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VIBRATION AND SOUND DAMPING OUTBOARD
MOTOR STRUCTURE WITH EXTENDED SHROUD
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Fig. 1

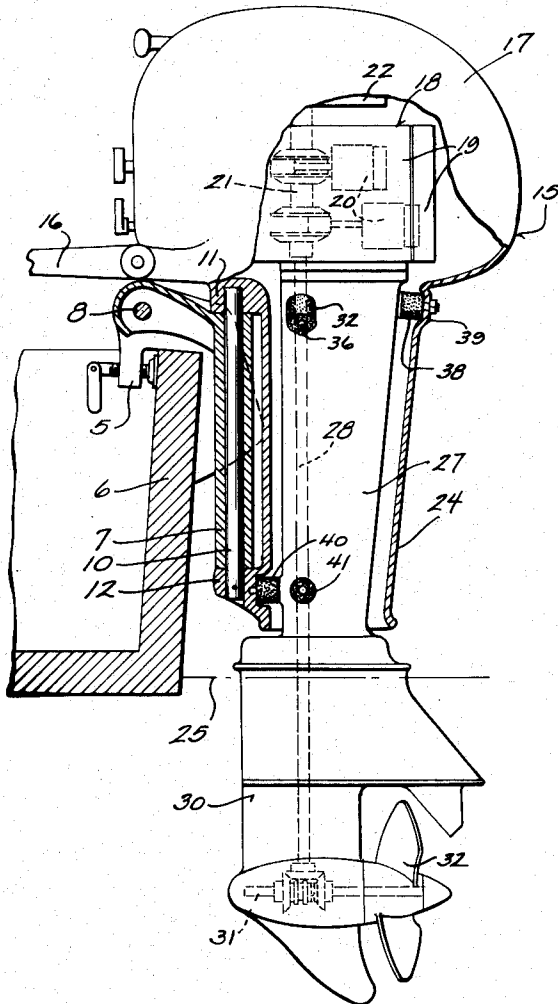


Fig. 2

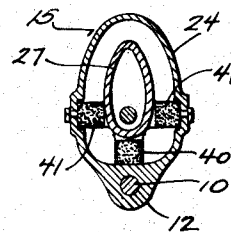
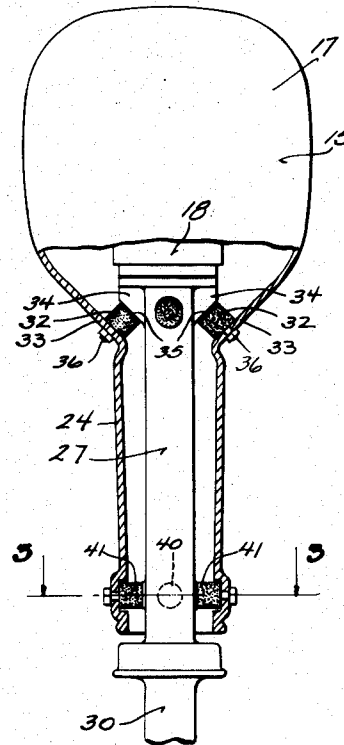


Fig. 3

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1

3,002,489

VIBRATION AND SOUND DAMPING OUTBOARD MOTOR STRUCTURE WITH EXTENDED SHROUD

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5 Claims. (Cl. 115—18)

This invention relates to a vibration and sound damping outboard motor structure with extended shroud. The structure herein disclosed is an improvement upon that disclosed in companion application 442,022 now U.S. Patent 2,740,368, filed July 8, 1954 by Finn T. Irgens and me and entitled, Vibration and Sound Damping Outboard Motor Mounting.

In the present device, as in the device of the companion application, there is a propulsion unit which comprises the power head, gear casing, and connecting strut through which the drive shaft transmits power to the propeller mounted on the gear casing. This unitary propulsion unit is not mounted directly to the transom bracket in accordance with conventional practice but is supported by springs which leave it free for vibration in any direction. This, of itself, minimizes transmission of noise and vibration to the boat. Further reduction in noise level in the boat is achieved by enclosing the power head in a shroud.

