United States Patent [19]

Moore

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[54] CONTROL ASSEMBLY FOR JET BOAT

[76] Inventor: **Cecil L. Moore,** 2801 Linda Ln., West Lafayette, Ind. 47906

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[52] **U.S. Cl.** ..... **115/12 R**

[51] **Int. Cl.** **B63h 11/00,** B63h 11/10

[58] **Field of Search** . 115/12 R, 14, 16; 60/221, 222

[56] **References Cited**

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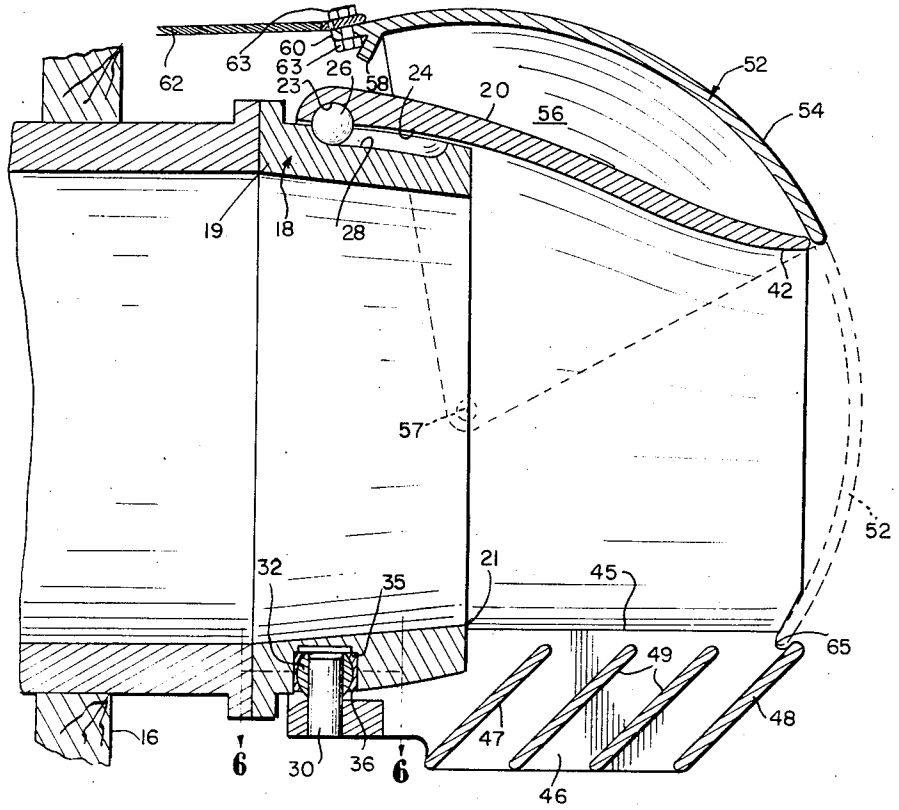
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Primary Examiner—Trygve M. Blix
Assistant Examiner—Stuart M. Goldstein
Attorney, Agent, or Firm—Trask, Jenkins and Hanley

[57] **ABSTRACT**

A control assembly for a boat having a water jet propulsion system in which the jet is moved successively through a discharge conduit and a nozzle movably mounted on said conduit. A bucket is mounted on said nozzle and is movable with and with respect to said nozzle whereby said nozzle and bucket can be moved into different positions of adjustment to control the jet for thus controlling the steering, fore and aft movements, and the desired planing of the boat.

