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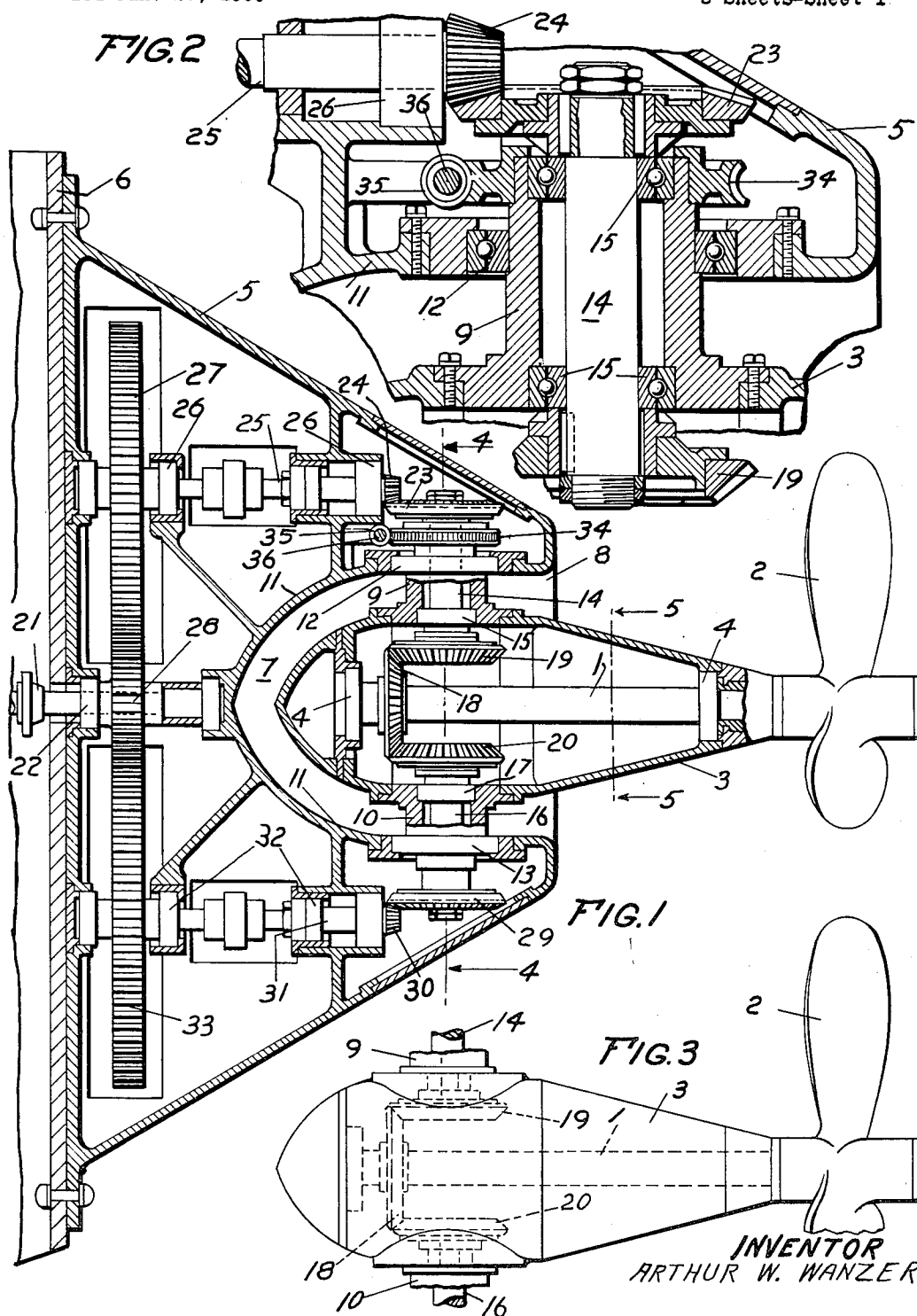
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2,755,765

