May 8, 1934. P. R. TARR 1,958,119

OUTBOARD MOTOR

Filed March 14, 1932

Fig-4

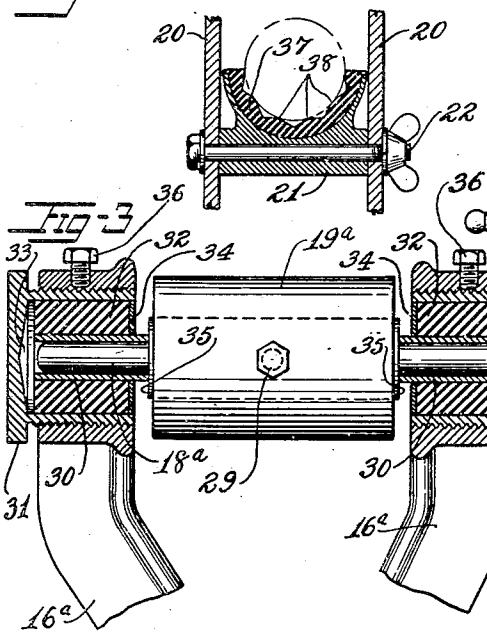


Fig-1

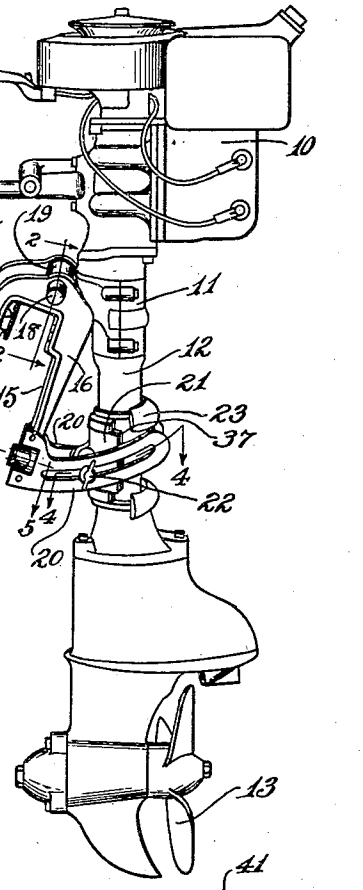


Fig-2

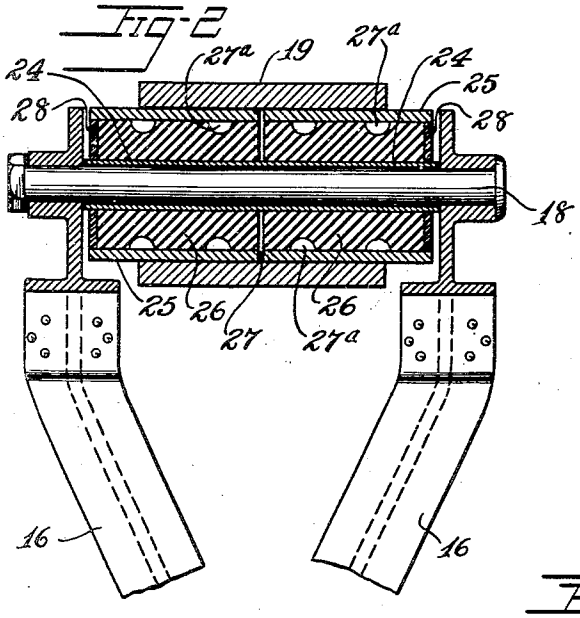
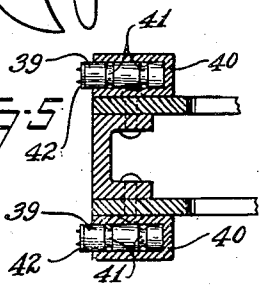


Fig-5



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OUTBOARD MOTOR

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Application March 14, 1932, Serial No. 598,545

10 Claims. (Cl. 248—14.2)

This invention relates to outboard motors and more particularly to the mounting structure of such motors.

