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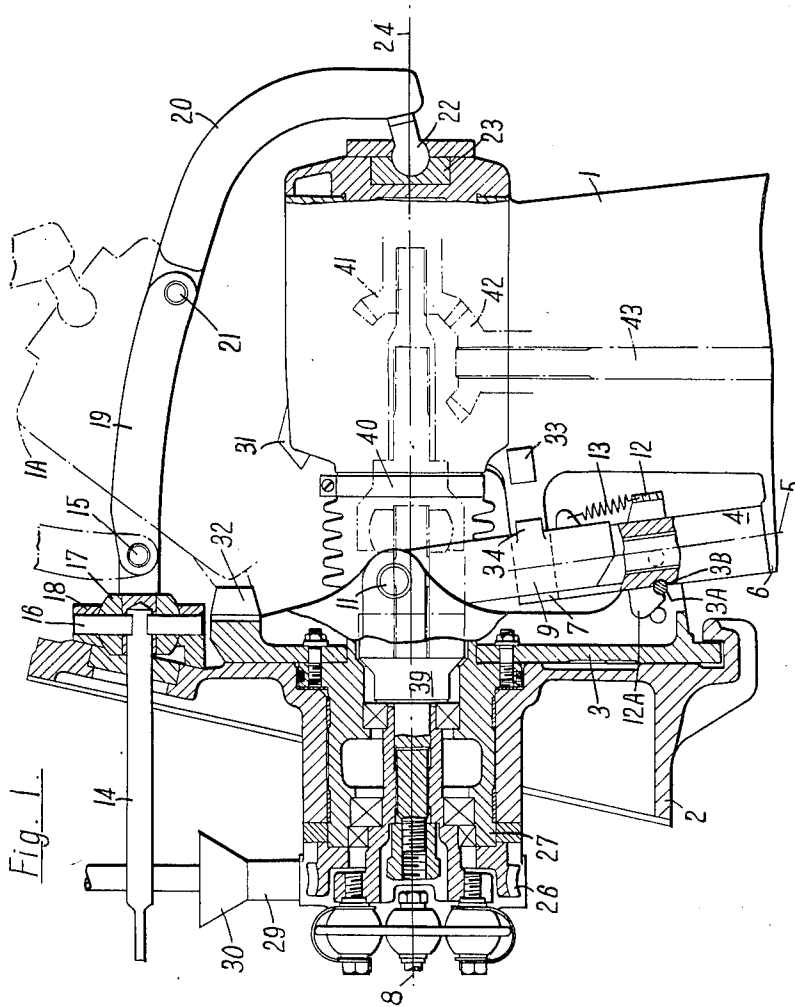
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OUTBOARD DRIVE UNIT FOR WATER CRAFT

Filed Sept. 2, 1964

2 Sheets-Sheet 1



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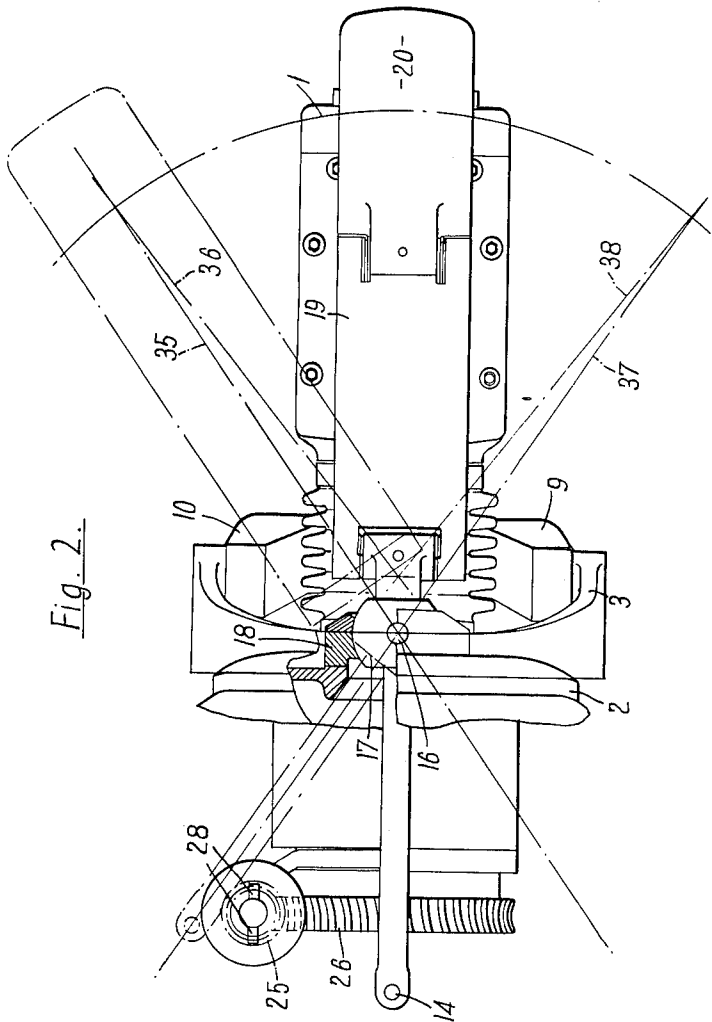
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OUTBOARD DRIVE UNIT FOR WATER CRAFT

