June 24, 1930. H. DITCHBURN 1,765,789

MOTOR BOAT

Filed March 26, 1928 2 Sheets-Sheet 1

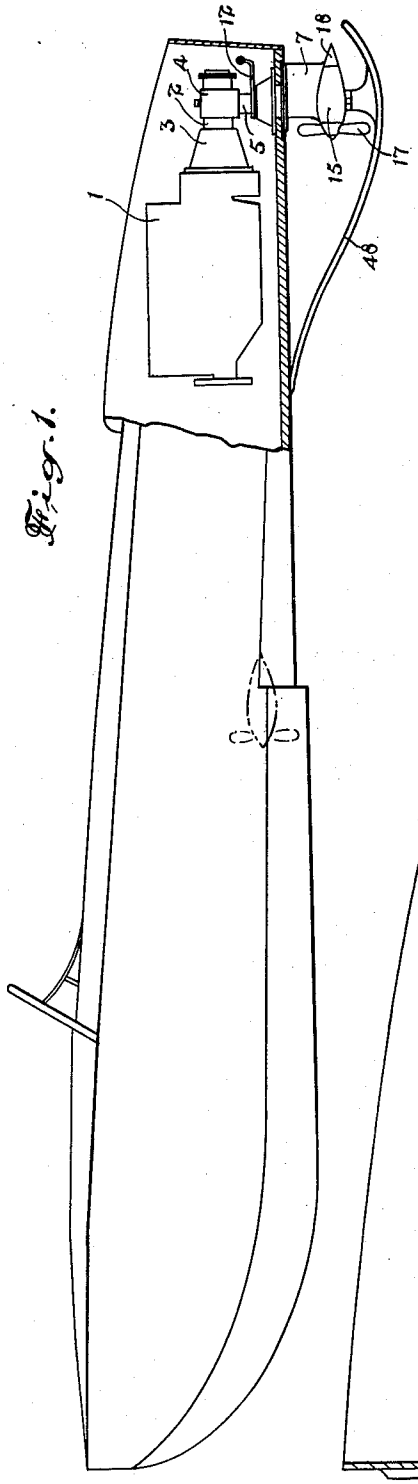


Fig. 1.

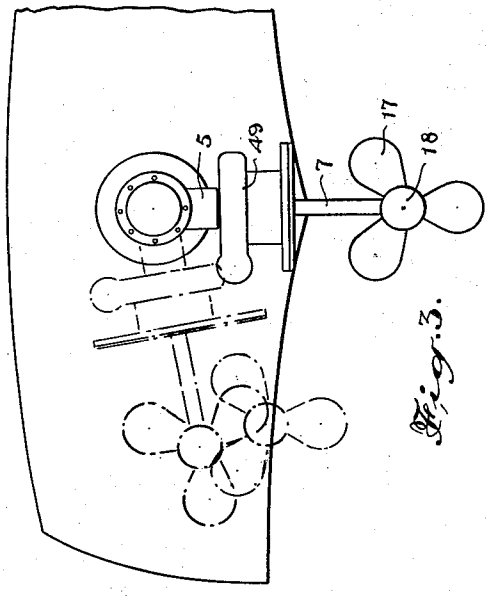


Fig. 3.

