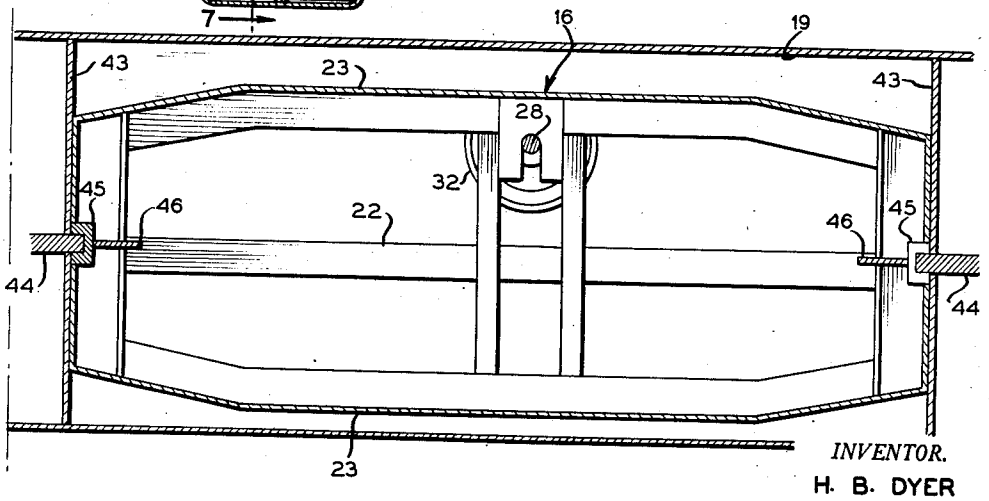


FIG. 6



INVENTOR.
H. B. DYER

BY

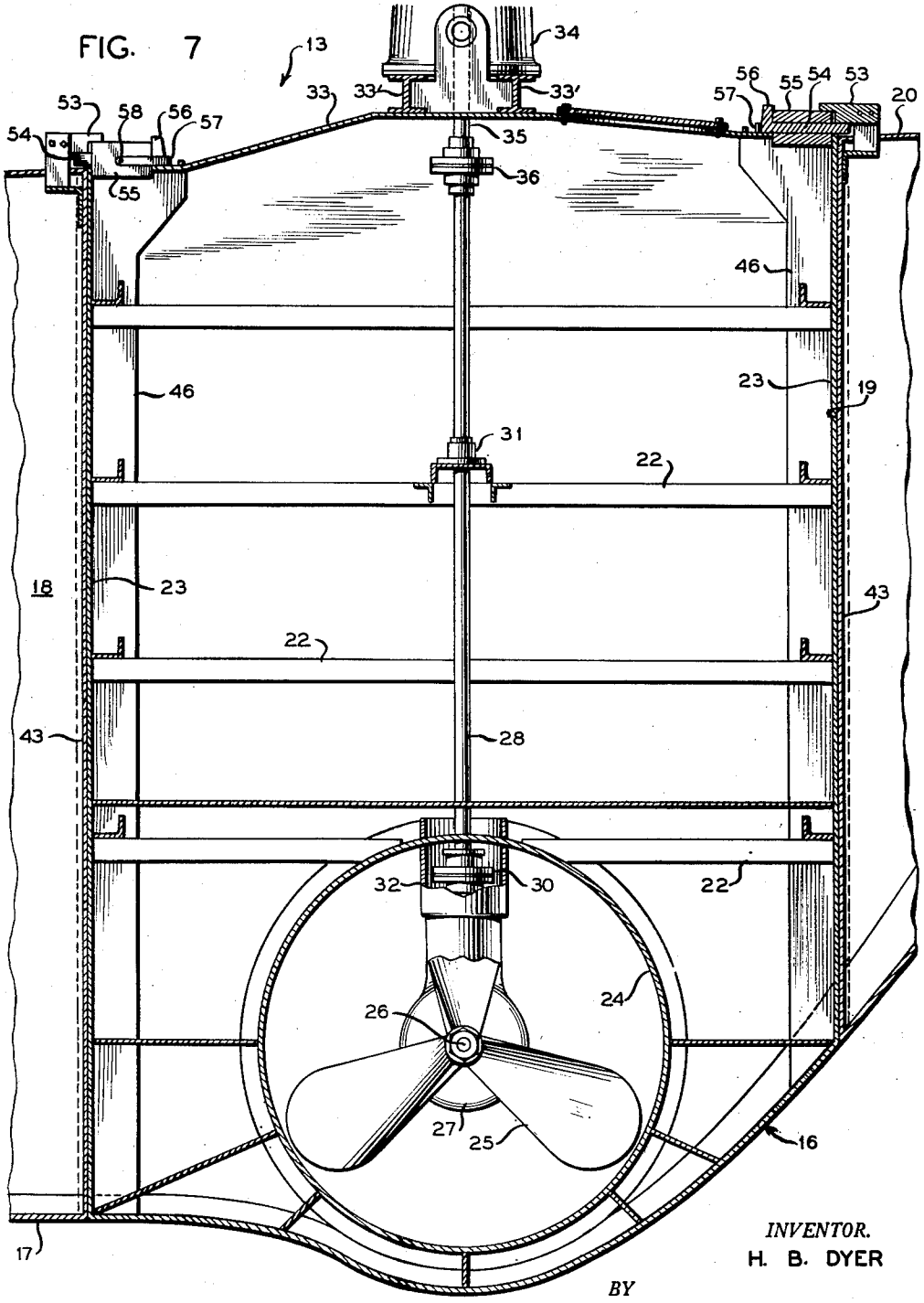
A. Yates Dowell
ATTORNEY

Jan. 11, 1955 H. B. DYER 2,699,138

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FIG. 7



INVENTOR.
H. B. DYER

BY

A. Yates Dowell

ATTORNEY

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2,699,138

VESSEL, INCLUDING A SCREW PROPELLER STEERING ASSEMBLY

Harry B. Dyer, Nashville, Tenn., assignor to Nashville Bridge Company, Nashville, Tenn., a corporation of Delaware

Application July 27, 1951, Serial No. 238,809

3 Claims. (Cl. 115—35)

This invention relates to navigation and the transportation of freight including oil or other substance particularly along inland waterways.

Specifically this invention relates to naval architecture specifically to the construction, operation and handling of barges or other vessels either singly or in a series of long connected units in addition to a towing vessel.

In the navigation of inland waterways and particularly in connection with the transportation of freight by barges it has been customary for the tow boat to occupy a position at the rear of the barge or barges and to push the same up or down the river as the case may be. Several barges may be lashed together to form a tow several hundred feet long and obviously the navigation and control of such a tow is a very real problem particularly where the river or channel is narrow and at the same time follows a winding course. In the past these tows have been steered by turning the tow boat and at particularly sharp bends it has often been necessary to stop, back and go forward several times in order to get the tow around the bend without grounding the same.

The problems connected with providing adequate steering mechanism for the bow of the barge are many, particularly in view of the fact that many inland waterways are relatively shallow and consequently no structure can be added which will increase the normal draft of the barge. A rudder on the bow of a boat does not operate efficiently and it is extremely doubtful if such a rudder would provide sufficient force to swing a relatively heavy long barge or tow at a speed or in a short enough turning radius to greatly facilitate river navigation.