All previous attempts to baffle noise transmission from the power head to the boat by means of a shroud have either involved the mounting of the shroud directly from the propulsion unit or have involved supporting the shroud independently of the propulsion unit from the transom bracket or the steering pintle thereof. The present invention makes the shroud the primary element which is rigidly connected with the transom bracket and supports the entire propulsion unit from the shroud so that the propulsion unit no longer has any connection with the steering pintle other than the connection through its spring supports, which are desirably elastomeric.

In the drawings:

FIG. 1 is a view of an outboard motor embodying the invention partially in side elevation and partially in vertical fore and aft section.

FIG. 2 is a fragmentary view partially in rear elevation and partially in vertical transverse section through the outboard motor of FIG. 1.

FIG. 3 is a detail view taken in section on line 3—3 of FIG. 2.

The transmission bracket 5 may be conventionally designed for application to the transom 6 of a boat. In accordance with usual practice, it has a bearing portion 7 connected to the clamp portion of the bracket by means of a transverse pintle 8 upon which the bearing portion is movable in a vertical plane for accommodating tilting movement of the propulsion unit.

The bearing portion 7 has a kingpin 10 upon a generally upright axis, upon the upper and lower ends of which are mounted the ear portions 11 and 12 of the shroud generally designated by reference character 15. Thus, the entire shroud is mounted to oscillate in a generally horizontal plane subject to the control of the tiller 16 connected to it.

Within the enlarged upper end portion 17 of the shroud is the power head 18 of the propulsion unit. The power head usually comprises cylinders 19 in which the pistons 20 are reciprocable, these being connected with the crankshaft 21, carrying flywheel magneto 22. The engine will desirably be supplied with fuel from some external source which may be as disclosed in U.S. Patent 2,656,828.

The portion 24 of the shroud extends downwardly to terminate very close to the water line 25, and has a

2

cross section materially reduced as compared with the cross section of the shroud portion 17 which houses the power head. Within the portion 24 of the shroud is the vertical strut or shaft housing 27 through which extends the vertical drive shaft 28 and the usual water connections (not shown) for cooling the engine. The strut 27 is connected with gear housing 30, within which there are the usual gears shown in dotted lines in FIG. 1, whereby power is transmitted from the drive shaft 28 to propeller shaft 31 which carries propeller 32. Engine 17, strut 27 and gear housing 30 are connected together as a rigid unit.

The propulsion unit is resiliently yieldably mounted in the shroud in such a manner as to be movable respecting the shroud for vibration in any direction. The preferred means for effecting such mounting comprises a pair of springs 32 which are desirably seated upon portions of the shroud 33 which are downwardly divergent at opposite sides of the shaft housing portion 27 of the propulsion unit. These springs 32 are below the power head 18, which provides seats at 34 for the upwardly convergent upper ends of springs 32.

While the invention is not particularly concerned with the type of springs employed, it is preferred that the springs be elastomeric, and it is appropriate to use cylindrical blocks of oil resistant synthetic rubber as disclosed in the companion application above identified. The rubber blocks comprising springs 32 are vulcanized to mounting means such as plates 35 and studs 36 whereby they are connected to their respective seats.

A third spring 38 is disposed in a fore and aft plane. If it is to be under compression during motor operation, it may be interposed between the rear of strut 27 and the seat 39 provided in the shroud immediately aft of the spring as shown in FIG. 1. As shown, the several springs support the weight of the propulsion unit partially in compression and partially in shear. Torque vibration of the propulsion unit about its neutral axis or about the axis of the drive shaft 28 is taken in shear. Propulsive thrust developed by the propeller 32 and transmitted from the propulsion unit to the boat is largely absorbed at the lower end of the strut 27, but the spring 38 will be compressed thereby and springs 32 will be subject to some such thrust in shear.

