Jan. 29, 1963 T. G. LANG 3,075,490

MOUNTING MEANS FOR BOAT PROPULSION

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FIG. 1.

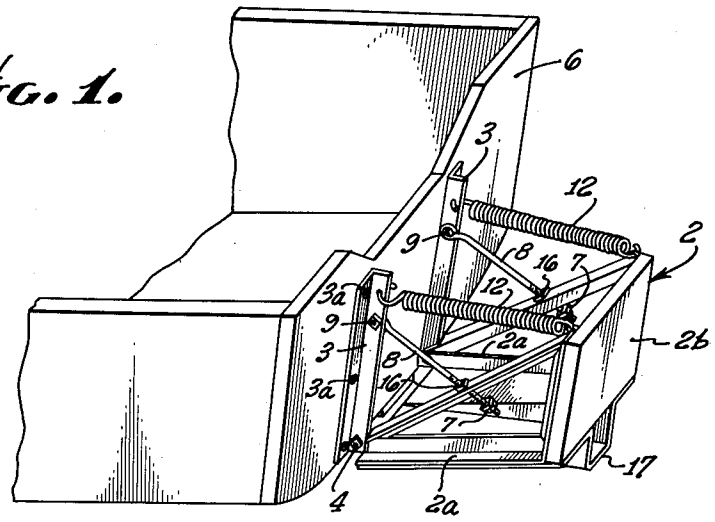


FIG. 2.

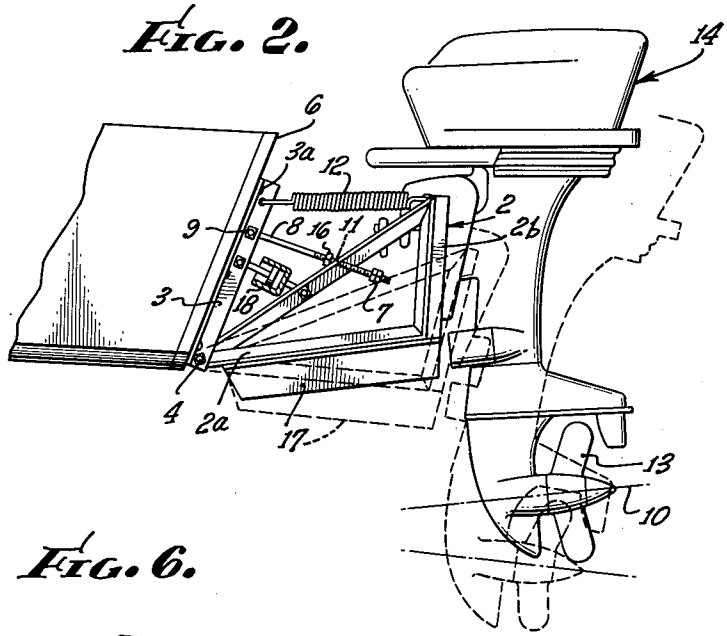
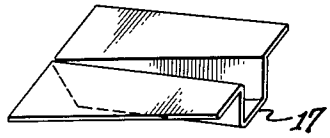


FIG. 6.



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FIG. 4.

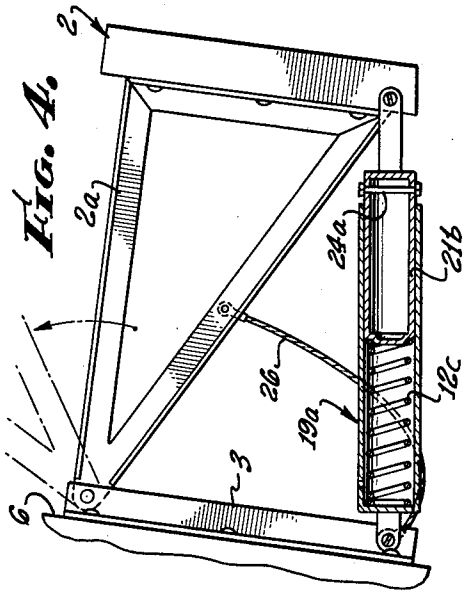


FIG. 3.

