June 13, 1961 J. W. TATTER 2,988,038

PROPULSION SYSTEM

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FIG. 1.

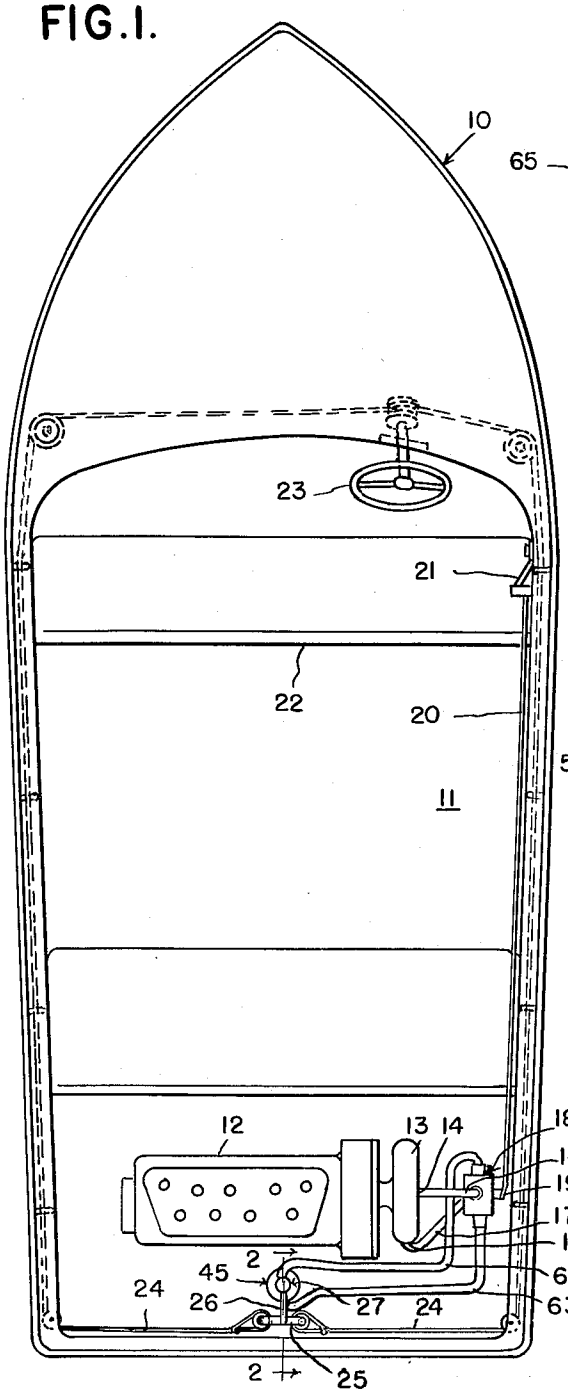
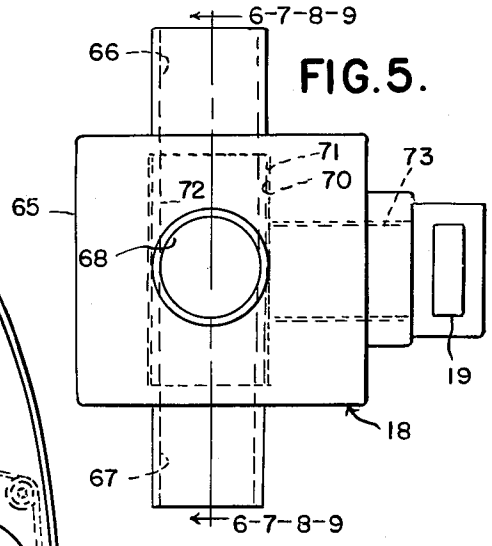


FIG. 5.



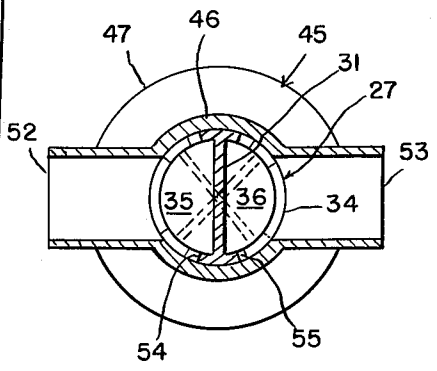


FIG. 3.

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PROPULSION SYSTEM

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FIG. 2.