BALANCED PROPELLER OPERATING MECHANISM FOR VESSEL

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3 Sheets-Sheet 1



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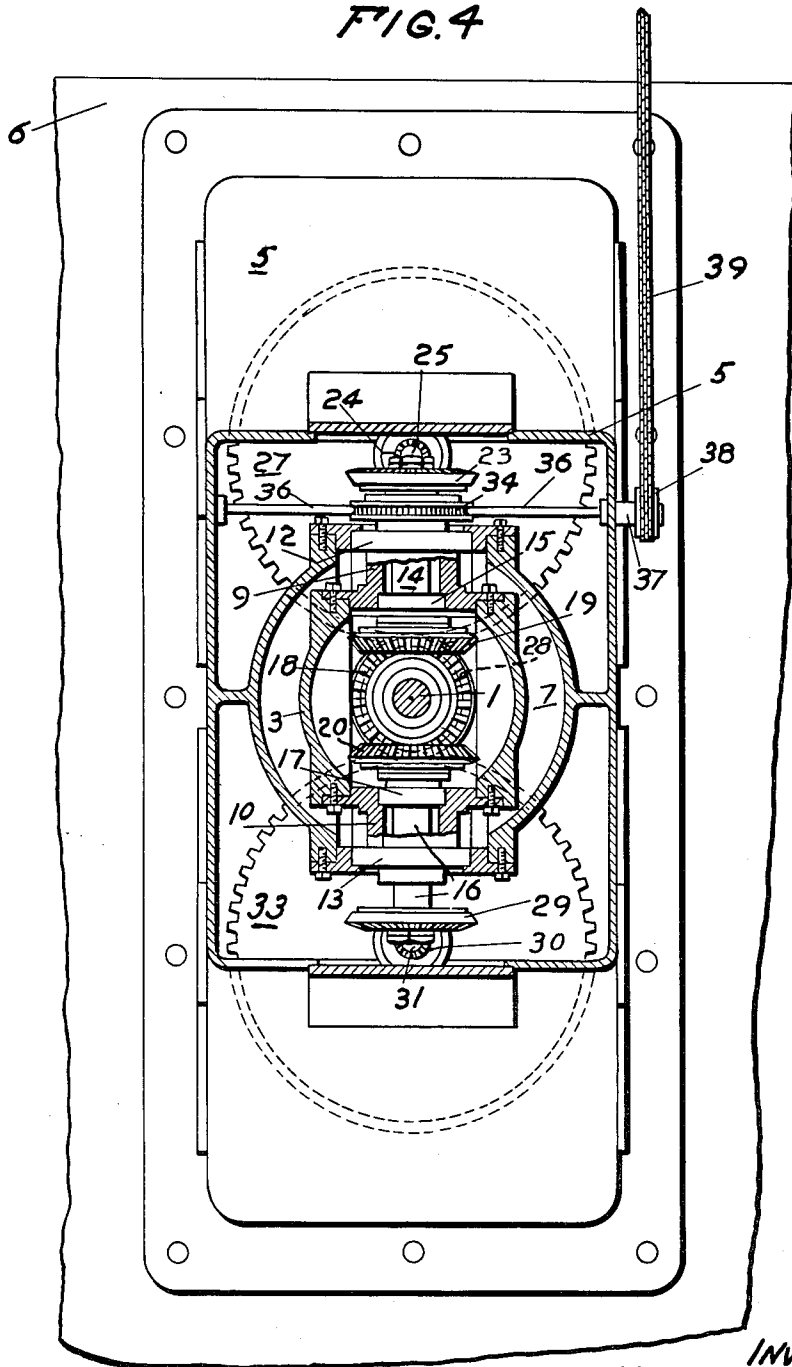
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FIG. 4



