United States Patent

Lee

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[54] WATER JET PROPULSION UNIT

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[52] **U.S. Cl.** **115/12**, 115/34

[51] **Int. Cl.** **B63h 11/00**, B63h 1/14

[58] **Field of Search** ..... 115/12, 12 A, 14, 16, 34, 35, 115/41; 60/221

[56] **References Cited**

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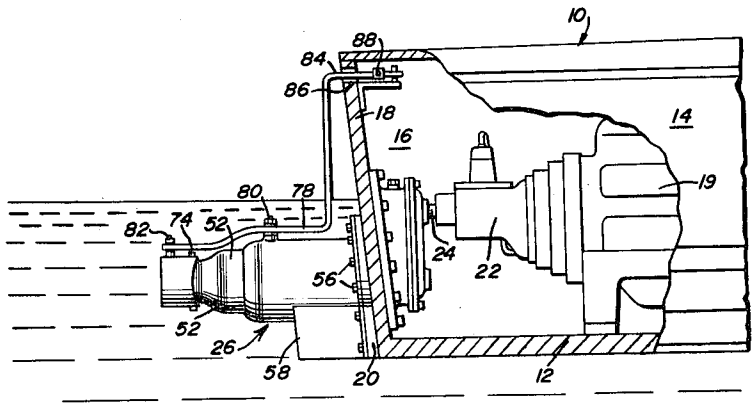
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[57] **ABSTRACT**

A propulsion unit for a boat hull of the type including a transom and an engine disposed forwardly of the transom and provided with a rearwardly facing output shaft spaced above the lower marginal edge portion of the transom. A hollow elongated housing is provided and supported from the lower marginal edge portion of the transom in rearwardly projecting position and the housing has a longitudinal impeller shaft journaled therein whose forward end projects forwardly through the transom. The forward end of the housing is provided with a downwardly opening outlet immediately rearward of the lower marginal edge portion of the transom and an offset drive train assembly is provided forwardly of the transom and drivingly connects the elevated engine output shaft to the lower forward end of the impeller shaft.

