Aug. 24, 1937. J. M. WILLIAMS, JR 2,091,247

OUTBOARD MOTOR

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Fig. 1.

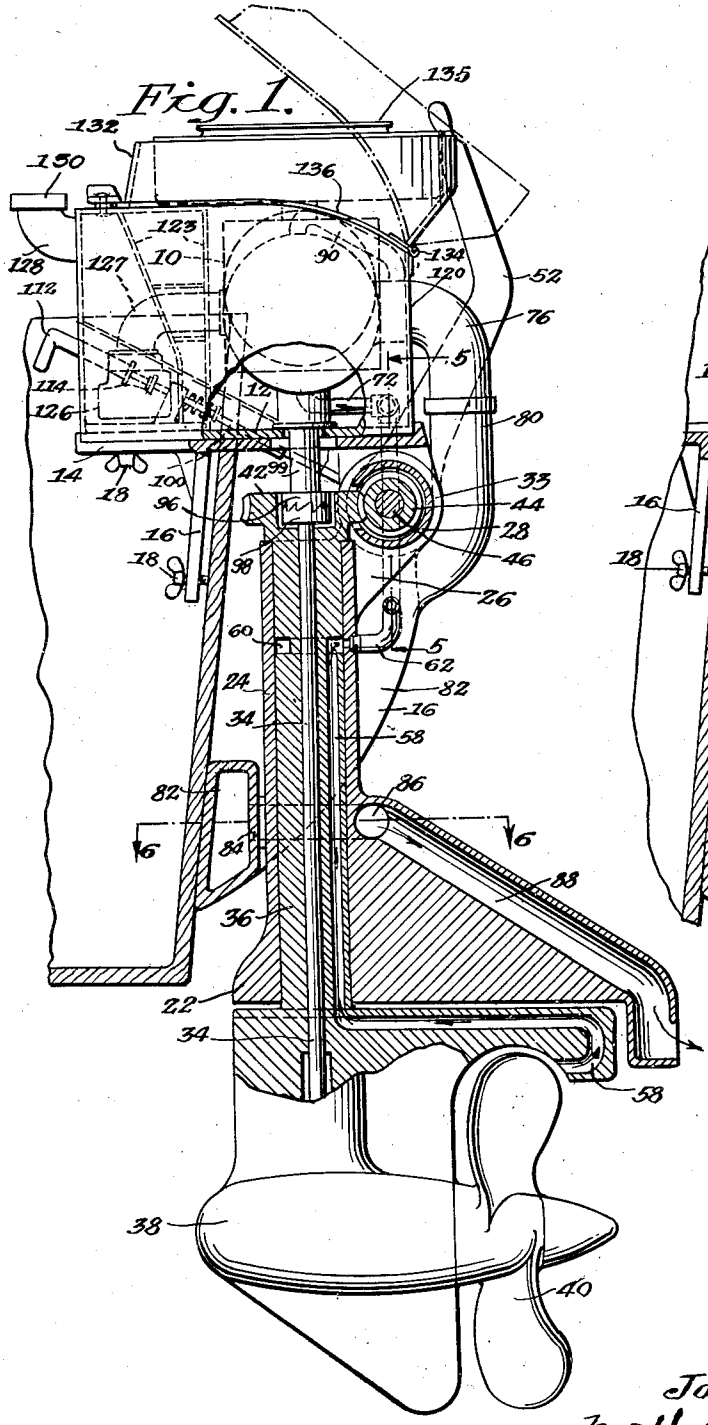
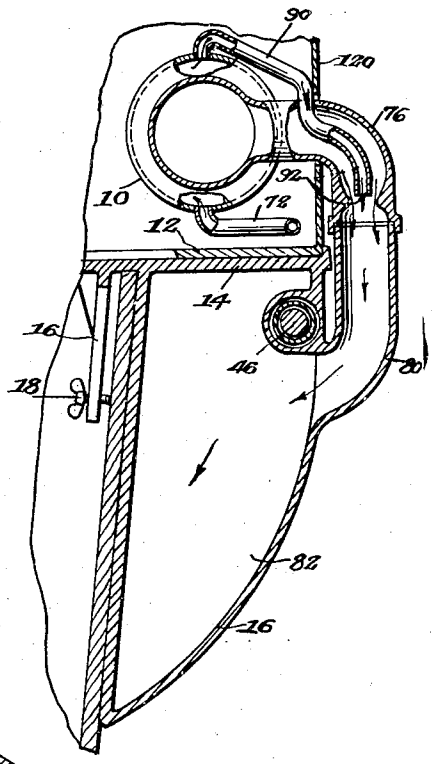


Fig. 2.