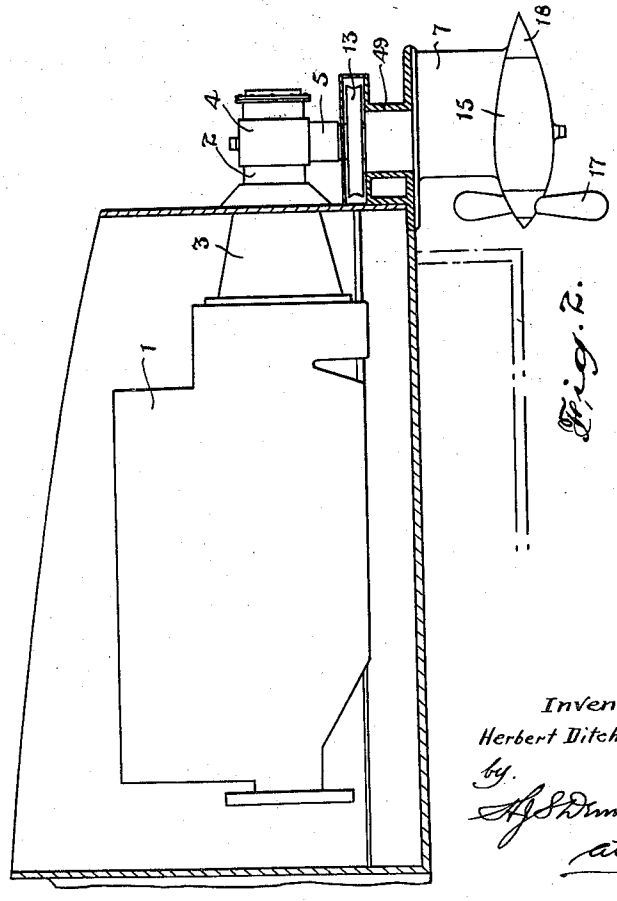


Fig. 2.

Inventor.
Herbert Ditchburn.
by.
H. S. Dennison
atty

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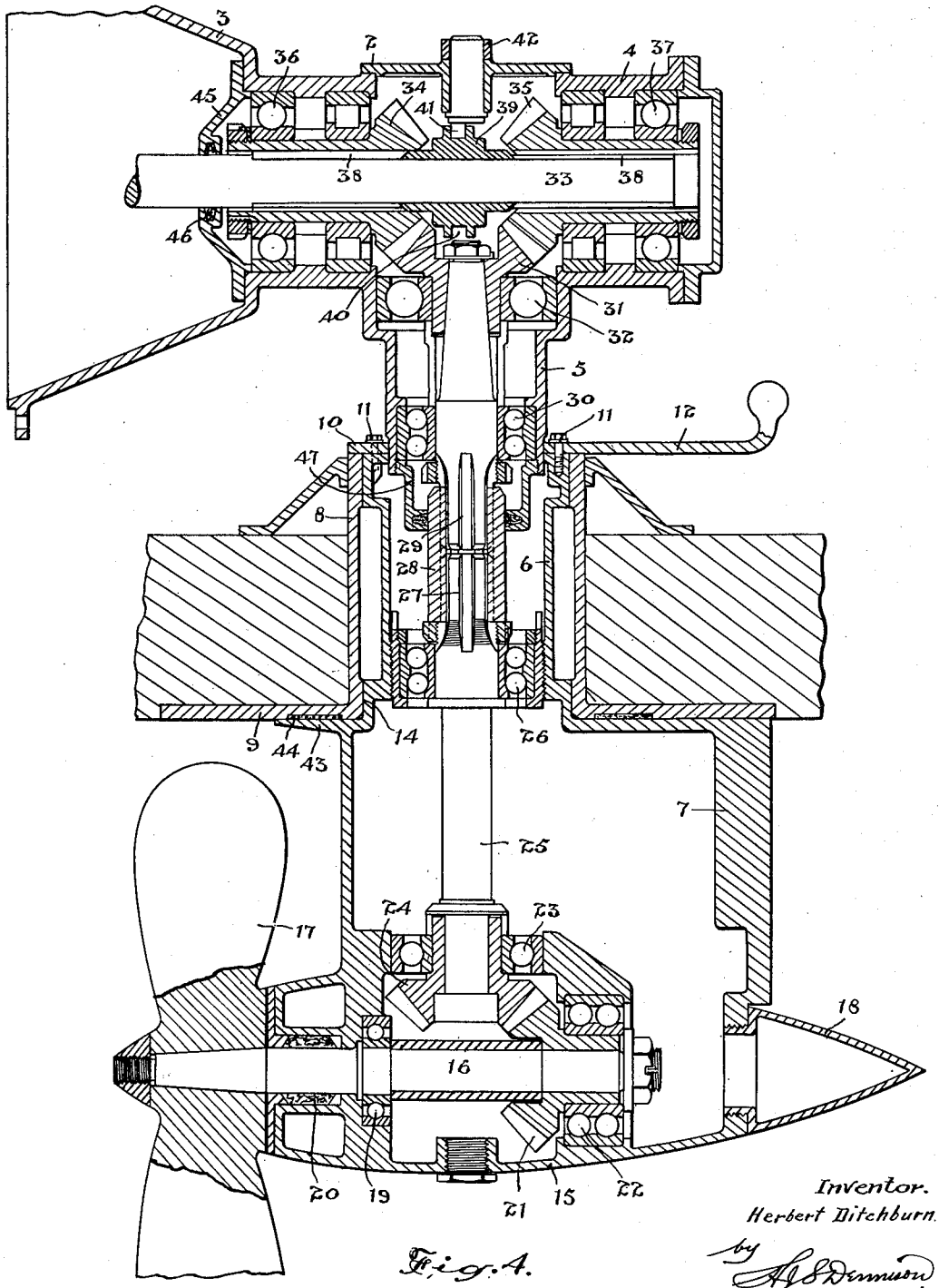


Fig. 4.