6 Claims, 6 Drawing Figures



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SHEET 1 OF 2

Fig. 1

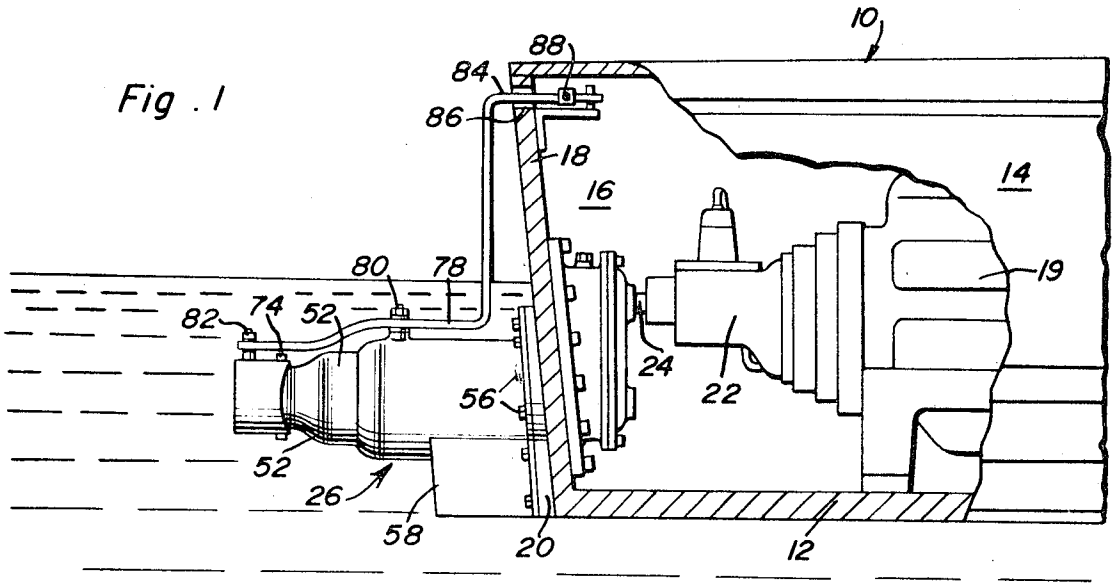


Fig. 2

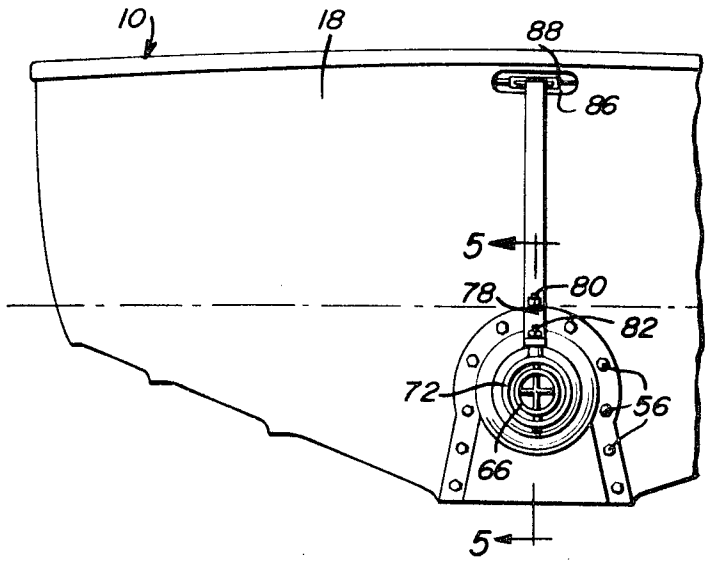


Fig. 4

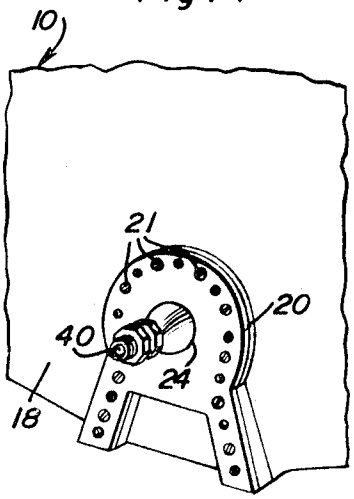
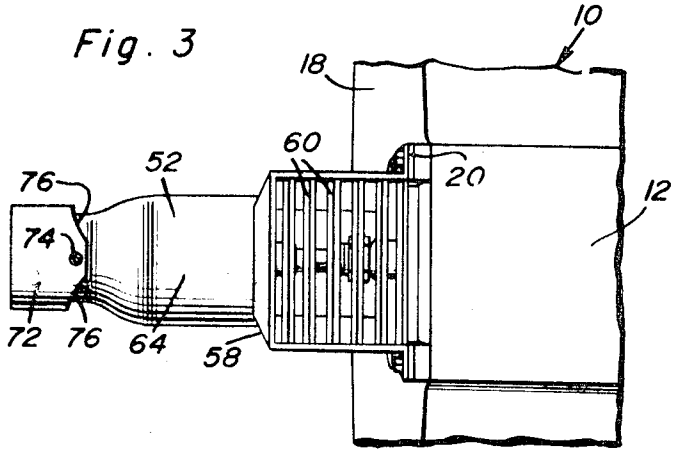