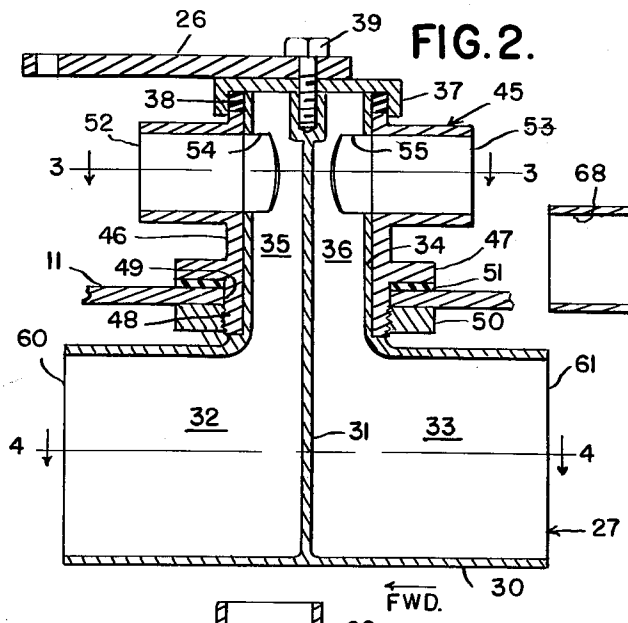


FIG. 6.

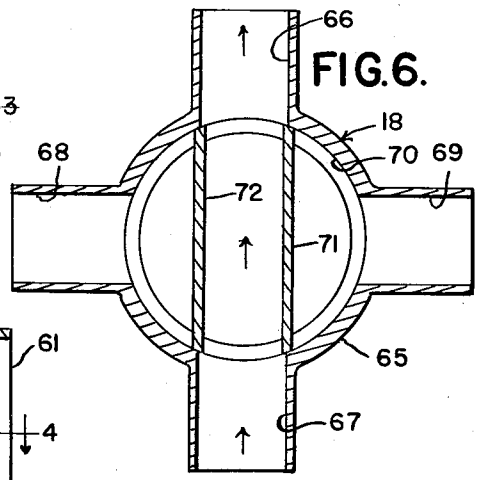


FIG. 7.

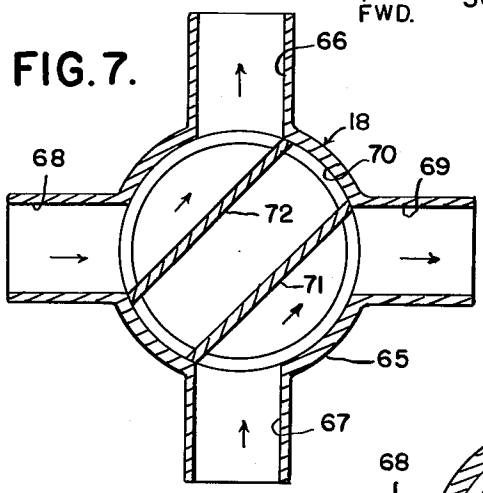


FIG. 8.

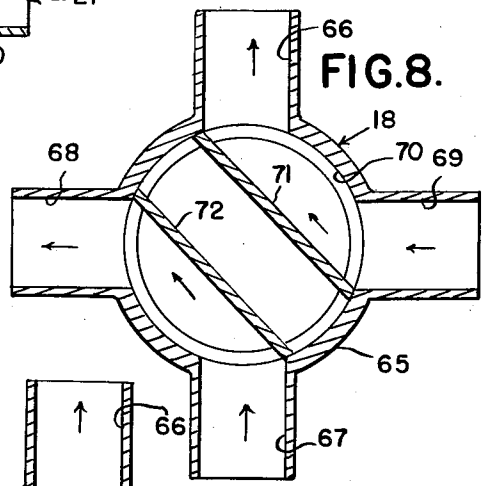


FIG. 9.

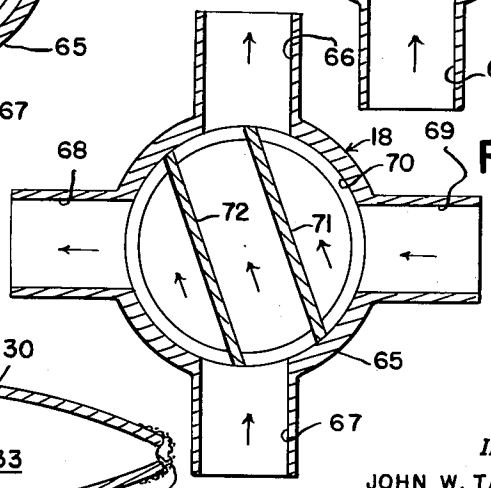
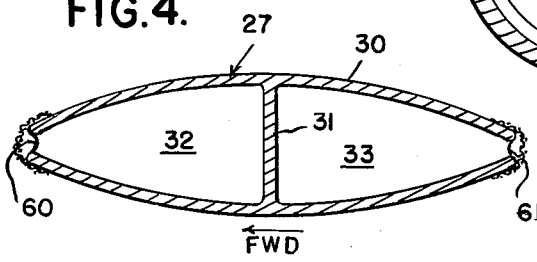


FIG. 4.



