

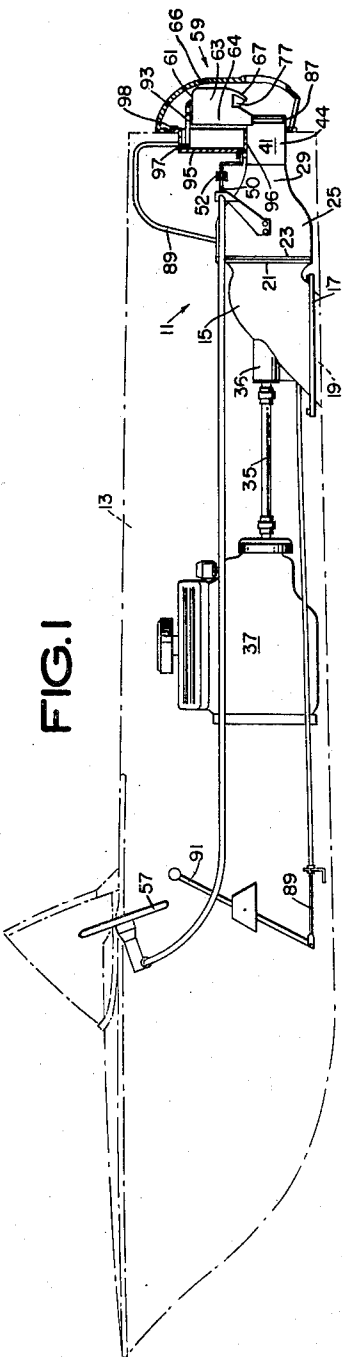
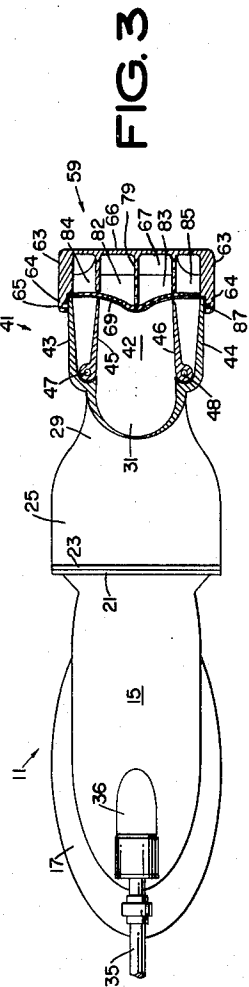
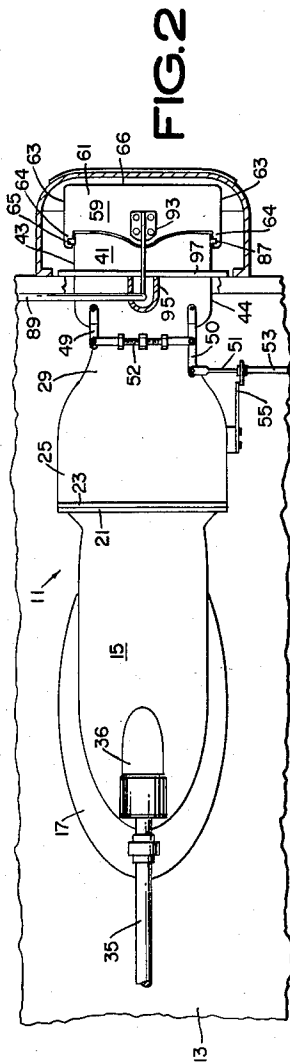
Dec. 17, 1963