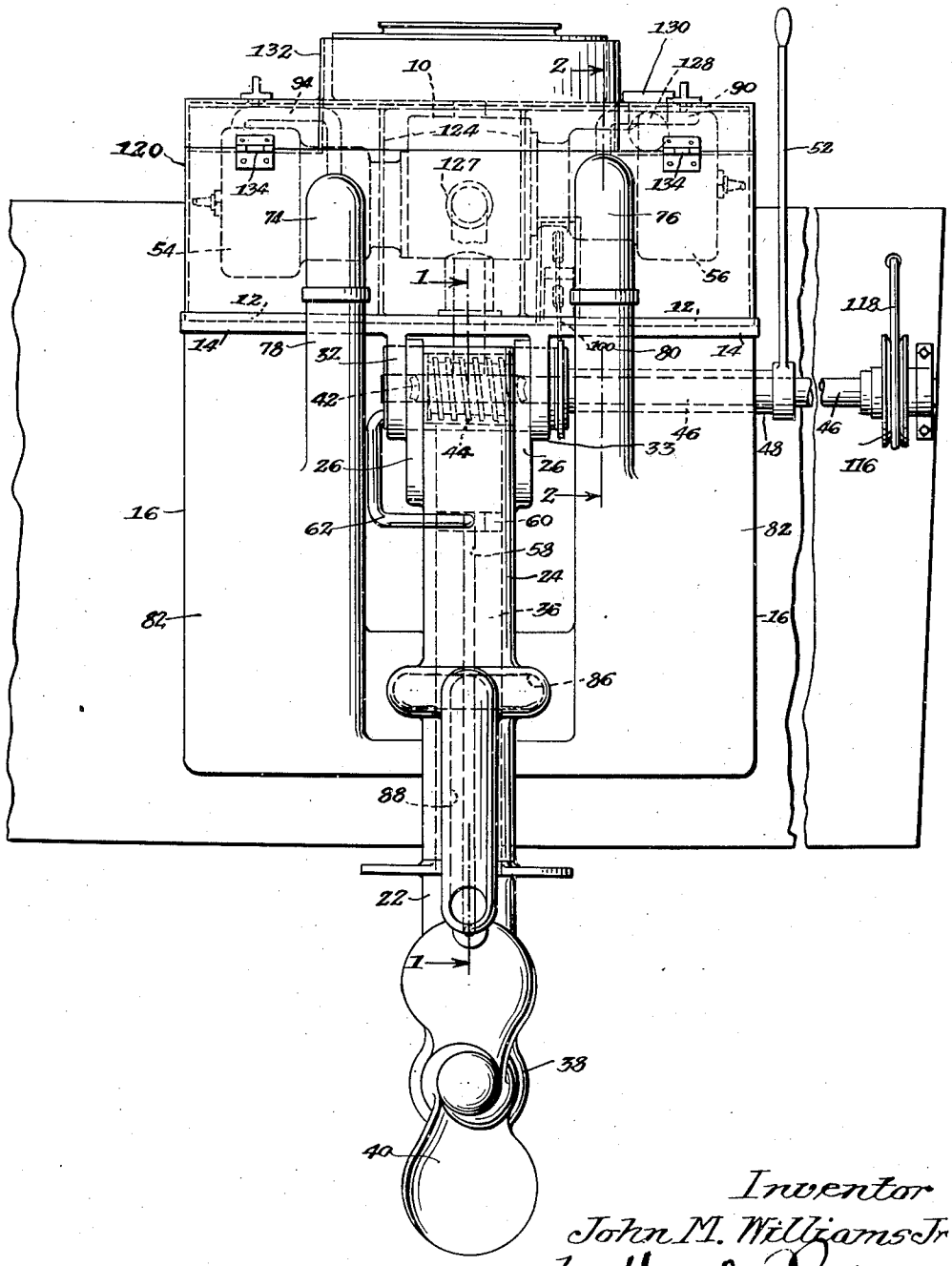
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Fig. 3.



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Fig. 4.