Springs 40 and 41, desirably also elastomeric, are interposed between the lower end of the strut 27 and the lower end of portion 24 of shroud 15. These springs contribute shear to the support of the propulsion unit and to the positioning thereof within the shroud. Spring 40 is, of course, the principal means of transmitting the thrust of the propulsion unit to the transom bracket and thence to the boat. Such propeller thrust is transmitted by spring 40 in compression and the springs 41 cooperate by transmitting some of such thrust in shear in the preferred organization of the parts wherein spring 40 is opposite the ear portion 12 of the shroud at the point where the lower end of kingpin 10 is engaged thereby, as will clearly appear from FIG. 1 and FIG. 3. It is because the thrust of propeller 32 is developed at a level considerably below the level of spring 40 that the rigid propulsion unit tends to pivot somewhat upon spring 40 and to develop compression thrust against spring 38 at the upper end of such unit.

As more fully explained in the companion application above identified, all speed and timing and reversing controls to the propulsion unit have to be made flexible in order to accommodate the vibration permitted such unit by the vibration and sound absorbing mounting. Not only is the vibration damped before reaching the shroud and the boat, thus tending to exclude from the boat any noise incident to such vibration, but it will be observed that noise incident to the operation of the

engine is also intercepted and largely kept from the boat by the shroud because of the extension of the shroud well below the top of transom and, desirably, to the immediate vicinity of the water line 25.

It will be noted that the tiller 16 is not connected with the propulsion unit except through the shroud. It is the shroud which becomes that part of the outboard motor organization which is primarily oscillated upon the axis of kingpin 10 for steering purposes. The propulsion unit is constrained to follow the steering movement of the shroud solely by the transmission of steering motion through the several vibration and sound damping springs.

Not only is the arrangement exceptionally effective in isolating the boat and its occupants from the vibration and noise of operation of the propulsion unit, but the structure shown is exceptionally simple as compared with any other means of accommodating and damping engine vibration and at the same time supporting the shroud independently of the propulsion unit.

There is but one part pivoted upon the kingpin and that is the shroud itself. The extension of the shroud downwardly about the shaft housing or strut 27 makes possible both objectives in the simplification of the structure and the dissipation of sound waves at a point below the transom and adjacent to the water.

I claim:

1. In an outboard motor, having a transom bracket and a propulsion unit including in unitary connection an engine having a depending drive shaft, a lower unit having a propeller and propeller shaft with which the drive shaft is in operative connection, and a strut housing the drive shaft and connecting the engine and lower unit, the improvement which consists in a shroud substantially completely surrounding and spaced from said engine and adjacent portions of said strut and providing a sound confining enclosure which is complete to a level materially closer to the lower unit than to said engine, means supporting the shroud for steering oscillation, a tiller connected with the shroud for directing the steering movement thereof, and vibration damping springs supporting the propulsion unit from the shroud to accommodate vibrations of said unit within the shroud while constraining said unit for steering movement with the shroud.

2. The device of claim 1 in which the means supporting the shroud for steering movement comprises a kingpin mounted on the transom bracket, the shroud having portions engaged with portions of the pin at the upper

and lower end thereof for steering movement upon the axis of the pin.

3. In an outboard motor structure comprising a propulsion unit having in substantial rigid connection a power head, strut and gear housing, the gear housing being substantially completely immersed in use to a water line adjacent the lower end of said strut, said power head including an engine having a drive shaft connection through the strut to a propeller shaft and propeller mounted on the gear housing, and a transom bracket applicable to a boat, and provided with upright bearing means including a kingpin, the improvement consisting of a shroud having a relatively large upper portion substantially completely enclosing the power head of said unit and having a unitary downwardly extending portion of reduced cross section substantially completely enclosing a large part of the length of the strut substantially to the lower end of the strut and spaced from all parts of said propulsion unit, means mounting the shroud upon the kingpin for steering oscillation about the axis thereof, a tiller connected with the shroud for controlling steering movement thereof, and resiliently yieldable means for supporting said propulsion unit from the shroud to partake of steering movement about the kingpin axis with the shroud, said propulsion unit having no connection with the kingpin except through the shroud, and the shroud serving to confine to a level near the water line sound originating in the portions of said propulsion unit enclosed therein.

4. The device of claim 3 in which the means for mounting the propulsion unit from the shroud comprises a plurality of springs interposed between said unit and said shroud at each of a plurality of vertically spaced levels.

5. The device of claim 4 in which at least one such spring is disposed between the shroud and said unit at the approximate level of the lower end of the kingpin and in a vertical plane extending fore and aft through said unit.

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