OUTBOARD MOTOR COWL MOUNTING

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ABSTRACT OF THE DISCLOSURE

An outboard motor engine enclosure cowl is carried by a cowl support frame assembly which is in turn supported from the power unit of the motor by resilient mounting means. The resilient mounting means serve to space and vibrationally isolate the cowl and its support frame assembly from the power unit.

This invention relates to improvements in outboard motors for propelling watercraft and more particularly to a mounting for the engine cowl assembly.

In outboard motors the power or drive unit is generally supported from the watercraft by a bracket assembly providing for tilting movement of the unit about a generally horizontal axis and steering movement about a generally vertical axis. Cushioning means are generally interposed between the drive unit and bracket assembly so as to substantially isolate the bracket assembly and watercraft from torque and other vibrations emanating from the drive unit.

Where the cowl enclosure for the engine of the drive unit is rigidly secured to the drive unit, the cowl remains a source of considerable noise as it vibrates with the drive unit. It is generally an object of this invention to provide a mounting for the engine cowl assembly which substantially isolate the cowl assembly from the drive unit vibrations.

Broadly, according to this invention, the cowl assembly for enclosing the engine of an outboard motor is vibrationally isolated from the drive unit. More specifically the invention provides for a cowl assembly suspended on support means which is resiliently mounted on the drive unit.

The drawings furnished herewith illustrate the best mode of carrying out the invention as presently contemplated and described hereinafter.

In the drawings:

FIGURE 1 is a side elevation of an outboard motor with parts broken away and which incorporates the present invention;

FIG. 2 is an enlarged partial side elevation of the upper end of the outboard motor with parts broken away and sectioned and the engine generally outlined in phantom, and shows the cowl mounting of this invention;

FIG. 3 is an exploded perspective view showing the cowl support frame assembly;

FIG. 4 is a plan view of the drive unit with the upper and intermediate cowl members removed to show the cowl support frame assembly of this invention;

FIG. 5 is a partial front elevation view of the drive unit with a portion of the cowl broken away to show the front portion of cowl support frame assembly;

FIG. 6 is a partial rear elevation view of the drive unit with a portion of the cowl broken away to show the rear portion of the cowl support frame assembly;

FIG. 7 is an enlarged detail sectional view taken generally at line 7—7 of FIG. 2;

FIG. 8 is a sectional view taken generally on line 8—8 of FIG. 7;

FIG. 9 is a view generally similar to that of FIG. 2, and shows another form of cowl support frame assembly;

FIG. 10 is a plan view of the drive unit of FIG. 9 with the upper and intermediate cowl members removed to show the cowl support frame assembly;

FIG. 11 is a partial sectional view, and shows another form of cowl securement to the support frame assembly; and

FIG. 12 is an enlarged plan view with parts broken away and sectioned of the quick opening clamp means showing the shaft of the clamp means in the locked position and in phantom in an unlocked position.

Referring to the drawings, an outboard motor for driving a watercraft includes the power or drive unit 1 which is pendently and steerable supported by the bracket assembly 2 adapted for securement to a watercraft transom, not shown. The drive unit 1 is connected to the bracket assembly 2 through the vertically extending, horizontally pivotal steering pin frame assembly 3 which includes the vertically spaced resilient mounts 4 and 5 as generally shown and described in United States Letters Patent No. 2,916,007 assigned to the common assignee of this invention. The resilient mounts 4 and 5 are adapted to vibrationally isolate the drive unit 1 from the steering pin assembly 2, bracket assembly 2 and the watercraft.

The drive unit 1 generally includes a drive shaft housing 6 which supports the engine 7 at the upper end thereof and carries a rotatable propeller 8 at the lower end thereof. The propeller 8 is driven by the engine 7 through a power train, not shown, which extends through the drive shaft housing 6.

The engine 7 is enclosed within a cowl assembly 9 which according to this invention is supported from the drive unit 1 in a novel manner. Cowl assembly 9 generally includes an upper cowl structure 10, a lower cowl structure 11 and an intermediate wrap-around cowl structure 12.

According to this invention, the engine cowl assembly 9 is supported on a supporting frame assembly 13 which is attached to and vibrationally isolated from the drive unit 1.

Referring specifically to the embodiment of FIGS. 2—6, the cowl support frame assembly 13 includes a forward frame member 14, an intermediate frame member 15, and a rear frame member 16 all of which are secured together by bolts as shown to form a unitary structure. The frame assembly 13 is adapted to fit over the engine 7 with a portion of the engine flywheel 17 projecting upwardly through the opening 18 in the intermediate frame portion 15.

The frame assembly 13 is attached at three locations to the engine 7 as provided by the lateral projections 19 and 20 extending outwardly from corresponding sides of the engine adjacent to the forward end thereof, and a third projection 21 which extends rearwardly from the engine. The projections 19, 20 and 21 are all disposed adjacent to the upper end of the engine and provide generally horizontal seats for the resilient mounts 22.

