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OUTBOARD PROPELLER MECHANISMS

Filed Aug. 31, 1955

3 Sheets-Sheet 1

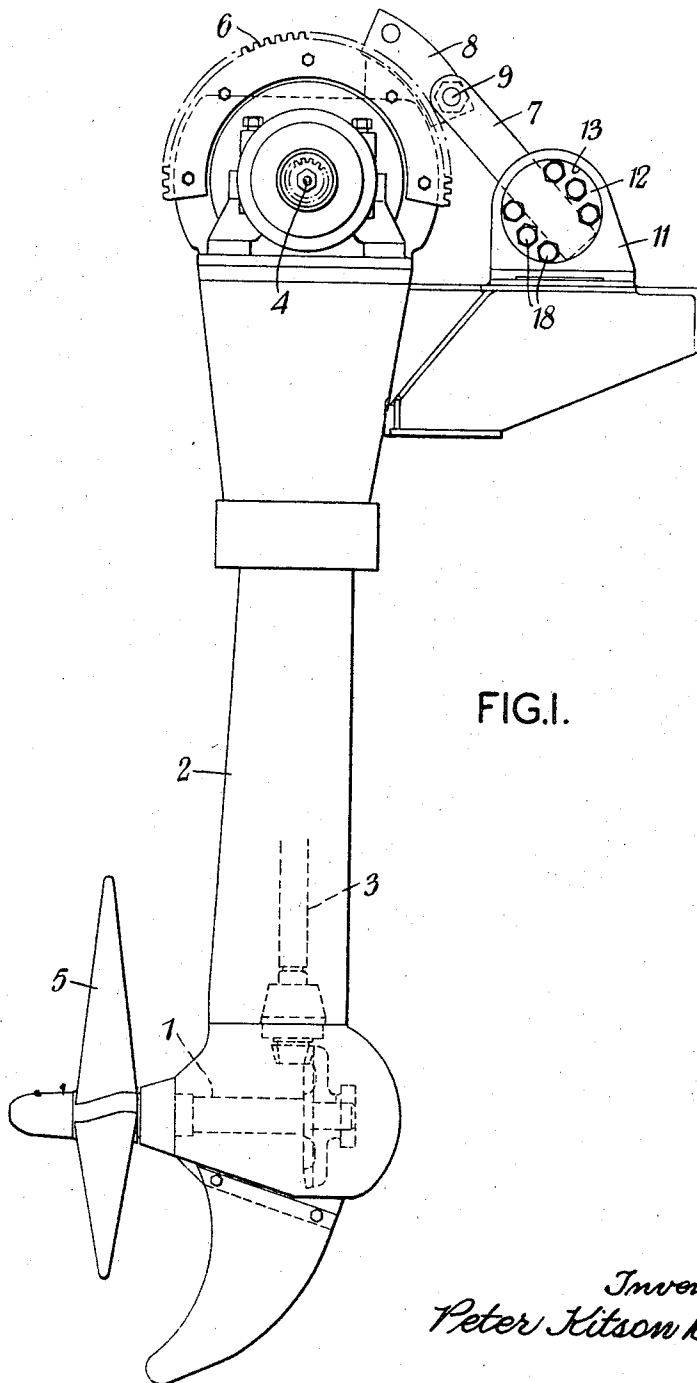


FIG. 1.