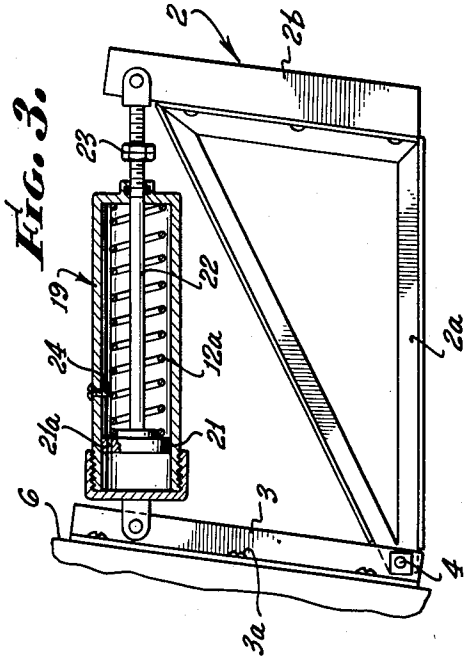
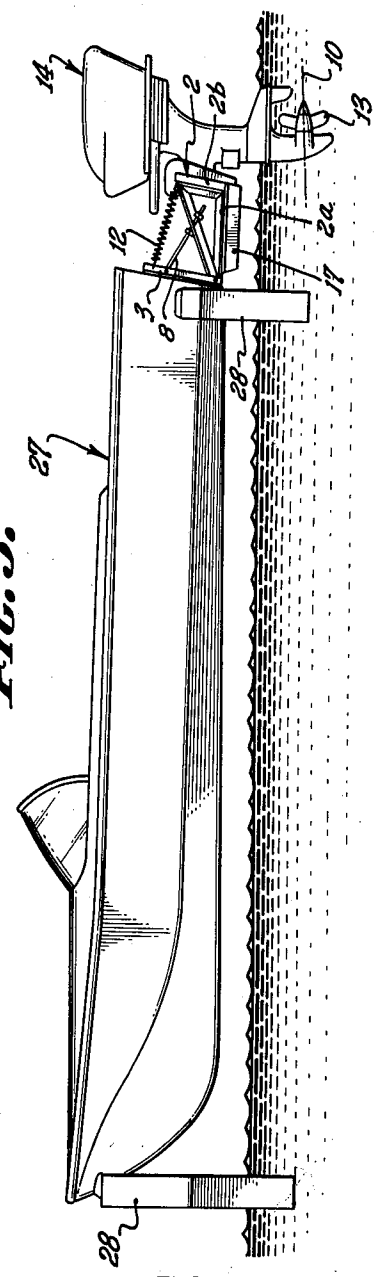


FIG. 5.



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MOUNTING MEANS FOR BOAT PROPULSION

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This invention relates to boats, and more particularly to mounting means for boat propulsion, including propellers and outboard motors having propellers, wherein the mounting means is instrumental in regulating the depth of the propellers.

A primary object of this invention is to provide new and improved means whereby the depth of a propeller is automatically regulated by the magnitude of its thrust.

Another object is to provide, in a hydrofoil craft, a mounting for an outboard motor which automatically lowers the motor and its propeller during forward motion so the propeller remains submerged after the boat rises above the water on its hydrofoils and which automatically raises the motor when the boat stops in order to protect the motor from waves.

Another object is to provide means for automatically raising the propeller to an upper position at low speeds to provide clearance past sand bars and other obstacles and for automatically lowering it to a normal operating position at higher speeds.

Other objects are to provide an exterior mounting for an outboard motor to enable a higher transom to be used on a boat, to provide more room in the boat, to provide more quiet operation of the motor, and to eliminate gas and oil leakage from the motor.

Another object is to automatically tilt the propeller shaft at the lower motor speeds so the propeller operates less efficiently, thereby permitting slower trolling speeds for fishing.

Another object is to provide means for adjusting the lowest operating position of the propeller for most efficient high speed operation.

Another object is to provide a mounting means for an outboard motor which can be easily attached to a boat transom and which can be economically manufactured.

Other objects and advantages of the invention will be apparent from the following description.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same:

FIGURE 1 is a perspective view of a mounting for an outboard motor attached to the transom of a boat.

FIGURE 2 is a side elevation of the motor mount including the outboard motor illustrating the upper position thereof.

FIGURE 3 is a sectional view of a biasing means combined with adjustable stops and a shock absorber.

