

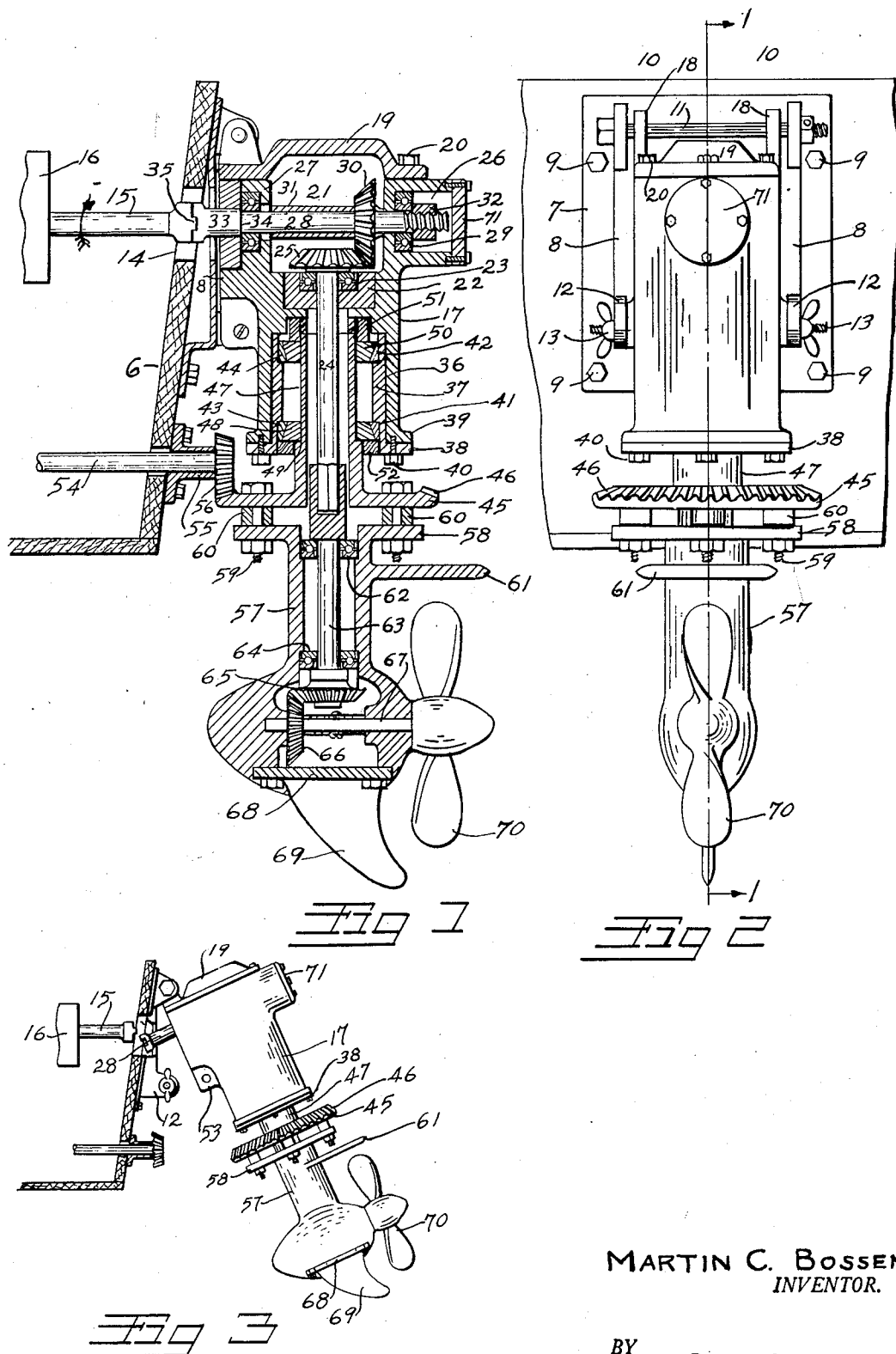
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MOTOR BOAT PROPULSION MECHANISM

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MOTORBOAT PROPULSION MECHANISM

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1 Claim. (Cl. 115—35)

This invention relates to improvements in motor boat propulsion mechanisms.

For the propulsion of small craft such as boats employed by hunters, fishermen and by sportsmen for racing, it has been customary to provide a motor propulsion device which can be readily attached to and removed from the stern of the boat, such devices being referred to as "outboard motors."

An outboard motor device is, of necessity of limited power, because the motor must be an integral part thereof, and since such devices are intended to be portable, they must be made comparatively light and therefore of small power. Where a greater amount of power is desired, the motor is positioned inside of the boat and power for driving the propeller is transmitted by means of shafts that connect the motor with the propeller. With the motor positioned in the boat, motors of any desired horsepower can be employed and thus a powerful propulsion device is provided.