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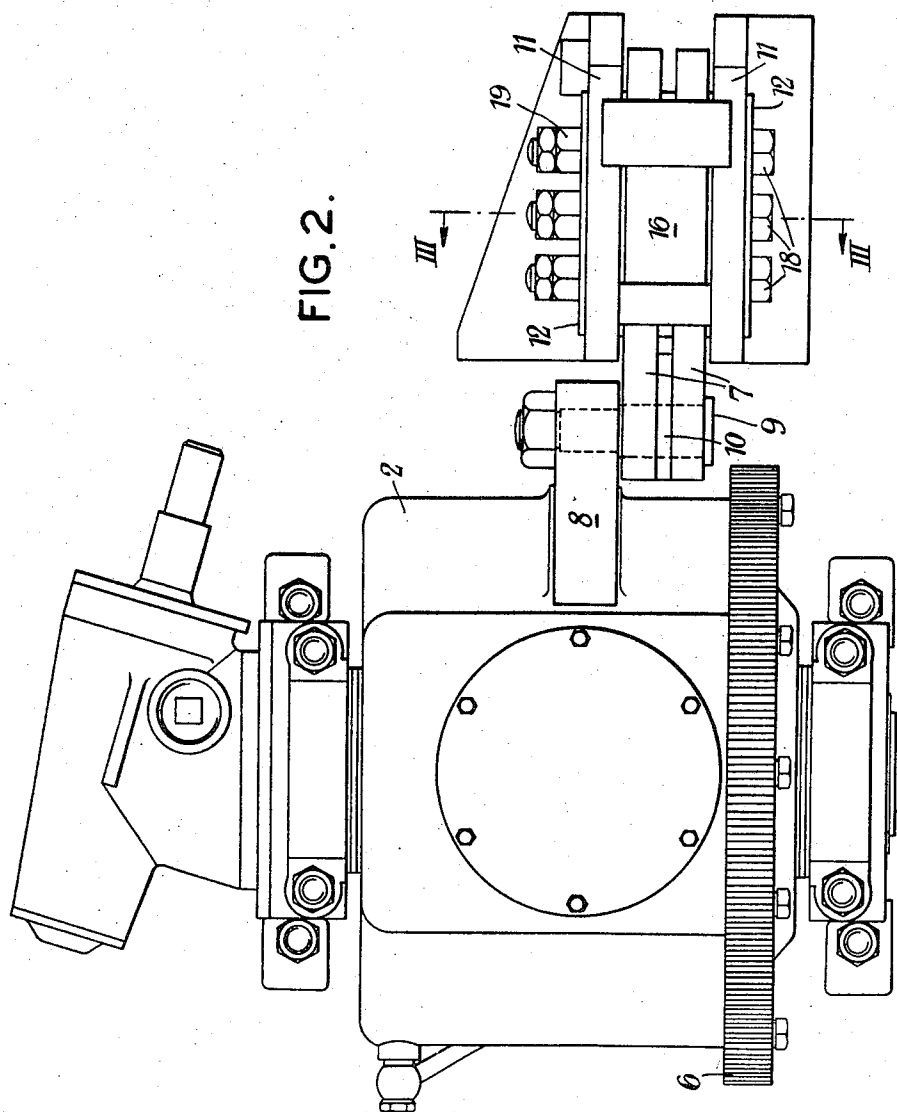
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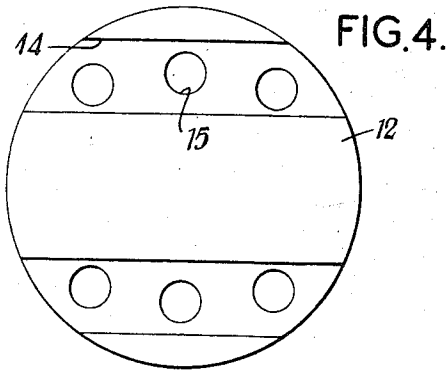


FIG. 4.

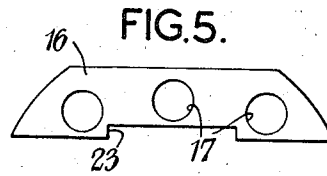


FIG. 5.

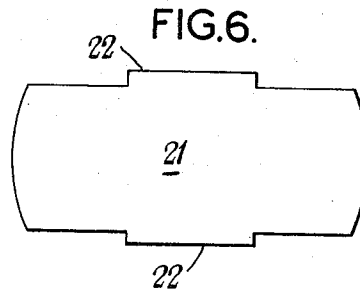


FIG. 6.