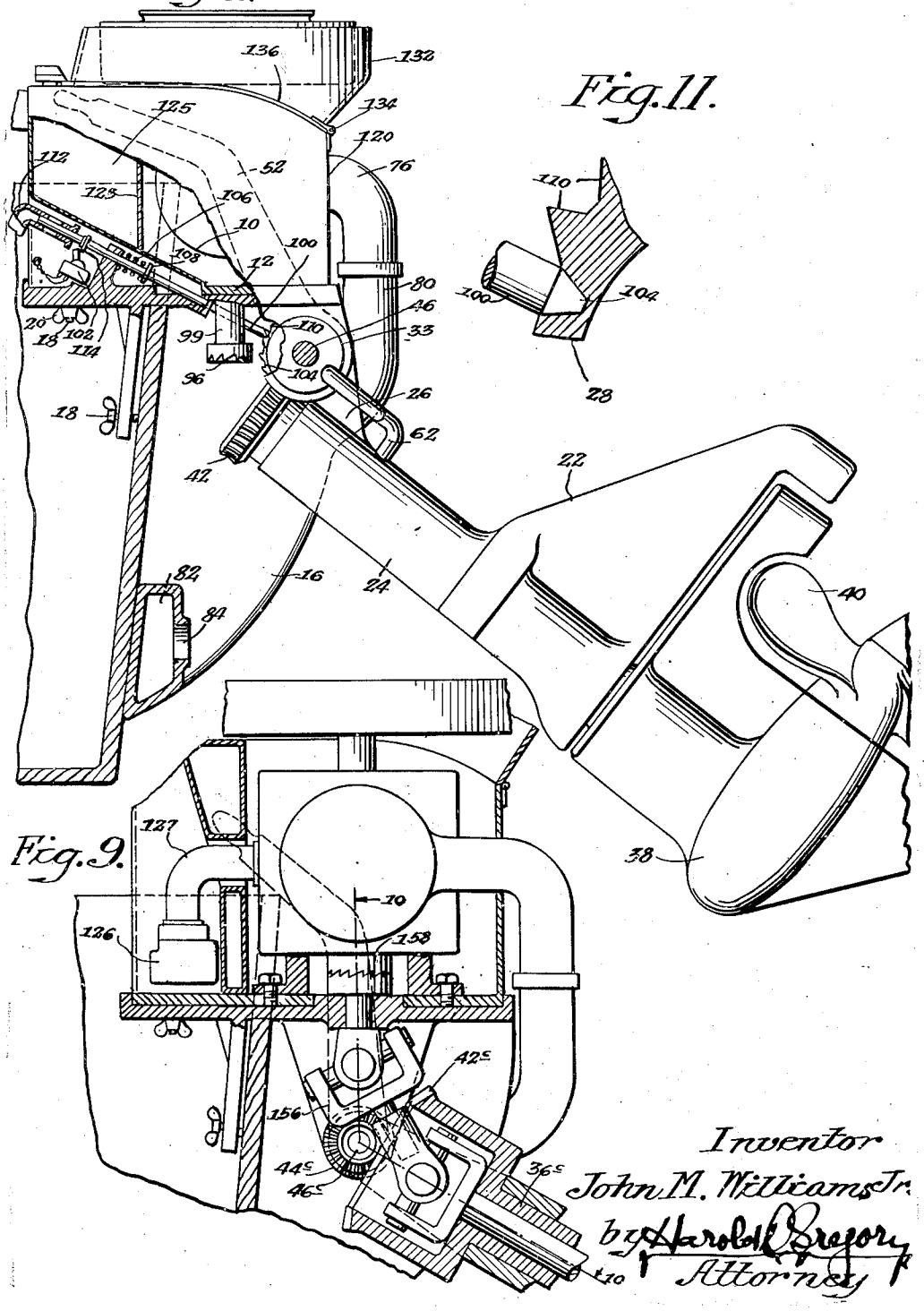


Fig. 11.

Fig. 9.

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Fig. 5.