The resilient mounts 22 comprise a cylindrical block 23 of relatively soft rubber, or the like, interposed between a pair of axially aligned bolts 24. The heads 25 of bolts 24 are bonded to the opposed ends of the block 23 with the threaded portions of the bolts extending in opposite directions. The bolts 24 are provided with square shanks 26.

The mounts 22 are disposed on the engine projections 19, 20 and 21 with the downwardly extending bolts 24 passing through the vertically extending holes 27 in the projections. As shown in FIG. 8 the holes 27 are generally square and adapted to receive the square shanks 26 of bolts 24 to rotationally fix the bolts and thereby prevent damage or undue stress at the bond between the bolt and corresponding block 23 when turning the nut 28 onto the bolt.

The intermediate frame member 15 is provided with
square holes 29 in vertical alignment with the holes 27 in engine projections 19, 20 and 21 for receiving the upwardly extending bolts 24 of the respective mounts 22. The attachment of the frame assembly 13 to the engine 7 is complete when the nuts 28 are turned onto the ends of the upwardly extending bolts 24 of the mounts.

In the embodiment of FIGS. 2–6, a plurality of resilient mounts 30 are disposed between the cowl support frame assembly 13 and the upper cowl member 10. The mounts 30 are axially stepped and made of rubber or the like and are bonded to the head of the downwardly extending bolts 31. The upper cowl member 10 is supported on the cowl support frame assembly 13 at three locations. The rear frame member 16 is provided with a laterally spaced pair of seats 32 and 33 for receiving mounts 30 and the forward frame member 14 is provided with a single seat 34. The several seats 32, 33 and 34 are provided with a vertically extending hole 35 through which the bolts 31 extend for securing of the mounts 30 on the respective seats. Interiorly the upper cowl member 10 is provided with integral support columns 36, 37 and 38 corresponding to the seats 32, 33 and 34 of the frame assembly 13 and which are adapted to seat upon the corresponding mounts 30.

The upper cowl member 10 is secured relative to the support frame assembly 13 through a quick opening clamp means 39 carried by arm portions 40 and 41 extending forwardly from the rear frame member 16 on opposite sides of engine 7. The arms 40 and 41 are each provided with a vertically extending stepped bore 42 adjacent to the forward ends thereof which rotatably receive a shaft 43 for a clamping lever 44 disposed beneath the respective arms. A resilient bushing 45 surrounds the shaft 43 and is disposed in the lower enlarged portion of bore 42. In spaced relation above the respective arms 40 and 41, the upper ends of the clamping shafts 43 are provided with a cross pin 46.

With the upper cowl member 10 generally in position on mounts 30, an opening 47 in the inwardly projective cowl flange portion 50, 51, 52, 53, 54 is vertically aligned with and adapted to receive the shaft 43 and cross pin 46 in the open or unlocked position of lever 44. With the shaft 43 and cross pin 46 extending through opening 47, the lever 44 is rotatable to the locked position as generally shown in FIG. 2. As the lever 44 is rotated to the locked position, the cross pin 46 moves up opposed camming ramps 48a on the cowl flange 49 adjacent to opening 47 to cam the shaft 43 and lever 44 upwardly and/or the cowl member 10 downwardly to compress the mounts 30 along with bushings 45. In the locked position of lever 44, the cross pin 46 comes to rest in a detent depression 49b with the mounts 30 and bushings 45 in a compressed state to securely hold the cowl member 10 relative to the frame assembly 13 in a rattle-free condition.

The forward cowl support frame member 14 extends downwardly in front of the engine 7 and terminates at the lower end thereof with an inwardly projecting drip tray 49 extending beneath the carburetor connections for the engine. A hose 50 serves to drain the tray 49.

The lower cowl structure 11 is spaced beneath the upper cowl structure 10 and is supported from the cowl support frame assembly 13. Adjacent to the lower end thereof is a forward cowl support frame member 14 provided with a pair of transversely spaced embossments 51 which engage interiorly and adjacent to the upper edge of the forward portion of the lower cowl 11. The embossments 51 are adapted to receive through bolts 52 for securing the cowl structure 11 to the frame member 14.

The rear cowl support frame member 16 extends downwardly on both sides of the engine 7 and generally to the rear thereof. The transversely spaced lower portions 53 and 54 of frame member 16 each terminate at the lower end thereof with an embossment 55 for engaging interiorly and adjacent to the upper edge of the respective sides of lower cowl 11. Through bolts 56 extend through the embossments 55 and engage the adjacent lower cowl 11 to further secure the lower cowl to the frame assembly 13.