Inventor.
Herbert Ditchburn.
by A. J. & Dennison
atty

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UNITED STATES PATENT OFFICE

HERBERT DITCHBURN, OF GRAVENHURST, ONTARIO, CANADA

MOTOR BOAT

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The principal objects of the invention are, to overcome the difficulties met with in the operation of engines of the internal combustion type in the propulsion of boats, particularly in respect to lubrication and to enable the use of standard automotive power plants for this purpose.

A further and very important object is to enable the placing of the power plant at the rear end of the boat, thus very greatly increasing the passenger accommodation of the boat and obviating the objectionable features of heat and engine odors.

A still further object of the invention is to effect the consolidation of the entire power plant so that the placing of the plant in the hull will be greatly simplified.

The principal feature of the invention consists in the novel construction and arrangement of a power unit and propeller mechanism in the rear end of a boat, whereby the fixed engine is directly connected through a vertical shaft with the propeller and is adapted to operate the propeller in either direction.

A further feature of importance consists in the novel arrangement of the rudder member whereby the propeller is carried thereby and whereby it may be manipulated separately from the power connection to the propeller.

In the drawings, Figure 1 is a side elevation and part sectional view of a motor boat showing the novel application of the power plant at the rear end.

Figure 2 is an enlarged elevational view showing a modified arrangement of the rudder and propeller structure.

Figure 3 is a rear end elevation of the rudder structure shown in Figure 2.

Figure 4 is an enlarged vertical sectional detail of the rudder and propeller structures.

The present day type of speed boat is constructed on the hydroplane principle and owing to the peculiar angular set of the boat when running at speed, many mechanical difficulties are encountered in the placing of the engine in the hull and in providing proper cooling and oiling conditions.

The present invention has been devised to enable the use of standard power plants, such as developed by the automobile, for propulsion of boats.

Many different forms of vertically arranged propeller drives have been devised but these have all been deemed impracticable and have never come into commercial use, with the exception of the type of power plant known as the "outboard" motor.

This invention contemplates the use of a power plant located in the rear end of a boat and directly connected through an arrangement of gearing and a vertical shaft to the propeller so that the whole power plant is a unitary structure and capable of being installed in the rear end of a boat of the modern hydroplane type.

In the present application of the invention it is preferred that the propeller be mounted upon a rudder structure through which the drive is effected.

In the structure herein shown the engine 1 is of any ordinary type and is mounted upon suitable supporting beams forming part of the boat structure at the rear end.

A casing 2 is secured to the rear end of the engine structure back of the clutch casing 3 and has a horizontal portion 4 which is arranged in axial alignment with the engine shaft and a vertical portion 5 extends downwardly intermediate of the length of said horizontal portion.

The lower end of the vertical portion of the casing extends into the cylindrical upper portion 6 of the rudder member 7 which is rotatably mounted in the sleeve portion 8 of the flanged member 9, secured in the bottom of the boat structure.

The member 6 is here shown secured within the sleeve 8 by a flanged member 10 which is secured to the upper end of the member 6 by the bolts 11 and engages the upper end of the sleeve 8.

Other forms of fastening means may of course be arranged.

The flange 10 is provided with a suitable means for rotating the member 6 within the sleeve 8 which is shown in Figures 1 and 4 as the arm 12 and in Figures 2 and 3 as a wheel 13.

Suitable steering connections are arranged

to operate the rudder, either through the arm 12 or wheel 13.

The rudder structure 7 below the lower journal portion 14 is enlarged and shaped to a flat oval form which converges at its lower end with a circular torpedo-shaped portion 15 which extends in a horizontal direction.

A propeller shaft 16 is mounted axially within the horizontal section 15 and carries the propeller 17, the hub of which forms a continuation of the torpedo-shaped casing and a tail extension 18 which tapers off to a point is secured at the opposite end of the rudder casing.

The shaft 16 is mounted at the forward end in a ball bearing 19 and a packing 20 is arranged between the propeller and the bearing.

A bevelled pinion 21 is mounted upon the inner end of the shaft 16 and is supported in a ball bearing 22.

A ball bearing 23 is arranged inside of the rudder casing above the shaft 16 and supports the bevelled pinion 24 which meshes with the pinion 21.