FIGURE 4 is a side elevation of an alternate construction of the motor mount.

FIGURE 5 is a side elevation of a hydrofoil boat equipped with the means of this invention and with an outboard motor, illustrating the lower, operating position.

FIGURE 6 is a perspective view of the deflection plate shown in FIGURES 1 and 2.

Referring more particularly to the drawings, the numeral 2 refers to a support member which is adapted to have an outboard motor mounted thereto and consisting of a pair of triangular brackets 2*a* spanned by a transverse board 2*b*. Member 2 is pivotally mounted to brackets 3 by means of pivot bolts 4 in such a manner that it is free to pivot about a pivot axis joining pivot bolts 4. Brackets 3 are attachable to boat transom 6 by suitable means as bolts 3*a* that hold the brackets rigidly to the transom. The lower pivotal position of the support member 2 is limited by a lower stop means such as the nuts 7 which contact a truss of the brackets 2*a*. Nuts 7 are screwed on eye bolts 8 in such a manner that their position is adjustable. The eyes of the eye bolts 8 are pivotally attached to brackets 3 by bolts 9, and the arms of the eye bolts freely pass through holes 11 in the trusses of brackets 2*a*. Other means could be used to limit the lower position of the support member 2 such as cables 26 (FIG. 4) attached between points 9 and 11.

Tension springs 12 are shown attached between the upper part of support member 2 and the upper part of brackets 3 in order to bias support member 2 pivotally toward an upper position. The tension in springs 12 decreases as the support member 2 pivots upward, such that when an outboard motor is attached to support member 2 an upper equilibrium position is reached where the spring tension balances the motor weight. This balance of forces and moments can be more easily seen in FIGURE 2. The propeller 13 of outboard motor 14 exerts a thrust along its axis 10 which passes below pivot bolts 4. This produces a new moment about pivot bolts 4 which tends to pivot support member 2 downward until springs 12 stretch sufficiently so their tension is increased to balance the thrust or until support member 2 contacts lower stops 7. The position of the support member in the latter case is shown in FIGURE 5. In practice, the spring bias will normally be designed such that the support member will rest in its lower position for medium to high values of propeller thrust and move upward only when the thrust is small or zero. In this manner the motor and propeller will be held in a lower, normal operating position over most of the speed range of the boat.

In some cases it may be found convenient to limit the upper position of pivoting of support member 2 by an upper stop means such as nuts 16 screwed on eye bolts 8. In this case the bias of springs 12 can be increased such that support member 2 will remain fixed in an upper position resting against nut 16 until a certain minimum thrust is exceeded and with slight increased thrust will then rest against the lower stop nuts 7, thereby providing effectively only an upper and a lower position of the motor and propeller, the lower position corresponding to higher speed operation.

It will be seen that the motor mount of this present invention provides automatic raising and lowering of the outboard motor and propeller. The propeller thrust of a boat is normally low when the boat is operating near shore or is navigating in treacherous waters; in these cases my invention automatically raises the propeller to minimize its chances of being damaged. It must be recognized that at least a portion of the propeller 13, and preferably all of it must be in the water in all positions of operation in order to develop thrust for it to be automatically lowered. When an outboard motor is mounted behind the transom of a large ocean-going craft it is desirable to maintain as much height of the motor above the waves as possible when the boat is at rest or moving very slowly. At higher boat speeds, a trough is formed behind the boat transom which lowers the water surface, permitting the motor to be safely lowered, which is automatically effected by my invention. Also, even at low forward speeds, the motor will be protected to a great extent from waves by the boat itself, so the springs 12 can be designed to automatically lower the motor at relatively low thrusts.

It is evident that any propeller means could be mounted similarly to that of the outboard motor propeller 13 in FIGURE 2 in such a manner as to be automatically lowered by action of its thrust. It has been found that struts of many outboard motors have relatively wide sections

a few inches above their cavitation plates in order to house shock mounts, shaft bearings, and the like, which would tend to deflect large amounts of water when moving forward, since these sections would extend below the support member 2. It has been found desirable, therefore, to attach a wedge-shaped (in plan form) deflection plate 17 to the lower side of support member 2 to split the water so it passes on either side of the motor strut. An inclined plate (in side veiw) has sometimes been found unsatisfactory because of its tendency to plane and produce upward oscillating forces when the boat passes through waves which thereby forces the support member 2 to pivot away from and then against lower stop member 7 in an objectionable manner. This oscillation can be eliminated by the use of deflection plate 17 or the addition of a shock absorber 18, shown schematically in FIGURE 2 attached between brackets 3 and support member 2 or by means of a latch that automatically locks support member 2 in the lower position during high speed operation. The shock absorber 18 may also be conveniently used to cushion the movements of support member 2 when it moves away from or toward upper stop nuts 16 and lower stop nuts 7.