W. W. AYLOR
BOAT PROPULSION MEANS

3,114,239

Filed March 23, 1962

3 Sheets-Sheet 1



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FIG. 4

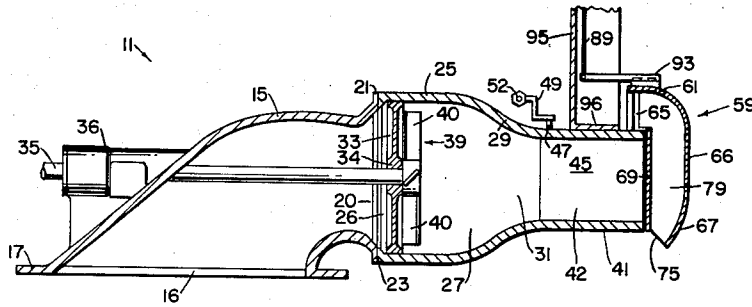


FIG. 5

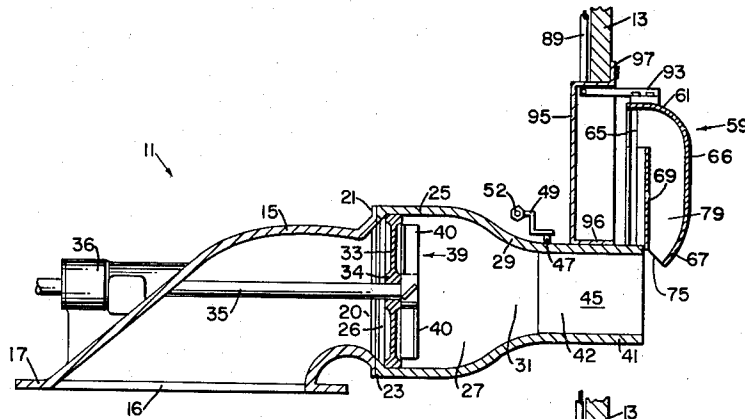
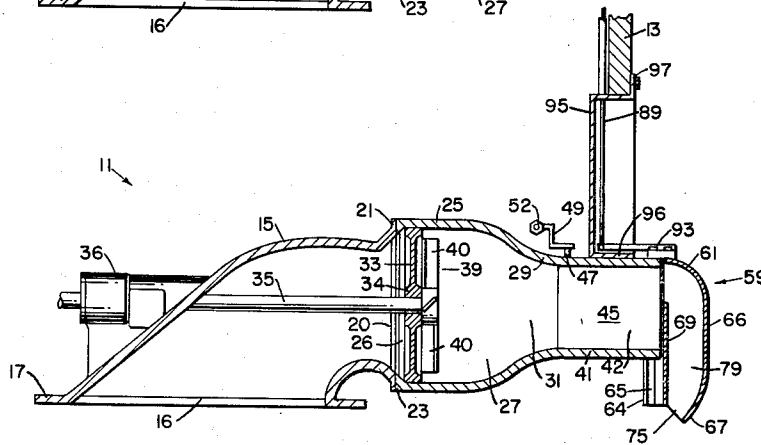


FIG. 6



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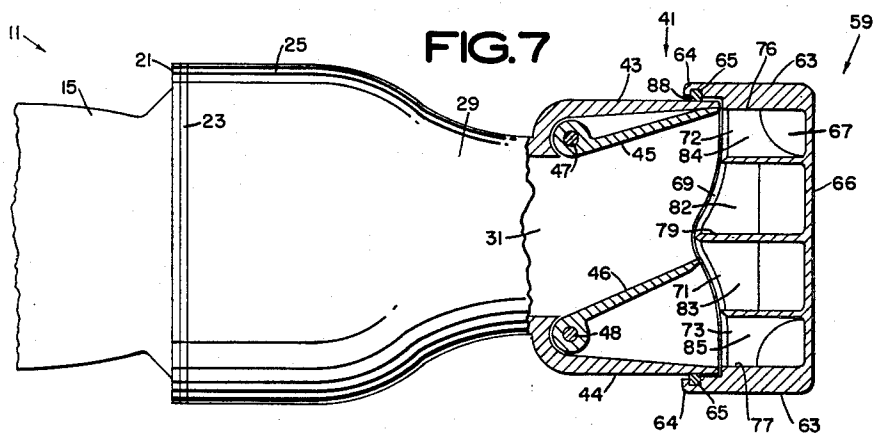
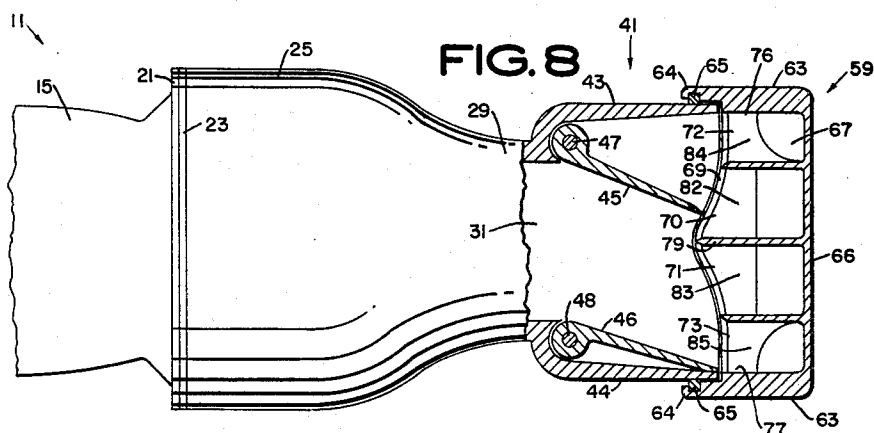
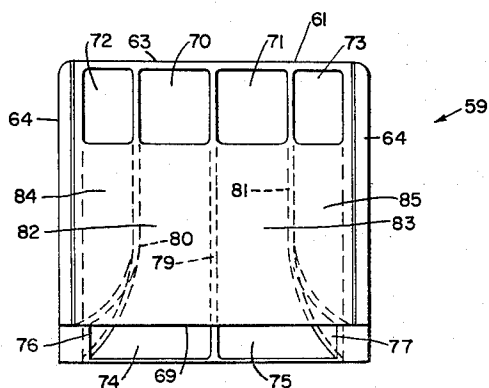
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3 Sheets-Sheet 3



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3,114,239

BOAT PROPULSION MEANS

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10 Claims. (Cl. 60—35.54)

This invention relates to new and useful improvements in the design, operation and efficiency of jet type propulsion units for boats and related watercraft.

More particularly the present invention relates to watercraft propulsion systems employing turbine type means of thrust utilizing the water beneath the craft for its locomotion.

The device of the present invention more specifically relates to a turbo-jet propulsion unit for marine craft embodying a minimal number of structural components, housing within these components the entire means for the speed and directional control of the craft.