A vertical shaft 25 is secured in the pinion 24 and extends upwardly through the rudder casing and is journalled at its upper end in a bearing 26 arranged within the cylindrical portion 6 of the rudder casing.

The upper end 27 of the vertical shaft is splined to fit a sleeve 28 which extends beyond the end thereof and engages a similarly splined shaft 29.

The shaft 29 is supported in a journal bearing 30 mounted in the lower end of the vertical portion 5 of the casing 2.

A bevelled pinion 31 is secured to the upper end of the shaft 29 and is supported in a ball bearing 32.

A horizontal shaft 33 which is connected with the engine shaft through a suitable form of clutch, which is not shown, extends axially of the horizontal portion 4 of the casing 2 and a pair of bevelled pinions 34 and 35 are rotatably mounted thereon.

Both of these pinions are supported in journal bearings 36 and 37 arranged at opposite ends of the casing 4 and are in constant mesh with the bevelled pinions 31 on the vertical shaft.

The horizontal shaft 33 is provided with longitudinal key-ways 38 and a clutch sleeve 39 slidably keyed to the shaft 38 is mounted between the pinions 34 and 35.

The sleeve 39 is formed with a peripheral groove 40 which is engaged by an eccentric pin 41 in the top of the casing 4.

An arm 42 is secured to the top end of the pin extending outside of the casing by means of which the pin is rotated so that the eccentric portion thereof will slide the clutch sleeve 39 on the shaft to cause either one or other of the pinions 34 or 35 to be connected with the shaft.

This arrangement of sliding clutch on the extension from the engine shaft to operate either of the pinions carried thereon at will with both of said pinions being constantly in mesh with the vertical shaft connected to the propeller shaft, provides a very simple and effective method of reversing the rotative movement of the propeller.

The rudder casing 7 is provided with a flange 43 immediately below the journal portion 14 which fits in snug contact against the under face of the flange 9 of the fixed sleeve member 8 which extends through the boat bottom and a circular groove 44 is formed in the flanged member 9 in which a rubber packing is placed to engage the flange 43. This provides a water tight joint between the rotatable rudder and the hull of the boat.

A flange 45 is arranged at the inward end of the horizontal portion 4 of the casing 2 which is provided with a packing 46 engaging the horizontal shaft 33 and a similar packing is carried in a sleeve 47 secured to the lower end of the cylindrical member 5 below the lower journal support of the vertical shaft 29. The reversible gears and shafting are thus arranged within an oil tight casing which may be packed with a suitable lubricant.

Direct lubrication of the other bearings for the propeller shaft and the lower vertical shaft may be effected through the top of the portion of the rudder casing extending above the sleeve 8.

In the operation of this device the horizontal shaft 33 is, as mentioned, connected through a clutch direct to the engine shaft and the engine may be placed in a horizontal position any desired distance above the boat bottom.

The connection with the propeller is made through the vertical shaft and gear connections described and the propeller is directly driven in either direction at any desirable speed.

The arrangement of the propeller on the rudder structure provides a very compact equipment which can be very simply and easily secured in place and in the event of damage to the propeller or the rudder section, the same can be very easily removed and replaced without disturbing the upper portion or moving the engine.

As shown in Figure 1 the bottom portion of the rudder is supported by a skeg 48 which will protect the propeller structure from damage.

The arrangement of the structure illustrated in Figures 2 and 3 is slightly different from that illustrated in Figures 1 and 4 by extending the casing 4 through the transom of the boat and having the rudder structure supported by a frame 49 supported from the rear of the transom.

The frame 49 may be arranged to swing on the transom so that the rudder and pro-

peller may be reefed or swung upwardly from its vertical position and the propeller may be thus brought into line with the back of the hull or partly so as may be desired.

The device is shown as being arranged upon a hydroplane type of hull in a submerged position but as indicated in dotted lines on Figure 2 it may be arranged in the partly submerged position on other types of boats.

It will be seen from this description and on reference to the drawings that by means of the vertical drive directly from the engine shaft to the propeller shaft an engine equipment of any standard design can be utilized. Furthermore, the arrangement is extremely desirable for pleasure boats as engine vibration, heat and odors are all behind the passengers and the conditions are ideal for perfect ventilation of the engine cock pit.