5 Claims, 6 Drawing Figures



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SHEET 1 OF 2

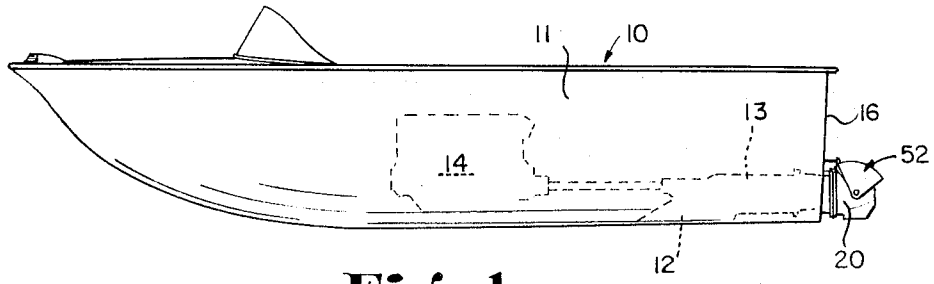


Fig. 1

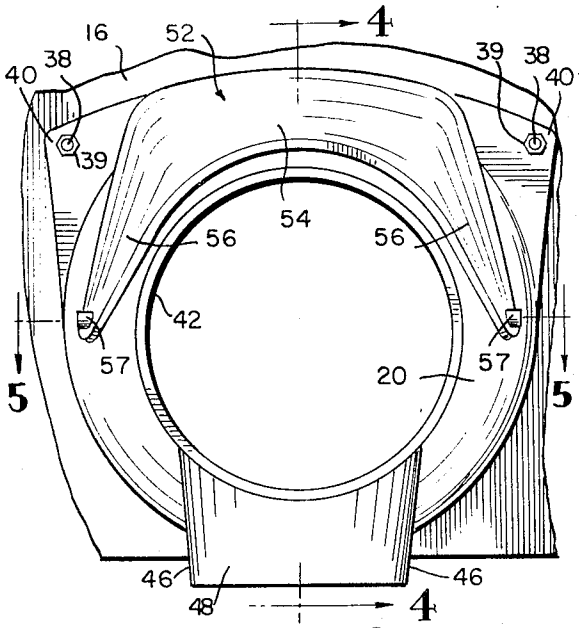


Fig. 2

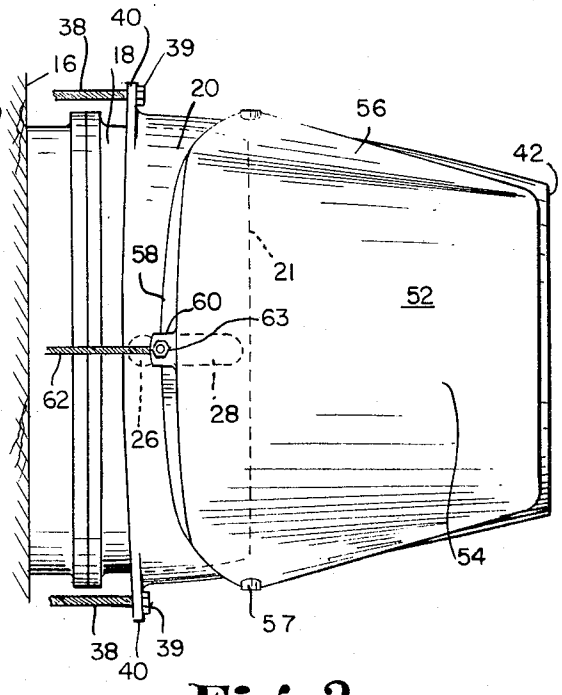


Fig. 3

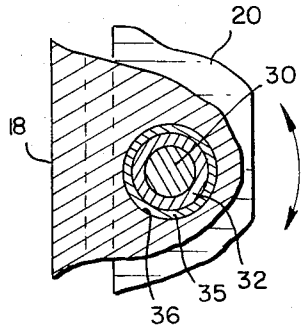


Fig. 6

INVENTOR
CECIL L. MOORE
BY
Cecil Jordan & Hurley
ATTORNEYS

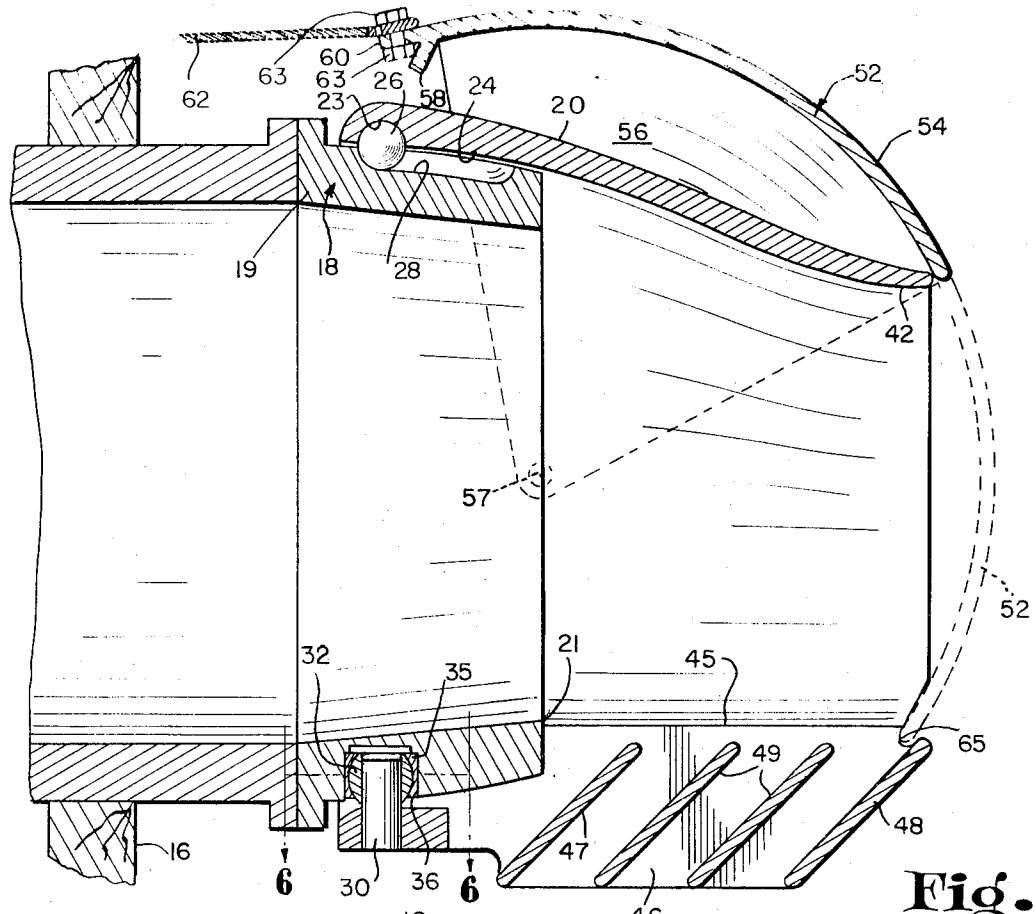


Fig. 4

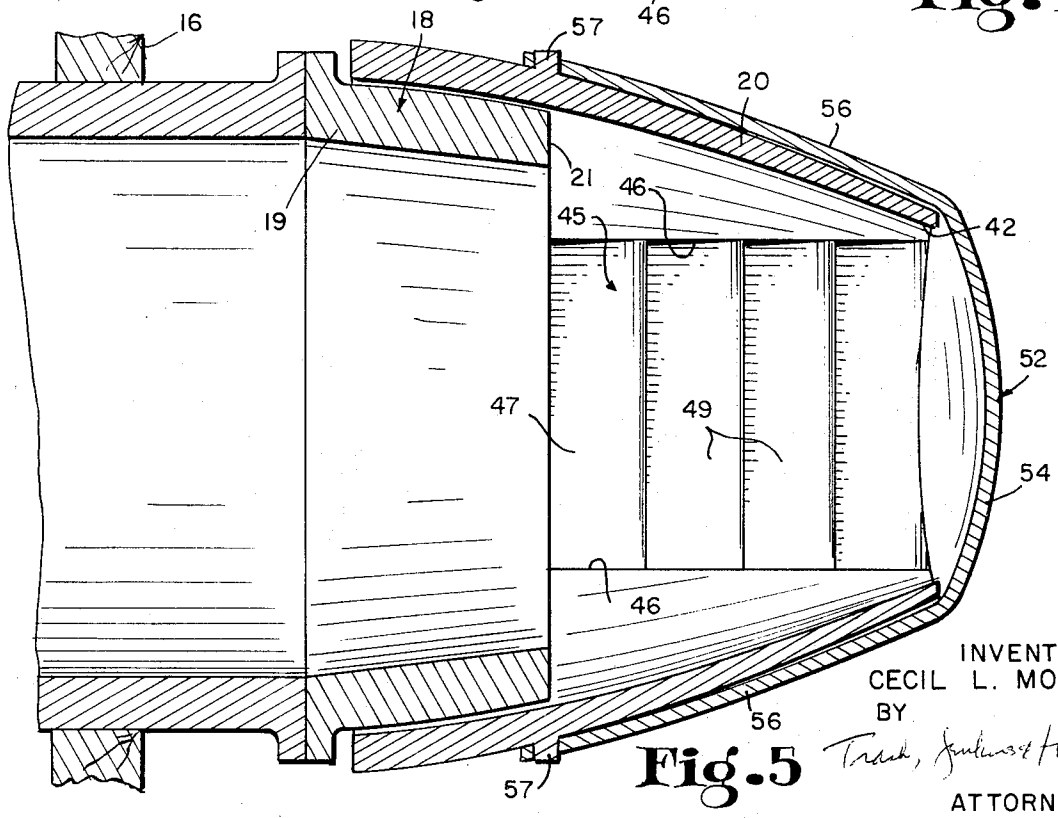


Fig. 5

INVENTOR
CECIL L. MOORE
BY
Trask, Jenkins & Hanley
ATTORNEYS

CONTROL ASSEMBLY FOR JET BOAT

BACKGROUND OF THE INVENTION

The ability of a boat to properly plane in the water for the most efficient operation and maximum speed is a function of various factors such as hull design, weight distribution, and the like. These factors exist irrespective of whether the boat employs a conventional propeller drive or a water jet propulsion system. While various types of steering controls for boats with water jet propulsion systems are known, these controls make no provision for controlling or adjusting the planing of the boat upon which they are mounted.

It is thus an object of this invention to provide a control system for a jet propelled boat which will control the fore and aft and lateral steering movements of said boat, as well as providing a means for increasing its ability to plane properly.

SUMMARY OF THE INVENTION

In accordance with one form of the invention, a discharge conduit projects rearwardly from the transom of a boat to receive the jet flow from a water jet propulsion power source. A nozzle extends around and projects rearwardly of the discharge conduit. The nozzle and conduit are interconnected by a swivelly mounted pivot pin and a cooperative bearing race and socket having a bearing carried therein whereby said nozzle is swivelly movable with respect to said conduit for controlling the horizontal and vertical angles that the jet is discharged from the nozzle for steering the boat and adjusting its planing.