The principal object of the present invention is to provide novel and useful propulsion means for boats, watercraft and the like.

Another object of the present invention is to provide a compact portable propulsion unit for boats and watercraft.

A further object of the present invention is to provide a marine jet type propulsion containing internally housed directional control means.

Another object of the device of the present invention is to provide remotely operable adjustable speed control means for a jet propulsion unit for watercraft.

A further object of the present invention is to provide a marine jet propulsion engine utilizing the buoyant liquid beneath the unit to supply the thrust means therefor.

Another object of the present invention is to provide a marine jet propulsion engine employing axial flow pump means for thrust.

A further object of the present invention is to provide shiftable baffle means for the thrust control of a hydrodynamic propulsion unit.

An additional object of the present invention is to increase the design and efficiency of hydrodynamic propulsion engines.

The means by which the foregoing and other objects of the present invention are accomplished and the manner of their accomplishment will be readily understood from the following specification upon reference to the accompanying drawings, in which:

FIG. 1 is a side elevational view of the device and its control means partly in section, with the boat indicated in dotted lines.

FIG. 2 is an enlarged fragmentary top plan view of the propulsion unit of the present invention and the related control mechanisms.

FIG. 3 is an enlarged fragmentary top plan view of the propulsion unit of the present invention with parts broken away for clarity and illustration.

FIG. 4 is an enlarged longitudinal sectional view of the propulsion unit with the control gate in neutral position.

FIG. 5 is a view similar to FIG. 4 of the propulsion unit with the control gate raised into full forward thrust position.

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FIG. 6 is a further view similar to FIG. 4 of the propulsion unit with the control gate lowered into reversed thrust position.

FIG. 7 is a further enlarged fragmentary top plan view of the propulsion unit of the present invention with parts broken away for purposes of illustration indicating the directional control vanes in right turn position.

FIG. 8 is a view similar to FIG. 7 of the propulsion unit indicating the directional control vanes in left turn position.

FIG. 9 is an enlarged front face view of the control gate with the walls of the flow channels indicated in dotted lines.

Referring now to the drawings in which the various parts are referred to by numerals, the device of the present invention comprises a hydro jet propulsion engine 11, which in use is preferably detachably mounted in the stern of a boat 13, as best illustrated in FIG. 1 of the drawings. The propulsion engine 11 further comprises a substantially downwardly open intake housing 15 having at its open base 16 a circumferential flange 17 which is affixed to the lowermost decking of the boat 13 as by bolts or similar means, the housing 15 resting in superjacent communicating alinement with the orifice 19 in the hull of the boat 13. It will thus be apparent upon reference to FIG. 1 of the drawings that the water below the boat 13 is afforded entrance into the housing 15 of the propulsion engine 11 via the orifice 19 in the boat 13. Housing 15 is additionally rearwardly open as at 20 with a peripheral flange 21 substantially perpendicular to the circumferential flange 17 surrounding opening 20. Co-extensive with peripheral flange 21 and securely attached thereto is a similar peripheral flange 23 carried by a shell 25 which is preferably substantially circular in cross section, shell 25 being forwardly open as at 26, opening 26 being surrounded by flange 23. The interengagement of flanges 21 and 23 effectively seal shell 25 to intake housing 15 with flow communication therebetween through the rear opening 20 of housing 15 and the forward opening 26 of shell 25.

Adjacent its junction with housing 15 shell 25 provides a turbulence chamber 27 which is thus disposed substantially centrally of propulsion engine 11. Shell 25 extending rearwardly from chamber 27 reduces substantially uniformly in cross section to merge into a constricted discharge throat 29, the constriction from chamber 27 into throat 29 effectively compressing flow discharge rearwardly through the throat from the chamber.

Chamber 27 adjacent to the flange connection with housing 15 is provided with a suitable shaft support such as a spider 33 having a central hub 34. The rearward end of a drive shaft 35 is journaled in hub 34 extending forwardly through and beyond housing 15 to a suitable journal 36 from which it extends into drive connection with a marine engine 37 carried amidships of boat 13. Rearwardly of spider 33 an impeller 39 is mounted upon drive shaft 35 within shell 25 for flow impelling drive under the influence of marine engine 37.

It will thus be seen, that when the internal combustion engine 37 is energized the attached drive shaft 35 rotating at prescribed engine speed, journaled within the hub 34 and connected to the axial pump impeller 39 will rotate the blades 40 of the impeller 39 moving the residual air within the housing 15 through the blades 40 and

through the turbulence chamber 27, thus creating a suction by which the water beneath the boat 13 is drawn into the housing and is impelled rearwardly into and through the turbulence chamber 37 as by the pump blades 40 of the pump 39. As the water in the turbulence chamber 37 continues to be driven rearwardly it enters the constricted throat 29 which provides a nozzle where it is compressed and accelerated into a jet stream and leaves the propulsion unit 11 discharging into the water rearward of the boat, imparting to the propulsion engine 11 and the boat 13 a reactive thrust to propel the boat along the surface of and through the water.