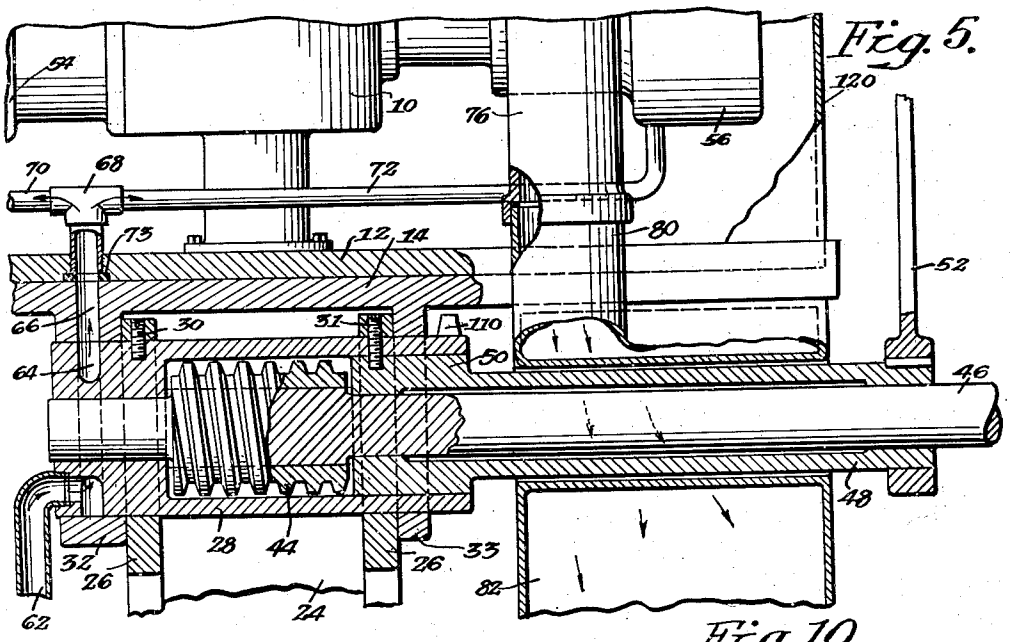
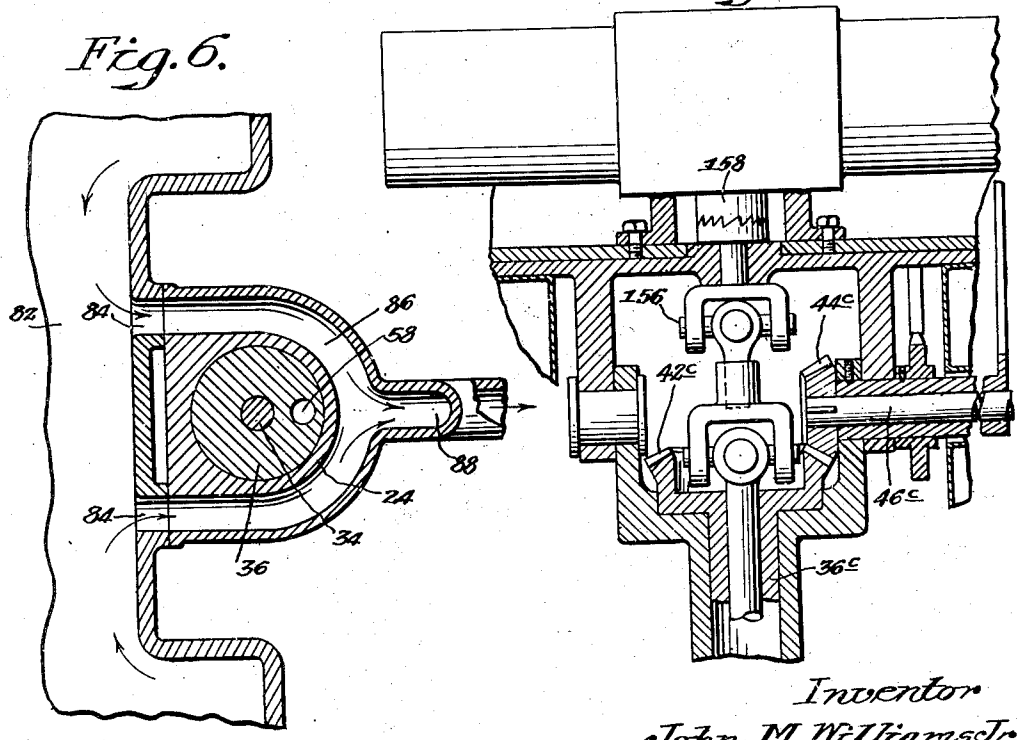


Fig. 10.

Fig. 6.



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Fig. 7.

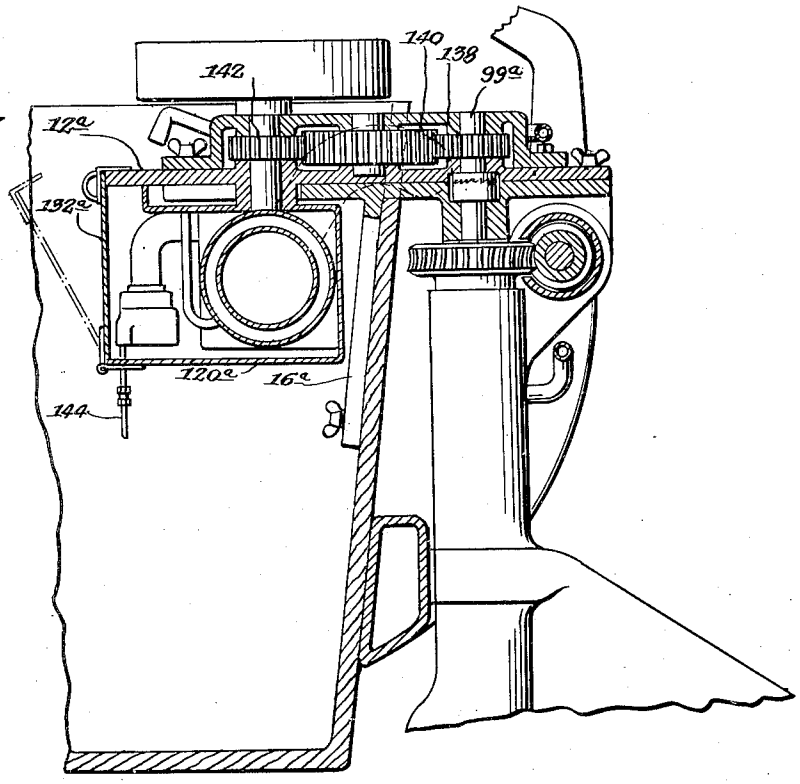
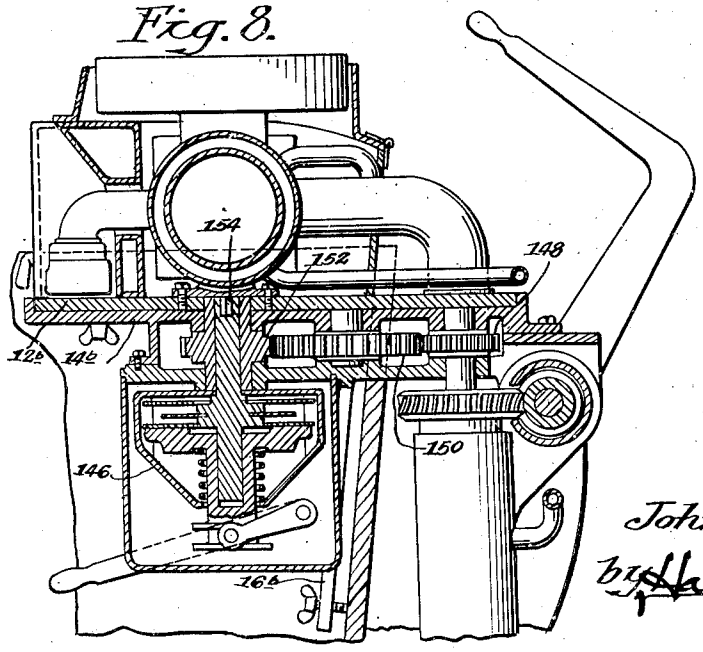


