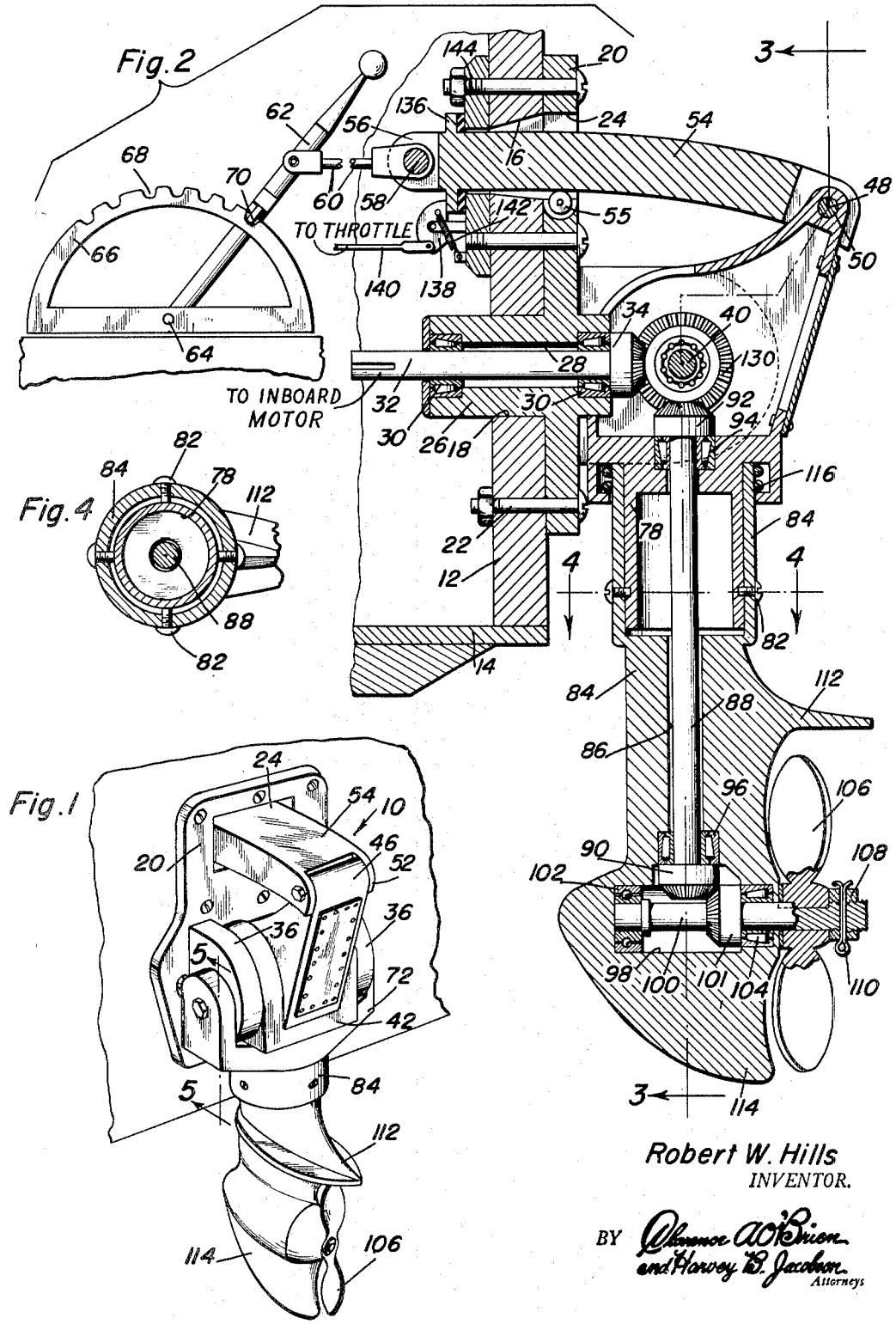
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DRIVE UNIT FOR BOAT WITH INBOARD MOTOR