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2,988,038

PROPULSION SYSTEM

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4 Claims. (Cl. 115—12)

My invention relates to water jet propulsion systems for boats, and more particularly to a water jet propulsion system utilizing a novel rudder construction and a simplified valve arrangement for readily operating in forward, reverse, neutral and part power positions.

Steering and water jet control in such propulsion systems present various difficulties which the present invention is intended to overcome. The use of a jet of water for steering a boat as well as for propulsion is not too satisfactory generally, and the control of water flow itself heretofore has been accomplished by means which are too complex and hence too expensive for competing with propeller drive systems.

An object of the present invention is to improve water jet propulsion systems by providing a simplified flow control valve.

Another object of the invention is to improve steering of a water jet propelled boat by providing a novel rudder construction which incorporates the water intake and outlet jet.

A further object of the invention is to simplify water jet propulsion systems by providing a rudder incorporating the water intake and outlet and mounted for simplified connection with the water pump and flow control valve.

Still another object of the invention is to improve maneuverability of boats by providing means for readily controlling the boat particularly at very slow speeds.

Still another object of the invention is to improve boat performance by providing means for rapidly stopping and reversing without killing the engine.

For a more complete understanding of the invention, reference may be had to the accompanying drawings illustrating a preferred embodiment of the invention in which like reference characters refer to like parts throughout the several views and in which

FIG. 1 is a plan view of a boat embodying a preferred arrangement of the present system.

FIG. 2 is a cross-sectional view of the rudder and rudder mounting as taken substantially on the line 2—2 of FIG. 1.

FIG. 3 is a cross sectional view of the rudder mounting as taken substantially on the line 3—3 of FIG. 2.

FIG. 4 is a cross-sectional view of the rudder as taken substantially on the line 4—4 of FIG. 2.

FIG. 5 is an elevational view of a preferred water flow control valve embodied in the present invention, and

FIGS. 6, 7, 8 and 9 are cross sectional views showing different valve positions and taken substantially on the line (6—7—8—9)—(6—7—8—9) of FIG. 5.

A preferred boat **10** is illustrated in FIG. 1 as having a hull **11** in which is mounted a power plant **12**, a water pump **13** driven thereby and having an inlet **14** and an outlet **15** respectively connected by conduits or pipes **16** and **17** to a water flow control valve **18**.

The valve **18** is operated by a control lever **19** actuated through a control rod **20** from an operating lever **21** near the driver's seat **22**. A steering wheel **23** is preferably connected by means of cables **24** to a link element **25** connected with a control arm **26** by which is operated a rudder assembly **27** shown in FIGS. 2, 3 and 4.

The rudder assembly **27** is seen to comprise a hollow vertical contoured rudder structure **30** having a center

partition **31** which defines separate compartments **32** and **33**, and a hollow tubular steering member **34** projecting upwardly through the hull **11**, the partition **31** also extending upwardly to define separate vertical passages **35** and **36** respectively contiguous with the compartments **32** and **33**. The upper end of the tubular member **34** is closed by a cap **37** and annular seal **38**, the cap **37** being secured to the upper end of the partition **31** by a screw **39** which also secures the arm **26** to the cap **37** such that lateral arcuate movement of the arm **26** rotates the rudder assembly **27** for primarily steering the boat in conventional manner, the contoured rudder structure **30** performing the steering function.

The rudder assembly **27** is rotatably supported by a fixture **45** which comprises a cylindrical supporting member **46** closely fitting the tubular member **34** and having an annular flange **47** on a threaded lower end **48** which extends through a hole **49** in the hull **11**, the fixture **45** being secured to the hull **11** by a nut **50**, with a seal **51** being disposed between the hull **11** and the flange **47**.

The fixture **45** has oppositely extending ports **52** and **53** respectively openly connected at all times with the passages **35** and **36** in the tubular steering member **34** respectively through arcuate ports **54** and **55** therein which are of greater arcuate dimensions and the inner openings of the ports **52** and **53** so that, as shown in FIG. 3, the rudder assembly **27** may be rotated to move the partition **31** to either dotted line position without closing communication between the ports **52—53** and the passages **35—36**.

The hollow rudder structure **30**, as shown in FIG. 4, is provided with ports **60** and **61** open respectively to the compartments **32** and **33** and preferably vertically along the leading and trailing edges of the rudder structure **30** to direct water flow in a direction and a plane substantially common to the longitudinal medial plane of the structure **30**.