Fig. 8.



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Patented Aug. 24, 1937 2,091,247

UNITED STATES PATENT OFFICE

2,091,247

OUTBOARD MOTOR

John M. Williams, Jr., Woodbury, N. J., assignor of one-half to Harold D. Gregory, Hadden Heights, N. J.

Application June 26, 1934, Serial No. 732,418

7 Claims. (Cl. 115—18)

My invention relates to improvements in outboard motors.

The many various outboard motors constructed heretofore have comprised a single unit hung over the stern of the boat, and which includes a vertically-disposed propeller shaft. These motors are exposed to the elements, and for this reason are sometimes unreliable in wet weather. Some attempts have been made to muffle the noise of the engines in this type of outboard motor, but even with this improvement, they are very noisy in operation, and, furthermore, the muffling action generally means an appreciable loss of speed. Also, the vibration of these motors is relatively great, the control at all times is awkward, and, generally, they cause unnecessary discomfort to the entire crew. The fact that, in these outboard motors of the prior art, the engine is a permanent part of the unit, increases the difficulty of removal from the stern of the boat for repairs or to prevent theft. In this connection, the units, due to their being so cumbersome and heavy, are sometimes lost overboard in attempting to remove them from or place the same in position over the stern of the boat.

In the prior outboard motors of the general type referred to, furthermore, the engines are not in the logical position for immediate attention when necessary, and there is lack of control at high speed.

For the purpose of holding these prior outboard motors in position, a supporting bracket is clamped or otherwise secured to the stern of the boat, and the motor unit is hung from this by a pivotal connection. The entire unit, therefore, can swing sternward upon striking an underwater obstruction, or upon striking bottom in riding up on the beach.

With the foregoing disadvantages of the prior outboard motors in mind, it has been proposed to make a construction wherein there are two units, namely, an engine unit which is built permanently into and enclosed in the stern of the boat, below the deck, and an outboard propeller unit pivotally connected to the stern and driven from the engine through a breakable driving connection which is broken when the propeller unit swings sternward. While this proposed construction avoids some of the disadvantages referred to, it is a rather radical departure from the conventional outboard motor, and approaches more nearly the usual construction of a motor boat with a built-in engine disposed with its crankshaft substantially parallel to the keel.

With all the foregoing in mind, it is one of the objects of my invention to provide an improved construction of outboard motor which avoids the various disadvantages referred to, while still retaining the general classification of an outboard motor, rather than departing for this purpose into the classification of the usual motor boat with the permanently built-in engine.

Other objects and advantages will hereinafter appear.

In accordance with my invention, the outboard motor, so-called, is constructed in two units, both supported by a common bracket which is attached to the stern of the boat. The engine unit is mounted on the bracket, and can be easily removed therefrom without disturbing the other parts. The propeller shaft is hung from the bracket by a pivotal connection, and can therefore swing sternward when required, a breakable driving connection between the engine and the propeller shaft permitting this at any time. A muffler chamber is incorporated in the supporting bracket through which connections are made between this chamber and the engine exhaust pipes. Connections for the circulation of cooling water through the cylinder jackets are also made through the bracket. A casing associated with the supporting bracket completely encloses and protects the engine.

My invention resides in the improved construction of the character hereinafter described and claimed.