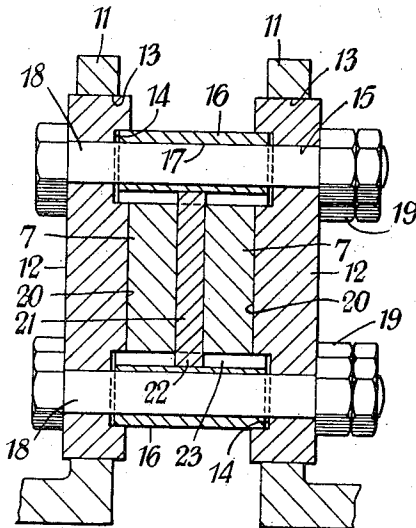


FIG. 3.

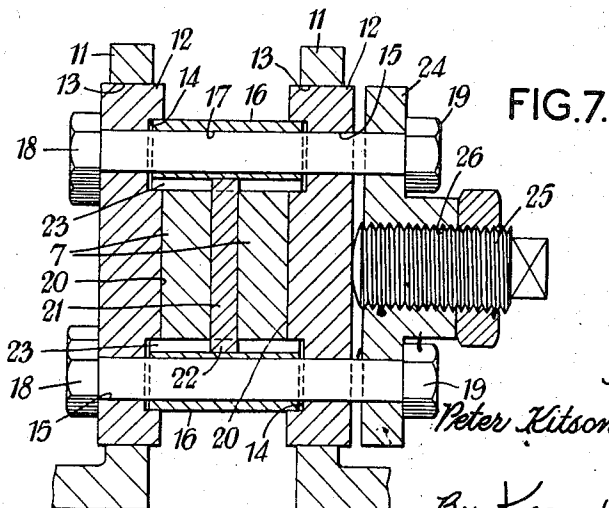


FIG. 7.

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OUTBOARD PROPELLER MECHANISMS

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Claims priority, application Great Britain
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2 Claims. (Cl. 115—41)

This invention relates to improvements in outboard propeller mechanisms and is particularly concerned with improvements in such mechanisms of the kind (hereinafter referred to as being of the kind specified) for mounting on a vessel such as a barge or the like in which a shaft extends downwardly through a housing and engages, in driving relationship, a propeller shaft located at the bottom of the housing, the housing being mounted so as to be capable of rotation about an axis which is usually located above and parallel to the surface of the water, when the mechanism is mounted on a vessel, to permit the housing to be raised and lowered as and when desired, a raising and lowering mechanism being provided for this purpose, and means is provided for securing the housing in a predetermined angular position relative to the axis referred to so that the thrust of the propeller may be transmitted to the vessel. In association with such mechanism of the kind specified there is usually provided a stop which is rigidly secured to the underside of the vessel and against which the housing of the mechanism is usually arranged to bear when the vessel is driven in the forward direction, this stop serving in some cases to transmit at least a part of the thrust of the propeller to the vessel in the forward direction and serving at the same time to limit rotation of the housing about the axis referred to towards the underside of the vessel to prevent the latter being damaged.

In outboard propeller mechanisms of the kind specified it is known to mount the raising and lowering mechanism rigidly on the vessel and to connect it permanently to the housing for raising and lowering the latter so that, in effect, this raising and lowering mechanism constitutes the means for securing the housing in the predetermined angular position relative to the axis referred to. This has the disadvantage that when the housing encounters an underwater obstruction the housing is forced to swing about the axis referred to with consequent damage to the housing and a breakage of the connection between the raising and lowering mechanism and the housing so that the raising and lowering mechanism is also damaged. Furthermore once the connection has been broken the housing is then free to swing about this axis so that once the obstruction has been cleared the thrust of the propeller will drive the housing about the axis towards the underside of the vessel and the housing will meet the stop, where this is provided, or alternatively the underside of the vessel where no stop is provided with a relatively large impact which will further damage the housing and frequently will snap or damage the shaft extending through.