What I claim as my invention is:

1. In a motor boat, the combination with a hull having an engine compartment at the rear end, of an engine fixed in said compartment having a shaft extending therefrom, a casing enclosing the extension shaft from the engine provided with a vertical extension, a casing extending vertically downward from said extension below the hull, a propeller shaft mounted in the lower end of the extension casing, a vertical shaft geared to the propeller shaft and extending upwardly, a vertical shaft geared to said extension shaft and extending downwardly in said extension casing from the engine, and means detachably and operatively connecting said vertical shafts.

2. In a motor boat, the combination with a hull, of an engine fixed in the after end of the hull having a gear casing extending therefrom, casings connected with the extension engine casing and rotatably mounted in the hull to extend vertically downward, a propeller shaft horizontally mounted in the vertical casing, a vertical jack shaft geared to the propeller shaft, a vertical jack shaft geared to the engine shaft in axial alignment with the aforesaid jack shaft, the adjacent ends of said jack shafts being splined, a sleeve member splined internally and fitting over the splined ends of said jack shafts and operatively connecting the same, and means for rotating the propeller casing.

3. In a motor boat, the combination with the hull, of an engine mounted in the rear end of the hull having a clutch and an extension shaft, a casing surrounding the extension shaft having a downwardly opening portion, a casing encircling the lower end of the downwardly extending portion of the engine casing and extending vertically downward through the hull, a propeller shaft horizontally journalled in the extension casing, a vertical shaft geared to the propeller shaft, a bevel gear mounted on the upper end of the vertical shaft, a pair of bevel pinions rotatably mounted on the extension engine shaft and journalled within the engine casing and arranged in constant mesh with the vertical shaft gear, and means for conecting either of said bevel gears to the engine shaft.

4. In a motor boat, the combination with the hull and an engine mounted in the rear end having a clutch and an extension shaft, a gear case enclosing the extension shaft, a pair of bevel pinions oppositely arranged and rotatably mounted on the engine shaft and journalled in the gear case, a clutch member slidably mounted on the engine shaft between said pinions adapted to connect either of said pinions to the shaft, a bevel pinion vertically journalled in a bearing in said gear case and arranged in constant mesh with the aforesaid pinion, a shaft extending downwardly from said vertically journalled gear, a cylindrical casing secured in the bottom of the hull coaxial with said shaft, a casing having a cylindrical portion journalled in the aforesaid cylindrical casing, and extending downwardly below the bottom of the hull and having a rudded-shaped portion, a propeller shaft horizontally mounted in the bottom of said rudder casing, gearing connecting the vertical shaft with said propeller shaft, and means within the hull for rotating the rudder casing.

5. In a motor boat, a hull having a vertically disposed cylindrical casing secured in the bottom thereof, a hollow rudder member having a cylindrical journal portion extending into said cylindrical casing and having a flange engaging the under side thereof, a rubber packing engaging said flange to form a water-tight joint between the rudder and the hull, a propeller shaft horizontally mounted in said rudder casing, means within the hull for turning said rudder casing, an engine mounted within the hull, a gear casing extending from the engine and having a downward extension extending into the rudder casing, a shaft vertically journalled in the rudder casing and connected with the propeller shaft, a shaft journalled in the vertical extension of the engine casing in alignment with the vertical portion of the rudder shaft, a splined sleeve connecting said vertical shaft, and a reversible gear connection between the upper shaft and the engine shaft.

6. In a motor boat, the combination with an engine arranged in the rear end thereof, of a casing rigidly supported from the engine casing, a vertical shaft journalled in said rigid casing and geared to the engine shaft, a casing supported from the boat structure independent of said rigid casing, a propeller shaft journalled in the latter casing, and a vertical shaft journalled in the latter casing and geared to said propeller shaft and op-

eratively connected with the vertical shaft in the rigid upper casing.

7. In a motor boat, the combination with an engine arranged in the rear end thereof, of a casing rigidly supported from the engine casing, a vertical shaft journalled in said rigid casing and geared to the engine shaft, a casing supported from the boat structure independent of said rigid casing, a propeller shaft journalled in the latter casing, and a vertical shaft journalled in the latter casing and geared to said propeller shaft and detachably connected in alignment with the aforesaid vertical shaft.

8. In a motor boat, the combination with an engine arranged in the rear end thereof, of a casing rigidly supported from the engine casing, a vertical shaft journalled in said rigid casing and geared to the engine shaft, a hollow rudder having a cylindrical extension rotatably and detachably mounted in the boat structure independent of said rigid casing, a horizontal propeller shaft journalled in said rudder, a vertical shaft geared to the propeller shaft and journalled in said rudder, and means detachably connecting said vertical shafts.

HERBERT DITCHBURN.