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Fig. 3

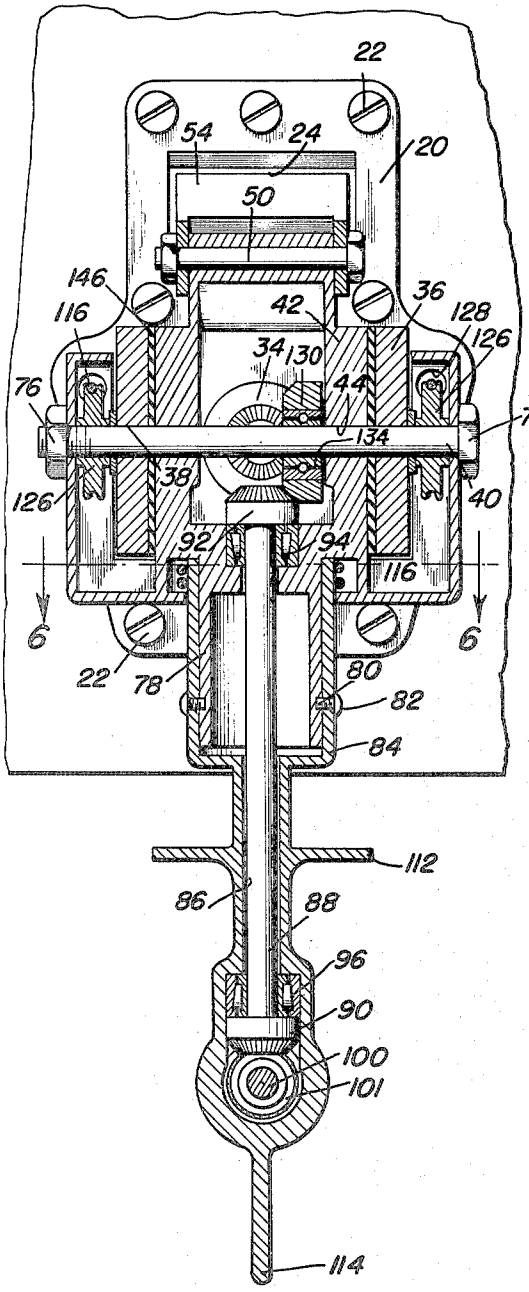


Fig. 5

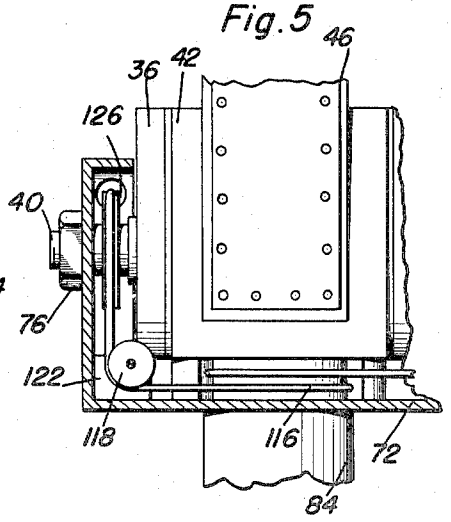
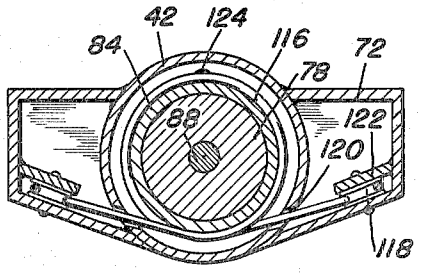


Fig. 6



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DRIVE UNIT FOR BOAT WITH INBOARD MOTOR

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3 Claims. (Cl. 115—41)

This invention relates to a drive unit for boats with inboard motors and more specifically provides a device for permitting the driving propeller to move rearwardly and upwardly in vertical swinging movement if the propeller and propeller housing comes into contact with an obstruction in the water.