It is also known to provide means whereby the raising and lowering mechanism may be disconnected from the housing once the latter has been rotated about the axis to the desired angular position relative thereto and to employ a replaceable frangible device for securing the housing in this desired angular position. This frangible device usually comprises one or more shear pins which are designed to break when the housing strikes an un-

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derwater obstruction. This arrangement has the disadvantage that the shear pins tend to become fatigued in the course of time and to shear when the propeller is driving the vessel without the housing striking an underwater obstruction. Furthermore when the pin or pins is or are sheared by the housing striking an underwater obstruction the housing is then free to swing loosely about the axis and once the obstruction has been cleared the thrust from the propeller then drives the housing about the axis with the result, as in the previous known construction referred to, that the housing is damaged by the stop or the underside of the vessel and the shaft extending therethrough may be damaged or may even snap.

It is an object of the present invention to provide an improved outboard propeller mechanism of the kind specified which shall not be subject to the disadvantages referred to above.

According to the present invention, in an outboard propeller mechanism of the kind specified the means for securing the housing in a predetermined angular position relative to the axis referred to includes frictional means arranged to oppose rotation of the housing about said axis.

Preferably the frictional means is adjustable to prevent rotation of the housing about said axis when the turning moment exerted on the housing tending to rotate it about said axis is not greater than the maximum turning moment exerted thereupon by the thrust of the propeller in normal use of the mechanism.

In order that the invention may be more readily understood one form of outboard propeller mechanism in accordance with the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a side elevation of a propeller mechanism embodying the invention;

Figure 2 is a plan view of a larger scale of the mechanism shown in Figure 1;

Figure 3 is a section of the friction block shown in Figure 2 taken on the line III—III;

Figure 4 is an elevational view of an end cover of the friction block;

Figure 5 is an elevational view of a spacer element;

Figure 6 is an elevational view of a friction plate; and

Figure 7 is a view similar to Figure 3 showing a modification.

In this example, the outboard propeller mechanism for a vessel such as a barge or the like comprises the usual driving motor (not shown) which drives a propeller shaft 1 located at the bottom of a downwardly extending housing 2 by way of a shaft 3 which extends through the housing 2. A raising and lowering mechanism is provided for rotating the housing about an axis indicated at 4 (Figure 1) extending transversely to the plane of the paper, which is usually located above and parallel to the surface of the water and which generally extends normal to the direction of motion of the vessel under the thrust of the propeller 5 so that the housing 2 can be swung into and out of the water by this mechanism and may be rotated to a desired angular position relative to this axis 4. The raising and lowering mechanism is arranged to be disconnected from the housing 2 once the latter has been rotated to the desired angular position, and conveniently includes a segment 6 carried on the housing 2 having a plurality of teeth capable of engaging with complementary teeth formed on a driving wheel (not shown) which in turn is driven by a motor (not shown). The driving wheel may be connected to the motor through a clutch whereby the segment 6 may be connected to or disconnected from the motor as desired. A pair of bronze bars 7 of rectangular cross-section are each pivotally con-