The nozzle is provided with a reversing opening in its lower face, and a bucket is swingably mounted on the nozzle for opening and closing the outlet thereof. Thus, when said bucket is swung upwardly into a retracted position, the jet is free to move in a generally rearward direction through the nozzle outlet for propelling the boat forwardly, but when said nozzle is swung downwardly into a reversing position over the nozzle outlet, the jet is diverted through the nozzle reversing opening into a generally forward direction for propelling the boat rearwardly.

Conveniently, the movements of the nozzle and bucket for controlling the steering, reversing, and planing of the boat are controlled by any desired type of actuating means, such as push-pull cables, control links, or the like.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIG. 1 is a side elevation of a jet boat having mounted thereon a control assembly embodying the invention;

FIG. 2 is an enlarged rear elevation of the control assembly shown in FIG. 1;

FIG. 3 is a top plan view of the control assembly shown in FIG. 2;

FIG. 4 is a vertical section taken on the line 4—4 of FIG. 2 and showing the bucket in full lines in its retracted position and in dotted lines in its reversing position;

FIG. 5 is a horizontal section taken on the line 5—5 of FIG. 2, but showing the bucket in its reversing position; and

FIG. 6 is a horizontal section taken on the line 6—6 of FIG. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. 1, the control assembly comprising the instant invention is adapted to be mounted on a jet boat **10** having a hull **11**. The hull is provided with an intake opening **12** connected to a pump **13** driven by a conventional marine engine **14** to force a jet of water outwardly through the transom **16** of the hull.

