July 7, 1959 J. V. LANGFORD 2,893,342

OUTBOARD MOTOR TILTING UNIT

Filed May 6, 1957 3 Sheets-Sheet 1

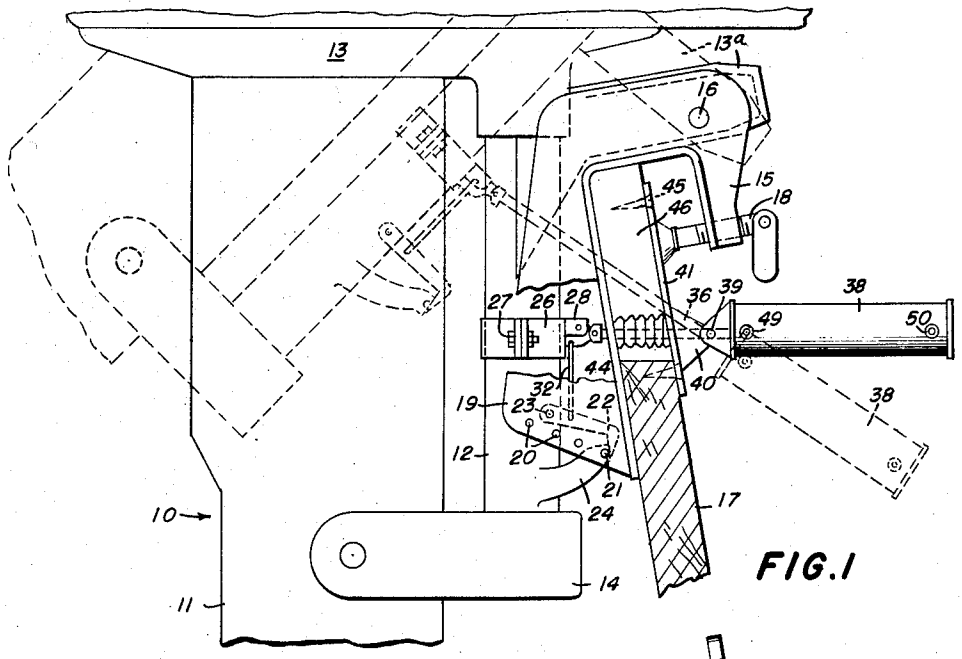



FIG. 1

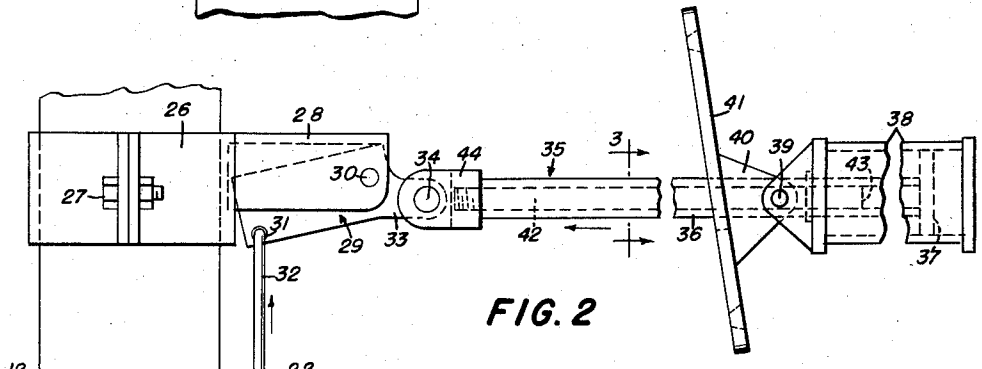
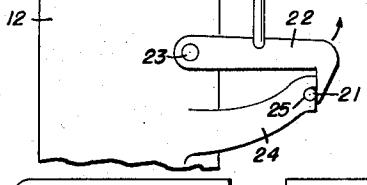