For the purpose of illustrating my invention, several embodiments thereof are shown in the drawings, wherein

Figure 1 is a vertical sectional view, the section being taken on the line 1—1 in Fig. 3;

Fig. 2 is a fragmentary, sectional view, taken from Fig. 1, the section being taken on the line 2—2 in Fig. 3;

Fig. 3 is an elevational view, looking toward the left in Fig. 1;

Fig. 4 is a view similar to Fig. 1, partly in section and partly broken away, the propeller unit being shown swung sternward;

Fig. 5 is an enlarged, fragmentary, elevational view, taken from Fig. 3, partly in section and partly broken away, the section being taken on the line 5—5 in Fig. 1;

Fig. 6 is an enlarged, fragmentary, sectional view, the section being taken on the line 6—6 in Fig. 1;

Figs. 7 and 8 are views similar to Fig. 1, illustrative, respectively, of several modifications;

Fig. 9 is a view similar to Fig. 4, illustrative of a modified driving connection between the engine and propeller units;

Fig. 10 is a sectional view, the section being taken on the line 10—10 in Fig. 9; and

Fig. 11 is an enlarged, fragmentary, sectional view, taken from Fig. 1.

With reference now to Figs. 1 to 6, the numeral 10 designates the engine unit, shown mounted on a base plate 12 which fits upon a platform 14 forming part of a supporting bracket construction 16. The plate 12 is secured to the bracket 16, and the latter is secured in place on the stern of the boat by stud bolts 18.

The propeller unit is designated generally by the reference numeral 22, and includes an outer, vertically-disposed casing 24 provided with spaced lugs 26 through which a bushing 28 extends, as more clearly shown in Fig. 5. Stud screws 30 and 31 pass through the lugs 26 and screw into the bushing 28.

For the purpose of pivotally connecting the propeller unit to the supporting bracket 16, the bushing 28 is journaled at its ends in spaced lugs 32 and 33 extending downwardly from the bracket platform 14, and between which the lugs 26 are disposed with a relatively loose fit.

The propeller-drive shaft 34 is rotatable in a cylindrical column 36 forming part of a member 38 which carries the propeller 40. The column 36 is rotatable in the casing 24, and is provided at its upper end with a worm wheel 42 which meshes with a complementary worm 44.

The worm 44 is fixed on a shaft 46 journaled in the bushing 28, as more clearly shown in Fig. 5, and also in a tubular bearing element 48. The element 48 has an enlarged head 50 at one end thereof which has a snug fit in the bushing 28, and which is fixed to the bushing by the stud screw 31. A lever 52 is fixed to the other end of the tubular element 48 for the purpose hereinafter explained.

Cooling water is supplied to the jackets of the engine cylinders 54 and 56 by the action of the propeller 40, which forces water up through a passage 58 in the member 38 and the column 36.

The passage 58 communicates with an annular groove 60 in the column 36, from which the water passes, by way of a connection 62, to an annular passage 64 in the bushing 28. An opening 66 through the bracket platform 14 provides communication between the passage 64 and a T-coupling 68 screwed into the base plate 12 and from which connections 70 and 72 lead to the cylinders 54 and 56, respectively. A compressible gasket 73 provides a water seal between the base plate 12 and the platform 14.

The exhaust gases leave the engine cylinders by way of exhaust pipes 74 and 76 which fit and connect respectively with complementary pipes 78 and 80 opening into a U-shape muffler chamber 82 formed in the supporting bracket 16. With the propeller unit 22 in the vertical operating position shown in Fig. 1, the muffler chamber 82 connects through openings 84 in the bracket 16 with a U-shape passage 86 in the casing 24, by way of which the exhaust gases pass into an outlet passage 88, as indicated by the arrows shown.

Cooling water leaves the jacket of cylinder 56 by a connection 90 which extends into the exhaust pipe 76. By terminating the end of the connection 90 at a Venturi neck 92 with which the pipe 76 is provided as shown in Fig. 2, an ejector action is provided for, whereby the flow of the exhaust gases through the Venturi neck is effective to draw the cooling water from the connection 90. This action works with that of the propeller 40, as explained, in maintaining the flow of cooling water.

A connection 94 operates in the same manner as the connection 90 to conduct cooling water from the jacket of cylinder 54 into the associated exhaust pipe 74, which is also provided with a Venturi neck.

From the foregoing it will be seen that the cooling water finds an outlet through the pipes 78 and 80, the muffler chamber 82, and passages 86 and 88.

Driving connection between the engine and the propeller shaft 34 is made by complementary ratchet wheels or gears 96 and 98. The gear 96 is fixed on the lower end of a vertical shaft 99 driven directly by the engine pistons, as will be well understood. The gear 98 is fixed on the upper end of the propeller shaft. The two gears, when engaged as shown in Fig. 1, are disposed within the recessed worm gear 42, with the engaging teeth in a horizontal plane through the axis of the pivotal connection between the propeller unit and the engine unit. The pivotal connection, therefore, is disposed on the stern side of the breakable driving connection between the engine and propeller units, and substantially at the same level as this connection.

