Oct. 31, 1933. F. T. IRGENS 1,932,785

OUTBOARD MOTOR MOUNTING

Filed March 24, 1932

Fig. 1.

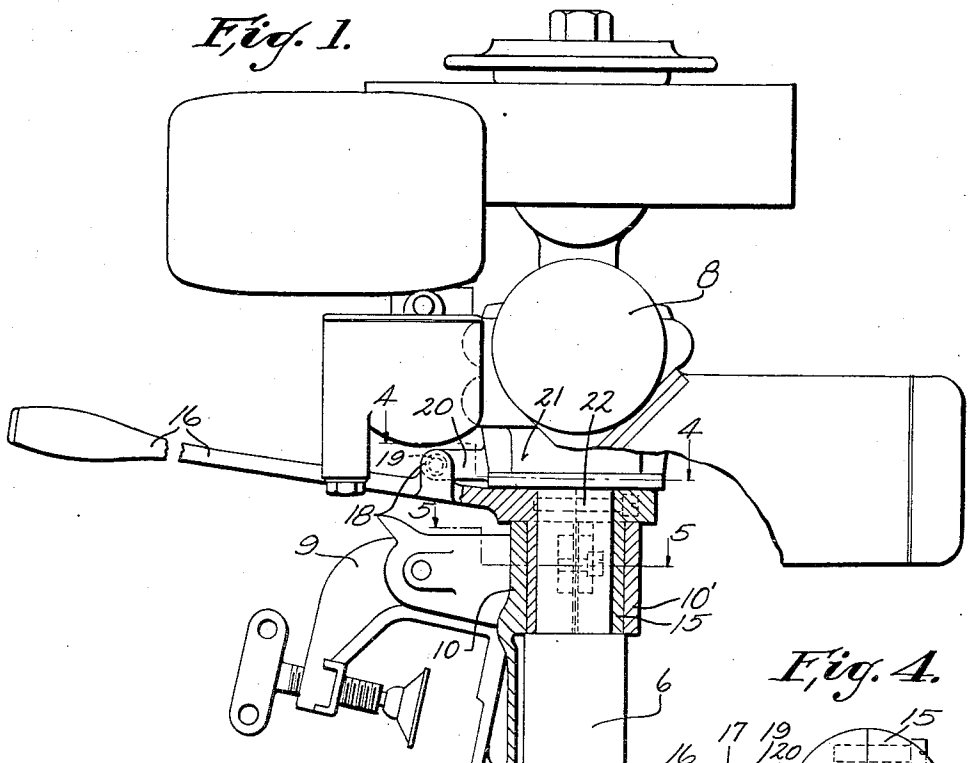


Fig. 4.

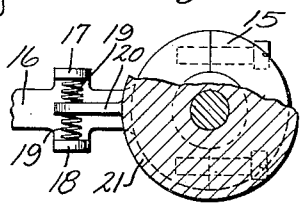


Fig. 2.

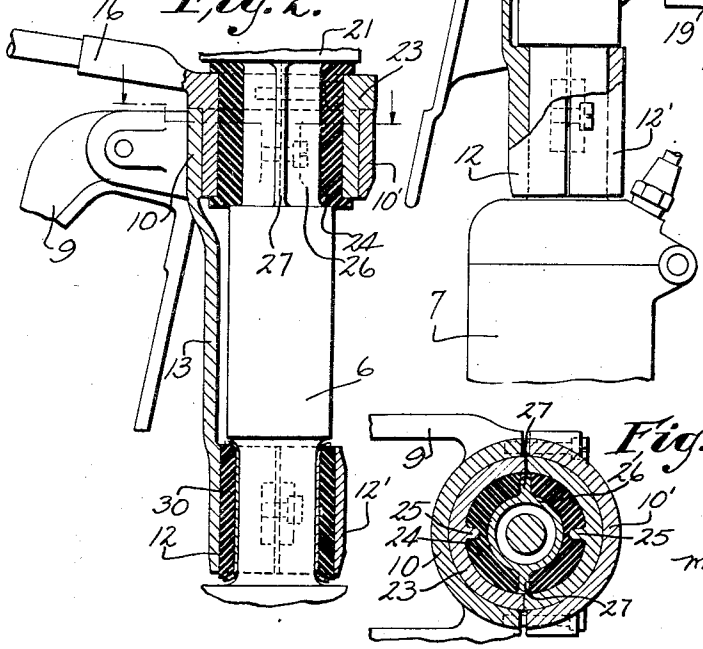


Fig. 5.

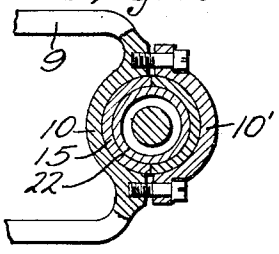


Fig. 3.