Adjacent the rearward portion of the constricted throat 29 and integrally attached thereto is a manifold 41 of substantially rectangular cross section comprising axially opposite substantially parallel walls embracing an enclosed exhaust passageway 42. The oppositely spaced substantially parallel vertical walls 43, 44 of the manifold 41 are further deformed radially inwardly at their foremost ends to provide for the rotatable attachment therein of a pair of directional control vanes 45, 46 pivotally attached to the upper and lower walls of the manifold 41 as by the pivot rods 47, 48. The pivot rods 47, 48 contained within and engaging the central bores of the vanes 45, 46 extend upwardly through the topmost wall of the manifold 41.

The pivot rod 47 is provided at its upper terminus with a rigidly attached pivot plate 49, and the pivot rod 48 is similarly provided with a rigidly attached pivot plate 50, the plate 50 somewhat greater in length than the plate 49 having hingedly attached to its forward end the distal end of a steering cable 51. The plates 49, 51 are further connected to each other with a spanning adjustable connector 52 to provide a synchronous unified movement between the respective plates 49, 51. The cable 51 is maintained in contiguous alinement with the pivot plate 50 as by the cable support bracket 55, the bracket 55 being securely attached to the shell 25. The forward extremity of the cable 51 is suitably connected to the steering wheel 57, by which the vanes 45, 46 may thus be directionally shifted for steering of the boat.

The propulsion engine 11 is additionally provided at its after end with a velocity control gate 59 rearwardly adjacent the manifold 41. The control gate 59 comprises a top section 61, oppositely spaced substantially parallel downwardly depending side members 63, an integrally attached rear member 65 in substantial perpendicular relation to the side members 63 and provided at its base with a downwardly and forwardly curved deflector 67.

The gate 59 on its front face further comprises a baffle plate 69 arcuately deformed as shown in FIGS. 7 and 8 and spanning from side to side of gate 59, spaced forwardly from rear 65. Adjacent the upper edge of baffle plate 69 a plurality of ports are formed to provide the gate 59 with upper entrance ports 70, 71, 72, 73. At its lower edge, plate 69 is spaced forwardly from the edge of deflector 67 providing intermediate its width lower forwardly directed exhaust ports 74, 75. The sides of the control gate 59 are additionally provided adjacent their bases with a pair of axially opposite, laterally directed exhaust ports 76, 77 substantially at the level of ports 74, 75.

The control gate 59 further comprises a central partition 79 in substantial perpendicular relation to the baffle 69 and extending rearwardly to the rear plate 66 of the control gate 59, and from top 61 downwardly to engage deflector 67. Partition 79 is positioned between and separates upper ports 70, 71, and is between and defines the inner edge of lower ports 74, 75. A pair of auxiliary partitions 80, 81 are interposed between the central partition 79 and the respective side members 63 of the gate 59. Each auxiliary partition 80, 81 adjacent its lower end curves laterally outward toward the adjacent side member 63, and the portions terminate in engagement with deflector 67 and at the lower ends of side members 63 to

which they are fixed. The lower edges of partitions 80, 81 are respectively adjacent and below lateral ports 76, 77.

Partitions 79, 80, 81 divide the interior of gate 59 into uninterrupted channels. Thus a channel 82 is formed between partitions 79, 80, communicating between ports 70 and 74; a channel 83 is formed between partitions 79, 81 communicating ports 71 and 75; and it will be observed in view of the lateral curving of the lower ends of partitions 80, 81, the lower ends of channels 82, 83 are enlarged to match substantially the opening size of ports 74, 75. Further a channel 84 is formed between partition 80 and adjacent side 63, communicating port 72 with lateral port 76; and a channel 85 is formed between partition 81 and the opposite side 63, communicating port 73 with the other lateral port 77.

The control gate 59 is slidably attached rearwardly adjacent the manifold 41 as by the slots 65 formed in the flaps 64 of the gate assembly substantially embracing the vertically disposed integrally connected guide rails 83 on the outer faces of the side walls 43, 44 of the manifold 41. The vertical movement of the control gate 59 is accomplished by means of a gate cable 89 connected at its extremity to a shift lever 91 and at its distal extremity to an arm 93 rigidly connected to the top plate 61 on the control gate 59. The cable 89 is maintained in substantial perpendicular alinement with the arm 93 as by the semi-cylindrical bracket 95. The base 96 of the bracket 95 is rigidly attached to the outer face of the top of the manifold 41, and the top member 97 of the semi-cylindrical bracket 95 is securely mounted as by an upwardly extending flange 98 to the transom of the boat 13.

It will be observed upon reference to FIG. 1 of the drawings that the control gate 59 and the adjacent rear portion of the manifold 41 extend rearwardly somewhat beyond the transom of the boat 13 to obtain maximum unimpeded thrust generated by the propulsion engine 11.

In the use of the device the internal combustion engine 37 is energized to rotate the attached driveshaft 35 and impeller 39. The impeller 39 forces the residual air from the housing 15 into the turbulence chamber 27 and further rearwardly through and beyond the manifold 41 of the propulsion engine 11. The pressure differential created by the removal of the air from the bell housing 15 creates suction which urges the water beneath the boat 13 upwardly through the orifice 19 into the housing 15. The rotating blades 40 propel the water from the housing 15 into the turbulence chamber 27 and therebeyond into the smaller chamber 31 of the constricted nozzle throat 29 where the flow of water is compressed and accelerated under the compressive conditions of the smaller area of the chamber 31.