The chief objects of the invention are to provide for reducing to a large extent the transmission of vibration from the motor to the craft, the vibration having a deteriorating effect on the structure of the craft and causing discomfort to the passengers, and to provide for such vibration reduction with compactness of structure and strength of support and without lessening the effectiveness of the steering and pivoting functions of the motor or the facility of disassembly of the parts.

These and further objects will be apparent from the following description, reference being had to the accompanying drawing in which:

Fig. 1 is perspective view of an outboard motor constructed according to and embodying the invention in its preferred form.

Fig. 2 is a section taken along the line 2—2 of Fig. 1.

Fig. 3 is a view similar to that of Fig. 2 but showing a modified construction.

Fig. 4 is a section taken along the line 4—4 of Fig. 1.

Fig. 5 is a section taken along the line 5—5 of Fig. 1.

Referring to the drawing, the outboard motor of Fig. 1 comprises an upper engine portion 10, a swivel bracket 11, a drive shaft housing 12, a propeller 13, and a steering handle 14, all of known construction, and for mounting the motor on the craft there is provided a bracket 15 comprising upwardly diverging arms 16, 16 united at their lower ends and having at their upper portions a pair of forwardly extending arms provided with clamping devices 17, 17 for securing the bracket in place upon the sternboard of a boat. At 18 the bracket is pivotally connected to a lug 19 forming a rigid part of the swivel bracket 11 of the motor to permit the customary fore and aft tilting of the motor.

The lower end of bracket 15 is provided with a pair of rearwardly extending quadrant arms 20, 20 and between these arms is positioned a half-cylindrical thrust socket 21 for limiting forward tilting movement of the propeller end of the motor while permitting free rearward tilting thereof, as well as rotation of that portion of the drive shaft housing engaging the thrust socket, for steering. The thrust socket is provided with the usual clamp 22 for securing it in its adjusted position on the quadrant, and the drive shaft housing comprises a locking device 23 of known construction for locking the housing against rearward tilting in the reversing position of the propeller.

The invention provides for complete avoidance of metal to metal contact between the motor proper and the mounting bracket and provides for a resilient, vibration dampening cushion at all necessary connections between these parts while providing for adequate support of the motor and effective pivoting of the swinging parts.

On the motor supporting shaft or pivot pin 18 (Fig. 2) there is mounted a pair of concentric sleeves 24, 25, preferably cylindrical, held spaced apart by a mass of resilient material 26, preferably resilient rubber composition in hollow cylindrical block form. The rubber may be in the form of a single block, or it may be composed of spaced sections, as indicated by the gap at 27, and the rubber may be recessed at one or more zones, as indicated at 27*a*, 27*a*, to render the rubber cushion more absorbtive of vibrations, especially of the transverse vibrations. For facilitating manufacture as to the sectional construction, the outer sleeve 25 may also be sectional, as shown.

The inner sleeve 24 is mounted for rotative movement upon the pin 18 and its ends preferably extend beyond the ends of the rubber and the outer sleeves and engage against the arms 16, 16 of the bracket to restrain the inner sleeve from transverse movement while permitting relative vibrating movement of the outer sleeve under the resilient resistance of the rubber. The outer sleeve is secured, as by a force fit or by a screw threaded connection, within the lug 19 of the swivel bracket 11. The rubber may be held between the sleeves 24 and 25 in any suitable manner, as by being held under compression between the sleeves, or by vulcanized adhesion to the sleeves. In order to guard the rubber against contact with oil or other harmful substance without hampering the vibration dampening action of the mounting the exposed ends of the rubber may be provided with flexible layers 28, 28 of a suitable resistant composition.

The mounting thus constructed is compact and affords strength of support and effective dampening of motor vibrations in all directions, without, however, hindering the pivotal movements of the motor, and further, by merely removing the pivot pin 18, the motor may be readily detached from the bracket 15, when desired.

Although the actual pivoting of the motor structure is preferably by means of rotation of the inner sleeve upon the supporting shaft, in some cases the required arc of swing of the motor structure is sufficiently limited to render it expedient, if desired, to mount the shaft and the inner sleeve rigidly and to permit the motor structure and the outer sleeve to move through the limited arc by flexure of the resilient rubber in torsion.

