

United States Patent

[11] 3,613,631

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[21] Appl. No. **855,292**
[22] Filed **Sept. 4, 1969**
[45] Patented **Oct. 19, 1971**
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2,890,674 6/1959 Rose..... 115/18
3,358,668 12/1967 Post et al. 115/17
3,452,704 7/1969 Watkins 115/41

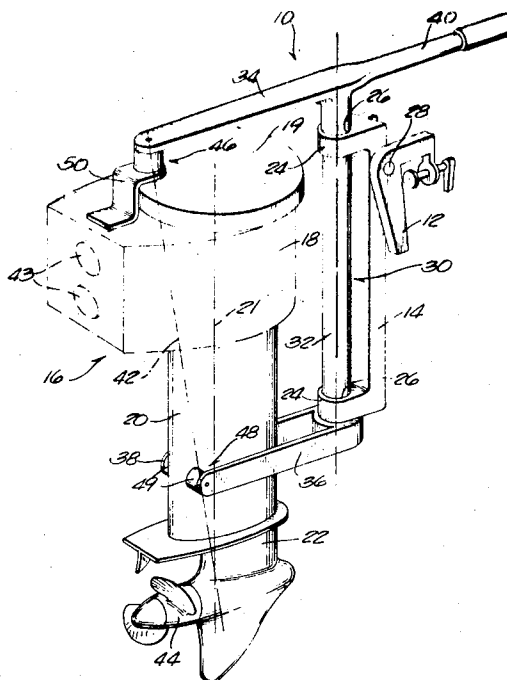
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[54] **OUTBOARD MOTOR ISOLATION SYSTEM**
7 Claims, 1 Drawing Fig.

[52] U.S. Cl..... 115/17,
115/0.5
[51] Int. Cl..... B63h 21/26
[50] Field of Search..... 115/18, 17,
0.5

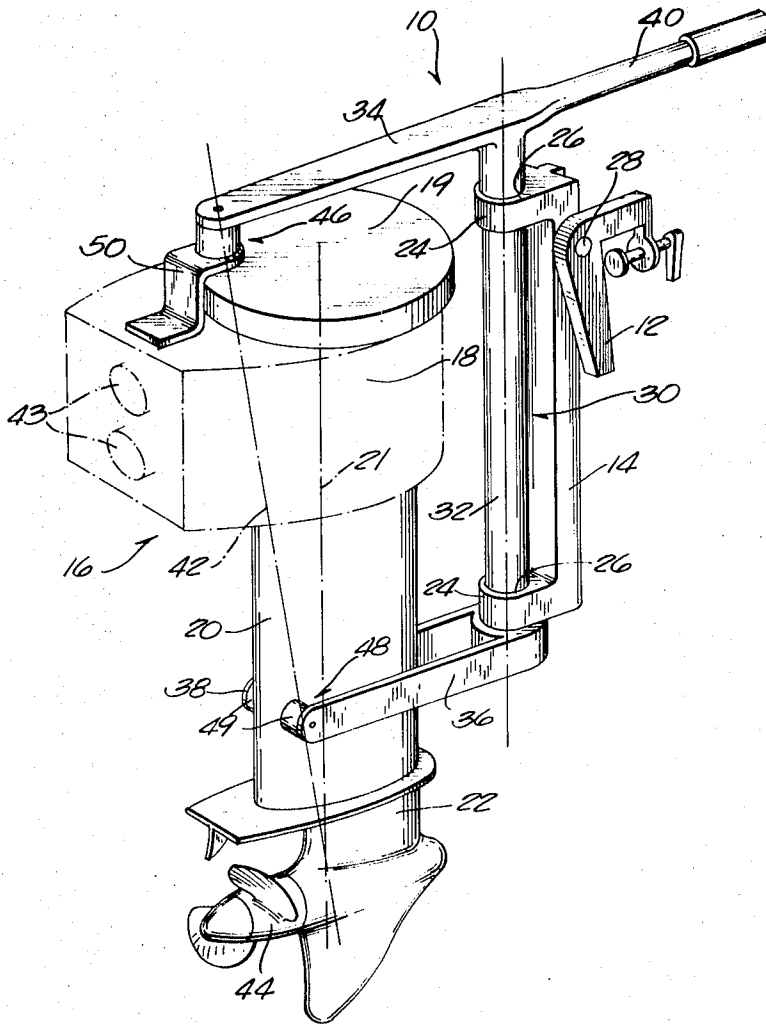
[56] **References Cited**
UNITED STATES PATENTS
2,740,368 4/1956 Irgens et al. 115/18