An object of this invention is to provide a drive unit for boats having a propeller drive shaft and housing that will swing from a vertical to an inclined position upon impact with an obstruction or by adjustment of a suitable control thereby raising or lowering the propeller as desired.

Another object of the present invention is to provide a drive unit for boats wherein the power is delivered through a novel drive system wherein the propeller is driven when the propeller drive shaft is in its normal position and in a position diagonal to or angular to the normal position.

A further object of the present invention is to provide a drive unit for boats wherein the vertically disposed propeller drive shaft will swing about a horizontal axis when an obstruction in the water is contacted thereby automatically reducing the speed of the propeller but yet leaving the power connected thereto wherein the boat may be maneuvered in very shallow water when desired.

Yet another object of the present invention is to provide a drive unit for motor boats having inboard motors wherein the propeller may be swung about a horizontal axis to an adjusted position as desired and wherein a suitable mechanism is provided for angulating the propeller about a vertical axis for propelling the boat in the desired direction.

Other important objects of the present invention are found in continuity of power, adjustment in various planes, simplicity in construction, adaptability for its purpose, and its relatively inexpensive manufacture and maintenance.

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:

Figure 1 is a perspective view of the drive unit of the present invention attached to a stern board of a motor boat having an inboard motor;

Figure 2 is a vertical, sectional view taken substantially upon a plane passing along the longitudinal center line of the drive shaft, propeller and housing showing the structural details thereof;

Figure 3 is a vertical, sectional view taken substantially upon a plane passing along section line 3—3 of Figure 2 showing further structural detail and structural relationship of the various component parts of the present invention;

Figure 4 is a top plan sectional view taken substantially upon a plane passing along section line 4—4 of Figure 2 showing the rotatably mounted portion of the propeller drive shaft housing wherein the propeller may be angulated about a vertical axis for guiding movement of the boat;

Figure 5 is a detailed sectional view taken substantially upon a plane passing along section line 5—5 of Figure 1 showing structural details of the guiding mechanism for the propeller; and

Figure 6 is a top plan sectional view taken substantially upon a plane passing along section line 6—6 of Figure 3 showing further structural details of the guiding mechanism for angulating the propeller in relation to the boat for guiding movement of the boat.

Referring now specifically to the drawings, it will be seen that the numeral 10 generally designates the drive unit of the present invention. The drive unit 10 is secured to the stern board 12 of a boat in spaced relation to the bottom 14 thereof. The stern board 12 is provided with apertures 16 and 18 in vertically spaced relation for a purpose described hereinafter. Secured to the outer surface of the stern board 12 is a generally rectangular plate 20 secured to the stern board by a plurality of screw threaded fastening bolts 22. The plate 20 is provided with an opening 24 in alignment with the opening 16 in the stern board 12 and positioned below the opening 24 in spaced relation thereto is an integrally formed sleeve 26 having a longitudinal opening 28 therethrough thereby forming an opening through the plate 20. At each end of the tubular sleeve 26 is positioned tapered roller bearings 30 for rotatably rotating a drive shaft 32 therein wherein the drive shaft 32 is connected at one end to an inboard motor (not shown). The other end of the drive shaft 32 is provided with a bevel spur gear 34 for a purpose described hereinafter.

Rigidly secured to and projecting from the outer base of the plate 20 is a pair of enlarged lugs 36 that are equally spaced from the tubular sleeve 26 and the lugs 36 are provided with apertures 38 in horizontal alignment with the drive shaft 32 for receiving a horizontally disposed transverse shaft 40 that is in alignment with the drive shaft 32 in perpendicular relation thereto for a purpose described hereinafter.