Fig. 3



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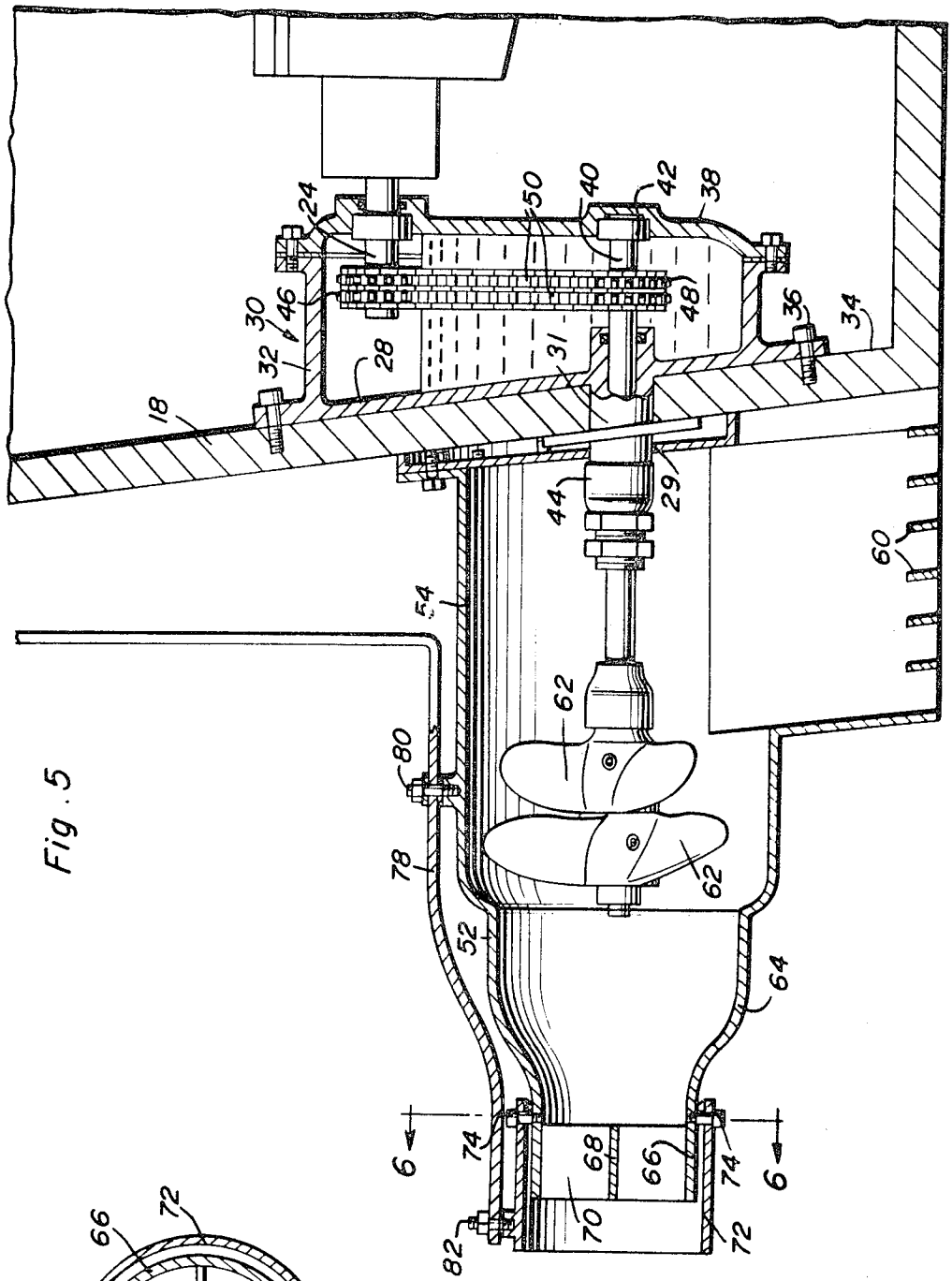


Fig. 5

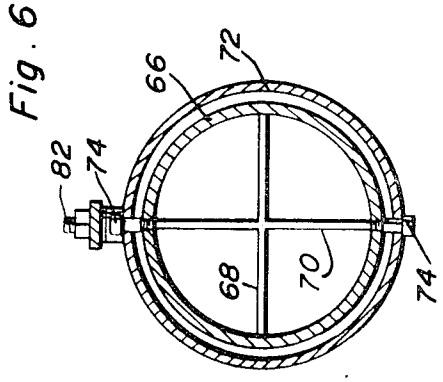


Fig. 6

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WATER JET PROPULSION UNIT

The water jet propulsion unit of the instant invention has been specifically designed for use in pleasure boats and provides a means whereby a water jet propulsion unit mounted to the rear of and on the lowest portion of the transom of the boat may be driven by an engine disposed within the boat whose output shaft is elevated above the impeller shaft of the water jet propulsion unit. Even when an inboard engine is utilized to drive a water jet propulsion unit mounted on a boat whose aft bottom surfaces are generally transversely flat, the output shaft of the engine is elevated above a horizontal plane in which the impeller shaft of the water jet propulsion unit would be disposed if the impeller shaft was horizontal. Accordingly, many water jet propulsion units utilize a drive train which is slightly rearwardly and downwardly inclined so that the driving engine may be properly mounted on longitudinal stringers above the inner surfaces of the bottom of the boat while the impeller portion of the water jet propulsion unit is located only slightly above the bottom of the boat. In addition, some water jet propulsion units have water intakes therefor which open downwardly through the bottom of the boat a considerable distance forward of the transom of the boat and which therefore include below the waterline connections within the boat which are subject to leakage.

The water jet propulsion unit of the instant invention, however, includes only one through the hull fitting for the impeller shaft which may be readily sealed by conventional means and the unit further includes an offset drive assembly whereby an elevated engine output shaft may be drivingly coupled to a lower impeller shaft. These structural features of the propulsion unit of the instant invention therefore function to eliminate potential areas of leakage and enable horizontal mounting of both the propulsion engine and the impeller shaft, even in the deep V type of hull which is becoming increasingly popular.