With the control gate in raised position as best illustrated in FIG. 5 of the drawings it will be observed that the jet stream will be expelled directly rearwardly from the engine 11 in such manner as to impart a reactive thrust to the boat 13 to propel the boat 13 forwardly at maximum speed. As the control gate 59 is lowered, by the shifting of the lever 91 forward, the jetted stream of water is impeded in its rearward progress reducing the forward speed of the boat 13.

When the control gate 59 is lowered into mid-position, as best illustrated in FIG. 4 of the drawings, it will be observed that the unapertured major portion of baffle 69 overlies the rearmost opening of the manifold 41 in such manner as to prevent the egress of the jetted stream from the propulsion engine 11, thus nullifying the forward movement of the boat 13.

When the shift lever 91 is retracted into "reverse" position, the interconnected cable 89 depresses the control gate 59 to the reverse or lowermost position, as best shown in FIG. 6 of the drawings, lowering the baffle 69 and bringing the ports 70, 71, 72 and 73 into registered alinement with a substantial portion of the jetted stream

which is diverted through the respective ports 70, 71, 72 and 73 and thence downwardly through the respectively adjacent flow channels 82, 83, 84 and 85. When the directional vanes 45, 46 are in substantial parallel alinement with the jetted stream, the jetted stream will be expelled into the ports 70, 71, 72 and 73, downwardly through the flow channels 82, 83, 84 and 85, leaving the area of the control gate 59 through the respective exhaust ports 74, 75, 76 and 77 discharging the jetted stream beneath and forwardly of the boat 13 utilizing the thrust of the jetted stream to propel the boat 13 in a rearwardly direction. It will thus be seen from the foregoing paragraph that in the "reverse" condition the boat 13 will be repelled at a lesser speed minimizing the tendency to capsize the boat.

To effect a right turn at substantially full thrust the control gate 59 is raised to its maximum height to allow the complete exhaust of the jetted stream, and the vanes 45, 46 will be angularly deflected as shown in FIG. 7 of the drawings directing the jetted stream away from the boat 13 at an angle substantially equal to the angle formed by the vanes 45, 46 and the longitudinal axis of the propulsion engine 11. Conversely, a left turn of the boat 13 is effected by reversing the angular deflection of the vanes 45, 46 and directing the jetted stream in an oppositely angular direction away from the longitudinal axis of the boat 13 as best illustrated in FIG. 8 of the accompanying drawings.

A right turn of the boat 13 may be effected from a stationary position with the propulsion engine 11 energized, as from a limited or restricted mooring. The control gate 59 is lowered to the lowermost position to allow the jetted stream ingress into the entrance ports of the upper forward end of the control gate above the baffle 69 with the vanes 45, 46 deflected into the attitude best illustrated in FIG. 7 of the drawings. It will be observed upon reference to FIG. 7 of the drawings that the vanes 45, 46 in the "right turn" position will deflect the jetted stream angularly away from its normal direction into the entrance ports 70, 72 downwardly through the connecting flow channel 82, 84 and out of the control gate 59 by means of the exhaust ports 74, 76. A portion of the jetted stream is thus directed into the port 70 through the channel 82 and is deflected against the forwardly curved section 67 of the rear plate 66 to discharge to one side of the keel line of the boat 13, and the remaining portion of the jetted stream is directed into the port 72 downwardly through the channel 84 and thence exhausted through the port 76 in a lateral direction away from the boat 13 employing the thrust of the egressing jetted stream to turn the boat in a clockwise direction, being assisted by the off-center discharge from port 74, with a minimum component of rearward movement.

To execute a left turn of the boat 13 from immobile or rest position the vanes 45, 46 are angularly deflected oppositely to the angularity of the vanes employed in a right turn to direct the jetted stream into the ports 71, 73 through the connected channels 83, 85 and exhausted from the control gate 59 via the exhaust ports 75, 77. A portion of the jetted stream is thus deflected into the port 71, the channel 83, and exhausted beneath the boat through the port 75 in such manner as to discharge along the other side of the keel line of the boat, while the other portion of the jetted stream is diverted into the port 73 through the adjoining channel 85 and exhausted in a lateral direction from the port 77 utilizing the thrust of the jetted stream to turn the boat 13 in a counter-clockwise manner, similarly being assisted by the off-center discharge from port 75, with minimum rearward movement.

It will be observed that manifold 41 is of a height internally substantially equal to the internal diameter of throat 29, and that vanes 45, 46, which are pivotally supported in manifold 41 for swinging movement, are of a height substantially equal to the internal height of

the manifold, and, therefore, substantially equal to the internal diameter of throat 29.

It will further be observed that vanes 45, 46 are laterally spaced apart a distance substantially equal to the internal diameter of throat 29. The arcuate deformation of baffle plate 69 comprises two arcs which are respectively formed concentrically of the arc of swinging movement of the respective vanes 45, 46 so that the rearward edges of the vanes, upon shift with gate 59 in lowered position, are enabled to slidably closely engage the arcuate surfaces of baffle 69.

It will further be noted that the total width of apertures 70, 71 is also substantially equal to the internal diameter of throat 29 and to the spacing between the vanes 45, 46.