It is therefore an object of this invention to modify the structure of a water borne vessel in such a manner as to provide a turning force which may be directed to either port or starboard in order to facilitate swinging or steering the vessel.

It is a further object of the invention to provide a bow steering unit for a barge which fairs into the lines of the barge thus maintaining the streamlining effect and at the same time does not increase the draft of the barge.

It is a further object of the invention to provide a bow steering unit for a barge which may be raised or lowered to compensate for the change in draft resulting from varying load conditions.

It is a further object of the invention to provide a bow steering unit for a barge which may be conveniently controlled either from the bow of such barge or from the pilot house of the tow boat utilized by propelling the barge.

It is a further object of the invention to provide a bow steering unit for a barge which may be economically constructed as a part of the same during the fabrication of the barge and which in no way interferes with the normal operation and load carrying capacity of the barge.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, where:

Fig. 1 is a top plan view of a typical pusher type river tow;

Fig. 2, a side elevation of the tow shown in Fig. 1;

Fig. 3, a fragmentary side elevation on an enlarged scale of the bow end of the first or lead barge;

Fig. 4, a side elevation similar to Fig. 3 illustrating an alternate position of the steering unit;

Fig. 5, a further enlarged transverse section on the line 5—5 of Fig. 3;

Fig. 6, a still further enlarged section taken on the line 6—6 of Fig. 5; and

Fig. 7, a vertical section on the line 7—7 of Fig. 5.

With continued reference to the drawing there is shown in Figs. 1 and 2 a typical pusher type river tow which is made up of three barges 10, 11 and 12 lashed together in a fore and aft direction to form a substantially rigid unit. Such tows are commonly several hundred feet long and in order to facilitate navigation of the same particularly in narrow rivers or channels which often have sharp bends the forward barge 10 is equipped with a bow steering unit 13 which forms the subject matter of this invention. A tug 14 engages the rearmost barge 12 and pushes the tow ahead of the same, navigation of the tow being accomplished from the pilot house 15 of the tug 14.