FIG. 2



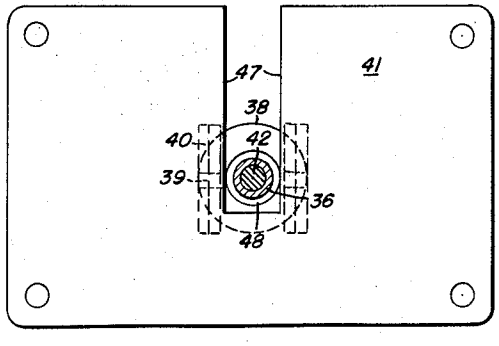




FIG. 3

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July 7, 1959 J. V. LANGFORD 2,893,342

OUTBOARD MOTOR TILTING UNIT

Filed May 6, 1957 3 Sheets-Sheet 2

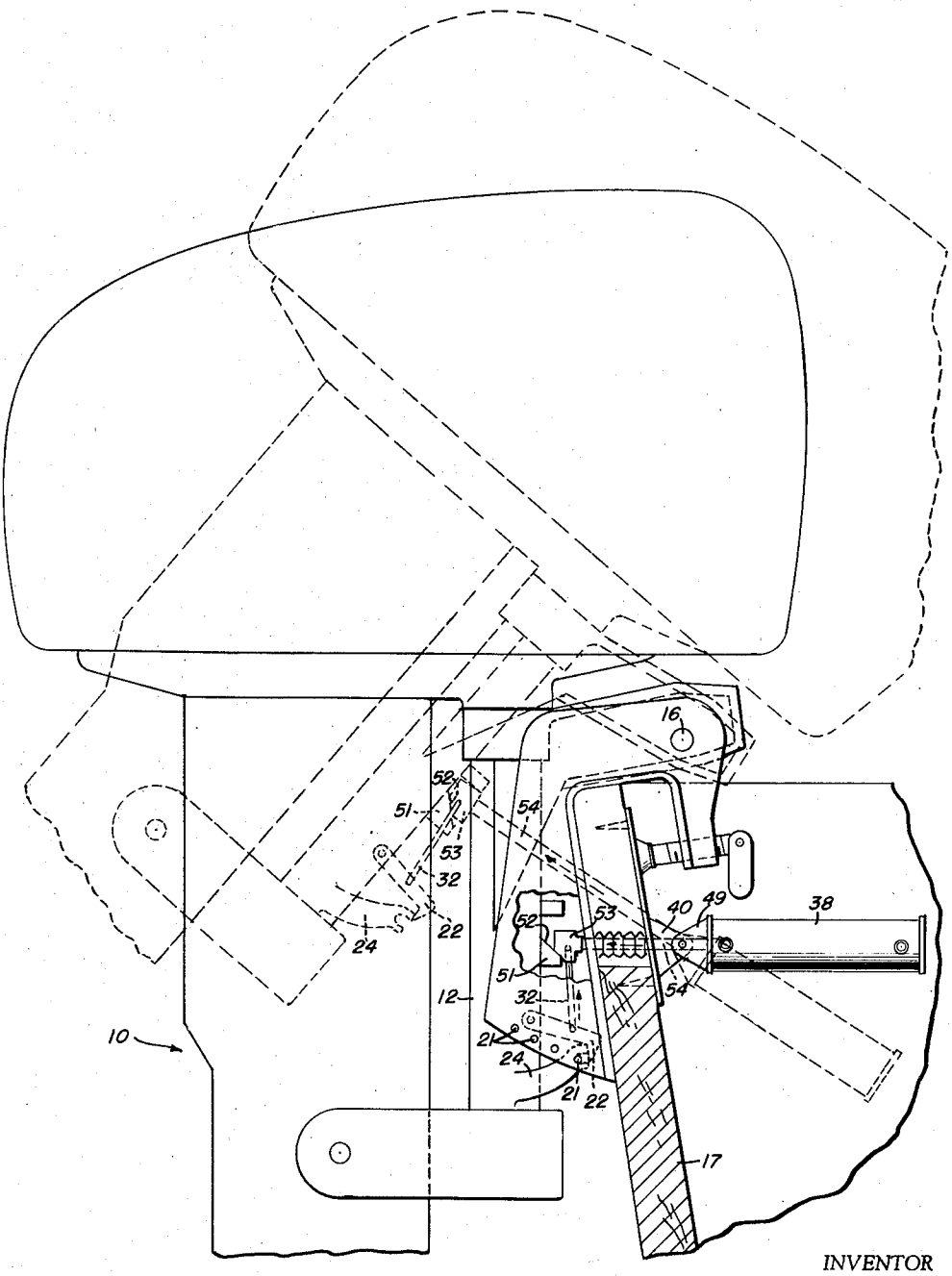



FIG. 4

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July 7, 1959 J. V. LANGFORD 2,893,342