It will also be observed that adjustable linkage 52 is preferably in the nature of a turnbuckle and may be utilized to vary the positions of vanes 45, 46 relative to each other so as to adjust the size of the terminal discharge of the nozzle. When adjusted such size is established until further variation is desired.

I claim:

1. In a boat, pump means for establishing an axial flow of water rearward, a composite nozzle adjacent the stern of the boat communicated with said pump means and receiving said flow therefrom; said nozzle comprising a restricted throat adjacent said pump means compressing and accelerating said flow into a jet stream, a manifold integrally connected with the rear of said throat for passage of said jet stream therethrough, said manifold being open and extending rearwardly beyond the stern of said boat for discharge of said jet stream substantially horizontally rearwardly of said boat creating thrust for propulsion of said boat; a pair of vertically disposed, rearwardly extending vanes swingably supported by said manifold, said vanes being spaced apart a distance substantially equal to the internal diameter of said throat, adjustable linkage interconnecting said vanes, means for jointly swinging said vanes from side to side, swinging shift of said vanes laterally deflecting discharge of said jet stream, a control gate slidably supported at the open rear end of said manifold, means for effecting vertical shift of said gate relative to said manifold among upper, intermediate and lower positions, said gate including a rear plate terminating at its lower edge in a forwardly curved deflector, a baffle connected to said rear plate and spaced forwardly therefrom, said baffle including an imperforate body terminating at its lower edge above and spaced from said deflector and having an area substantially equal to the area of said manifold rear end, said baffle having adjacent its upper edge above said baffle body a pair of central ports and a pair of side ports communicating into the space between said rear plate and said baffle, channelways respectively connecting said central ports with the space between the said lower edges, additional channelways connecting said side ports respectively with laterally directed discharge ports formed in the sides of said gate intermediate said plate and said baffle, said gate in said upper position clearing said manifold for unobstructed rearward jet stream discharge to forwardly propel said boat, deflection of said discharge responsive to vane shift effecting a turning change of direction of said boat, said gate in intermediate position disposed with said imperforate baffle body in discharge blocking register with said manifold rear end interrupting propulsion of said boat, said gate in said lower position having said central and side ports in communication with the upper part of said manifold rear end and said deflector and baffle lower edge below said manifold receiving stream discharge, said deflector directing said discharge forwardly to rearwardly propel said boat, vane shift in lower position diverting at least a part of said flow through one of said side ports for lateral discharge through its connected lateral port to effect boat turning in reverse.

2. In a boat, pump means for establishing an axial

flow of water rearward, a composite nozzle adjacent the stern of the boat communicated with said pump means and receiving said flow therefrom; said nozzle comprising a restricted throat adjacent said pump means compressing and accelerating said flow into a jet stream, a manifold connected with the rear of said throat for passage of said jet stream therethrough, said manifold being open and extending rearwardly beyond the stern of said boat for discharge of said jet stream substantially horizontally rearwardly of said boat creating thrust for propulsion of said boat; a pair of vertically disposed, rearwardly extending vanes swingably supported by said manifold, said vanes being spaced a distance substantially equal to the internal diameter of said throat, means for jointly swinging said vanes from side to side, swinging shift of said vanes laterally deflecting discharge of said jet stream, a control gate slidably supported at the open rear end of said manifold, means for effecting vertical shift of said gate relative to said manifold between upper and lower positions, said gate including a rear plate terminating at its lower edge in a forwardly curved deflector, a baffle connected to said rear plate and spaced forwardly therefrom, said baffle including an imperforate body terminating at its lower edge above and spaced from said deflector, said baffle having adjacent its upper edge above said baffle body a pair of central ports and a pair of side ports communicating into the space between said rear plate and said baffle, channelways respectively connecting said central ports with the space between the said lower edges, additional channelways connecting said side ports respectively with laterally directed discharge ports formed in the sides of said gate intermediate said plate and said baffle, said gate in said upper position clearing said manifold for unobstructed rearward jet stream discharge to forwardly propel said boat, deflection of said discharge responsive to vane shift effecting a turning change of direction of said boat, said gate in said lower position having said central and side ports in communication with the upper part of said manifold rear end and said deflector and baffle lower edge below said manifold receiving stream discharge, said deflector directing said discharge forwardly to rearwardly propel said boat, vane shift in lower position diverting at least a part of said flow through one of said side ports for lateral discharge through its connected lateral port to effect boat turning in reverse.

3. In a boat, pump means for establishing an axial flow of water rearward, a composite nozzle adjacent the stern of the boat communicated with said pump means and receiving said flow therefrom; said nozzle comprising a restricted throat adjacent said pump means compressing and accelerating said flow into a jet stream, a manifold connected with the rear of said throat for passage of said jet stream therethrough, said manifold being open and extending rearwardly beyond the stern of said boat for discharge of said jet stream substantially horizontally rearwardly of said boat creating thrust for propulsion of said boat; a pair of vertically disposed, rearwardly extending vanes swingably supported by said manifold, means for jointly swinging said vanes from side to side, swinging shift of said vanes laterally deflecting discharge of said jet stream, a control gate slidably supported at the open rear end of said manifold, means for effecting vertical shift of said gate relative to said manifold among upper, intermediate and lower positions, said gate including a rear plate terminating at its lower edge in a forwardly curved deflector, a baffle connected to said rear plate and spaced forwardly therefrom, said baffle including an imperforate body terminating at its lower edge above and spaced from said deflector and having an area substantially equal to the area of said manifold rear end, said baffle having adjacent its upper edge above said baffle body a pair of central ports and a pair of side ports communicating into the space between said rear plate and said baffle, channelways respectively connect-