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nected at one end to an arm 8 secured on the housing 2 by means of a pivot pin 9, and extend away therefrom in parallel relationship. A spacer 10 is provided between the bars 7 at one end thereof adjacent to the location of arm 8 and pivot pin 9. These bars 7 extend at their opposite ends into a friction block which is rotatably mounted in a pair of spaced upstanding lugs 11 secured to the vessel. The friction block is in the form of two circular end covers 12 of cast iron which fit each within a circular aperture 13 formed in the corresponding lug 11 so as to be rotatable therein. Each end cover 12 is formed with a pair of parallel channels 14 of rectangular cross-section, these channels 14 being equally spaced one on either side of a diameter of the cover 12 such that the distance between adjacent sides of the channels 14 is substantially equal to, but not smaller than, the width of the bars 7. Three bolt holes 15 extends from the base of each channel 14 to the other face of the cover 12 and the covers are disposed in the lugs 11 with the channelled faces facing each other and with the channels 14 in the faces disposed parallel to each other. A spacer element 16 is located in each pair of opposed channels 14 and extends between the two end covers 12. Bolt holes 17 corresponding to those formed in the channels 14 are formed in the spacer elements 16 and bolts 18 extend through the assembly such that by tightening nuts 19 on these bolts 18 the end covers 12 may be caused to approach each other, the spacer elements 16 limiting the amount by which the end covers 12 may approach each other such that they are each always retained in the aperture 13 in the associated lug 11. There is thus provided between the end covers 12 a passage of substantially rectangular cross-section, the width of this passage being capable of variation within predetermined limits by controlling the spacing between the end covers 12 by the bolts 18 provided. This passage is divided into two similar smaller passages 20 (Figure 3) of substantially rectangular cross-section by a friction plate 21 of cast iron also of substantially rectangular cross-section which is formed on each opposed longitudinal edge with a key 22 (Figures 3 and 6) which engages in a slot 23 formed in each of the spacer elements 16 to locate the friction plate 21. The width of each of these smaller passages 20 is initially slightly greater than the thickness of the bronze bars 7 and the breadth thereof is substantially equally to the width of these bars 7 and each bar 7 is arranged to extend through one of these smaller passages 20. The bolts 18 are then tightened so that the end covers 12 are caused to approach each other and the bars 7 are clamped each between one face of the friction plate 21 and the opposed face of the end cover 12 between the channels 14 formed therein. Thus longitudinal motion of the bars 7 within the passages 20 is opposed by the frictional force between the surface of these bars 7 and the associated surfaces of the friction plate 21 and the end covers 12, and the magnitude of this frictional force is adjustable by means of the bolts 18.

It will be understood that the arrangement described is such that rotation of the housing 2 about the axis 4 referred to causes the bars 7 to move longitudinally within the friction block against the frictional force opposing such motion.

In the operation of the mechanism described the angular position of the housing 2 with respect to the axis 4 is adjusted by first freeing the housing for rotation and connecting the raising and lowering mechanism to the sector 6 on the housing. The housing 2 is freed either by loosening the bolts 18 of the friction block or more conveniently by disconnecting the bars 7 from the arm 8 by removing the pivot pin 9. Once the housing is in the desired position the bolts 18 are again tightening up to hold the bars 7 in the friction block, or the bars 7 are connected to the arm 8 by replacing the pivot pin 9 as the case may be and the raising and lowering mechanism is disconnected from the housing 2. The friction block

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is set up by lowering the housing 2 to the driving position for backing the vessel at maximum thrust of the propeller 5 and adjusting the bolts 18 until the frictional effect on the bars 7 is just sufficient to prevent rotation of the housing 2 about the axis 4 under the turning moment exerted thereon by this maximum thrust.

The propeller mechanism is then rotated to drive the vessel in the forward direction. If the housing 2 then encounters an underwater obstruction the turning moment on the housing is equal to the algebraic sum of the moments exerted thereupon by the thrust of the propeller 5 and by the effect of the underwater obstruction opposing the motion of the housing through the water. As soon as this total moment exceeds the maximum turning moment which the propeller can exert on the housing 2, the housing will rotate about the axis 4 with the bars 7 sliding within the friction block against the friction effect of the latter. The housing 2 is thus lifted to clear the underwater obstruction. Once this has been cleared the housing 2 will tend to rotate about the axis 4 towards its original position under the effect of the propeller thrust and also due to gravity but will be held against such rotation by the frictional effect of the friction block on the bars 7. Even if this frictional effect should not be quite sufficient to retain the housing 2 in the position to which it is raised by the obstruction the return of the housing to its original position will take place very slowly. Thus in either event the housing 2 would not suffer any further damage other than that produced by the obstruction. After an underwater obstruction has been encountered the housing 2 is returned to its desired angular position relative to the axis 4 and the friction block is set up again in the manner described above.