In order to control the direction of the jet flow for controlling the steering, reversing, and planing movements of the boat, there is provided a control assembly as shown in detail in FIGS. 2–6 of the drawings. As shown, said assembly comprises a discharge conduit **18** projecting rearwardly of the transom **16** and having its inlet end **19** interconnected to the pump.

A nozzle **20** extends around and projects rearwardly of the outlet end **21** of the conduit **18**. As shown in FIG. **4**, a bearing socket **23** is formed in the inner face of the nozzle adjacent its inlet end **24**. A bearing **26** is carried in the socket **23** and rides in a longitudinally extending bearing race **28** formed in the outer face of conduit **18**. A pivot pin **30** located in diametrically opposed relation to the bearing socket **23** projects inwardly from the inner face of the nozzle. A head **32** having spherically shaped side walls is mounted on the inner end of the pin **30**. The head **32** is swivelly received in a collar **35** mounted in an oepning **36** in the outer face of the conduit **18**. As shown, the limits of the swivel movements of the nozzle can be controlled by the length of the race **28** and the interference between the overlapping nozzle inlet and conduit outlet ends.

Conveniently, the nozzle is movable with respect to the conduit by a pair of push-pull control cables **38** connected, as by nuts **39**, to a pair of laterally projecting ears **40** on the nozzle. Thus, oppositely directed forces applied to said cables will swing the nozzle laterally for steering the boat, and a force applied to the cables in the same direction will swing the nozzle upwardly or downwardly. As will be understood, when the nozzle is angled downwardly, the jet will be directed downwardly from the nozzle outlet **42** to force the bow of the boat downwardly so that it will better plane.