The lower cowl structure 11 generally comprises an upper member 57 and a lower or U-shaped extension member 58. The upper member 57 of cowl structure 11 generally surrounds and encloses the lower portion of engine 7. The base of upper member 57 includes an opening 59 the edge of which is spaced from and is out of contact with the adjacent portions of the engine 7 and drive shaft housing 6.

The U-shaped extension member 58 extends around the sides and rear of the upper portion of the drive shaft housing 6 and covers the engine to drive shaft housing securing means, not shown. The upper edge portion of extension member 58 complements the corresponding edge portion of opening 59 of cowl member 57 and is secured thereto. The member 58 is turned inwardly at the bottom thereof to form the flange 60 which remains in spaced relation from the adjacent portion of drive shaft housing 6. The spaced, vertically extending forward edges of U-shaped member 58 are similarly turned inwardly and form flange 61 which also remain in spaced relation from the drive shaft housing. A resilient sealing strip 62 extends around the rear of the drive shaft housing 6 immediately adjacent to flange 60 and continues upwardly on each side of the drive shaft housing adjacent to the flanges 61. Thus, the extension member 58 is vibrationally isolated from the drive shaft housing 6 and water and other noxious foreign material is precluded entry. Member 58 being secured to lower cowl member 11 tends to limit displacement of the cowl within the limits of compression of the sealing strip 62.

Forwardly of the U-shaped lower cowl extension member 58, the upper end of the drive shaft housing 6 is provided with a forward extension 63 the upper surface of which is generally in the plane of opening 59 at the base of cowl member 57. The front edge configuration of housing extension 63 generally complements the corresponding edge of opening 59 and remains spaced therefrom. The resilient sealing strip 64 is interposed between the edge of cowl member opening 59 and the drive shaft housing extension 63. Thus, at no point is there metal-to-metal contact between the lower cowl structure 11 and the drive shaft housing 6 giving rise to cowl noise due to rattling and vibration.

The spaced upper and lower cowl structure 10 and 11 are provided with vertically extending and aligned annularly spaced flanges 65 and 66 respectively along their opposed edges. The space between the cowl structures 10 and 11 is spanned by the flexible, generally rectangular, wrap-around intermediate cowl member 12 which is disposed over the respective flanges 65 and 66 and extends vertically between the respective outwardly offset shoulders 67 and 68. A plurality of vertically spaced toggle clamps 69 draw the end edges of the wrap-around cowl member 12 toward each other forwardly of the engine 7 to secure the intermediate cowl member relative to the upper and lower cowl structures 10 and 11. A front trim cover 70 extends between the upper and lower cowl structures 10 and 11 forwardly of engine 7 and covers the toggle clamps 69 to complete the cowl assembly. The cover member 70 is rigidly secured in place by the tension spring biased latch means 71 which extends through the cover member and engages with the forward frame member 14.

According to the embodiment in FIGS. 6, 7, 8, and 9, the cowl support frame assembly 72 comprises two longitudinally spaced frame elements 73 and 74 for mounting of the cowl assembly 75. The forward frame element 73 is provided with a pair of rearwardly extending, laterally spaced arms 76 and 77 at the upper end thereof which are adapted for attachment to the corresponding laterally spaced engine projections 78 and 79 through resilient mounts 22. Forwardly of the resilient mounts 22, the
The forward frame element 73 extends downwardly in front of the engine 7 and is provided with laterally extending and aligned projections 81 adjacent to the lower end thereof. The spaced projections 81 are adapted to receive securement means 82 which extend vertically therethrough and threadedly engage within corresponding vertical columns 83 provided interiorly of the upper member 84 of the lower cowl structure 85 for support of the latter by frame element 73.

The rear frame element 74 is supported generally centrally thereof by a resilient mount 22 secured upon the rearwardly extending engine projection 86. Rearwardly from resilient mount 22, the upper surface of frame element 74 carries a resilient mount 30 for support of the upper cowl structure 80. Frame element 74 extends over the rear portion of engine 7 and a pair of transversely aligned support arms 87 for clamp means 39 extend forwardly therefrom on corresponding sides of the engine. With the upper cowl structure 80 in place, closure of clamp levers 44 will draw the cowl structure compressibly into the triangularly related mounts 30 carried by the separable frame elements 73 and 74.

The rear frame element 74 continues downwardly on opposed sides of engine 7 beyond the arms 87 and terminates with the generally horizontal rearwardly converging portions 88 and 89 which are connected rearwardly of the engine by the laterally extending U-shaped portion 90. The horizontal converging portions 88 and 89 are engageable from beneath by a plurality of corresponding vertical columns 91 provided interiorly of the upper member 84 of the lower cowl structure 85. Suitable securement means 92 extend through the portions 88 and 89 and threadedly engage within the columns 91 to rigidly secure the lower cowl structure 85 to the rear frame element 74.