In the modified construction of Fig. 3 a pivot pin 18*a* is rigidly secured, as by a set screw 29, within the aperture of the lug 19*a* that forms a part of the swivel bracket 11 of the motor. The ends of the pivot pin are rotatably received within

respective sleeves 30, 30 concentric with respective hollow bushings 31, 31 mounted in opposed apertures in the upper ends of the bracket arms 16a, 16a. The sleeve 30 and bushing 31 are held in spaced apart relation by an intervening resilient cushion 32, preferably of resilient rubber composition that desirably is secured by vulcanized adhesion to both the inner sleeve and the bushing. For protecting the rubber cushion from oil and the like, the outer end of the bushing may be closed as shown, the adjacent end face of the rubber and of the inner sleeve preferably being spaced from the inner end wall of the bushing, as shown at 33, to facilitate absorption of the transverse vibrations of the motor by the rubber. The inner end face of the rubber may be provided with an oil resisting facing 34.

In order to avoid rubbing of metal parts due to the motor vibrations, especially the transverse vibrations, and to permit the vibrations to be transmitted directly to the rubber, it is desirable that means be provided for taking up end slack between the inner sleeves 30 and the pivot pin 18a, and for this the pivot pin may be shouldered, as at 35, 35, against which shoulders the ends of the inner sleeves may be abutted, the screw threaded connection of the bushing 31 in the bracket arms permitting adjustment for this. For this adjustment, the bushings 31, 31 are screwed toward each other, thus urging the outer portions of the rubber annuli axially toward each other while the inner portions of the annuli are held against a similar movement by the abutment of the inner sleeves 30, 30 against the shoulders 35, 35, and thereby causing the rubber to be placed under tension in the axial direction to press the sleeves against the abutments. By properly adjusting the two bushings, the supported lug 19a may be centered between the arms 16a, 16a. Besides eliminating looseness of the inner sleeve ends at the abutments despite the transverse vibrations of the supported structure, this construction has the advantage also that by varying the positions of the bushings 31, 31 in relation to one another to impart greater or less tension on the rubber, the resistance of the rubber to the vibratory movement is accordingly varied, the deflection for a given force being dependent upon the condition of initial stress of the rubber, and thus the vibration cushioning properties of the mounting can be adjustably varied for most satisfactory operation. Each bushing may be detachably secured in adjusted position by any suitable means, such as a set screw 36. It will be seen that in the construction of this embodiment, also, there are provided the advantages of compactness, ruggedness, ease of detachability and adjustability and effective dampening of vibrations in all directions without hampering the pivotal functions of the mounting.

It is desirable to provide a cushion of rubber also at the thrust socket 20, to constitute the motor proper wholly rubber insulated from the bracket 15 and thus from the boat, and this may be effected by the construction of Fig. 4 without hindrance to the steering and reversing movements of the shaft casing at the thrust socket.

The concave face of the thrust socket may be provided with a cushion 37, preferably of resilient rubber composition adhered to the socket and preferably formed on its exposed face with alternate, vertically-extending ridges and grooves, the ridges preferably having convex surfaces 38, 38 adapted to contact the surface of the shaft casing to facilitate transverse sliding movement of the metal surface against the ridges during steering. Due to the fact that this thrust socket in the ordinary use of the motor is usually close enough to the water so that the turbulence causes some water to be splashed upon it, the rubbing surfaces are usually well lubricated during operation, although for the relatively small pressures and amount of movement ordinarily imposed on these particular bearing parts, lubrication is not usually required. Passage of the water to the rubbing surface is facilitated by the grooves of the rubber and by the convex surfaces which cause the water to be wiped in between the surfaces of the rubber and shaft casing during the sliding movement of these parts. Also the vibration dampening function of the rubber cushion is facilitated by the grooved construction which lessens stiffness in that part of the rubber contacting the casing. The cushion also acts to reduce the shock of impact when the motor is permitted to swing against it, as when the motor swings back to its normal position after the striking of the lower part of the housing against an obstruction when underway.