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This invention relates to inboard-outboard drives for water craft and more particularly to steering controls for such drives.

Some inboard-outboard drive units have a mounting permitting pivotal movement of the unit about a fore-and-aft axis so that the unit may be swung clear of the water when the craft is moored. There is also means for permitting swinging movement about an upright axis for steering the swinging movement being effected by a steering arm which is pivotal about an upright axis. A further mounting allows the unit to swing upwards on an axis transverse the craft should the unit strike a submerged obstacle.

Hitherto, the steering arm was secured to the top of the unit casing by fastening means which had to be released before the unit could be swung out of the water. A disadvantage of this arrangement is that the fastening means is awkward to reach from the craft and a person attempting to engage or release same may overbalance and fall overboard.

An object of the present invention is to provide an inboard-outboard drive which allows the steering linkage to remain connected when the drive swings about a fore-and-aft axis.

A further object is to provide an inboard-outboard drive which allows the steering linkage to collapse when the drive swings upward due to striking a submerged object.

These and other objects and advantages will be readily apparent from the following description and accompanying drawings in which:

FIG. 1 is a partly sectioned side view of an outboard drive unit according to the present invention, and

FIG. 2 is a plan view corresponding to FIG. 1 to a reduced scale.

Briefly, the present invention provides an outboard drive unit of the type aforesaid for a water craft and in which said linkage is connected to the unit casing by a joint having a pivotal axis co-axial with said fore-and-aft axis.

Preferably said joint is a ball and socket joint, said linkage carrying the ball and the unit casing carrying the socket.

Referring to the drawings which show one embodiment that the invention might take, an outboard drive unit for transmitting drive from the inboard engine of a water craft to the propeller consists generally of a casing 1 housing the drive and carrying a propeller (not shown) at its lower end, and a mounting 2 adapted to be bolted or otherwise fixed to the transom of the craft (not shown) and having a support 3 for the casing 1. The support 3 carries a king pin 4 having a generally upright axis 5 to which the casing 1 is attached by bearings 6, 7. The support 3 is rotatable, by means to be described, relative to the mounting 2 about a fore-and-aft axis 8, and the casing 1 can be swung about the king pin 4 for steering. The king pin 4 has an upper forked portion of which the arms 9, 10, FIG. 2, are pivotally connected to the support 3 about an axis 11 extending transverse to the craft so that the casing 1 can swing upwards and rearwards to the position shown chain-dotted at 1A in FIG. 1 if it strikes a submerged obstacle.

A lower part 3A of the support 3 has a transverse rod

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3B which supports the casing 1 of the unit by co-operating with a convex recess in the king pin 4. The king pin 4 is connected to the rod 3B and hence to the support 3 by a U-shaped yoke 12 having hooked outer ends 12A engaging the rod 3B, the yoke 12 being pivoted on the king pin 4 about a transverse horizontal axis. A tension spring 13 connected between the king pin 4 and yoke 12 serves to hold the hooked ends 12A in engagement with the rod 4B. When a predetermined force acts on the lower part of the casing 1 the connection between the yoke and support "breaks," i.e., the spring force is overcome, and the unit can then pivot to the position shown in chain-dotted lines in FIG. 1.

The swinging steering movement of the casing 1 is effected through a steering arm 14 which at its forward end is connected to steering mechanism such as a steering wheel (not shown) and at its rear end is pivoted at 15 to the forward portion of a linkage whose rear portion is connected to the casing 1. The arm 14 is mounted for swinging movement in a substantially horizontal plane by means of a ball and socket joint. The arm 14 is connected by a pin 16 to a ball 17 and socket 18 of the joint, and the socket 18 is fixed to the mounting 2.

The linkage has two links 19, 20 pivotally interconnected at 21, and the connection between the linkage and the casing 1 is a ball and socket joint of which the ball 22 is secured to the link 20 and the socket 23 is fixed to the casing 1, the center of the ball lying on the extension of the axis 8 so that the joint has a pivotal axis 24 co-axial with the fore-and-aft axis 8.