OUTBOARD MOTOR TILTING UNIT

Filed May 6, 1957 3 Sheets-Sheet 3

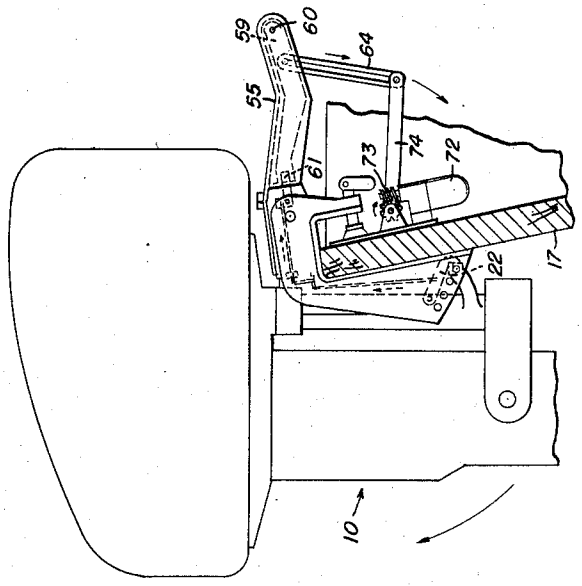



FIG. 6

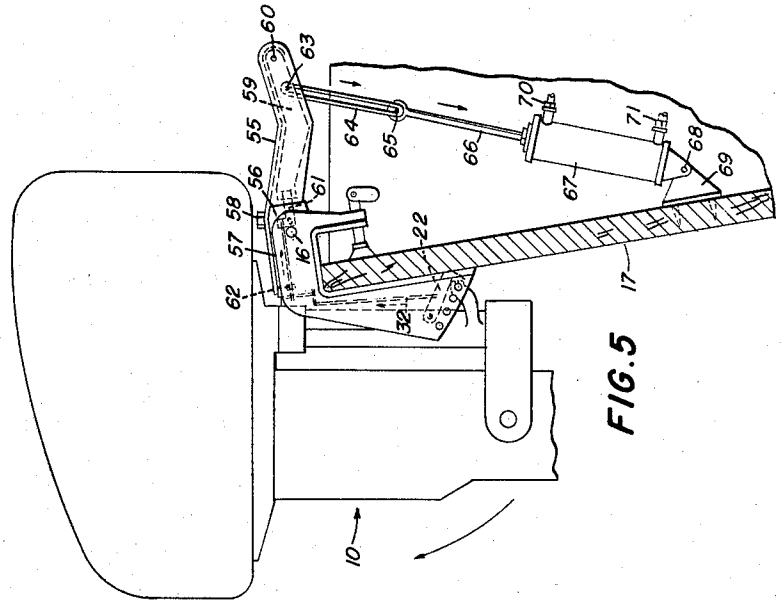



FIG. 5

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# OUTBOARD MOTOR TILTING UNIT

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9 Claims. (Cl. 115—41)

This invention relates to outboard motor tilting mechanism and consists more particularly in new and useful improvements in a tilting device designed for use in connection with conventional outboard motor units of the type provided with a latch mechanism for locking the motor unit in a predetermined operating position but which is automatically releasable when the motor encounters an obstruction under water as the boat progresses.

Practically all of the various types of outboard motors currently being manufactured are equipped with locking mechanisms for securing the motor unit in a selected operative position which is necessary to insure the proper operation of the motor as the boat travels through the water and to prevent the motor from flying up when it is reversed. These conventional structures are also provided with means for pivotally mounting the unit on the transom of the boat so that its operative position may be adjusted to suit conditions and also to permit the complete tilting of the unit out of the water, when not in use.

It is also conventional in outboard motor units of this nature to provide an automatically releasable latch so constructed as to release the lock if the motor encounters an obstruction. Ordinarily, this automatic release mechanism is designed to release the latch at a pressure of approximately 300 pounds exerted on the lower portion of the unit, and to automatically relock itself when the motor swings back in place after the obstruction has been passed.

Various manually operative means have been proposed for tilting these outboard motors on their main pivots but all of these with which I am familiar are objectionable because of the fact that they require the operator to move to the stern of the boat if it is desired to tilt the motor, and further, because of the weight of the outboard motor, it is often difficult to manually effect its tilting. This is particularly true in the case of the more recent outboard motor models of from 35 to 60 H.P. which are very heavy and bulky to tilt manually.

It is therefore the primary object of the present invention to provide a tilting mechanism adapted to be installed in connection with the conventional latch mechanisms of present day units whereby, without interfering with the automatic release mechanism, the outboard motor may be tilted at will and to any desired degree by a remotely controlled prime mover.

Another object of the invention is to provide an outboard motor tilting mechanism of this type, the initial actuation of which releases the conventional latch so that the continued operation of the prime mover can effect the tilting of the motor at will of the operator.

A further object of the invention is to provide an outboard motor tilting mechanism which is particularly adaptable to modern small cruisers which are operated from the forward portion of the boat which carries the electric starter, electric choke, gear shift and throttle, as well as the steering mechanism of the boat. By designing



the tilting mechanism for remote control, it can be actuated from the forward or control portion of the boat without requiring the operator to move aft when it is desired to release the lock and tilt the outboard motor in order to clean grass or weeds or for any other purpose other than encountering an obstruction.

A still further object of the invention is to provide an outboard motor tilting unit which is located completely inside the boat.

With the above and other objects in view, which will appear as the description proceeds, the invention consists in the novel features herein set forth, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

Referring to the drawings, in which numerals of like character designate similar parts throughout the several views:

Figure 1 is a fragmentary side elevational view of an outboard motor in place on the transom of a boat and equipped with the preferred form of the invention; the transom being shown in cross section.

Figure 2 is an enlarged side elevational view of the latch control mechanism shown in Figure 1.

Figure 3 is a transverse sectional view taken on line 3—3 of Figure 2.

Figure 4 illustrates a modification of the control mechanism shown in Figure 1.

Figure 5 is a side elevational view of an outboard motor embodying a further modification of the control mechanism, operated by hydraulic means; and

Figure 6 is a still further modification of a control mechanism substantially the same as Figure 5 but actuated by an electric motor reduction unit through a worm drive.

In the drawings, referring first to Figure 1, the numeral **10** generally represents an outboard motor unit of conventional design and embodying a drive shaft housing **11** to which a mounting post **12** is secured between the base of the motor **13** and a U-shaped clamp **14** fixed to the housing **11**. The usual mounting clamp **15**, generally comprising a bifurcated structure, pivotally supports the mounting block **13***a* of the motor unit, at **16** and is secured in place on the transom **17** by thumb screws **18**. The rear legs **19** of the clamp **15** in the particular form of outboard motor mounting here illustrated, are in the form of laterally spaced, fan-shaped, fins provided adjacent their rearwardly and upwardly inclined lower edges, with a series of spaced openings **20** adapted to selectively receive the thrust bar **21** for engagement by the conventional latch **22** which is pivotally mounted at **23** on the mounting post **12**.

In opposed relation to the latch **22** and projecting forwardly from the mounting post **12**, between the spaced fins or legs **19** is an arm **24**, the forward end of which is bifurcated or notched as at **25** (see Figure 2) to embrace the thrust bar **21** while the motor unit is in locked position, with the latch **22** engaging the opposite side of the periphery of the thrust bar **21**. Thus, with the thrust bar **21** in place in any one of its selective positions in openings **20**, forward shifting movement of the motor unit is prevented by the notched end of the arm **24** and rearward shifting movement thereof is prevented by the latch **22**.

As stated earlier, it is conventional to design these latches so as to be automatically released upon encountering an obstruction which exerts a predetermined pressure on the lower portion of the motor unit. However, it is the purpose of this invention to provide a mechanism which is sequentially operable to first release the conventional latch **22** at the will of the operator and then to tilt the outboard motor to the desired degree.

The latch release mechanism is mounted on the post

12 of the outboard motor unit by means of a collar or clamp 26 secured in place by bolts 27. A forwardly projecting bracket or arm 28 is integral with the collar 26 and is preferably longitudinally slotted from its lower edge. The projecting extremity of the slotted arm 28 carries a toggle lever 29 which is eccentrically pivoted to the arm as at 30. The long leg 31 of the lever is operatively connected to the latch 22 by a suitable link 32 while its short arm 33 is pivotally secured as at 34 to the outer end of a telescoping piston rod generally indicated by the numeral 35, the pivot 34 lying in a plane slightly lower than that of the pivot 30. This piston rod structure comprises an outer tubular rod 36, the inner end of which carries a piston 37 reciprocably mounted in a cylinder 38, one end of which is pivotally mounted at 39 on a suitable bracket 40, fastened to a connecting plate 41 for attachment to the transom of a motor boat as will hereinafter appear. An inner piston rod 42 is slidably received within the tubular outer rod 36 with its inner end 43 terminating short of the piston 37 so as to permit its complete retraction within the outer rod as shown in Figure 2.

The outer end of the inner rod 42 carries a clevis 44, the bifurcated portion of which receives the pivot pin 34 for connection to the short arm 33 of the toggle lever 29, said clevis normally lying in abutment with the outer end of the tubular piston rod 36. As shown in Figure 1, the mounting plate 41 is secured to the transom 17 of the boat by means of screws or the like 45, and normally, when the telescoping piston rods are fully retracted, the assembly assumes the position shown in full lines in this figure. A vertical slot 46 in the transom 17 registers with a corresponding slot 47 in the mounting plate 41 to accommodate the vertical shifting movement of the telescoping piston rods in the course of the operation of the tilting mechanism. An accordion type neoprene boot or the like 48, is fastened to the mounting plate 41 and is fitted closely around the outer piston rod 36 to prevent any splash through the slot in the transom.

Suitable connections 49 and 50 are provided at opposite ends of the cylinder 38 for fluid pressure lines leading from a source of hydraulic pressure (not shown). The application of pressure through connection 49 causes retraction of the piston 37 and the telescoping of piston rods 36—42, while the application of pressure through connection 50 causes the extension or projection of the telescoping piston rods.

In the operation of the form of invention just described, we will assume that the outboard motor 10 is in its normal position shown in Figure 1 in full lines, with the latch 22 engaged on the thrust bar 21 which in turn is embraced by the bifurcated arm 24 and the piston 37 and piston rods 36—42 fully retracted. When it is desired to tilt the outboard motor either partially or to completely remove it from the water, pressure is applied through connection 50 to the cylinder 38 by any suitable control means located at a convenient point in the boat. The initial movement of the telescoped piston rods 36—42 rocks the toggle lever 29 to release the latch 22. The continued outward movement of the piston rods causes the abutment of the long arm 31 of the toggle lever with the roof of the slot in the arm 28 and when the toggle lever has reached the end of its movement on pivot 30, the outward force on the piston rods causes the motor 10 to rock on its pivot 16 as shown in dotted lines in Figure 1. The release of pressure from the cylinder 38 through the connection 50 permits the weight of the motor 10 to return the latter to its normal position whereupon it is automatically locked by the latch 22.

Thus, the motor can be either completely tilted out of the water by the full extension of the tilting assembly or it may be elevated to a selected angular position by simply controlling the hydraulic pressure mechanism.

If, during the course of travel, the motor encounters an obstruction which is of sufficient magnitude to automatically trip the conventional latch 22 as before indicated, the motor is released from its locked position and permitted to swing rearwardly on the pivot 16. During this action, the inner piston rod 42 is progressively withdrawn from the tubular rod 36 to the required extent but due to the telescoping action of these two rods, they are maintained in alignment so as to remain under the control of the hydraulic actuating cylinder 38. In other words, the tilting assembly always remains in alignment regardless of the position of the outboard motor, and if the motor is tilted by an obstruction or otherwise to a position halfway up, for example, the hydraulic unit can immediately be actuated to lift the motor to its fully extended or tilted position.

The form of the invention shown in Figure 4 is generally similar to that just described with the exception of the piston rod and its relationship to the outboard motor. Here it will be seen that the mounting post 12 of the motor unit is provided with a socket member 51 which projects towards the slot in the transom 17 and is provided with an inclined lower surface or bottom 52 adapted to be engaged by a complementary inclined surface on a lug 53 mounted on the outer end of a single piston rod 54 extending from the hydraulic cylinder 38. The lug 53 is operatively connected by the link 32, to the latch 22 as in the structure just described.

In the operation of this embodiment of the invention, the initial outward movement of the piston rod 54 causes the lug 53 to engage the inclined surface 52 of the socket 51 with a composite outward and upward movement which causes the initial release of the latch 22. The continued movement of the piston rod 54 brings the lug 53 into abutment with the inner extremity of the socket 51 and causes the motor to tilt on its pivot 16. Here again, the motor 10 is free to move outwardly upon the automatic release of the latch 22, should the motor encounter an obstruction, as there is no fixed connection between the mounting post 12 and the end of the piston rod 54. In this event, when the motor returns by gravity to its normal position, the complementary inclined surfaces of the lug 53 and the socket 51 facilitate resumption of their normal relationship.

Turning now to the form of the invention shown in Figure 5, an extension arm 55 is attached to the motor support 56 by slipping into a dovetail 57, cast in the top of the motor support and locked in position by a cap screw or the like 58. The arm 55 is vertically slotted from its lower edge to receive a lock release arm 59, pivoted at one end 60 to the outer end of the arm 55 with its opposite end connected to a release lever 61. The lever 61 is operatively connected by any suitable linkage system shown diagrammatically in dotted lines at 62, to the latch releasing link 32 which in turn is connected to the conventional latch 22. Intermediate its ends, the pivoted arm 59 is connected by a cross pin 63 to a longitudinally slotted link 64, the opposite end of which is connected by a cross pin 65 to the piston rod 66 projecting from a hydraulic cylinder 67. The cylinder 67 is pivotally connected at its opposite end as at 68, to a mounting bracket 69 projecting from the inner face of the transom 17 and suitable connections 70 and 71 from a source of hydraulic pressure, are provided in the cylinder 67. In this instance, it will be noted that the transom 17 requires no slot as the tilting mechanism is entirely within the boat.

In operation, the application of pressure through connection 70 causes the piston rod 66 to move downwardly with respect to the cylinder 67 and through link 64, initially releases the latch 22 through pivotal movement of the arm 59 and the linkage system 62. After the arm 59 has reached its lowermost position, the continued downward movement of the piston rod 66 rocks the extension arm 55 downwardly to tilt the motor 10 on its pivot 16. As in the cases of the previously described embodiments, the motor 10 is free to swing outwardly upon encounter-

ing an obstruction due to the longitudinal slot in the link 64. Under these conditions, it will be seen that the link 64 simply rides down with the arm 55, with the cross pin 65 slidably engaging the slot in the link.

A generally similar embodiment of the invention is shown in Figure 6 where, in place of the hydraulic unit previously described as the prime mover, an electric motor reduction unit 72 is provided which, by means of a worm drive 73 and a crank arm 74, causes the slotted link 64 to actuate the latch release arm 59 and extension arm 55 in a similar manner.

It will be apparent that with the invention illustrated and described herein, there is provided a tilting assembly of maximum sensitivity and effectiveness which can be controlled from the operating position in the boat and which is readily adaptable to the numerous specific types of tiltable outboard motors now on the market. One of the important features of all of these forms of the invention is the arrangement for sequentially releasing the conventional latch and following up in a continuous movement with the selective tilting of the outboard motor without in any way interfering with the automatic release of the latch upon encountering an underwater obstruction.

From the foregoing, it is believed that the invention may be readily understood by those skilled in the art without further description, it being borne in mind that numerous changes may be made in the details disclosed, without departing from the spirit of the invention as set forth in the following claims.

I claim:

1. In an outboard motor mounting assembly including a mounting bracket for attachment to the transom of a boat, means for pivotally supporting an outboard motor on said bracket for tilting movement toward and away from said transom, and a latch device between said motor and bracket for normally locking said motor in operative position; a latch release and tilting unit comprising a prime mover, means securing the latter to the transom of said boat and mechanism interposed between said prime mover and motor, operable by the action of said prime mover for tilting said motor on its pivot, including means operable by said prime mover upon the initiation of said action to release said latch device.

2. In an outboard motor mounting assembly including a mounting bracket for attachment to the transom of a boat, means for pivotally supporting an outboard motor on said bracket for tilting movement toward and away from said transom, and a latch device between said motor and bracket for normally locking said motor in operative position, a sequentially operable latch release and tilting unit comprising a prime mover, means securing the latter to the transom of said boat a member interposed between said prime mover and motor, operable by the action of said prime mover, releasably engageable with said motor, for tilting the latter on its pivot, and means carried by said member operable by said prime mover upon the initiation of said action, to release said latch device.

3. In an outboard motor mounting assembly including a mounting bracket, means for securing said bracket on the transom of a boat, means for pivotally supporting an outboard motor on said bracket for tilting movement on its pivot, and a latch device between said motor and bracket for normally locking said motor in operative position; a sequentially operable latch release and tilting unit comprising a hydraulic cylinder, means for pivotally mounting one end of said cylinder on the transom of said boat, a piston in said cylinder, a piston rod connected thereto, means connected to said piston rod, operable upon projection of the latter by said cylinder, for tilting said motor on its pivot, said last named means being connected to said latch device and operable upon the initiation of the projection of said piston rod for releasing said latch device.



4. Apparatus as claimed in claim 3, wherein said last named means comprises a toggle lever pivotally supported on said motor and sequentially operable to release said latch device and tilt said motor.

5. Apparatus as claimed in claim 3, wherein said piston rod comprises inner and outer telescoping sections, the outer section being fixed to said piston and the inner section being pivotally connected to said last-named means and being freely withdrawable from said outer section whereby, upon the release of said latch device, the motor is free to swing upon its pivot, irrespective of the tilting unit.

6. In an outboard motor mounting assembly including a mounting bracket, means for securing said bracket on the transom of a boat, means for pivotally supporting an outboard motor on said bracket for tilting movement, and a latch device between said motor and bracket for normally locking said motor in operative position; a sequentially operable latch release and tilting unit comprising a tilting extension on said motor, an electrically operated reduction unit fixed to said transom, a lever operated by said reduction unit, a link operatively connecting said lever with the tilting extension of said motor, and means operable by said link upon the initiation of action by said lever, for releasing said latch device.

7. In an outboard motor mounting assembly including a mounting bracket, means for securing said bracket on the transom of a boat, means for pivotally supporting an outboard motor on said bracket for tilting movement, and a latch device between said motor and bracket for normally locking said motor in operative position; a sequentially operable latch release and tilting unit comprising a hydraulic cylinder, means for pivotally mounting one end of said cylinder on the transom of said boat, a piston in said cylinder, a piston rod connected thereto, wedge means carried on the end of said piston rod and interposed between the latter and said motor for releasing said latch device upon the initiation of the projection of said piston rod from said cylinder.

8. In an outboard motor mounting assembly including a mounting bracket, means for securing said bracket on the transom of a boat, means for pivotally supporting an outboard motor on said bracket for tilting movement, and a latch device between said motor and bracket for normally locking said motor in operative position; a sequentially operable latch release and tilting unit comprising a tilting extension on said motor, a hydraulic cylinder pivotally mounted at one end on the transom of said boat, a piston rod extending from the opposite end of said cylinder, a link operatively connecting said piston rod to said extension, and means operable by said link upon the initiation of action by said piston rod, for releasing said latch device.

9. Apparatus as claimed in claim 8, wherein said last named means includes a separate arm pivotally mounted at one end on said extension with its other end operatively connected to said latch device, said separate arm being connected intermediate its ends, to said link.

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