A generally U-shaped housing member 42 is provided for pivotal mounting on the shaft 40 between the lugs 36. The legs of the U-shaped member 42 are provided with apertures 44 pivotally surrounding the shaft 40 for movement in relation to the mounting lugs 36. Integrally formed and extending between the legs 42 is an upstanding enlarged member 46 having a horizontal bore 48 for receiving a pivot bolt 50 therethrough. The pivot bolt 50 extends through lugs 52 on a transversely enlarged operating arm 54 that extends through the opening 24 and the plate 20 and the opening 16 and the stern board 12. The inner end of this operating arm 54 is provided with a pair of projecting lugs 56 for receiving an attaching bolt 58 that is secured to an operating rod 60 that is pivotally secured to an operating handle 62. The operating handle 62 is secured to a pivot pin 64 and is pivotally mounted over a segmental member 66 having spaced notches 68 with inclined surfaces on the arcuate periphery thereof. A spring loaded dog 70 having a rounded lower end is associated with the handle 62 for engaging notches 68 wherein the handle 62 may be adjusted in angular relation thereby moving the operating arm 54 inwardly and outwardly through the openings 16 and 24 thereby pivoting the housing 42 about the shaft 40.

The under surface of the shaft 40 is provided with an integrally extending U-shaped portion 72 that surrounds and engages the outer ends of the shaft 40 exteriorly of the mounting lugs 36. This extending housing portion 72 is hollow for a purpose described hereinafter and the shaft 40 is provided with a headed end 74 in the nature of a bolt having a screw threaded nut member 76 on the other end thereof wherein the entire apparatus may be disassembled by removing the shaft 40. Projecting downwardly from the main U-shaped

portion 42 is a tubular sleeve 78 that is provided with a peripheral groove 80 adjacent the lower end thereof for receiving a plurality of screw threaded members 82 that are threaded through apertures in a vertically disposed tubular housing 84 wherein the screw threaded members 82 riding in the groove 80 will permit angular adjustment about a vertical axis defined by the center of the tubular housing 84. The tubular housing 84 extends vertically downwardly below the bottom of the boat 14 and includes a vertical passage 86 for receiving a propeller drive shaft 88 that is provided with a bevel gear 90 at the lower end and a bevel gear 92 at the upper end thereof wherein the bevel gear 92 is positioned interiorly of the housing 42 and the propeller shaft 88 is journaled in tapered roller bearings 94 at the upper end thereof and tapered roller bearings 96 at the lower end thereof wherein the bevel gear 90 is mounted in a horizontal enlarged bore 98 that journals a propeller shaft 100 therein. The inner end of the propeller shaft 100 is journaled in ball bearing 102 and the outer end thereof is journaled in tapered roller bearings 104. Secured to the outer end of the propeller shaft 100 is a propeller 106 that is secured thereon by a locked nut 108 having a transverse removable pin 110 extending therethrough thereby securely locking the propeller 106 to the propeller shaft 100. Positioned above the propeller 106 is a deflector plate 112 and positioned forwardly of the propeller 106 and extending downwardly to the lower end thereof is a rounded protective projecting member 114 substantially in the nature of a skeg.

As previously stated, the upper end of the tubular housing 84 extends upwardly into the hollow portion of the housing 72 and upwardly into the housing 42 wherein a steering cable 116 is wrapped around and secured to the upper end of the tubular housing 84. The ends of the steering cable 116 pass over guide pulleys 118 that are substantially tangential to the upper end of the tubular housing 84 wherein the guide cable 116 leaves the tubular casing 84 in substantially a horizontal tangential direction. Suitable openings 120 are provided in the housing 42 for permitting the passage of the cable 116 therethrough for engagement with the guide pulleys 118 that are mounted on suitable brackets 122 secured to the internal sides of the hollow housing 72. It will be noted that the numeral 124 generally designates the attaching means for securing the guide cable 116 to the upper end of the tubular sleeve 84. The cable 116 passes over the guide pulleys 118 at each side of the hollow housing 72 and extends vertically upwardly therefrom in tangential direction in relation to the pulleys 118 over pulleys 126 mounted exteriorly of the lugs 36 on the shaft 40 in rotatable relation. The cable 116 then passes through apertures 128 in the plate 20 and in the stern board 12 and extends forwardly therefrom to a suitable controlled steering wheel (not shown) wherein by winding and unwinding the cable about a steering column, the angular position of the tubular housing and the angular position of the propeller 106 may be adjusted thereby directing the path of movement of the force exerted by the propeller 106. It is noted that the apertures 128 are substantially tangential in relation to the pulleys 126 wherein the cable 116 will be guided through the center of the apertures 128 thereby preventing chafing and damage to the cable 116.