It is the object of this invention to produce a motor propulsion device of the inboard motor type in which the steering is effected by rotating the propeller assembly so as to change the direction of the propelling force with respect to the keel of the boat, thereby dispensing with the usual rudder.

Another object is to provide a simple mechanical construction for transmitting power from the motor to the propeller and in which the propeller assembly is rotatably connected with a transmission housing so as to turn about a vertical axis concentric with the latter.

Another object of this invention is to produce a simple mechanical construction in which the transmission housing and propeller assembly are connected with the stern of the boat at a point above the motor shaft for movement about a horizontal axis, and secured to the boat by means of shear pins so that if the propeller assembly strikes a rock or other obstruction in the water, the shear pins will break, permitting the propeller assembly and transmission housing to swing rearwardly about their pivot.

Another object of the invention is to produce a propelling device of the class specified in which the steering mechanism shall be so constructed that the propeller can be rotated about a vertical axis through an angle of at least 180 degrees, whereby the boat can be moved rearwardly without reversing the direction of motor rotation.

In addition to the above, my invention com-

prises certain mechanical constructions which will be hereinafter described in detail.

The above and other objects that may become apparent as this description proceeds are attained by means of a construction and an arrangement of parts that will now be described and for this purpose reference will be had to the accompanying drawing in which the invention has been illustrated, and in which:

Figure 1 is a vertical diametrical section on line 1—1 of Fig. 2 looking in the direction of the arrows through the propulsion device showing the same in position on the stern of a boat;

Figure 2 is an end elevation; and

Figure 3 is a side elevation showing the apparatus after the shear pins have been removed or broken so as to permit the device to swing rearwardly and upwardly.

In the drawing reference numeral 5 designates the bottom of a boat and reference numeral 6 the stern thereof. Secured to the outer surface of the stern is a plate having a flange 7 and a central elevated surface 8. This plate is held in position by means of bolts 9 and is provided at its upper end with spaced lugs 10 that are perforated for the reception of a bolt 11, which serves as a hinge pin or pivot. At the lower end of the elevated surface 8, there is another pair of lugs or ears which have been designated by reference numeral 12. These are perforated for the reception of shear bolts 13 to which reference will hereinafter be made. The stern of the boat and also the elevated surface 8 are provided with registering openings 14 through which a driving connection is made between shaft 15 that extends from the motor 16 and the transmission mechanism which will now be described.

A transmission housing 17 is provided at its upper end with lugs 18 through which the bolt 11 extends. A removable cap 19 closes the upper end of the transmission housing and is secured thereto by means of cap screws 20. The transmission housing has an opening extending from the top to the bottom thereof and this opening is formed from several sections of different cross sectional areas. At the top there is a section which has been designated by reference numeral 21 which terminates in a circular section of somewhat smaller diameter in which is located a removable cup 22 that supports the antifriction bearing 23. A shaft 24 is mounted in the bearing. Secured to the upper end of shaft 24 is a bevel gear 25. At diametrically opposite points of the chamber 21 are openings, one of

which communicates with the compartment marked 26 and the other with a recess in which is located the antifriction bearing 27. A drive shaft 28 is mounted in bearings 27 and 29. Bevel gear 30 is nonrotatably secured to shaft 28. A spacer sleeve 31 may encircle the shaft 28 in the manner shown. A nut 32, or other suitable means, holds the shaft in assembled relation with respect to the bearings. The forward end of shaft 28 has an enlarged portion 33 forming a shoulder 34 for engaging the inner bearing race. A suitable shaft coupling 35 forms a driving connection between the motor shaft 15 and shaft 28.