ABSTRACT: Disclosed herein is a sound and vibration isolation mounting arrangement for an outboard motor having a marine propulsion unit mounted rearwardly of the steering axis of the outboard motor and including a power head, and a lower unit including a drive shaft housing and a gear case. The torque roll axis of the propulsion unit extends approximately vertically through the power head, drive shaft housing and lower unit gear case. The mounting arrangement includes an upper resilient mount connected to the top of the power head and a lower resilient mount positioned on each side of the lower end of the drive shaft housing. The upper and lower mounts have elastic axes which are coaxially arranged with respect to the torque roll axis of the propulsion unit.



3,613,631

PATENTED OCT 19 1971



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OUTBOARD MOTOR ISOLATION SYSTEM

BACKGROUND OF THE INVENTION

Attempts to eliminate or reduce sound and vibration transmitted by the propulsion unit of an outboard motor to a boat hull, while transmitting thrust forces to the boat hull has been a problem that has confronted the outboard motor industry for many years. Typical examples of sound and vibration isolation mounting arrangements are shown in U.S. Pat. Nos. 2,740,368; 2,910,007; 2,911,963 and 3,002,489. Most of these arrangements include a plurality of spring mounts to isolate the various vibrations from the hull of the boat.

Reference is also made to the Watkins U.S. Pat. No. 3,452,704.

SUMMARY OF THE INVENTION

The sound and vibration isolation mounting arrangement of this invention involves the use of a resilient mount connected to a swivel bracket and to the top of the propulsion unit and a lower mount connected to the swivel bracket and to the lower part of the propulsion unit at a substantial vertical distance from the upper mount. It is preferred that both mounts have an elastic axis approximately coincident with the torque roll axis of the propulsion unit. The maximization of the vertical distance between the mounts permits the use of softer mounts while still controlling deflection under thrust. The elastic symmetry of the upper and lower mounts about the roll axis will decouple some of the vibrating modes of the propulsion unit.

Other objects and advantages of the invention will become apparent from the following detailed description when read in connection with the accompanying drawing in which a perspective view of the invention is shown.

DESCRIPTION OF THE INVENTION

Referring to the drawing, the outboard motor 10 of this invention typically includes a clamp or transom bracket 12, a steering or swivel bracket 14 and a propulsion unit 16 having a power head 18 and a lower unit. The power head includes an engine with a flywheel 19 (shown schematically), and the lower unit includes a drive shaft housing 20 having a drive shaft indicated at 21 and a lower unit gear case 22. The steering bracket 14 is pivotally connected to the transom bracket 12 for generally vertical tilting movement by means of a pivot pin 28 and includes a pair of horizontally and rearwardly disposed flanges 24 having apertures 26.

The propulsion unit 16 is supported for steering movement on the swivel bracket 14 by means of a kingpin assembly 30 having a pivot shaft 32 journaled in the swivel bracket apertures 26. At the upper end of the pivot shaft 32 is secured a rearwardly extending arm or yoke 34. At the yoke 34. At the lower end of the pivot shaft 32 is secured a yoke 36 having a pair of rearwardly extending arms 38. Steering of the propulsion unit 16 is provided by means of a steering arm or bracket 40 which extends forwardly from the arm 34. Forward and reverse thrust forces are produced by means of a propeller 44 mounted on the lower unit gear case 22.

It is generally known that the propulsion unit 16 is subject to various vibrations including torsional or oscillational vibrations resulting from the periodic power impulses of the engine. In connection with use of reciprocating piston engines, the propulsion unit is also subject to shaking forces resulting from piston movement. The torsional vibrations occurs about a torque roll axis which is indicated at 42 and which extends approximately vertically and through the center of mass of the propulsion unit 16 and is generally located rearwardly of the drive shaft in a reciprocating engine when the cylinder heads 43 extend rearwardly. In

the past, the torque roll axis has sometimes been referred to as the neutral axis.