Referring now specifically to Figures 2 and 3, it will be seen that an inwardly facing bevel gear 130 is positioned on the shaft 40 between the inner surfaces of hte U-shaped housing 42 and is journaled on the shaft 40 by suitable roller bearings 134. The bevel gear 130 is mounted on the horizontal shaft 40 in meshing engagement with the bevel gear 34 on the drive shaft 32 wherein the shaft 32 is mounted in the horizontal plane as is the shaft 40 wherein the two shafts 32 and 40 are in perpendicular relation with the bevel gear 34 driving the bevel gear 130. The bevel gear 130 is in meshing engagement with the bevel gear 92 on the upper end of the propeller drive shaft 88 thereby rotating the propeller drive shaft 88 for driving the propeller 106 in the obvious manner. If it is desired to raise the effective height of the propeller 106, the handle 62 is rotated thereby pivoting the housing 42 as well as the housing 72 about the axis of the shaft 40 wherein the bevel gear 92 will continuously be in meshing engagement with the bevel gear 130 regardless of the angular position of the propeller drive shaft 88.

In the event that the propeller housing 84 engages some obstruction in the water, it will be seen that the device will pivot about the shaft 40 wherein the inner end of the operating arm 54 is provided with a projecting flange 136 for engagement with a pivot member 138 that is connected to a throttle rod 140. Upon sudden inward movement of the operating arm 54 caused by the upward swinging movement of the housing 84, the throttle rod 140 will be actuated thereby reducing the speed of the inboard motor (not shown). A return spring 142 is provided for returning the pivotal member 138 and the throttle 140 to its normal position in latching engagement over the peripheral flange 136. The flange 136 is provided with a cushion 144 which will cushion downward pivotal movement of the housing 84 in the event the obstruction is only temporary and the action of the propeller 106 will tend to urge the propeller housing 84 towards the front of the boat thereby returning it to its vertical normal position. Also, it will be noted that suitable friction members 146 are provided between the pivot lugs 36 and the housing 42 for generally retarding the rapidity of pivotal movement therebetween.

In operation, power is supplied through the drive shaft 32 and transferred through the meshing bevel gears 34, 130 and 92, propeller drive shaft 88, bevel gear 90, bevel gear 101 and propeller shaft 100 to the propeller 106. Angular movement of the propeller drive shaft housing 84 is effected by movement of the handle 62 wherein the operating arm 54 will reciprocate in relation to the stern board 12 on the roller 55 which is horizontally journaled in the plate 20 for supporting the operating arm 54. When the operating arm 54 moves inwardly thereby raising the propeller 106 toward the upper surface of the water, the pivotal member 138 will actuate a throttle control rod 140 thereby reducing the speed of the inboard motor (not shown). The angular direction of the propeller drive shaft housing 84 together with the propeller 106 about the vertical axis of the propeller shaft 88 is effected by the steering control cable 116 in an obvious manner. It will be seen that the device of the present invention provides a "continuous power" drive unit for boats having inboard motors wherein the propeller 106 will be driven in various angular positions in relation to the boat and in various angular positions in relation to the power drive shaft 32. The rod 60 retains the propeller in operative position during reverse rotation thereof and the spring dog 70 due to the inclined surfaces of the notches 68 and the rounded end of dog 70 permits the propeller to swing rearwardly upon impact with an obstruction in the water.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, 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 shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. A drive unit for boats having an inboard motor having a throttle control rod comprising a mounting plate secured to the rear surface of a stern board of a boat, a pivotally mounted housing attached to said mounting plate for pivotal movement about a horizontal axis,