The ports **52** and **53** of the fixture **45** are respectively connected by conduits or pipes **62** and **63** to the flow control valve **18**, as shown in FIG. 1. The preferred construction of the flow control valve **18** is illustrated in FIGS. 5, 6, 7, 8 and 9 as comprising a casing **65** provided with four equally annularly spaced ports **66**, **67**, **68** and **69**, respectively, adapted for connection at all times with the pump inlet pipe **16**, the pump outlet pipe **17**, the forwardly positioned rudder fixture pipe **52**, and the rearwardly positioned rudder fixture pipe **53**. Water flow through the valve **18** is illustrated by directional arrows.

The valve casing **65** has a cylindrical chamber **70** in which is rotatably carried a rotor **71** having an axial passage **72**. The rotor is connected for operation to the lever **19** by a shaft **73**.

FIG. 6 illustrates the neutral operating position of the valve rotor **71** in which the inlet **14** and outlet **15** of the pump **13** are connected through the rotor passage **72** while the connections to the rudder are closed off. Water is pumped from the pump outlet **15** through the pipe **17** to the port **67**, thence through the rotor passage **72** out the port **66** through the pipe **16** to the pump inlet **14**.

FIG. 7 illustrates the forward operating positions of the valve rotor **71** in which water is pumped from the forward rudder compartment **32** to the rearward rudder compartment **33**, flow through the rotor passage **72** being closed off. Water is pulled into the forwardly disposed rudder port **60** into the compartment **32**, through the steering member passage **35** and the ports **54** and **52**, thence through the pipe **62** into the valve port **68** and out the valve port **66**, and through the pipe **16** to the pump inlet **14**. The water is then pumped out the outlet **15** through the pipe **17** into the valve port **67** and out

the pipe 17 into the valve port 67 and out the valve port 69, thence through the pipe 63 to the rudder fixture port 53 and into the port 55, through the steering member passage 36 into the compartment 33 and out of the rearwardly disposed rudder port 61. In effect, the water is pumped longitudinally through the rudder structure 30 for forward propulsion of the boat. In addition to propulsion, the jet flow of water, directed in a plane common to the rudder, increases the normal steering function of the rudder.

FIG. 8 illustrates the reverse operating position of the valve rotor 71 in which water flow is reversed to pull water into the rearwardly disposed rudder port 61 and out the forwardly disposed rudder port 60 to propel the boat in reverse.

FIG. 9 illustrates the part power operating position of the valve rotor 71 in which part of the water flow is diverted for propulsion as described above while the remainder of the water flow recirculates through the rotor passage 72.

Although I have described only one preferred embodiment of the invention, it will be apparent to one skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. In a water jet propulsion system for a boat having a power plant, a water pump and valve means for controlling water flow whereby to selectively control said propulsion system for forward, neutral and reverse drive, a rudder structure adjustably supported by said boat and comprising a hollow vertical structure partitioned to provide separate water intake and outlet compartments each having an opening to the water, said rudder including a hollow tubular steering member projecting upward into said boat and longitudinally partitioned contiguously with said hollow rudder structure to provide passages respectively open to said compartments, said boat having a support structure rotatably carrying said tubular steering member and having ports respectively open to said steering member passages and connected with said valve means, and means selectively rotating said steering member.

2. A water jet propulsion system for a boat, comprising a power plant, a water pump driven thereby and having an intake and an outlet, a vertical rudder structure adjustably supported by said boat and comprising a hollow structure partitioned to provide separate water intake and outlet compartments each having an opening to the water, and a valve means controlling water flow between said pump and said rudder compartments, said valve means being selectively operable to direct water flow to either compartment and to close off water flow to said compartments, said rudder being constructed and arranged to direct water delivered to either compartment for water jet propulsive flow in directions coplanar with said rudder.

3. The propulsion system as defined in claim 2 and in which said valve means comprises a casing having two ports respectively adapted for connection at all times with the pump inlet and pump outlet, two other ports respectively adapted for connection at all times with said rudder compartments, and a valve rotor adjustably supported by said casing and having a transverse bore, said rotor being operable to connect said first two ports through said bore while closing off said two other ports for neutral operation and to selectively connect either of said two other ports with said pump outlet while closing off said transverse bore to selectively direct water to and from either of said rudder compartments for forward or reverse operation.

4. The propulsion system as defined in claim 3 and in which said rotor is arranged for selective adjustment in an intermediate position to connect said pump outlet with said pump inlet through said bore and to either one of said two other ports for part power operation in forward or reverse operation.

References Cited in the file of this patent

UNITED STATES PATENTS

1,484,075	Otto	Feb. 19, 1924
1,721,827	Mauquoi	July 23, 1929
2,154,321	Briggs	Apr. 11, 1939
2,310,361	Ford	Feb. 9, 1943