The main object of this invention is to provide a water jet propulsion unit whereby the elevated output shaft of a horizontally disposed engine supported within a boat may be drivingly coupled to a lower horizontal impeller shaft of a water jet propulsion unit disposed rearwardly of the transom of the associated boat.

Another object of this invention, in accordance with the immediately preceding object, is to provide a simplified water jet propulsion unit which may be utilized on substantially all types of conventional forms of pleasure boats as well as boats designed for uses other than pleasure.

A still further object of this invention is to provide a water jet propulsion unit of a type which may be readily driven by an inboard engine through a conventional form of marine transmission.

A still further important object of this invention is to provide a water jet propulsion unit that may be readily adapted to boats of various sizes and displacement for maximum efficiency in operation in conjunction with a given power supply.

A final object of this invention to be specifically enumerated herein is to provide a water jet propulsion unit which will conform to conventional forms of manufacture, be of simple construction and easy to install so as to provide a device that will be economically feasible, long lasting and relatively trouble free in installation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a fragmentary side elevational view of the rear portion of a boat hull utilizing the water jet propulsion unit of the instant invention and with portions of the hull of the boat being broken away and illustrated in vertical section to more clearly illustrate the installation of the propulsion unit within the boat;

FIG. 2 is a fragmentary rear elevational view of the assemblage illustrated in FIG. 1;

FIG. 3 is a fragmentary bottom plan view of the aft portion of the boat;

FIG. 4 is a fragmentary perspective view of the transom of the boat illustrating the mount for the housing of the water jet propulsion unit;

FIG. 5 is an enlarged fragmentary longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 5—5 of FIG. 2; and

FIG. 6 is a transverse vertical sectional view taken substantially upon the plane indicated by the section line 6—6 of FIG. 5 and on somewhat of an enlarged scale.

Referring now more specifically to the drawings the numeral 10 generally designates a conventional form of deep V hull including a bottom 12, opposite sides 14 and 16, and a transom 18.

The boat hull 10 has a conventional inboard engine 19 mounted therein driving through any suitable form of marine transmission 22. The transmission 22 includes an output or drive shaft 24 and the water jet propulsion unit of the instant invention is generally referred to by the reference numeral 26. The unit 26 includes a mount 20 mounted on the exterior of the transom 18 by means of suitable fasteners 21 and includes an opening 29 through which a bearing sleeve 31 extends. The bearing sleeve 31 is carried by the rear wall 28 of an offset drive assembly referred to in general by the reference numeral 30 disposed forward of the transom 18. The drive assembly 30 includes a vertically elongated housing 32 of which the rear wall 28 comprises a part and the housing 32 is secured to the inner surface 34 of the transom 18 by means of suitable fasteners 36. The housing 32 includes a removable front wall or cover 38 and an output shaft 40 has its forward end journaled by a bearing 42 supported from the front wall or cover 38 and its rear end journaled through the sleeve 31. The rear end of the sleeve 31 has a packing gland 44 mounted thereon rearward of the transom 18 and the rear end of the sleeve 31 forward of the packing gland 44 is sealingly received through the opening 24.

The output shaft 24 of the transmission 22 comprises the input shaft for the drive assembly 30 and a double sprocket wheel 46 is mounted on the shaft 24 within the housing 32. Further, a double sprocket wheel 48 is mounted on the forward end of the shaft 40 within the housing 32 and a pair of flexible chains 50 are entrained about the sprocket wheels 46 and 48.

An elongated housing 52 includes a flanged large diameter end 54 secured to the mount 20 by means of suitable fasteners 56 and the large diameter end 54 of the housing 52 includes a downwardly opening neck or inlet 58 whose lower end is coplanar with and disposed immediately rearward of the rear marginal edge portion of the bottom 12. The inlet neck 58 has a plurality of forwardly and downwardly inclined transverse bars 60 secured thereacross to prevent to entrance of large foreign material into the housing 52 and a pair of conventional three-bladed propellers 62 are mounted on the rear end of the shaft 40 in the rear portion of the large diameter end portion 54 of the housing 52.

The housing 52 necks down rearward of the large diameter end portion 54 as at 64 and emerges smoothly into a discharge neck or nozzle 66 which opens horizontally rearwardly of the transom 18. The discharge neck or nozzle 66 has a pair of right angularly disposed diametric vanes 68 and 70 mounted therein to prevent the water being discharged from the neck 66 from swirling in the direction of the rotation of the propeller 62 and a steering sleeve 72 is loosely telescoped over the discharge nozzle or neck 66 and pivotally supported therefrom by means of pivot fasteners 74. It will be noted that the forward end of the steering sleeve 72 is pivotally supported from the forward end of the discharge neck or nozzle 66 and that the forward edges of the steering sleeve 72 are provided with notches 76 whereby the steering sleeve 72 may be oscillated approximately 45° to either side of a center position aligned with the discharge neck or nozzle 66.