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UNITED STATES PATENT OFFICE

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OUTBOARD MOTOR MOUNTING

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8 Claims. (Cl. 115—18)

This invention relates to improvements in outboard motor mountings.

It is the primary object of the invention to float an outboard motor unit for freedom of torque vibration without transmitting any of such vibration either to the boat or to the tiller handle, and without in any wise interfering with the perfect control of such a motor in the course of its dirigible movement for steering.

It is well known that the torque developed in the submerged bevel gearing of an outboard motor intending to turn its lower unit bodily about the vertical drive shaft axis, may be neutralized by connecting the lower unit rigidly with the engine and mounting the whole device to turn as a unit in the collar which supports it for steering movements.

Over the entire cycle of engine operation the total value of the torque reaction developed in the engine cylinders will equal the total value of the torque, and hence the motor will not exert any sustained lateral tension on the steering handle. The torque reaction, however, is intermittently developed at the time of engine combustion while the torque, although equal in opposition over the entire cycle, is rendered more or less continuous at an average level due to the fly-wheel action. The result is the so-called torque vibration which tends to oscillate the entire supported unit in one direction when the torque reaction exceeds the torque, and to oscillate it in the other direction when the torque reaction is less than the torque.

The resulting vibration in the tiller which is necessary to control the dirigible position of the motor unit is extremely annoying to the point of tending to numb the operator's hand and forearm. Various attempts have been made to overcome this objectionable characteristic of such motors by providing flexible tiller handles, but these have been only partially successful.

It is the purpose of the improvement hereinafter disclosed, to completely eliminate torque vibration from the tiller handle while, at the same time, leaving the engine entirely free to respond to such vibration, thereby minimizing the transmission thereof to the boat and other parts.

In the drawing:

Figure 1 shows in vertical section a motor mounting embodying this invention, in which the portion of an outboard motor is illustrated in side elevation.

Figure 2 is a fragmentary detail showing in similar section a modified embodiment of the invention.

Figure 3 is a view in section in the plane indicated by line 3—3 in Figure 2.

Figure 4 is a view in section in the plane indicated by line 4—4 in Figure 1.

Figure 5 is a view in section in the plane indicated by line 5—5 in Figure 1.

Like parts are identified by the same reference characters throughout the several views.

I have shown at 6 a portion of the shaft housing which connects a conventional outboard motor lower unit 7 with the engine 8 thereof. These parts are too well known to require further discussion.

The support for the motor comprises a bracket 9 having a bearing collar at 10 preferably including a removable cap 10' as shown in Fig. 5. Ordinarily, one such bearing collar is sufficient for the support of an outboard motor, but in the particular device illustrated I prefer to employ a second bearing collar at 12 likewise provided with a removable cap portion 12' and connected with the first mentioned bearing collar by an arm 13 to comprise and effect an extension of the first mentioned collar.

In the upper bearing collar 10 is journaled a split bushing 15 to which the tiller lever 16 is connected. Spaced ears 17 and 18 on the tiller lever confine compression springs 19 which tend to center between said ears a finger 20 connected with the crank case 21 of the engine. The bearing portion 22 of shaft housing 6 extends downwardly from the crank case through bushing 15 in which it is freely rotatable.

The tension with which the bearing cap 12' is tightened upon the shaft housing, will regulate the degree to which the entire outboard motor unit is freely rotatable in its support. Ordinarily, there will be little frictional resistance employed, since it is one of the objects of the invention to minimize the transmission of torque vibration to the boat by leaving the motor unit entirely free for vibration in its support.

The pressure exerted by bearing cap 10' is exerted not upon the shaft housing, but upon the contained bushing 15 which is connected with tiller 16. Hence, the cap 10' is used to regulate the friction opposing steering movements with the tiller and it has no effect whatever on the freedom of the motor to respond to torque vibration within its mounting.

Aside from such slight frictional resistance as would ordinarily be afforded by bearing cap 12', the free vibration of the motor about its axis in the support herein described is limited only by the pressure of the compression springs 19 and,

since these will readily respond to a periodic vibratory movement, they will offer practically no opposition to the freedom of the motor to oscillate about the vertical axis on which it steers.

Thus, the tiller handle 16 is frictionally held to the bracket and is connected only by means of the springs 19 to the dirigible motor unit which is floated not merely with reference to the bracket, but also with reference to the tiller. Yet any dirigible movement of the tiller will be immediately transmitted through one or the other of springs 19 to the dirigible motor unit to effect its oscillation in bearings 10 and 12 for steering purposes.