As shown in FIG. **4**, the nozzle is provided with a reversing section in its bottom face adjacent its outlet **42**. Said section comprises an opening **45** extending forwardly from the outlet **42** to the conduit outlet end **21**. A pair of side walls **46** extend downwardly from the opening **45** and are interconnected by front and rear walls **47** and **48** angling downwardly and forwardly from the opening **45**. A plurality of longitudinally spaced, transversely extending vanes **49** also extend downwardly and forwardly from the opening **45** and interconnect the side walls **46** between the front and rear walls **47** and **48**.

In order to force the jet outwardly through the open lower end of the reversing section, a bucket **52** is mounted on the nozzle **20**. Said bucket comprises a generally spherically or cup shaped center section **54** interconnecting a pair of side arms **56** rotatably mounted on a pair of stub axles **57** projecting outwardly from the opposed sides of the nozzle **20**. An angularly disposed flange **58** extends across the upper edge of the section **54**, and a finger **60** projects upwardly therefrom. A push-pull cable **62** is connected,

as by nuts **63,** to the finger **60** for swinging the bucket about the axis of the axles **57** between a retracted position as shown in full lines in FIG. **4** in which the jet is discharged generally rearwardly through the nozzle outlet **42** for propelling the boat forwardly and a reversing position as shown in dotted lines in FIG. **4** in which the bucket closes the nozzle outlet and the jet is directed generally forwardly through the reversing section for propelling the boat rearwardly. With the bucket in its retracted position, the force of the jet will, of course, cause it to pass over the reversing section for discharge out the nozzle outlet **42.**

As shown, a transverse slot **65** extends across the rear of the nozzle at the juncture of the outlet **42** and the rear wall **48** of the reversing section. The lower edge of the bucket is received in the slot **65** when said bucket is moved into its reversing position for thus limiting movement of the bucket into its reversing position and bracing and supporting said bucket against the force of the jet.

Thus, with the bucket **52** being mounted on the nozzle **20,** said bucket can be moved into the desired position of adjustment for propelling the boat forwardly and rearwardly with the nozzle swinging about its connection to the discharge conduit to effect steering. In addition, the nozzle is also movable about its connection to the discharge conduit to tilt the axis of the jet to cause the boat to properly plane.

As will be understood, of course, the control cables **38** and **62** are shown for illustrative purposes only, and any desired type of actuators may be employed to achieve the desired nozzle and bucket movements.

I claim:

1. A control assembly for a boat having a water jet propulsion power source, comprising a discharge conduit at the rear of said boat having an inlet operatively connected to said power source and an outlet, a nozzle having an inlet and outlet and extending around and projecting rearwardly of said conduit, said nozzle having a bearing socket formed in its inner face, said conduit having a longitudinally extending bearing race formed in its outer face, a bearing movably carried in said socket and race, a pivot pin on said nozzle swivelly connected to said conduit in diametrically opposed relation to said race, a bucket swingably mounted on said nozzle for movement between a reversing position in which it extends over said nozzle outlet to divert the jet flow from the power source generally forwardly from the nozzle and a retracted position in which said flow is permitted to move in a generally rearwardly direction through the nozzle outlet, and control means for moving said nozzle and bucket into the desired positions of adjustment.

2. The invention as set forth in claim **1** in which said nozzle has a longitudinally extending opening formed in its lower face, and a plurality of downwardly and forwardly angled vanes are mounted in said opening.

3. The invention as set forth in claim **1** in which said nozzle has a reversing section in lower face extending between the nozzle and conduit outlets, and open at its upper and lower ends for the passage of the jet flow therethrough when said bucket is in its reversing position, said section comprising a pair of side walls interconnected by downwardly and forwardly angled front and rear walls, and at least one downwardly and forwardly angled vane extending between said side walls.

4. The invention as set forth in claim **1** with the addition that said nozzle is provided with means engageable with said bucket when said bucket is in its reversing position for supporting said bucket in and limiting its movements into said reversing position.

5. The invention as set forth in claim **1** in which said bucket comprises a generally spherically shaped center section interconnecting a pair of side arms swingably connected to said nozzle, and said nozzle is provided with a reversing opening in its lower face and a slot disposed adjacent said opening for the reception of the lower edge of said center section when said bucket is in its reversing position.

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