An alternate method of construction of the biasing means, stops, and shock absorber is schematically shown in FIGURE 3, wherein a spring 12*a* is placed in compression between end of cyliner 19 and piston 21; piston 21 is attached to rod 22, which in turn is pivotally bolted to support member 2 near its upper edge. Cylinder 19 is pivotally attached to bracket 3. A nut 23 is screwed on rod 22 to provide upper stop means, and peg 24 is positioned in cylinder 19, to provide lower stop means to limit the oscillation of support member 2. Cylinder 19 can be filled with a viscous fluid and the piston provided with an orifice 21*a* to thereby act as the aforementioned shock absorber.

Another alternate construction is shown in FIGURE 4, wherein the support member 2 is pivotally mounted to brackets 3 near their upper end, and a spring 12*c* is placed in compression between end of cylinder 19*a* and elongated piston 21*b*, which in turn is pivotally attached to support member 2. The left end of cylinder 19*a* is pivotally attached to bracket 3. The lower stop means in this case consists of peg 24*a* placed through piston 21*b* and the upper stop means consists of cable 26 attached between bracket 3 and support member 2. In this alternate construction the main advantage is that the support member 2 can be pivoted to a position almost within the boat (shown in dotted lines), upon release of cable 26 and cylinder 19*a* from bracket 3, in order to repair the motor or propeller while at sea without having to remove the motor from support member 2.

An important use of this novel invention is in combination with a hydrofoil boat shown in operation in FIGURE 5. As the boat 27 gains speed, it rises on its hydrofoils 28, in a manner well known by those skilled in the art. An outboard boat having hydrofoils may rise from a few inches to over a foot above the water on its hydrofoils at higher speeds. Consequently, if a conventional short shaft outboard motor is to be utilized for propulsion, it must be lowered with respect to the boat to keep its propeller submerged at these higher speeds. At lower speeds, when the boat once again contacts the water, the motor must be raised again so it will not be damaged by waves. Consequently, the mounting means for boat propulsion described herein is uniquely suited for use with a hydrofoil craft. Such a craft is illustrated for example in my co-pending application Serial No. 854,176, filed November 19, 1959 entitled "Hydrofoil for Water Craft." If it is desired to supply a kit composed of hydrofoils adapted to be attached to a conventional outboard boat, to convert it into a hydrofoil craft, the outboard motor mount described herein is ideally suited for use with or inclusion with such a kit, since the smaller outboard motor boats are powered by conventional short shaft motors.

I claim as my invention:

1. Mounting means for a boat propulsion mechanism having a rotary propeller, comprising: means defining a transverse, generally horizontal axis on a boat transom adjacent the bottom thereof; a bracket pivotally mounted on said transom about said axis, said bracket extending rearwardly and generally horizontally from said axis and having a mounting portion thereon adjacent the rear end thereof; propulsion means having a propeller mounted on said mounting portion to rotate on a fore-and-aft axis passing below said transverse axis; the horizontal distance from said transverse axis to said propeller being at least about equal to the vertical distance between said transverse axis and said fore-and-aft axis whereby said propeller moves generally vertically downwardly as said bracket pivots about said transverse axis in response to forward thrust of said propeller.

2. Mounting means as defined in claim 1 including resilient means urging said bracket to swing upwardly to normally counterbalance the weight of said bracket and propulsion means but yieldable to permit said bracket to swing downwardly by forward thrust developed by said propeller.

3. Mounting means as defined in claim 1 wherein said mounting portion comprises an upright board for removably mounting an outboard motor.

4. Mounting means as defined in claim 1 including means limiting the range of movement of said bracket about said transverse axis to a sector wherein the motion of said propeller is principally vertical.

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