ing said central ports with the space between the said lower edges, additional channelways connecting said side ports respectively with laterally directed discharge ports formed in the sides of said gate intermediate said plate and said baffle, said gate in said upper position clearing said manifold for unobstructed rearward jet stream discharge to forwardly propel said boat, deflection of said discharge responsive to vane shift effecting a turning change of direction of said boat, said gate in intermediate position disposed with said imperforate baffle body in discharge blocking register with said manifold rear end interrupting propulsion of said boat, said gate in said lower position having said central and side ports in communication with the upper part of said manifold rear end and said deflector and baffle lower edge below said manifold receiving stream discharge, said deflector directing said discharge forwardly to rearwardly propel said boat, vane shift in lower position diverting at least a part of said flow through one of said side ports for lateral discharge through its connected lateral port to effect boat turning in reverse.

4. In a boat, pump means for establishing an axial flow of water rearward, a composite nozzle adjacent the stern of the boat communicated with said pump means and receiving said flow therefrom, said nozzle comprising a restricted throat adjacent said pump means compressing and accelerating said flow into a jet stream, a manifold connected with the rear of said throat for passage of said jet stream therethrough, said manifold being open and extending rearwardly beyond the stern of said boat for discharge of said jet stream substantially horizontally rearwardly of said boat creating thrust for propulsion of said boat, a pair of vertically disposed, rearwardly extending vanes swingably supported by said manifold, means for jointly swinging said vanes from side to side, swinging shift of said vanes laterally deflecting discharge of said jet stream, a control gate slidably supported at the open rear end of said manifold, means for effecting vertical shift of said gate relative to said manifold between upper and lower positions, said gate including a rear plate terminating at its lower edge in a forwardly curved deflector, a baffle connected to said rear plate and spaced forwardly therefrom, said baffle including an imperforate body terminating at its lower edge above and spaced from said deflector, said baffle having adjacent its upper edge above said baffle body a pair of central ports and a pair of side ports communicating into the space between said rear plate and said baffle, channelways respectively connecting said central ports with the space between the said lower edges, additional channelways connecting said side ports respectively with laterally directed discharge ports formed in the sides of said gate intermediate said plate and said baffle, said gate in said upper position clearing said manifold for unobstructed rearward jet stream discharge to forwardly propel said boat, deflection of said discharge responsive to vane shift effecting a turning change of direction of said boat, said gate in said lower position having said central and side ports in communication with the upper part of said manifold rear end and said deflector and baffle lower edge below said manifold receiving stream discharge, said deflector directing said discharge forwardly to rearwardly propel said boat, vane shift in lower position diverting at least a part of said flow through one of said side ports for lateral discharge through its connected lateral port to effect boat turning in reverse.

5. In a boat, pump means for establishing an axial flow of water rearward, a composite nozzle adjacent the stern of the boat communicated with said pump means and receiving said flow therefrom; said nozzle comprising a restricted throat adjacent said pump means compressing and accelerating said flow into a jet stream, a manifold integrally connected with the rear of said throat for passage of said jet stream therethrough, said manifold being open and extending rearwardly beyond the stern of said boat for discharge of said jet stream substantially horizontally rear-

wardly of said boat creating thrust for propulsion of said boat; vane means swingably supported by said manifold, means for laterally swinging said vane means to laterally deflect discharge of said jet stream, gate means shiftably supported at the open rear end of said manifold, means for effecting shift of said gate means relative to said manifold among forward, neutral and reverse positions, said gate including reversing means for forwardly deflecting said jet stream and means for blocking said jet stream, said reversing means including laterally directed discharge means communicating with said reversing means, said gate means in said upper position clearing said manifold for unobstructed rearward jet stream discharge to forwardly propel said boat, deflection of said discharge responsive to vane shift effecting a turning change of direction of said boat, said gate means in intermediate position disposed with said blocking means in discharge blocking register with said manifold rear end interrupting propulsion of said boat, said gate means in said lower position having said reversing means in communication with said jet stream directing said discharge forwardly to rearwardly propel said boat, vane shift in lower position diverting at least a part of said flow through part of said laterally directed means for lateral discharge to effect boat turning in reverse.