In accordance with the invention, means are provided for supporting the propulsion unit from the swivel bracket, while, at the same time, isolating the vibration of the propulsion unit 16 from the boat hull and affording transmission of thrust forces to the boat hull. Such means is in the form of an upper mount 46 and a lower mount 48 connected between the propulsion unit 16 and the kingpin assembly 30. More particularly, the upper mount 46 is connected to the top of the power head 16 by suitable means such as the illustrated bracket 50 connected to the power head 18 and to the arm 34 of the kingpin assembly 30. The upper mount 46 can comprise one or more discrete rubber or other resilient members and in the specifically disclosed construction comprises a disc or block of resilient material such as a natural rubber. The upper mount 46 has an elastic axis which is substantially coaxial with the torque roll axis 42. The thrust force produced by the propeller 44 is transmitted, in part, by the upper mount 46. Location of the mount 46 above the power head at a maximum vertical distance from the lower mount 48 permits the use of a relatively soft mount.

The lower mount 48 can be constructed in various ways so long as the mount has an elastic axis approximately coincident with the torque roll axis. For instance, the lower mount constructions described in the Taipale application Ser. No. 856,990 filed Sept. 11, 1969, entitled "Sound and Vibration Isolating Mount for an Outboard Motor," Attorney's Docket No. 4475 could be used. In the disclosed construction, a pair of blocks or discs 49 of resilient material, such as rubber, are connected to the inside surface of the lower pair of arms 38 and to the opposite sides of the drive shaft housing 20 in close proximity to the torque roll axis 42. The blocks 49 constitute together a mount which has an elastic axis approximately coincident with the torque roll axis. In the disclosed construction one axis of the lower blocks or discs 49 is generally horizontally disposed transverse to the torque roll axis 42 and to the direction of thrust of the propulsion unit 16. The weight of the propulsion unit 16 is principally supported by means of the lower mount 48 although the upper mount also contributes to this function. In addition, the propeller thrust is principally transmitted through the lower mount. Although a pair of blocks 49 are shown in the drawing, a single block could also be used if an elastic center thereof, i.e., a center of elasticity, generally coincides with the torque roll axis.

Various features of the invention are set forth in the following claims.

What is claimed is:

1. An outboard motor comprising a transom bracket, a swivel bracket mounted for vertical tilting movement on said transom bracket, a propulsion unit including a power head and a lower unit including a generally upright drive shaft, and means for supporting said propulsion unit from said swivel bracket to afford steering about an axis generally parallel to and forwardly of said drive shaft, said propulsion unit supporting means including an upper resilient mount connected to said swivel bracket and secured to said propulsion unit above said power head and a lower resilient mount connected to said swivel bracket and secured to said lower unit.

2. An outboard motor according to claim 1 wherein said lower unit includes a drive shaft housing and said lower mount includes a resilient block on each side of said drive shaft housing.

3. An outboard motor according to claim 1 wherein said upper mount is disposed rearwardly of said drive shaft.

4. An outboard motor according to claim 3 wherein said lower mount includes a pair of transversely spaced resilient blocks extending generally horizontally and disposed transverse to the direction of intended motion of said propulsion unit.

5. An outboard motor according to claim 1 wherein said propulsion unit includes a torque roll axis, wherein said upper mount is substantially coaxial to said torque roll axis and said

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lower mount is disposed transversely to the torque roll axis.

6. An outboard motor comprising a transom bracket, a swivel bracket mounted on said transom bracket for vertical tilting movement, a kingpin assembly mounted on said swivel bracket for pivotal steering movement rearwardly of said transom bracket, a propulsion unit having a torque roll axis and including a power head, a drive shaft housing and a lower X unit gear case, and means for connecting said propulsion unit to said kingpin assembly, said propulsion unit connecting means including an upper resilient mount connected to said kingpin assembly and secured to said propulsion unit above

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said power head and a lower resilient mount connected to said kingpin assembly and secured to said drive shaft housing above said lower unit gear case.

7. An outboard motor according to claim 6 wherein said upper mount includes a resilient rubber block having an axis approximately coinciding with said torque roll axis and said lower mount has an elastic axis approximately coinciding with said torque roll axis and includes resilient rubber blocks extending horizontally and disposed transverse to the direction of motion of said propulsion unit.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,613,631 Dated October 19, 1971

Inventor(s) Gerald H. Wick and Theordore J. Holtermann

It is certified that error appears in the above-identified patent
and that said Letters Patent are hereby corrected as shown below:

Column 3, line 8 delete "X".

Signed and sealed this 25th day of April 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents