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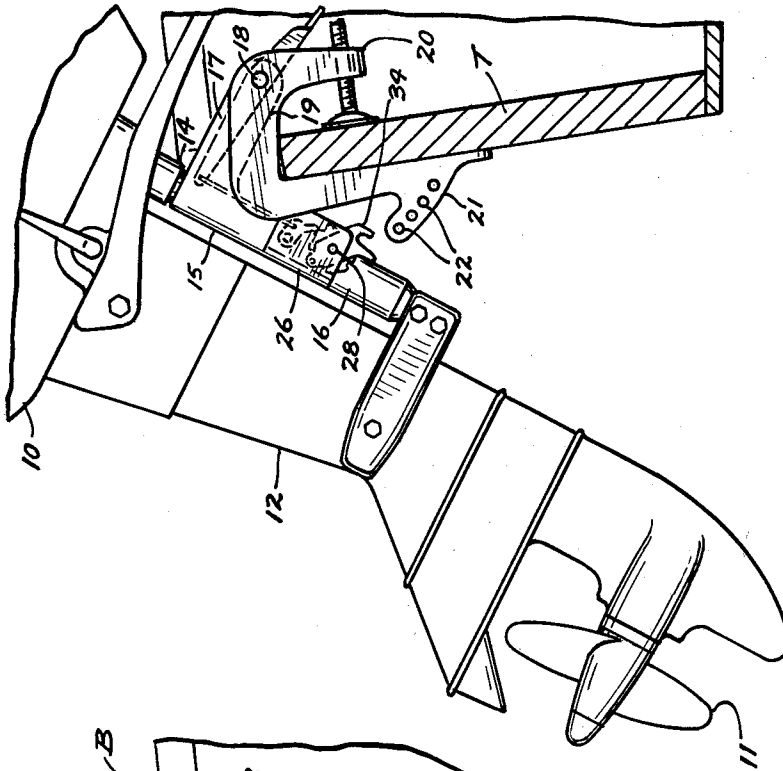
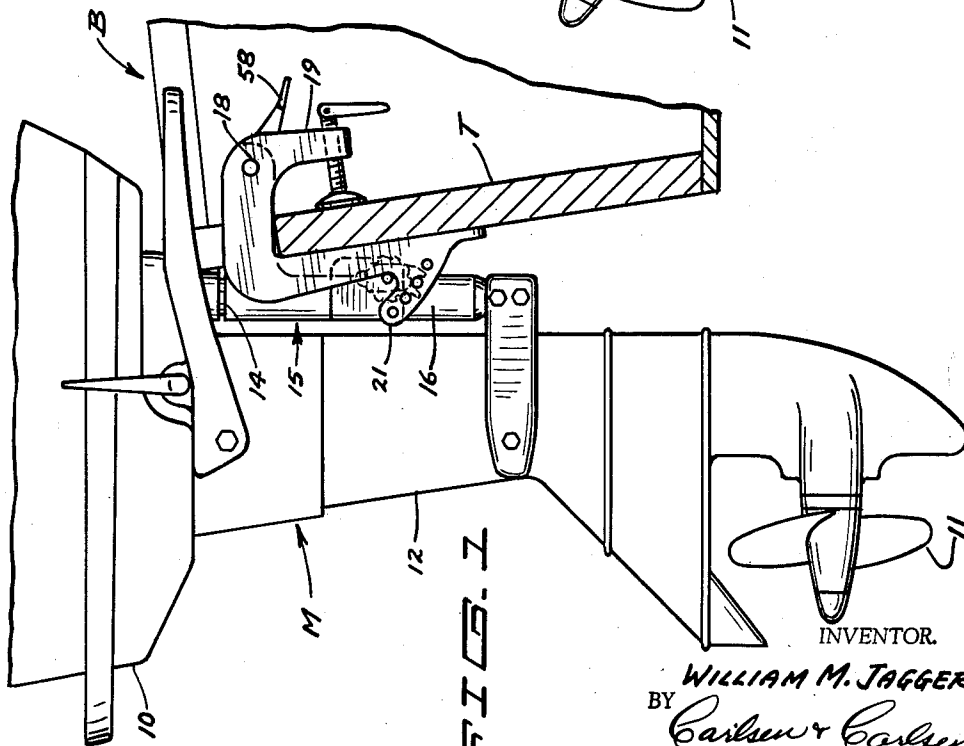
W. M. JAGGER

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REVERSE LOCK FOR OUTBOARD MOTORS

Filed March 26, 1962

2 Sheets-Sheet 1



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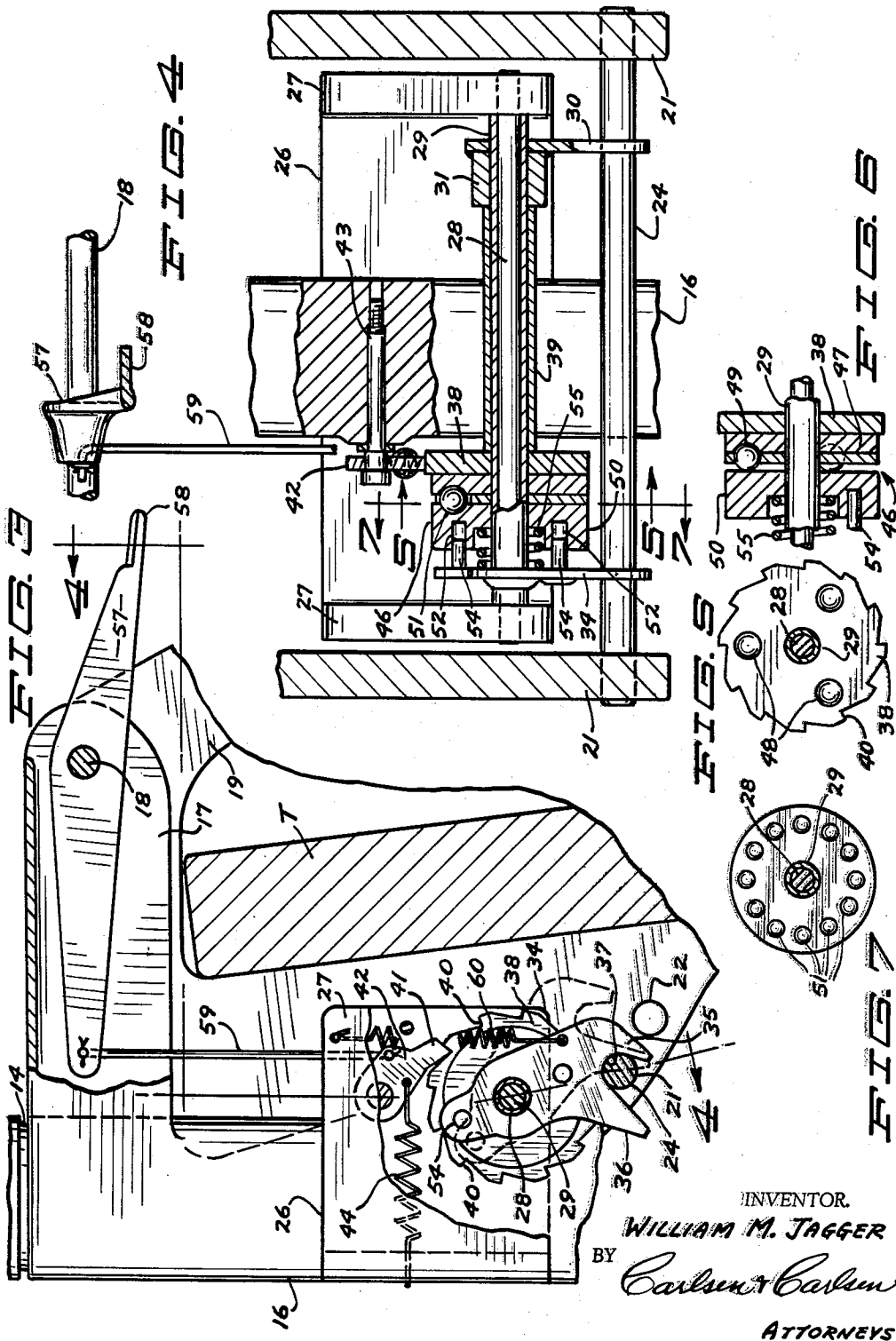
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REVERSE LOCK FOR OUTBOARD MOTORS

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7 Claims. (Cl. 248-4)

This invention relates generally to outboard motors and particularly concerns means for yieldably locking the motor against forward tilting movement during reverse operation of the propeller.

It is well known that in conventional outboard motor operation the direction of propeller spin is reversed to impart reverse movement to the craft on which the motor is mounted. However, inasmuch as the motor is generally mounted on a horizontal tilt pin for swinging movement between various tilt positions, it is necessary to lock the motor against such tilting movement to prevent the motor lower portion from swinging away from the craft during the aforementioned reverse operation. Such a lock must be releasable when pressure in excess of reverse operating pressure is applied to the lower unit, such as when an underwater obstacle is encountered at high speeds, to prevent breakage of the motor or of the boat transom on which it is mounted.

This releasability is generally provided by a detent latch hook on the motor having a frictional camming engagement with the tilt pin on the boat bracket whereby excessive tilting pressures imposed upon the motor will cause the latch hook to be actually pulled off of the pin. In this type of construction all of the releasing forces are transferred directly to the small area of frictional engagement between the pin and hook, thus causing undesired wear and part breakage. Moreover, in this type of construction difficulty is frequently encountered during the relatching operation.

The object of the present invention is to provide a reverse lock having a new and improved latch hook device which is rotationally operative through a slip clutch mechanism adapted to reduce wear on the device and to yieldably hold the hook in two different positions respectively for locking and for relatching with the motor tilt pin.

The above mentioned and still additional objects of the invention will be brought to light during the course of the following specification, reference being made to the accompanying drawings, in which—

FIG. 1 is a side elevation of an outboard motor embodying the present invention showing the motor mounted on a boat transom in normal operating position.

FIG. 2 is similar to FIG. 1 but shows the motor reverse lock released and the motor in forwardly tilted position.

FIG. 3 is an enlarged side elevation of the reverse latch mechanism in locking engagement with the tilt pin and the motor in operating position. The release position of the latch is shown in broken lines.

FIG. 4 is a transverse section through the locking mechanism taken along the irregular line 4—4 in FIG. 3 and looking in the direction of the arrows.

FIG. 5 is a vertical section through the detent mechanism taken along line 5—5 of FIG. 4.

FIG. 6 is an elevation of the detent mechanism in spread condition allowing releasing movement of the latch mechanism.

FIG. 7 is a section taken along the same line as FIG. 5 but looking in the opposite direction.

Referring now more particularly to the drawings, reference characters will be used to denote like parts or structural features in the different views. The motor embodying the invention is denoted generally by the let-

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ter M and is shown mounted on the transom T of a boat B.

Motor M has the conventional powerhead 10 which is in reversible driving connection with propeller 11 by means of a drive shaft extending through the housing 12. The motor has an upright steering pintle 14 which is journaled in a motor bracket designated generally at 15. Bracket 15 has a tubular portion 16 with a projection 17 extending forwardly from the upper end thereof. Projection 17 has its forward end pivoted on pin 18 which extends transversely between the transversely spaced U-shaped clamp portions 19 of a conventional boat bracket 20. Each of the bracket members 19 has a rearwardly and upwardly projecting arm 21, each of the arms being provided with a series of apertures 22 arranged on an arc about the axis of pin 18 with the apertures in the arms being aligned transversely for reception of a reverse lock pin or catch 24. As thus far described the motor is of rather conventional construction, it being understood that the motor M and its carrying bracket 15 are tiltable about the transverse axis of pin 18 between various positions of tilt adjustment.

A reverse lock mounting bracket designated at 26 is mounted to extend laterally from opposite sides of the tubular portion 16 of the motor bracket 15 (see FIG. 4). This bracket has side walls 27 which extend forwardly on opposite sides of the bracket portion 16 and jointly and irrotatably support a shaft 28 which extends crosswise in front of said portion. A tubular sleeve 29 is journaled on shaft 28 extending between the walls 27 to prohibit endwise movement thereof on the shaft. A latch dog 30 secured to a mounting collar 31 is integrally mounted on the sleeve 29. This dog normally extends downwardly and has a rearwardly opening hook portion for locking engagement around the front side of the pin 24. Dog 30 is near the right end of sleeve 29 as the sleeve is viewed from the front as in FIG. 4.

On the opposite end of sleeve 29 or the left as viewed in FIG. 4, there is integrally mounted another latch dog designated generally at 34. This dog is transversely aligned with dog 30 and the configuration thereof is clearly shown in FIG. 3. The lower end is formed in a rearwardly and downwardly opening latch hook with a forward hook projection 35 engaging around the front side of pin 24. A second projection 36 having a tapered configuration extends downwardly behind the pin 24. This projection 36 serves as a guide during the relatching operation as will be subsequently described. A pin engaging seat 37 is formed between the dog projections 35 and 36. While latch dog 30 at the opposite end of sleeve 29 is not described or shown in detail, it preferably has a configuration identical to the member 34 with the corresponding projections 35 and 36 and seat 37 in transverse alignment for identical and simultaneous engagement of pin 24 by the two dogs.

A ratchet wheel 38 is journaled on the sleeve 29 between the latch dogs and adjacent the end thereof on which dog 34 is mounted. A spacer tube 39 encircles sleeve 29 between wheel 38 and the collar 31. Wheel 38 has a plurality of ratchet teeth which have their stop edges 40 facing counterclockwise as the wheel is viewed from the right as in FIG. 3. These teeth are engageable by the tongue 41 of pawl 42 pivoted on a transverse axis above the wheel as by bolt 43 suitably anchored in the tubular portion 16 of the motor bracket 15. A coil spring 44 (FIG. 3) has its ends respectively connected to the pawl 42 and a point on bracket 26 spaced rearwardly from the pawl to yieldably hold the pawl in locking engagement with the wheel 38 to prohibit rotation thereof in an upward and rearward direction about sleeve 29.

A slip clutch mechanism designated generally at 46 connects the wheel 38 and latch dog 34 to yieldably restrain relative axial movement between these two ele-

ments. An annular cage member 47 is integrally associated with the wheel 38. This cage member has three pockets 48 which are circumferentially equally spaced around the shaft 28 as seen in FIG. 5. Metal balls 49 are seated in each of the pockets free to rotate therein. An opposing clutch plate 50 is journaled on the tube 29. This plate on its inner surface facing the member 47 is provided with an annular series of twelve pockets 51, on the same radius as the pockets 48, said pockets 51 having their centers spaced thirty degrees apart. These pockets seat the outer portions of the balls 49 to resist relative rotation between the members 47 and 50. Plate 50 has diametrically opposing cylindrical sockets 52 opening toward the latch member 34 which slidably receive the pins 54 mounted on the latch. A coil spring 55 encircling the sleeve 29 is held under compression between the members 34 and 50. It will thus be seen that the member 50 is rotationally locked to the latch 34 while being slidable toward and away therefrom with spring 55 urging the member 50 toward the member 47 and into seating engagement with the balls 49.

A manual control 57 having an operating handle 58 at one end is pivoted on bracket 15 on or near pin 18 with its opposing end connected by the rod 59 with the pawl 42. As control portion 58 is depressed the pawl will accordingly be lifted against the tension of spring 44 out of locking engagement with the ratchet wheel 38. A spring 60 extends between the latch member 34 and a point thereabove on the bracket 26.

Operation of the invention will now be explained. In normal usage of the motor M it is in the upright position shown in FIG. 1. The latch members 30 and 34 are in locking engagement with the pin 24 to prevent the lower portion of the power unit from pulling rearwardly away from the boat when propeller 11 is operated in reverse. The latch members are yieldably held in their locking condition through slip clutch 45 and the ratchet and pawl assembly 38, 42.

In the event that the lower portion of the motor M should engage an unyielding underwater obstacle during high speed forward operation, the impact or pressure will be transferred through bracket 26 and shaft 28 to the latch members 30 and 34 which are integrally united through the sleeve 29 journaled on the shaft 28. This will tend to urge the latch members upwardly in a counterclockwise direction, as viewed from the right side as in FIG. 3, to seek release from the pin 24. The excessive pressure being transferred to the clutch member 50 through pins 54 will cause member 50 to slide outwardly on sleeve 29 against spring 55 releasing itself from the detent holding action of the balls 49 and roll along the balls until the members 30 and 34 have released the pin 24. The power unit can accordingly swing clear of the obstacle without destructive effect upon the boat transom T.

As hereinbefore mentioned the pockets 51 in the clutch plate 50 have their centers spaced at thirty degrees about the axis of shaft 28. The latch members 30 and 34 are so designed and positioned relative to the pin 24 as to release the pin when they have rotated thirty degrees about the axis of shaft 28 (FIG. 2). Accordingly, the latch members will normally be rotated only one twelfth of a turn at which point the pressure will be relieved therefrom and from plate 50 and the latter will reseal the balls 49 in the pockets 51 next adjacent to the pockets seating the balls before the impact. During this movement the pawl 42 will have remained engaged with the ratchet wheel 38 prohibiting rotation thereof. With this thirty degree releasing movement of the latch members 30 and 34, they will be yieldably retained in the position shown in broken lines in FIG. 3.

Then as the power unit gravitationally or under pressure swings forward again, the tongue 36 and the corresponding portion of latch 30 will contact the pin 24 and with the tongues moving downwardly along the pin, the

entire assembly journaled on shaft 28 including the ratchet wheel 38 will be caused to rotate thirty degrees clockwise, as viewed in FIG. 3. Inasmuch as there are twelve equally spaced teeth on the ratchet 38, one tooth will pass under the pawl 42 and the unit will again be locked in its original upright position.