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FIG. 5

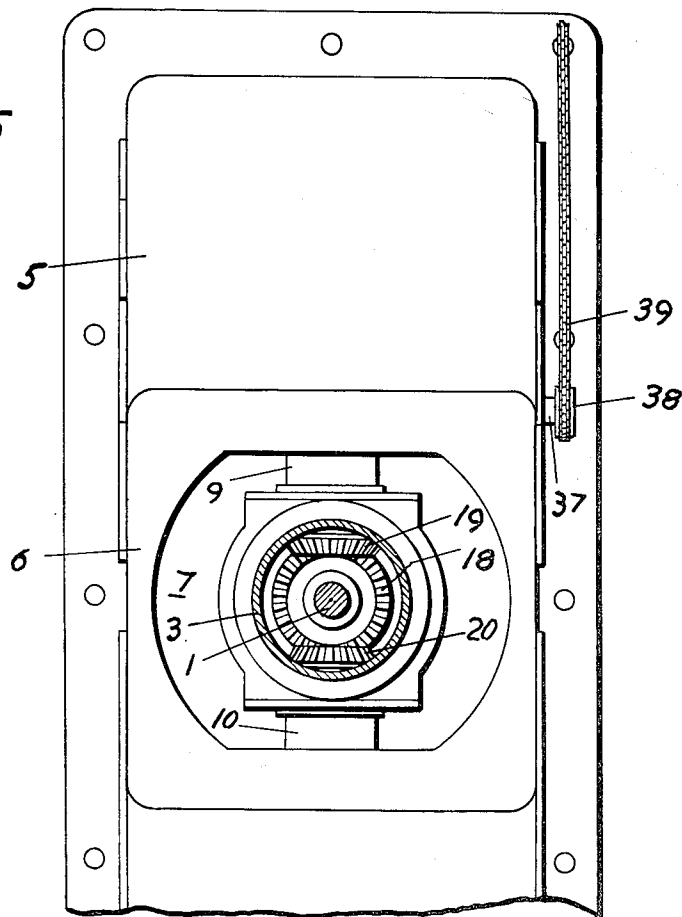
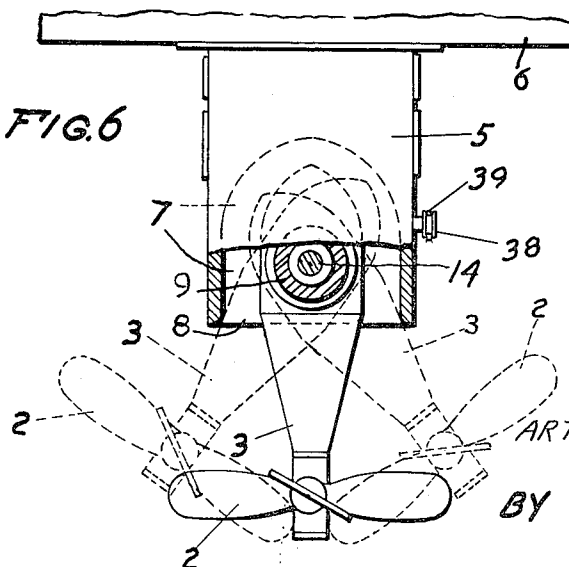


FIG. 6



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BALANCED PROPELLER OPERATING MECHANISM FOR VESSEL

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4 Claims. (Cl. 115—35)

This invention relates to propeller operating mechanism for vessels, and especially to propeller operating mechanism of that type in which the horizontal shaft carrying the propeller is mounted in a propeller housing that in turn is mounted to turn about a vertical axis for steering the boat.

In many propeller operating mechanisms of this type, the propeller shaft is driven by a vertical driving shaft, and when this is the construction the application of power to the vertical driving shaft to rotate the propeller shaft produces a turning moment in the propeller housing tending to turn it about its vertical axis in the same direction in which the driving shaft is turning. The presence of such turning moment on the propeller housing produces an unbalanced condition in the steering of the boat because such turning moment assists the operation of turning the propeller housing in one direction, but resists the turning movement of the housing in the other direction, thereby making it more difficult to steer the boat in one direction than in the other.

Various devices have been produced to obviate this difficulty and to counterbalance the turning moment on the propeller housing which is developed by the application of power to the vertical drive shaft. Some of these devices are shown in the Mathewson Patent No. 2,335,577, November 30, 1943, and in my Patents No. 2,499,339, February 28, 1950, and No. 2,532,470, December 5, 1950.