The bow steering unit 13 is carried by a vertically movable housing 16 which fairs into the bow skeg 17 attached to the under surface of the hull 18 of the barge 10. The housing 16 is disposed in a well 19 extending from the deck 20 of the barge 10 to the bottom 21. The housing 16 is generally rectangular in shape and comprises a skeleton framework 22 covered by metallic plates 23.

Adjacent the lower end of the housing 16 is a substantially circular port 24 extending through the housing 16 transversely thereof, port 24 serving to receive a propeller 25 mounted upon a shaft 26 extending into gear box 27. Gear box 27 includes bevel gears (not shown) which serve to transfer the propeller drive from a vertical shaft 28 to the shaft 26. Shaft 28 is connected to a shaft 29 extending into the gear box 27 by a coupling 30 and shaft 28 is journaled in a bearing 31 mounted upon the frame 22. A casing 32 extends upwardly from the gear box 27 through the wall of the port 24 to provide a water tight connection where the shaft 28 emerges into the port 24 and thus prevent filling of the interior of the housing 16 with water. From an inspection of the drawings and particularly Fig. 6, it will be evident that housing 16 is relatively narrow and appreciably longer than its width since the housing does not rotate on a vertical axis. There is no need for rotation of the housing since the steering action depends upon the reversal of the propeller to perform the steering function and when the propeller is idle there is no appreciable steering effect produced.

Supported upon the top wall 33 of the housing 16 is a gear box 34 mounted on the transverse beams 33', having an output shaft 35 connected to the shaft 28 by a coupling 36. Gear box 34 is provided with a power input shaft 37 which is connected through a universal joint 38 with a drive shaft 39 which in turn is connected through a universal joint 40 with the power output shaft of an internal combustion engine 41. Obviously if desired a steam engine or an electric motor could be substituted for the internal combustion engine 41 without in any way changing the operation of the invention. Engine 41 may be provided with a reverse gear 42 in order to permit rotation of the propeller 25 in either direction.

Fore and aft bulkheads 43 of the well 19 serve to support vertically disposed guide tracks 44. Tracks 44 are received in guideways 45 carried by a reinforcing web 46 which forms part of the framework 22. Disposed directly above the well 19 in an inverted U-shape frame 47 which serves to support a block and tackle 48 the opposite end of which is attached by means of a shackle 49 to the housing 16. If desired a chain hoist or other equivalent hoisting means may be substituted for the block and tackle 48.

Stop means is provided for limiting the upward and downward movement of the housing 16, the stops for limiting the downward movement comprising beams 50 extending transversely of the hull 18 and projecting into the well 19 at 51. These beams projecting into the well 19 serve to engage the overhanging portion 52 of the transverse beam 33' on the top wall 33 of the housing 16 and prevent downward movement thereof beyond this point. Upward movement of the housing 16 is limited by overhanging members 53 secured to the deck structure of the barge.

Means is also provided to latch the housing 16 in uppermost position, this means comprising a latch bolt 54 slidably mounted in a block 55 attached to the housing 16. Bolt 54 is provided with an upwardly extending in-

ner end **56** which may be engaged by a bail **57** pivotally mounted on the block **55** at **58**, the opposite end of bolt **54** passing beneath the overhanging member **53** and engaging the upper surface of the deck **20**. This structure is clearly shown in Fig. 7 and it will be obvious that with the bolt **54** extended that the housing **16** is securely locked against vertical movement in either direction.

In operation and with the barge **10** loaded the bow steering unit **13** would be disposed in the position shown in Fig. 3 with the propeller **25** beneath the surface of the water. The operation of internal combustion engine **41** and reverse gear **42** may be controlled either at the bow of barge **10** or by remote control from the pilot house **15** of the tug **14**. When it is desired to move the bow of the barge **10** to port or starboard the engine **41** is started and the propeller **25** rotated to drive the bow sideways in either direction. When the barge **10** is coupled to other barges **11** and **12** operation of the bow steering unit **13** would of course serve to swing the entire tow of barges.

When the barge **10** is unloaded the bow steering unit **13** may be lowered by operation of the block and tackle **48** to the position shown in Fig. 4 at which time the propeller **25** would still be disposed beneath the surface of the water. The universal joints **38** and **40** which connect the drive shaft **39** with the gear box **34** permit such vertical movement of the housing **16** while still maintaining a driving connection between the engine **41** and the propeller **25**. Obviously the housing **16** may be disposed in any intermediate position in order to maintain the propeller **25** beneath the surface of the water regardless of the load condition of the barge **10**.