From the above, it will be seen that the casing 1 can be swung out of the water about the co-axial axes 8 and 24, the joint 22, 23 being the only connection between the linkage 19, 20 and the casing 1, so that the necessity hitherto for releasing the steering fastening means before the casing could be swung out of the water, is eliminated.

The pivotal connections 15 and 21 are such that when the unit is steered the ball 22 follows the path of the unit 1 and still transmits the steering force.

Swinging movement of the casing 1 about the axis 8 and its extension 24 is effected by a worm 25 (FIG. 2) and worm wheel 26, the latter being fixed to one end of a shaft 27 on the axis 8 and the other end of the shaft 27 being fixed to the support 3. The worm 25 is driven by a removable handle (not shown) which has dogs for engagement in slots 28 in a tube 29 on the worm the tube 29 having a funnel guide 30 for the handle.

The drive to the propeller is transmitted through shafting including two universal joints 39, 40 that permit the various swinging actions of the casing 1, the shafting being co-axial with the axes 8, 24. Bevel gearing 41, 42 connects the outer end of the shafting to the upper end of an upright shaft 43 in the casing 1. The lower end of this shaft is connected through further bevel gears (not shown) to the propeller to drive same. The forward end of the shafting is connected by a flexible drive coupling to an inboard motor (not shown).

The FIG. 1 numerals 31, 32 indicate stops on the casing 1 and support 3 which co-operate to limit upwards swinging of the casing 1, and the numerals 33, 34 indicate stops on the casing 1 and arms 9, 10 which co-operate to limit swinging steering movement of the casing 1 about the king pin 4. The ball and socket joint 22, 23 also permits relative pivotal movement in the vertical plane when the unit 1 swings upwards after striking a submerged obstacle, as will be seen from the raised position of the unit 1 shown chain-dotted at 1A in FIG. 1.

In FIG. 2 the chain-dotted radial arms 35, 36 and 37, 38 indicate the fore-and-aft axes of the linkage 19, 20

and of the casing 1 when swung to opposite sides of the mid steering position.

The ball and socket joint 22, 23 could be replaced by a swivel pin on the casing 1 and co-axial with the fore-and-aft axis 8 and connected to the link 20 so as to be pivotal about a horizontal axis perpendicular to the axis 8, or vice versa.

It will be readily seen that the invention permits the casing 1 and parts carried thereby to swing about axis 3 for movement of the unit into and out of the water for repair, transported without disturbing the steering connection. Also the casing 1 can swing upwards about axis 11 if the lower portion strikes an object below the water, the linkage 19-20 "breaking" to permit such action without disconnecting the steering linkage.

Modifications to, and other applications of, the invention will readily be apparent to those skilled in the art and are within the scope of the invention which is limited only by the following claims.

I claim:

1. An outboard drive for a water craft including a drive unit and support means for attaching and supporting the drive unit on the water craft transom, said drive unit mounted on said support for rotation about a fore-and-aft axis, for rotation about a generally vertical axis and for rotation about a transverse axis, steering means carried by said supported means, and a plurality of pivotally connected links connected between said steering means at said supporting means and said drive unit to rotate said drive unit about said generally vertical axis, said pivotally connected links extending between said support means and drive unit in line with said fore-and-aft axis to permit rotation of said drive unit about said transverse axis and said fore-and-aft axis without affecting the operation of said steering means.

2. The outboard drive of claim 1 wherein said linkage is collapsible to permit rotation of said drive unit about said transverse axis.

3. The outboard drive of claim 2 wherein said steering means is carried by said supporting means through a ball and socket joint and said linkage is connected to said drive unit through a ball and socket joint having an axis generally coaxial with said fore-and-aft axis.

4. An inboard-outboard drive for a water craft including a drive unit, a support member adapted to be rigidly connected to the transom of the water craft, a first intermediate member extending through said support member on a fore-and-aft axis and rotatable on said axis, a second intermediate member pivotally connected to said first intermediate member on a generally transverse axis for up and down swinging movement between limit positions said drive unit pivotally connected to said second intermediate member on a generally vertical axis for swinging thereabout between limit positions, a steering member carried by said support member and connected by linkage means to said drive unit at a point coaxial with said fore-and-aft axis for causing rotation of said drive unit on said generally vertical axis and allowing said first and second intermediate members and said drive unit to rotate as a unit about said fore-and-aft axis, said linkage means being collapsible to permit said second intermediate member and said drive unit to swing up and down on said transverse axis.

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