It will be appreciated that with the mechanism described the housing 2 is capable of rotating about the axis 4 against the frictional effect of the friction block when it encounters an underwater obstruction so that it will not suffer as much damage as would occur if the housing were fixedly held in position e.g. by the driving mechanism or by shear pins. Furthermore as the housing cannot swing freely about the axis referred to once the obstruction has been cleared it will not suffer the further damage to which it would otherwise be liable.

The friction block arrangement described may be modified as shown in Figure 7 by providing a further plate 24 adjacent to and facing one of the end covers 12, passing the bolts 18 through this further plate 24 and providing an adjusting bolt 25 which extends through a threaded bore 26 in this further plate 24 and bears against the adjacent face of this one end closure 12. This adjusting bolt 25 provides a means whereby the frictional effect of the friction block on the bars 7 may be readily adjusted or whereby the bars 7 may be quickly released from the friction block without the necessity of adjusting all the six bolts 18 which extend therethrough. Thus in order to adjust the frictional effect the adjusting bolt 25 is threaded into the threaded bore 26 in the additional plate 24 to bear against the adjacent face of the one end closure 12 to draw the additional plate 24 away therefrom and to urge the two end covers 12 towards each other and increase the friction effect. To release the bars 7 the adjusting bolt is turned in the opposite direction.

What I claim is:

1. In combination, an outboard propeller mechanism for mounting on a vessel comprising a housing rotatably mounted on the vessel about an axis disposed parallel to the surface of the water and normal to the direction of length of the vessel, a shaft extending downwardly through the housing, a propeller, a propeller shaft engaging said downwardly extending shaft in driving relationship, and means for securing said housing in a predetermined angular position relative to said axis, said securing means comprising a pair of rectangular-section bars pivotally secured at one end to said housing, a pair of outer friction surfaces spaced from each other, a cen-

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tral friction plate disposed between said outer friction surface with its two opposed friction surfaces substantially parallel and spaced from said outer friction surfaces, one friction surface of said center friction plate and the opposed friction surface of the adjacent cover providing a pair of friction surfaces adapted to engage the other end of each of said bars, and means for urging the outer friction surfaces toward each other to adjust the frictional engagement between the bars and the respective pairs of friction surfaces to prevent the rotation of the housing about said axis due to the turning moment exerted thereon by the thrust of the propeller in the normal use of the mechanism and yet to permit rotation of the housing about said axis when an abnormal thrust is exerted thereon.

2. An outboard propeller mechanism for mounting on a vessel comprising a housing adapted to be mounted on said vessel, means for rotatably mounting said housing on said vessel to provide for rotation about an axis disposed parallel to the surface of the water and normal to the direction of length of said vessel, a shaft extending downwardly through said housing, a propeller, a propeller shaft engaging said downwardly extending shaft in driving relationship, and frictional securing means for frictionally securing said housing relative to said axis, said frictional means being adjustable in amount to prevent rotation of the housing about said axis due to the turning moment exerted thereon by the thrust of the propeller in the normal use of the mechanism and yet to permit rotation of the housing about said axis when an abnormal thrust is exerted thereon, said securing means compris-

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ing at least one element attached to said housing and a pair of adjustably spaced friction surfaces between which the element extends in frictional engagement therewith, said element being pivotally attached at one end thereof to said housing and said friction surfaces being rotatably secured to said vessel whereby as said housing rotates about said axis, the other end of each element travels longitudinally between said friction surfaces, wherein said friction surfaces are formed in a block rotatably secured to said vessel, said block comprising two end covers the opposed faces of which constitutes said friction surfaces, means spacing said end covers from each other, a friction plate disposed between the end covers with its two opposed surfaces substantially parallel to said friction surfaces and spaced therefrom, one friction surface of the plate and the opposed friction surface of the adjacent cover providing a pair of friction surfaces adapted to engage said element and the other friction surface together with the opposed friction surface of the other cover providing a further pair of friction surfaces adapted to engage a second of said elements, and means for urging the end covers toward each other to adjust the frictional engagement between the elements and the respective pairs of friction surfaces.

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