When it is desired to manually tilt the motor, the pawl 42 is raised upwardly about its pivot through depression of the control handle 58. This releases the entire assembly journaled on shaft 28 for rotation thereon allowing the motor to be tilted about pin 18, the latch members being free to rotate upwardly to release the pin 24. The spring 60 will aid in raising the latch members and hold them in proper position for relatching as the motor is returned to operating position.

The construction accordingly presents a reverse lock mechanism for an outboard motor which releases the motor from the boat bracket upon contact with an underwater obstacle or the like through means of a rotational slip clutch whereby friction between the interlocking elements on the motor and bracket is reduced to a minimum.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. In an outboard motor, a power unit, a boat bracket, means mounting the power unit on the boat bracket for fore and aft tilting movement about a fixed axis between an upright and a forwardly tilted position, a catch member mounted on the boat bracket, a latch pivotally mounted on the power unit for movement between a catch engaging and a catch releasing position, retention means for yieldably holding the latch in either of such positions, and the latch having a guide portion extending when the latch is in catch releasing position to engage the catch member as the power unit is tilted from its forwardly tilted to its upright position to move the latch against the holding force of said retention means into a catch engaging position.

2. In an outboard motor, a power unit, a boat bracket, means mounting the power unit on the boat bracket for fore and aft tilting movement about a fixed axis, a catch on the boat bracket spaced below said tilt axis, a latch hook pivoted on the power unit on an axis parallel to the tilt axis for movement between catch engaging and catch releasing positions, a toothed ratchet wheel journaled on the power unit coaxially with the latch hook pivot, a pawl pivoted on the power unit for locking engagement with the ratchet to prevent rotation thereof, a manual control connected to the pawl for removing the pawl from locking engagement with the ratchet, and means providing a rotationally locking connection between the ratchet wheel and latch hook.

3. In an outboard motor, a power unit, a boat bracket, means mounting the power unit on the boat bracket for fore and aft tilting movement about a fixed axis, a catch on the boat bracket spaced below said tilt axis, a latch hook pivoted on the power unit on an axis parallel to the tilt axis for movement between catch engaging and catch releasing positions, a toothed ratchet wheel journaled on the power unit coaxially with the latch hook pivot, a pawl pivoted on the power unit for locking engagement with the ratchet to prevent rotation thereof, a manual control connected to the pawl for removing the pawl from locking engagement with the ratchet, and means providing a rotationally locking connection between the ratchet wheel and latch hook, said locking connection being a slip clutch adapted to yield and allow pivotal movement of the latch hook independent of the ratchet wheel when a predetermined catch releasing pressure is applied thereto.

4. In an outboard motor having a power unit pivoted to a boat bracket, a catch on the boat bracket spaced from the pivot axis, a latch member pivoted on the unit

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for releasable engagement with the catch to prohibit movement of the power unit about its pivot axis from an upright to a forwardly tilted position, a ratchet wheel journaled on the power unit coaxially with the latch member pivot, a manually releasable locking means for locking the ratchet wheel against rotation, and clutch means rotationally interconnecting the latch member and ratchet wheel on their common axis, said clutch means having a plurality of equally spaced rotational positions of adjustment and adapted to yield to move from one position to the next position to release the latch member from the catch when power unit tilting pressure in excess of a predetermined amount is applied between the latch member and catch.

5 The subject matter of claim 4 wherein the latch member is provided with a guide adapted to engage the catch and rotate the latch, clutch means and ratchet in a return direction to again engage the latch member with the catch as the power unit is moved from a tilted to an upright position.

6. In an outboard motor having a power unit pivoted to a boat bracket unit for fore and aft tilting movement of the power unit when the bracket unit is secured to a boat

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transom, a locking mechanism acting between the units to prohibit said tilting movement, said locking mechanism including a catch pin on one unit below the pivot and a latch hook rotatably mounted on the other unit below the pivot and on an axis parallel thereto for rotary movement between catch pin engaging and catch pin releasing positions, and an annular slip clutch disposed coaxially with the latch hook rotation axis and operatively connected to the latch hook for yieldably holding the latch hook against rotation but adapted to slip to allow rotation of the latch hook member when predetermined pressure is applied to said member.

7. The subject matter of claim 6 wherein said clutch member is mounted for unitary rotation with the latch hook on said latch axis, and a manually operable locking device for releasably locking the clutch member against such rotation.

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