It will be seen that by the above described invention there has been provided a relatively simple, economically constructed bow steering unit which permits relatively simple navigation of long tows of barges which heretofore have been extremely unwieldy, this bow steering unit serving to greatly speed up the transportation of merchandise and to prevent many groundings with consequent damage to the barge.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. A vessel having an end, spaced skegs adjacent said end, a watertight well formed in the said end thereof and extending from the deck of the vessel to the bottom thereof and providing a clear passage from the deck to the bottom, a narrow housing mounted in said well for vertical motion relative to the vessel only, said housing being substantially watertight, the bottom of said housing being closed and provided with an opening extending transversely to the vessel, said opening having a closed periphery, a propeller positioned in said opening and mounted on said housing for rotation on an axis transverse to the vessel, power conveying means for conveying power from the top of the housing to the propeller, a motor having a reversing gear mounted on the deck of the vessel adjacent the well, drive means from said motor to the power conveying means whereby power may be put into the said propeller for forcing the water supporting the vessel from one side of the vessel to the other and the reaction thereby moving the said end of the vessel transversely for steering the same, said power means being arranged to furnish and convey power to the propeller regardless of the vertical position thereof, and means for moving said housing and said propeller vertically to obtain the desirable operating characteristics thereof to prevent striking obstructions on the bottom of the body of water and to permit the propeller to be in the water regardless of the load on the vessel, the length and width dimensions of the housing preventing pivotal movement of the housing while permitting the housing with the propeller attached to be removed upwardly through the well, the narrow housing permitting the lower end of the housing to merge with the skegs.

2. A vessel comprising a hull having a deck and a bottom, a vertically extending passage of generally rectangular shape in horizontal cross section with the largest dimension extending in the line of the vessel adjacent to and spaced from one end of the vessel and extending from the bottom to the deck, said passage being provided with a surrounding watertight wall preventing leakage from the passage into the vessel, guide means on the walls of said passage, a vertically elongated housing of generally rectangular shape in horizontal cross section with the largest dimension extending in the line of the vessel mounted in said passage and provided with means engaging said guide means for vertical movement of the housing relative to the vessel, means on the deck of the vessel for raising and lowering the housing, a gear box mounted on said housing within the projected outline of said passage, a propeller rotatably mounted on said gear box with the plane of the propeller extending in substantially parallel relation to the center line of the vessel at all times, the said housing extending below said propeller and completely surrounding said propeller and being provided with a transverse port of a diameter slightly greater than the diameter of the propeller and receiving the propeller whereby the propeller may force water through said port without appreciable interference, a motor mounted on the deck of said vessel and provided with a reversing gear, drive means including flexible coupling means interconnecting the gear box and the reversing gear thereto for causing rotation of said propeller in either direction whereby the thrust of the propeller may move the said one end of said vessel to one side or the other depending upon the direction of rotation of said propeller, said driving connection being operable to drive said propeller in any vertical position of the housing so that the propeller may be operated at substantial depths in deep water and at shallow depths in shallow water providing effective steering of long and slow speed vessels.

3. A vessel comprising a hull having a deck and a bottom, a vertically extending passage adjacent to and spaced from one end of the vessel and extending from the bottom to the deck, said passage being of generally rectangular shape in horizontal cross section with the largest dimension extending in the line of the vessel, said passage being provided with a surrounding wall preventing leakage of water from the passage into the vessel, guide means on the walls of said passage, a housing mounted in said passage and provided with means engaging said guide means for vertical movement of the housing relative to the vessel, means on the deck of the vessel for raising and lowering the housing, a gear box mounted on said housing within the projected outline of said passage, a propeller rotatably mounted on said gear box with the plane of the propeller extending in substantially parallel relation to the center line of the vessel at all times, the said casing extending below said propeller and completely surrounding said propeller, said housing being provided with a transverse port of a size slightly greater than the diameter of the propeller and receiving the propeller whereby the propeller may force water through said port without appreciable interference, a motor mounted on the deck of said vessel and provided with a reversing gear, drive means including flexible coupling means interconnecting the gear box and the reversing gear thereto for causing rotation of said propeller in either direction whereby the thrust of the propeller may move the said one end of the vessel to one side or the other depending upon the direction of rotation of said propeller, said driving connection being operable to drive said propeller in any vertical position of the housing whereby the propeller may be operated at substantial depths in deep water and at shallow depths in shallow water thereby providing for effective steering of long and slow speed vessels.

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