The lower part of the bracket 15 may if desired be provided with a cushioning device, such as that illustrated most clearly in Fig. 5, to dampen vibrations that might result from a lack of rigidity in the sternboard of the boat to which the bracket is clamped at its upper portion. This cushioning device may comprise a pair of blocks 39, 39 of rubber or other cushioning material of cylindrical or other shape mounted on the bracket, as by means of suitable holders 40, 40 secured to the bracket, the arrangement being such that the rubber blocks project forward from the bracket and are compressed against the sternboard of the boat when the bracket is clamped thereto. The rubber blocks are preferably grooved peripherally at 41, 41 to facilitate compression of the block in the holder, and the boat engaging ends of the blocks may be provided with caps 42, 42 secured to the rubber for protection of the latter and, by small projections formed in the faces of the caps, for engaging the wood of the sternboard to resist rubbing of the block against the wood under excessive vibration.

Variations may be made without departing from the scope of the invention as it is defined in the following claims.

What is claimed is:

1. An outboard motor assembly comprising, in combination, a bracket structure having spaced apart members and a hollow bushing mounted on each of said members a motor structure having a supporting element comprising projecting end portions positioned within said bushings, resilient cushions held between the end portions of the supporting element and said bushings, sleeves interposed between the resilient cushions and the end portions of the supporting element and rotatable on the latter, and means limiting the movement of said sleeves toward each other, said bushings being adjustable in said members to vary their positions in the directions toward and away from each other.

2. An outboard motor assembly comprising, in combination, a mounting bracket, a motor structure pivotally connected with said bracket, and a thrust socket on said bracket spaced from said pivotal connection and slidably engaging said motor structure, said thrust socket having a facing of resilient rubber composition comprising convex ridges contacting the motor structure and extending transversely to the direction of the sliding movement.

3. A resilient supporting connection comprising a pair of relatively movable structures, a rubber cushion so held in tension between said structures in non-separating relation thereto as to tend to pull one of them relative to the other, and means other than the supported load for resisting such movement while nevertheless permitting relative movement of the structures under the resilient resistance of the cushion.

4. A resilient connection as defined in claim 3 comprising means for adjustably varying the degree of tension in said rubber cushion.

5. A resilient connection as defined in claim 3 in which the resisting means comprises a second rubber cushion held in tension between the said structures in a direction to oppose the tendency of the first said cushion to cause relative movement of the structures.

6. A resilient connection comprising a pair of relatively movable structures having spaced-apart, substantially parallel surfaces, a rubber cushion so held in tension between said surfaces in non-separating relation thereto as to tend to pull one of them in a parallel direction relative to the other, the rubber cushion being so held independently of influence of the supported load, and a second rubber cushion so held in tension between said surfaces in non-separating relation thereto as to resist such pulling of the structure.

7. A resilient connection comprising a pair of relatively movable structures including inner and outer annular elements, a pair of rubber cushions held between said elements at axially spaced positions in tension-resisting relation to their inner faces, said cushions being held tensioned so as to tend to pull the structure in axial directions opposing each other and the cushions being so held independently of influence of the supported load.

8. A resilient connection as defined in claim 7 comprising means for adjustably varying with relation to each other the axial spacings of the radially inner and outer portions of the said rubber cushions to vary the degree of tension in the cushions.

9. A resilient connection comprising, in combination, a structure having spaced apart members and a hollow bushing mounted on each of said members, a second structure comprising an element having portions positioned within said bushings, resilient cushions disposed between said element and the bushings, and means for adjusting said bushings and thereby the adjacent portions of the cushions in the direction toward each other while the portions of the cushions adjacent said element are held against a similar movement.

10. A resilient connection comprising a pair of relatively movable structures, a rubber cushion so held in tension between said structures in non-separating relation thereto as to tend to pull one of them relative to the other, the rubber cushion being so held independently of influence of the supported load, and resilient means for resisting the pull while nevertheless permitting relative movement of the structures under the resilient resistance of the cushion.

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