If an underwater obstruction is encountered, or the boat is run up on the beach, the propeller unit 22 swings sternward as shown in Fig. 4, and the gears 96 and 98 are disengaged. Simultaneously with this action, a rod 100, slidably mounted on the bracket 16, is moved upwardly and to the left as viewed in Fig. 4 to open a switch 102 connected in the ignition circuit of the engine. For this purpose, the bushing 28 is provided with a notch 104 into which the lower end of the rod 100 fits as shown in Fig. 11 when the gears 96 and 98 are engaged. As the propeller unit swings sternward the cam action of the inclined side of the notch 104 forces the rod 100 outward against the action of a compressed spring 106, whereupon a collar 114 fixed on the rod engages the switch 102 to open it. Ratchet teeth 110 with which the bushing 28 is also provided then engage with the lower end of the rod, as shown in Fig. 4, to prevent return movement of the propeller unit until an outward pull is exerted on the handle 112 at the other end of the rod. When the propeller unit has moved back into the vertical position and the driving gears 96 and 98 are properly engaged, the lower end of the rod 100 is again free to enter the notch 104 under the action of the spring 106, in which case the shank of the handle 112 engages the ignition switch 102 to close it.

It will, therefore, be seen that my improved construction provides for automatic opening of the ignition circuit or other control means to shut down the engine simultaneously with the breaking of the driving connection 96, 98, and that the ignition is automatically turned on only when the propeller unit is again in operating position and the driving connection re-established. Racing of the engine when the load thereon is suddenly removed is thereby prevented.

By grasping the lever 52 and swinging it in a counterclockwise direction, as viewed in Fig. 1, the operator can swing the propeller unit sternward and bring about the same action just explained.

Pivotal movement of the propeller unit does not break or interfere with the inlet connection for cooling water to the cylinder jackets because the opening 66 always makes communication with the annular passage or groove 64 in the rotatable bushing 28. This is the advantage of supplying cooling water to the engine by way of the pivotal connection between the engine and propeller units.

Steering is accomplished by rotating the shaft 46, whereupon the worm gearing 42, 44 causes rotation of the member 38 about the vertical axis. For this purpose it is proposed to fix a pulley 116 on the shaft 46, about which is a rope 118 associated with the usual steering gear (not shown). It will be seen that the shaft 46 can be rotated to turn the propeller through 360 degrees in either direction. The boat can, therefore, be easily and quickly maneuvered. When the propeller is rotated through 180 degrees from the position shown in Fig. 1, engagement of the lower end of rod 100 in the notch 104 is sufficient to hold the propeller unit in the vertical position against a moderate sternward thrust. The spring 106, to provide for this, is placed under the proper tension by a collar 108 fixed on the rod 100.

A casing 120 completely encloses the engine, and is provided with the recess shown in Fig. 4 to accommodate the rod 100 and associated parts. The casing 120 is provided with partitions 123 and 124 to form fuel chambers 125 forward of the engine and on both sides of the carburetor 126 and the intake manifold 127. The fuel is placed into the chambers 125 by way of a connection 128 closed by a removable cap 130.

A cover 132 for the casing is pivotally connected thereto at 134, and is shaped to fit about the engine flywheel 135 when closed. By swinging the cover 132 upward to the open position shown in Fig. 1 by dash lines, access to the engine may be had. The cover of the engine casing slopes downwardly in the sternward direction, as shown at 136, to give a streamline effect. In this way, also, the pivotal connection 134 is caused to be substantially below the forward upper edge of the casing 120, so that when the cover is swung upward more room is allowed for inspection of and repair to the engine than would otherwise be the case.

The casing 120 and its cover 132, and the fuel chambers 125 disposed directly forward of the engine cylinders, muffle the engine noises.

In the modification shown in Fig. 7, the engine is disposed within the hull of the boat, below the stern deck, and is mounted on a base plate 12*a* secured to the supporting bracket 16*a*. The short shaft 99*a* corresponds to the shaft 99 in Fig. 1, and is driven by the engine through the gears 138, 140, and 142 mounted as shown on the plate 12*a* and forming part of the engine unit. A casing 120*a* encloses the engine and is provided with a cover 132*a*. Fuel is supplied to the carburetor by a connection 144 from a fuel tank which may be located in the bow. The construction and manner of operation is otherwise the same as in Figs. 1 and 6.

In Fig. 8 the engine is disposed within the boat, as in Fig. 7, but is mounted on the upper side of the supporting platform 14*b* which corresponds to the platform 14 in Fig. 1. Connection between the engine and the propeller shaft is made through a suitable clutch 146 and gears 148, 150, and 152 associated with and forming part of the propeller unit. In removing the engine unit, the base plate 12*b* is released from the platform 14*b*, and the unit lifted out. To permit this, the lower end 154 of the engine shaft is made square, and fits into a square hold in the clutch shaft. The construction and manner of operation is otherwise the same as in Figs. 1 to 6.

In the modification shown in Figs. 9 and 10, connection between the engine, and propeller shafts is made through a double universal joint 156. In removing the engine unit, complementary ratchet wheels 158 disengage. The cylindrical column 36*c*, which corresponds to the column 36 in Fig. 1, is provided with a bevel gear 42*c* which meshes with a bevel gear 44*c* fixed on the end of the shaft 46*c*. Steering is accomplished by rotating the shaft 46*c*. The complementary ends 160 and 162 of the universal joint are square and slidable one within the other to permit pivotal movement of the propeller unit, as shown in Fig. 9, without breaking the driving connection between the engine and the propeller. The construction and manner of operation are otherwise the same as in Figs. 1 to 6.