A steering lever 78 is pivotally supported from the large diameter end portion 54 of the housing 52 by means of a

fastener **80** and the steering lever **78** includes a rear end which is pivotally secured to the rear end of the steering sleeve **72** by means of a pivot fastener **82**. The forward end of the steering lever **78** projects upward from the housing **52** and includes a forwardly directed end portion **84** which projects through a slot **86** in the upper portion of the transom **18** and has a control cable **88** connected thereto for oscillation of the lever **78** about the pivot fastener **80** in order to oscillate the steering sleeve **72**.

It will be noted from FIG. **1** of the drawings that the engine **19** and transom **18** are horizontally disposed and from FIG. **5** of the drawings that the impeller shaft **40** is horizontally disposed. Further, it may be observed from FIG. **5** of the drawings that the horizontally disposed output shaft **24** of the transmission **22** is elevated above the impeller shaft **40** and that the offset drive assembly **30** provides a means whereby the upper output shaft of the transmission **22** may be drivingly coupled to the lower impeller shaft **40**. Also, from FIG. **5** of the drawings it may be seen that the interior of the housing **32** is almost completely filled with lubricating fluid whereby the drive assembly **30** may be operated for long periods of time under heavy loads without breaking down. Further, from FIG. **5** of the drawings it may also be seen that water is readily taken into the inlet neck **58** of the housing **52** and it is to be understood that the rear end of the housing **52** necks down to the discharge neck or nozzle **66** in order to provide a means for accelerating the discharge of water from the nozzle **66** whereby a greater speed is possible. Also, the housing **52** may be readily removed from access to the propeller **62** whereby the latter may be changed as desired according to the load and power of the boat **10**.

When the shaft **40** is driven in reverse, the propellers **62** pull water inwardly through the rear of the housing **52** and discharge the water in a forward and downward direction through the inlet **58**. Of course, when the hull **10** is standing still or moving slowly in reverse, the level of the water is approximately that illustrated in FIG. **1**. On the other hand, when the hull is moving forward at speed, the level of the water immediately rearward of the transom is substantially coplanar with the undersurfaces of the bottom **12** adjacent the transom. Accordingly, when the hull is moving forward at speed, it draws very little water, on the order of 4 inches.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. In combination with a boat hull of the type including a bottom from whose rear end a transom projects upwardly and from which an upper powered drive shaft is journaled forwardly of the transom at an upper elevated position relative to the bottom, a hollow elongated housing supported in rearwardly projecting position from the lower marginal portion of said transom, a lower longitudinal impeller shaft journaled in said housing and including a forward end projecting through said transom at an elevation below said drive shaft, the rear end of said housing being open, the forward end of said housing including a downwardly opening inlet opening outwardly immediately rearward of the lower marginal portion of said transom, an impeller member mounted on said impeller shaft for rotation therewith intermediate said inlet and the open rear end of said housing, and drive train means disposed forward of said transom wholly within said boat hull drivingly connecting said drive shaft to said impeller shaft.

2. The combination of claim **1** wherein said drive train means includes an upstanding housing supported from the inner side of said transom from whose upper portion said drive shaft is journaled and including spaced front and rear walls from which longitudinally spaced portions of said forward end portions are journaled, and a pair of aligned drive wheels mounted on said drive and impeller shafts within said upstanding housing and including drive means drivingly connecting the output shaft wheel to the impeller shaft wheel, said impeller shaft being free of associated journal means rearward of said impeller member.

3. The combination of claim **2** wherein said housing includes a lower end portion defining a sump, and lubricating fluid disposed in said sump at least to a level below which the lower periphery of the lower sprocket wheel projects.

4. The combination of claim **1** including a larger diameter outer sleeve telescoped over the rear end of said housing and supported therefrom for oscillation about a vertical axis closely adjacent the rear end of said housing.

5. The combination of claim **4** including remotely operable control means operatively connected between said hull and said sleeve for adjustably angularly displacing said sleeve relative to said housing.

6. The combination of claim **1** wherein said inlet opens downwardly through a plane substantially coinciding with the under surface portions of said bottom immediately forward of said inlet.

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