6. In a boat, pump means for establishing an axial flow of water rearward, a composite nozzle adjacent the stern of the boat communicated with said pump means and receiving said flow therefrom, said nozzle comprising a restricted throat adjacent said pump means compressing and accelerating said flow into a jet stream, a manifold integrally connected with the rear of said throat for passage of said jet stream therethrough, said manifold being open and extending rearwardly beyond the stern of said boat for discharge of said jet stream substantially horizontally rearwardly of said boat creating thrust for propulsion of said boat, a control gate slidably supported at the open rear end of said manifold, means for effecting vertical shift of said gate relative to said manifold among upper, intermediate and lower positions, said gate including a rear plate terminating at its lower edge in a forwardly curved deflector, a baffle connected to said rear plate and spaced forwardly therefrom, said baffle including an imperforate body terminating at its lower edge above and spaced from said deflector and having an area substantially equal to the area of said manifold rear end, said baffle having adjacent its upper edge above said baffle body a pair of ports, channelways respectively connecting said ports with the space between the said lower edges, said gate in said upper position clearing said manifold for unobstructed rearward jet stream to forwardly propel said boat, said gate in intermediate position disposed with said imperforate baffle body in discharge blocking register with said manifold rear end interrupting propulsion of said boat, said gate in said lower position having said ports in communication with the upper part of said manifold rear end and said deflector and baffle lower edge below said manifold receiving stream discharge, said deflector directing said discharge forwardly to rearwardly propel said boat.

7. In a boat, pump means for establishing an axial flow of water rearward, a composite nozzle adjacent the stern of the boat communicated with said pump means and receiving said flow therefrom, said nozzle comprising a restricted throat adjacent said pump means compressing and accelerating said flow into a jet stream, a manifold integrally connected with the rear of said throat for passage of said jet stream therethrough, said manifold being open and extending rearwardly beyond the stern of said boat for discharge of said jet stream substantially horizontally rearwardly of said boat creating thrust for propulsion of said boat, a control gate slidably supported at the open rear end of said manifold, means for effecting vertical shift of said gate relative to said manifold between upper and lower positions, said gate including a rear plate termi-

nating at its lower edge in a forwardly curved deflector, a baffle connected to said rear plate and spaced forwardly therefrom, said baffle including an imperforate body terminating at its lower edge above and spaced from said deflector, said baffle having adjacent its upper edge above said baffle body a pair of ports, channelways respectively connecting said ports with the space between the said lower edges, said gate in said upper position clearing said manifold for unobstructed rearward jet stream to forwardly propel said boat, said gate in said lower position having said ports in communication with the upper part of said manifold rear end and said deflector and baffle lower edge below said manifold receiving stream discharge, said deflector directing said discharge forwardly to rearwardly propel said boat.

8. In a boat, pump means for establishing an axial flow of water rearward, nozzle means adjacent the stern of the boat communicated with said pump means and receiving said flow therefrom compressing and accelerating said flow into a jet stream, said nozzle means being open and extending rearwardly beyond the stern of said boat for discharge of said jet stream substantially horizontally rearwardly of said boat creating thrust for propulsion of said boat, a control gate slidably supported at the open rear end of said nozzle means, means for effecting vertical shift of said gate relative to said manifold between upper and lower positions, said gate including a rear plate terminating at its lower edge in a forwardly curved deflector, a baffle connected to said rear plate and spaced forwardly therefrom, said baffle including an imperforate body terminating at its lower edge above and spaced from said deflector, said baffle having adjacent its upper edge above said baffle body of pair of ports, channelways respectively connecting said ports with the space between the said lower edges, said gate in said upper position clearing said nozzle means for unobstructed rearward jet stream to forwardly propel said boat, said gate in said lower position having said ports in communication with the upper part of said nozzle means rear end and said deflector and baffle lower edge below said nozzle means receiving stream discharge, said deflector directing said discharge forwardly to rearwardly propel said boat.

9. In a boat, means for establishing an axial flow of water rearward, nozzle means adjacent the stern of the boat communicated with said axial flow means and receiving said flow therefrom compressing and accelerating said flow into a jet stream, said nozzle means being open and extending rearwardly beyond the stern of said boat for discharge of said jet stream substantially horizontally rearwardly of said boat creating thrust for propulsion of said boat, gate means shiftably supported at the open rear end of said nozzle means for shift of said gate means between forward and reverse positions, said gate means including a rear plate terminating in a forwardly curved deflector, a baffle connected to said rear plate and spaced forwardly therefrom, said baffle including an imperforate body spaced from said deflector, said baffle having adjacent one edge remote from said deflector a pair of ports, channelways respectively connecting said ports with the space between said deflector and said baffle, said gate means in said forward position clearing said nozzle means for unobstructed rearward jet stream to forwardly propel said boat, said gate means in said reverse position having said ports in communication with said manifold rear end and said deflector receiving stream discharge and directing said discharge forwardly to rearwardly propel said boat.

10. In a boat, pump means for establishing an axial flow of water rearward, a composite nozzle adjacent the stern of the boat communicated with said pump means and receiving said flow therefrom, said nozzle comprising a restricted throat adjacent said pump means compressing and accelerating said flow into a jet stream, a manifold integrally connected with the rear of said throat for passage of said jet stream therethrough, said manifold being open and extending rearwardly beyond the stern of said boat for

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discharge of said jet stream substantially horizontally rearwardly of said boat creating thrust for propulsion of said boat, a pair of vertically disposed, rearwardly extending vanes swingably supported by said manifold, said vanes being spaced apart a distance substantially equal to the internal diameter of said throat, adjustable linkage interconnecting said vanes, means for jointly swinging said vanes from side to side, swinging shift of said vanes laterally deflecting discharge of said jet stream, rearward jet

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stream discharge forwardly propelling said boat, deflection of said discharge responsive to vane shift effecting a turning change of direction of said boat, and means for interrupting said discharge.

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