It is the object of the present invention to provide a novel propeller operating mechanism in which when the power is applied to the vertical drive shaft for operating the propeller, the propeller housing will be subjected to two opposed turning moments which will cancel or balance each other, so that the propeller housing can be turned as easily in one direction as in the other.

In the drawings, wherein I have illustrated a selected embodiment of the invention:

Fig. 1 is a vertical sectional view through a propeller operating mechanism made in accordance with the invention;

Fig. 2 is an enlarged fragmentary vertical sectional view through one of the hubs of the propeller housing to better illustrate the construction;

Fig. 3 is a side view of the propeller housing with portions of the hubs showing;

Fig. 4 is a section on the line 4—4, Fig. 1;

Fig. 5 is a section on the line 5—5, Fig. 1;

Fig. 6 is a plan view showing the manner in which the propeller housing is swung about its vertical axis for steering the boat.

In the drawings, 1 indicates the horizontal propeller shaft on which the propeller 2 is mounted. This propeller shaft is carried by a propeller housing 3, the latter having suitable bearings 4 for said shaft. The propeller housing is in turn carried by a supporting housing 5 which is mounted on or secured to the stern of the vessel, a portion of which is indicated at 6. The supporting hous-

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ing 5 is formed with a recess 7 in which the inner end portion of the propeller housing 3 is received, said supporting housing having an opening 8 through which the outer end of the propeller housing projects. The propeller housing is formed with two oppositely disposed vertically extending hub portions 9 and 10, the hub portion 9 extending upwardly through the wall 11 of the recess 7 and being mounted in suitable bearings 12 carried by the supporting housing 5. The lower hub portion 10 extends downwardly through the wall 11 of the recess 7 into the supporting housing 5 and is mounted in suitable bearings 13. These hub portions 9 and 10 and their bearings provide for the swinging movement of the propeller housing about a vertical axis.

The propeller shaft 1 is driven by means of two drive shafts, an upper drive shaft 14 extending through the upper hub 9 and mounted in suitable bearings 15, and a lower drive shaft 16 extending through the lower hub 10 and mounted in suitable bearings 17 therein. The propeller shaft 1 has fast thereon a bevel gear 18 which meshes with a bevel gear 19 on the inner end of the upper drive shaft 14, and another bevel gear 20 on the inner end of the lower drive shaft 16.

The two drive shafts 14 and 16 are driven from a common power shaft 21 which may be powered by any suitable motor mechanism, and which is shown as mounted in bearings 22 carried by the supporting housing 5. The driving connection between the power shaft 21 and the upper drive shaft 14 comprises a bevel gear 23 fast on the upper end of the drive shaft 14 and meshing with a bevel gear 24 fast on an intermediate shaft 25 which is mounted in bearings 26 carried by the supporting housing 5 and which has fast thereon a gear 27 that meshes with and is driven by a pinion 28 fast on the power shaft 21.

A similar driving connection is provided between the power shaft 21 and the lower drive shaft 16. Said lower drive shaft has fast thereon a bevel gear 29 which meshes with a bevel gear 30 fast on an intermediate shaft 31 which is mounted in suitable bearings 32 carried by the supporting housing 5, said intermediate shaft 31 having fast thereon a gear 33 which also meshes with and is driven by the pinion 28.

The power from the power shaft 21 is thus conveyed to the propeller shaft through two similar power transmitting connections.

With the construction shown in which the bevel gear 24 of the intermediate shaft 25 is on the upper side of the bevel gear 23, while the bevel gear 30 for the intermediate shaft 31 is on the lower side of the bevel gear 29, the upper drive shaft 14 and lower drive shaft 16 will be rotating in opposite directions. The power transmitted from the upper drive shaft 14 and the bevel gear 19 to the bevel gear 18 will produce a turning moment in the propeller housing tending to turn it in the same direction as that in which the power shaft 14 is rotating, while the power transmitted from the lower drive shaft 16 and its bevel gear 20 will tend to produce in the propeller housing 3 a turning moment in the direction in which the shaft 16 is rotating. Inasmuch as two drive shafts 14 and 16 are rotating in opposite directions, these two turning moments will balance or cancel out each other, so that the propeller housing is not subjected to any unbalanced turning moment.