Figures 2 and 3 disclose the employment of a rubber mounting as a substitute for the springs 19 to permit the motor unit to oscillate in response to torque vibration not only with respect to the torque, but also with respect to the tiller. The bracket 9, bearings 10 and 12, arm 13, and bearing caps 10' and 12' correspond in general to the parts already described.

The tiller 16 is connected with a sleeve 23 which is similar to sleeve 15, but which, instead of being in bearing contact with the adjacent portion of the shaft housing, is spaced therefrom by a rubber bushing 24. The sleeve 23 is preferably internally ribbed at 25 to engage the rubber bushing 24, and the shaft housing portion 26 has similar ribs at 27, ninety degrees from ribs 25 and engaged between the component parts of the rubber bushing 24.

The ribs positively prevent any great change of relative angular position between the parts, and yet the angular spacing between ribs is sufficient so that the interposed mass of rubber will readily yield in response to torque vibration, thereby permitting the motor unit freedom of response to such vibration independently of the tiller lever 16.

A bushing 30 may be employed in bearing 12 to clampingly engage shaft housing and thereby adjustably to restrict the freedom of response of the motor unit to torque vibration if desired. For reasons already explained, adjustment will ordinarily be such as to leave the motor unit substantially entirely free to vibrate in order that its movement may not be transmitted through the bracket to the boat.

In both of the structures herein disclosed the tiller is always available for the adjustment of the dirigible position of the motor unit and yet, because of the mounting of said unit, the tiller is substantially entirely freed of the torque vibration to which it has heretofore been subject. In this connection it is important to note that the torque vibration always occurs about the center of mass of the motor which is usually very close to the axis of its drive shaft. The axis upon which the motor unit is made to oscillate in response to torque vibration in the mounting herein disclosed, is the axis of the motor drive shaft, about which the shaft housing and the supporting bearings are concentric. If the pivotal movement between the tiller and the motor occurred upon any axis other than the axis aforesaid, no springs or resilient cushioning means could prevent some degree of vibration from reaching the tiller. In the present device the axis of relative movement between the tiller and the oscillating motor unit is the same axis about which the motor unit oscillates, and it is this fact which so completely eliminates vibration from the tiller in the use of the structure illustrated.

I claim:

1. The combination with a bracket provided with a bearing sleeve, a motor unit having a shaft housing portion mounted to turn in said sleeve, a tiller having a bearing portion journaled on said sleeve, and a yieldable connection between said tiller and motor unit.

2. The combination with a bracket provided with bearing means, of an outboard motor unit turnable therein, a tiller pivoted to said bracket, means acting upon a tiller independently of the motor unit for frictionally opposing the pivotal movement of the tiller with respect to the bracket, and a yieldable connection between said tiller and outboard motor unit.

3. The combination with a bracket provided with bearing means, of an outboard motor unit turnable therein, a tiller pivoted to said bracket, means acting upon a tiller independently of the motor unit for frictionally opposing the pivotal movement of the tiller with respect to the bracket, and a yieldable connection between said tiller and outboard motor unit, the pivotal axis of tiller movement being coincident with the axis upon which said motor unit is turnable in said bearing means.

4. The combination with a bracket provided with a bearing sleeve, of a tiller having a complementary sleeve turnable on said first mentioned sleeve, an outboard motor unit provided with a third sleeve concentric with said first mentioned sleeves and in bearing relation to one thereof, and means yieldably opposing movement of said outboard motor unit in each direction respecting said tiller.

5. An outboard motor bracket provided with a bearing sleeve in combination with a tiller having a complementary bearing sleeve, an outboard motor unit journaled within said tiller sleeve, spaced abutments carried by said tiller, an intermediate abutment connected with said outboard motor unit, and resilient means interposed between said abutments whereby to oppose yieldably the oscillation of said motor with respect to said tiller.

6. The combination with an outboard motor bracket having axially spaced bearing means each including a friction clamp, of a tiller journaled on one of said bearing means and engaged by said clamp, an outboard motor unit freely oscillatable respecting said tiller and journaled therein and on said other bearing means, and means yieldably connecting said outboard motor unit with said tiller.

7. The combination with a bracket provided with a bearing, of a tiller pivoted on said bracket, an outboard motor oscillatable respecting said bearing, adjustable means frictionally adapted to resist the freedom of oscillation of said motor respecting said bracket, adjustable friction means adapted to oppose the freedom of movement of said tiller respecting said bracket, and means yieldably connecting said tiller with said outboard motor unit.

8. The combination with a bracket and a tiller provided with a sleeve journaled in said bracket, of an outboard motor unit suspended within said tiller sleeve, and a resilient cushion interposed between said motor unit and sleeve, whereby to transmit steering movements of said tiller to said unit while permitting the oscillation of said unit in response to torque vibration developed therein.

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