From the above description it will be observed that whenever shaft 28 rotates, it will also rotate the vertical shaft 24. The transmission housing has a circular section which has been designated by reference numeral 36, in which is mounted a sleeve 37. This sleeve has an outwardly extending flange 38 that laps the corresponding flange 39 at the lower end of the transmission housing and is secured to the latter by means of cap screws 40. It will be observed that the inner surface of sleeve 37 is provided with end sections 41 and 42 of somewhat larger diameter and in which are located the cone bearing members 43 and 44, respectively. A plate 45 is provided along its upper edge with gear teeth 46 and has a central hub 47 that encircles the shaft 24. A lower cone bearing 48 is carried by the hub 47 and rests on the shoulder 49. Another cone bearing ring which has been designated by reference numeral 50 encircles the hub 47 in position to engage cooperatively the upper cone bearing ring 44. The upper end of hub 47 is threaded for the reception of a nut 51 by means of which the two cone bearings can be adjusted to compensate for wear. A grease seal 52 is positioned between the lower end of sleeve 37 and the hub 47. The shear bolts 53 extend through openings in the lugs 52 and into cooperating lugs 53 carried by the transmission housing 17. If the propeller assembly, which will hereinafter be described, strikes a rock or other obstruction, the shear bolts will break and allow the housing to tilt in the manner shown in Figure 3. A steering shaft 54 extends through an opening in the stern and through a bearing block 55. A bevel gear pinion 56 is secured to the rear end of shaft 54 in position to engage with the gear teeth 46 on plate 45. A suitable mechanism is provided in the boat for rotating the shaft 54 and it is therefore possible for the pilot to rotate the plate 45 through any desired angle. Attached to the plate or gear 45 is a propeller assembly having a tubular body 57 that is provided at its upper end with a flange 58. This flange is perforated for the reception of bolts 59 that also extend through openings in plate 45 and through tubular spacers 60. The propeller assembly is also provided with a rearwardly extending flat projection 61 for a purpose which will hereinafter appear. Positioned in the upper end of the opening of the tubular body 57, is a bearing 62 in which is journaled the vertical shaft 63 whose lower end is mounted in an antifriction bearing 64. A bevel gear 65 is secured to the lower end of shaft 63 and cooperates with a similar gear 66 carried on the propeller shaft 67. The lower end of the propeller body 57 is provided with a removable bottom 68 that has a downwardly extending projection 69 whose purpose and function is to protect the propeller against injury from rigid objects such as submerged rocks and the like.

From the above description it will be apparent that by means of the motor 16, the propeller 70 can be rotated and that the direction of the propeller thrust can be varied by rotating the shaft 54. This makes the use of a rudder unnecessary and by rotating the propeller assembly 180 degrees, the direction of movement of the boat can be reversed and this dispenses with the necessity of reversing the engine or providing a reversing gear in the transmission.

Particular attention is directed to the transmission housing and to the fact that the plate or gear 45 has an upwardly extending hub 47 and is so connected with the transmission housing that it can rotate therein without moving longitudinally with respect thereto. This construction makes it possible to rotate the propeller assembly about an axis that coincides with the axis of the drive shaft and decreases the amount of force necessary to control the steering of the boat as compared with a transmission mechanism that might be pivoted to turn about a vertical shaft positioned to the front of the transmission.

A removable plate 71 closes the opening into chamber 26 to seal the latter against the entrance of water.

The transmission housing may be packed or partially filled with oil or grease so as to assure a constant and sufficient lubrication, the grease being held in position by the grease seal 52 which has been shown in a more or less diagrammatic manner, it being the intention to employ any one of the grease seals now available which is believed to be best suited for the purpose.

The rearward projection 61 serves the purpose usually served by similar projections in other propelling devices as it has been found that greater efficiency is attained when a flat projecting surface is positioned directly above the propeller.

With the construction shown and described, it is possible to provide a boat with a motor of any horsepower and to quickly attach and remove the propulsion mechanism by the means and in the manner shown and described.

Attention is again directed to the rotatable connection between the propeller assembly and the transmission housing which serves to greatly simplify the construction and operation of the device and which also makes the boat more easily steered and makes it possible to apply the propulsion force at any angle relative to the keel of the boat whereby the boat may be turned as on a pivot and which also permits reversal of travel in a manner pointed out and apparent from the above description and drawing.

Having described the invention, what is claimed as new is:

In a propulsion mechanism for a boat having an inboard motor and a propeller, a motion transmitting mechanism for rotating the propeller by power derived from the motor, comprising a transmission housing hingedly connected at its upper end to the boat, two angularly related shafts positioned within the housing for rotation about intersecting axes, one of the shafts being substantially horizontal and provided at its outer end with means for effecting a separable operative connection with the motor, the other shaft being substantially vertical, means comprising bevel gears for transmitting power from the horizontal to the vertical shaft, a circular plate having a tubular cylindrical hub extending upwardly into the housing, an anti-friction bearing in the space

between the hub and the housing, said bearing comprising an inner cylindrical bearing race surrounding the hub, means for securing the race in position on the hub and holding it from movement thereon, and an outer bearing race having its lower end provided with an outwardly extending perforated flange, tap screws passing through the flange and into the lower end of the housing, a propeller assembly comprising a hollow member

having its upper end provided with a perforated flange, fastening devices passing through the last named perforations into the plate, and means operable from the inside of the boat and operably connected with the plate for rotating the latter and the propeller assembly relative to the housing.

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