As stated above, the vessel is steered by swinging the propeller housing 3 horizontally about its vertical axis and for thus swinging the propeller housing the upper hub portion 9 has fast thereon a worm gear 34 which meshes with a worm 35 on a transversely extending shaft 36 that is mounted in the supporting housing 5 and which extends through the wall of said housing, as shown at 37 in Fig. 5. The projecting end of this shaft carries

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a sprocket wheel 38 which is connected by sprocket chain 39 with a steering wheel (not shown) and which is mounted in a suitable location on the vessel 6.

Inasmuch as the propeller housing 3 is not subjected to any unbalanced turning moments due to transmission of power to the propeller shaft, the same effort will be required to turn the propeller housing into either dotted line position, Fig. 6, and thus the vessel can be as easily steered in one direction as in another. It will be understood that the opening 8 in the supporting housing 5 has a sufficient horizontal dimension to provide for any necessary swinging movement of the propeller housing for steering the vessel.

I claim:

1. Propeller operating mechanism for vessels comprising an horizontal propeller shaft having a propeller thereon, a propeller housing in which the propeller shaft is mounted, said propeller housing having an upper and a lower vertically extending hub portion, which hub portions are in vertical axial alinement, supporting means in which said hub portions are mounted for turning about their common vertical axis, a drive shaft extending axially through each hub portion, means for rotating both driving shafts, a driving connection between each drive shaft and the propeller shaft by which torque is transmitted from both drive shafts to the propeller shaft in the same direction, the turning moment of the propeller housing about its axis which is developed by transmission of torque to the propeller shaft from one drive shaft being in the opposite direction from that developed by transmission of torque to the propeller shaft by the other drive shaft, and means connected to one of said hub portions to turn the propeller housing about said vertical axis for steering the vessel.

2. Propeller operating mechanism for vessels comprising an horizontal propeller shaft having a propeller thereon, a propeller housing in which the propeller shaft is mounted, a supporting housing having an open recess providing top and bottom walls and in which recess the propeller housing is partially received, said propeller housing having oppositely disposed vertically extending upper and lower tubular hub portions mounted in said top and bottom walls for turning movement about a vertical axis, a drive shaft extending axially through each hub portion, means to rotate both drive shafts, a driving connection between each drive shaft and the propeller shaft by which both drive shafts transmit torque to the propeller shaft in the same direction, and means carried by one of said hub portions to turn the propeller housing about said vertical axis for steering the vessel.

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3. Propeller operating mechanism for vessels comprising an horizontal propeller shaft having a propeller thereon, a propeller housing in which the propeller shaft is mounted, said propeller housing having an upper and a lower vertically extending hub portion, which hub portions are in vertical axial alinement, supporting means in which said hub portions are mounted for turning about their common vertical axis, a drive shaft extending axially through each hub portion, means for rotating both drive shafts, a driving connection between each drive shaft and the propeller shaft by which torque is transmitted from both drive shafts to the propeller shaft in the same direction, the turning moment of the propeller housing about its axis which is developed by transmission of torque to the propeller shaft from one drive shaft being in the opposite direction from that developed by transmission of torque to the propeller shaft by the other drive shaft, a gear element mounted on and rigid with one of said hub elements, and means to actuate said gear element thereby to turn the propeller housing about said vertical axis for steering the vessel.

4. Propeller operating mechanism for vessels comprising an horizontal propeller shaft having a propeller thereon, a propeller housing in which the propeller shaft is mounted, a supporting housing having an open recess providing top and bottom walls and in which recess the propeller housing is partially received, said propeller housing having oppositely disposed vertically extending upper and lower tubular hub portions mounted in said top and bottom walls for turning movement about a vertical axis, a drive shaft extending axially through each hub portion, means to rotate both drive shafts, a driving connection between each drive shaft and the propeller shaft by which both drive shafts transmit torque to the propeller shaft in the same direction, a gear element mounted on and rigid with one of said hub elements and situated within the supporting housing, and means to actuate said gear element thereby to turn the propeller housing about said vertical axis for steering the vessel.

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