a vertical tubular housing depending from said pivotal housing, a propeller drive shaft journaled in said tubular housing, a propeller rotatably positioned at the lower end of the tubular housing, means interconnecting the propeller drive shaft and propeller for driving said propeller, and means for driving said propeller drive shaft at various angular positions of said tubular housing and propeller drive shaft about said horizontal axis, said mounting plate having a horizontally disposed sleeve journaling a drive shaft from a motor, a transverse shaft pivotally securing the pivotal housing to the mounting plate, said means for driving said propeller drive shaft including a bevel gear on the end of said drive shaft, a bevel gear journaled on said transverse shaft in meshing engagement with the drive bevel gear, a bevel gear mounted on the upper end of said propeller drive shaft in meshing engagement with the gear on the transverse shaft wherein all the gears will remain in constant mesh upon pivotal movement of the propeller drive shaft and the tubular housing about an axis formed by the transverse shaft and the rotational center of the bevel gear mounted thereon, and means interconnecting said pivotal housing and the throttle control rod of the motor for automatically reducing the speed of the motor when the propeller is swung upwardly about the horizontal axis of the pivotal housing.

2. A drive unit for boats having an inboard motor comprising a mounting plate secured to the rear surface of a stern board of a boat, a pivotally mounted housing attached to said mounting plate for pivotal movement about a horizontal axis, a vertical tubular housing depending from said pivotal housing, a propeller drive shaft journaled in said tubular housing, a propeller rotatably positioned at the lower end of the tubular housing, means interconnecting the propeller drive shaft and propeller for driving said propeller, and means for driving said propeller drive shaft at various angular positions of said tubular housing and propeller drive shaft about said horizontal axis, said mounting plate having a horizontally disposed sleeve journaling a drive shaft from a motor, a transverse shaft pivotally securing the pivotal housing to the mounting plate, said means for driving said propeller drive shaft including a bevel gear on the end of said drive shaft, a bevel gear journaled on said transverse shaft in meshing engagement with the drive bevel gear, a bevel gear mounted on the upper end of said propeller drive shaft in meshing engagement with the gear on the transverse shaft wherein all the gears will remain in constant mesh upon pivotal movement of the propeller drive shaft and the tubular housing about an axis formed by the transverse shaft and the rotational center of the bevel gear mounted thereon, said tubular housing being swivelly secured to the pivotal housing, and control means for swivelling said tubular housing about a vertical axis for positioning the propeller for guiding movement of the boat, an upstanding arm on said housing, and means connected to said arm for swinging the pivotal housing about its horizontal axis thereby controlling the position of the propeller.

3. A drive unit for boats having an inboard motor having a throttle control rod comprising a mounting plate secured to the rear surface of a stern board of a boat, a pivotally mounted housing attached to said mounting plate for pivotal movement about a horizontal axis, a vertical tubular housing depending from said pivotal housing, a propeller drive shaft journaled in said tubular housing, a propeller rotatably positioned at the lower end of the tubular housing, means interconnecting the propeller drive shaft and propeller for driving said propeller, and means for driving said propeller drive shaft at various angular positions of said tubular housing and propeller drive shaft about said horizontal axis, said mounting plate having a horizontally disposed sleeve journaling a drive shaft from a motor, a transverse shaft pivotally securing the pivotal housing to the mounting plate, said means for driving said propeller drive shaft including a bevel gear on the end of said drive shaft, a bevel gear journaled on said transverse shaft in meshing engagement with the drive bevel gear, a bevel gear mounted on the upper end of said propeller drive shaft in meshing engagement with the gear on the transverse shaft wherein all the gears will remain in constant mesh upon pivotal movement of the propeller drive shaft and the tubular housing about an axis formed by the transverse shaft and the rotational center of the bevel gear mounted thereon, an upstanding arm on said housing, and means connected to said arm for swinging the pivotal housing about its horizontal axis thereby controlling the position of the propeller, and means interconnecting said pivotal housing and the throttle control rod on the motor for automatically reducing the speed of the motor when the propeller is swung upwardly about the horizontal axis of the pivotal housing.

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