The embodiment according to FIG. 11 includes a resiliently mounted cowl support frame assembly 93 generally similar to frame assembly 72 shown in FIGS. 9 and 10. However, in FIG. 11 a quick-release clamp is not employed for securement of the upper cowl structure. Instead, the upper cowl structure 94 is rigidly secured to the forward and rear frame elements 95 and 96 respectively by means of the threaded elements 97.

The invention thus provides a cowl assembly which is suspended from the engine of an outboard motor power unit by means of a resiliently mounted support frame assembly to isolate the cowl from mechanical sounds and vibrations which emanate from the power unit. The described mounting for the cowl assembly has contributed substantially to quieter operation for outboard motors.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

We claim:

1. In an outboard motor having a power unit including an engine at the upper end of said unit, a cowl support frame assembly, resilient mounting means disposed on the power unit and supporting said frame assembly, and a cowl carried by the frame assembly and enclosing said engine, said frame assembly and cowl being spaced from the power unit by said resilient mounting means to vibrationally isolate the cowl from the power unit.

2. The invention as set forth in claim 1 wherein the resilient mounting means are disposed on the engine of the power unit.

3. The invention as set forth in claim 1 wherein the resilient mounting means are disposed on the engine of the power unit and the support frame assembly for the cowl comprises a unitary assembly which extends over the engine.

4. The invention as set forth in claim 1 wherein the resilient mounting means are disposed on the engine of the power unit and the support frame assembly for the cowl comprises a plurality of spaced frame elements.

5. In an outboard motor having a power unit including an engine at the upper end of said unit, a frame assembly, resilient mounting means disposed on the engine and supporting the frame assembly, and a cowl assembly enclosing said engine and including vertically spaced upper and lower cowl members secured to the frame assembly, said frame assembly and cowl assembly being spaced from the engine by the resilient means to vibrationally isolate said assemblies from the engine.

6. The invention as set forth in claim 5 wherein the upper cowl member is secured to the frame assembly by a clamp assembly.

7. In an outboard motor having a drive shaft housing and an engine carried at the upper end of said housing, a cowl support frame assembly, resilient mounting means disposed on the engine and supporting said frame assembly, a cowl carried by said support frame assembly and enclosing said engine and the adjacent drive shaft housing portion, and second resilient means interposed between the cowl enclosure and the drive shaft housing, said support frame assembly and cowl enclosure being spaced from the engine and drive shaft housing by the several resilient means to vibrationally isolate the cowl and support frame assembly from the engine and drive shaft housing.

8. In an outboard motor having a drive shaft housing and an engine carried at the upper end of said housing, a frame assembly, a plurality of spaced resilient mounts provided on said engine and supporting said frame assembly, said frame assembly including a forward portion and a rear portion extending downwardly in spaced relation from the engine, a cowl assembly enclosing said engine and the adjacent drive shaft housing portion and being spaced therefrom, said cowl assembly including vertically spaced upper and lower cowl structures with the upper cowl structure being carried by the upper portion of the frame assembly and the lower cowl structure being carried by the downwardly extending forward and rear portions of the frame assembly, and resilient means interposed between the lower cowl structure and the drive shaft housing adjacent to the lowest extremity of the lower cowl structure to seal the space therebetweent, said mounts and sealing means serving to vibrationally isolate the cowl assembly from the engine and drive shaft housing.

9. The invention as set forth in claim 8 wherein the frame assembly comprises spaced forward and rear portions.

10. The invention as set forth in claim 8 wherein the spaced upper and lower cowl structures are rigidly secured to the frame assembly.

11. The invention as set forth in claim 8 wherein the upper cowl structure is resiliently supported on the frame assembly.

12. The invention as set forth in claim 8 wherein resilient mounts are interposed between the upper cowl structure and the frame assembly and wherein quick-opening clamp means are interposed between said structure and said assembly, said clamp means being adapted upon closure to draw the upper cowl structure down tightly upon the resilient mounts.

13. The invention as set forth in claim 12 wherein the quick-opening clamp means are carried by the frame assembly.

14. In an outboard motor having a drive shaft housing and an engine carried at the upper end of said housing, a frame assembly, a plurality of spaced resilient mounts provided on said engine and supporting the frame assembly, said frame assembly including downwardly extending portions spaced from the engine, a cowl assembly enclosing said engine and the adjacent drive shaft housing portion and being spaced therefrom, said cowl assembly in-
Claiming upper and lower cowl structures with the upper cowl structure being carried by the upper portion of the frame assembly and the lower cowl structure being carried by the downwardly extending portions of the frame assembly, and resilient means interposed between the lower cowl structure and the drive shaft housing to seal the space therebetween, said mounts and resilient sealing means serving to vibrationally isolate the cowl assembly from the engine and drive shaft housing.

15. The invention as set forth in claim 14 wherein the upper and lower cowl structures of the cowl assembly are spaced vertically and connected by an intermediate cowl structure.