It will be understood that various other modifications, within the conception of those skilled in the art, are possible without departing from the spirit of my invention or the scope of the claims.

I claim as my invention:

1. In an outboard motor having a vertical shaft structure, a motor unit including an internal combustion engine mounted on the upper end of the shaft structure and a lower unit including a propeller; a bearing device embracing said vertical shaft structure and supporting the same for pivotal movement therein for steering the boat to which said outboard motor is adapted to be connected, a transom bracket structure secured to said bearing device, said transom bracket structure being formed to provide an exhaust chamber therein and having a substantially vertical wall, means including said wall for clamping said bracket structure to the boat, and an exhaust connection from said engine to said chamber whereby said chamber serves as an exhaust muffler.

2. In an outboard motor having a vertical shaft structure, a motor unit including an internal combustion engine mounted at one end of the shaft structure and a lower unit including a propeller at the other end of the shaft structure; a bearing device embracing said vertical shaft structure and supporting the same for pivotal movement therein for steering the boat to which said outboard motor is adapted to be connected, a transom bracket structure associated with said bearing device, said transom bracket structure being formed to provide an exhaust chamber therein and having a wall, means including said wall for clamping said bracket structure to the boat, and an exhaust connection from said engine to said chamber whereby said chamber serves as an exhaust muffler.

3. In an outboard motor, a bracke adapted to be applied to the stern board of a boat and provided with a bearing disposed to be in a position aft of such board when the bracket is applied thereto, an engine unit attached to said bracket for support thereby independently of direct support by the boat structure, a vertically disposed propeller unit pivotally connected to said bearing for support by said bracket independently of direct support by the boat structure and independently of support by said engine unit, said engine unit being supported by said bracket in-

dependently of said propeller unit and fixed against relative movement with respect to said bracket, and means providing a driving connection between said units.

4. In an outboard motor, a bracket adapted to be applied to the stern board of a boat and provided with a bearing disposed to be in a position aft of such board when the bracket is applied thereto, an engine unit attached to said bracket for support thereby independently of direct support by the boat structure, a vertically disposed propeller unit pivotally connected to said bearing for support by said bracket independently of direct support by the boat structure and independently of support by said engine unit, said engine unit being supported by said bracket independently of said propeller unit and fixed against relative movement with respect to said bracket, means providing a driving connection between said units, said propeller unit comprising a member rotatable about the vertical axis through three hundred and sixty degrees in either direction and a propeller rotatable with said member about said axis, and means for rotating said member about said axis.

5. In an outboard motor, a bracket adapted to be applied to the stern board of a boat and provided with a bearing disposed to be in a position aft of such board when the bracket is applied thereto, an engine unit attached to said bracket for support thereby independently of direct support by the boat structure, a vertically disposed propeller unit pivotally connected to said bearing for support by said bracket independently of direct support by the boat structure and independently of support by said engine unit, said engine unit being supported by said bracket independently of said propeller unit and fixed against relative movement with respect to said bracket, and means providing a driving connection between said units, said propeller unit being provided with an exhaust-gas outlet passage having communication with said engine unit and disposed below the water-line of said outboard motor.

6. In an outboard motor, a bracket adapted to be applied to the stern board of a boat and provided with a bearing disposed to be in a position aft of such board when the bracket is applied thereto, an engine unit attached to said bracket for support thereby independently of direct support by the boat structure, a vertically disposed propeller unit pivotally connected to said bearing for support by said bracket independently of direct support by the boat structure and independently of support by said engine unit, said engine unit being supported by said bracket independently of said propeller unit and fixed against relative movement with respect to said bracket, means providing a driving connection between said units, said propeller unit comprising a member rotatable about the vertical axis through three hundred and sixty degrees in either direction and a propeller rotatable with said member about said axis, said propeller unit being provided with an exhaust-gas outlet passage having communication with said engine unit and disposed below the water-line of said outboard motor, and means for rotating said member about said axis.

7. In an outboard motor, a bracket adapted to be applied to the stern board of a boat and provided with a bearing disposed to be in a position aft of such board when the bracket is applied thereto, an engine unit attached to said bracket for support thereby independently of direct support by the boat structure, a vertically disposed propeller unit pivotally connected to said bearing for support by said bracket independently of direct support by the boat structure and independently of support by said engine unit, said engine unit being supported by said bracket independently of said propeller unit and fixed against relative movement with respect to said bracket, and means providing a driving connection between said units, said outboard motor being provided with a passage for cooling water for said engine unit and passing through said bearing whereby the connection with said engine unit for the cooling water is maintained during occurring pivotal movement of said propeller unit about said bearing.

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