

Sept. 23, 1941.

R. KAREY

2,256,831

OUTBOARD MOTOR

Filed April 23, 1938

5 Sheets-Sheet 1

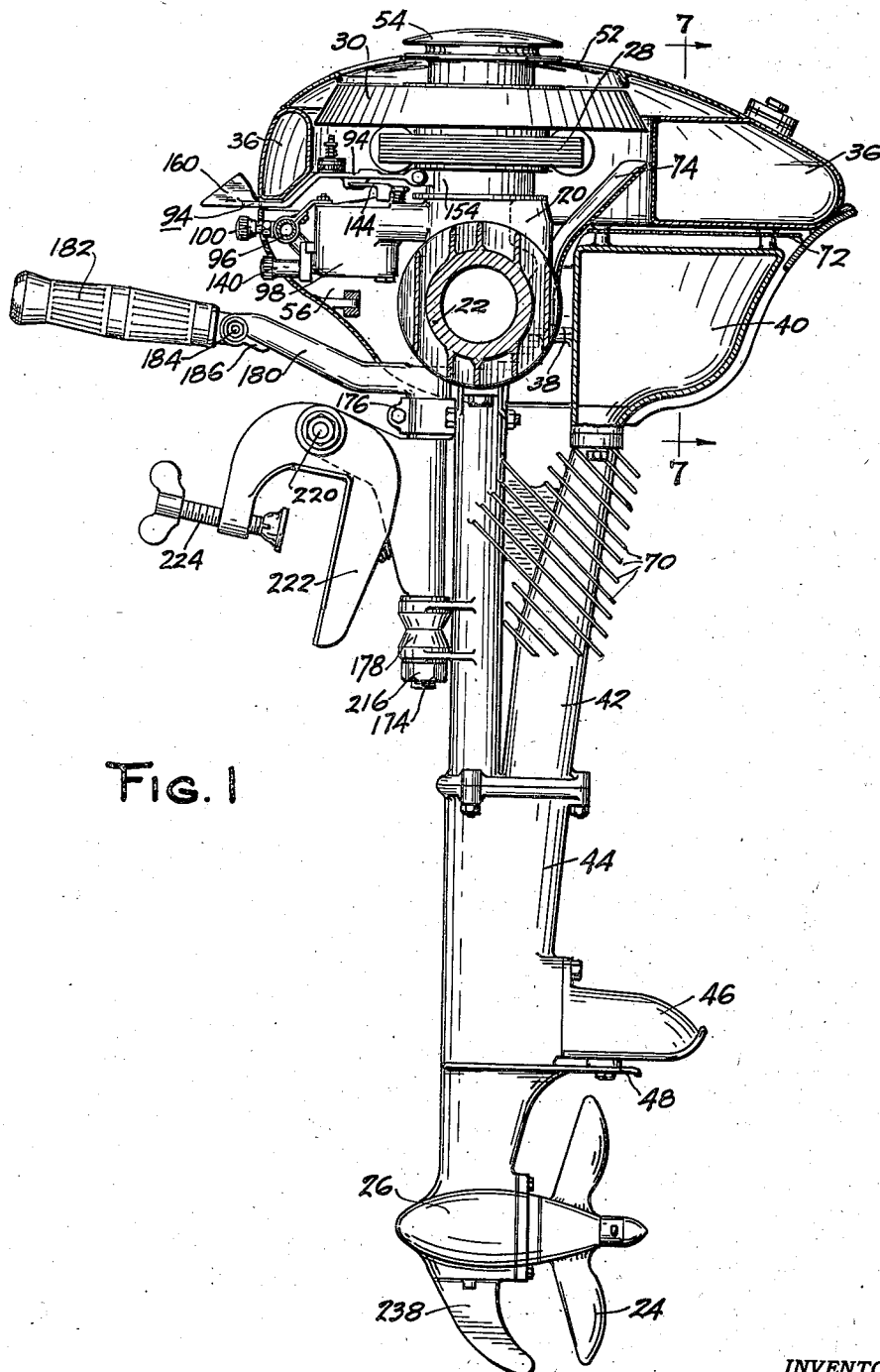


FIG. 1

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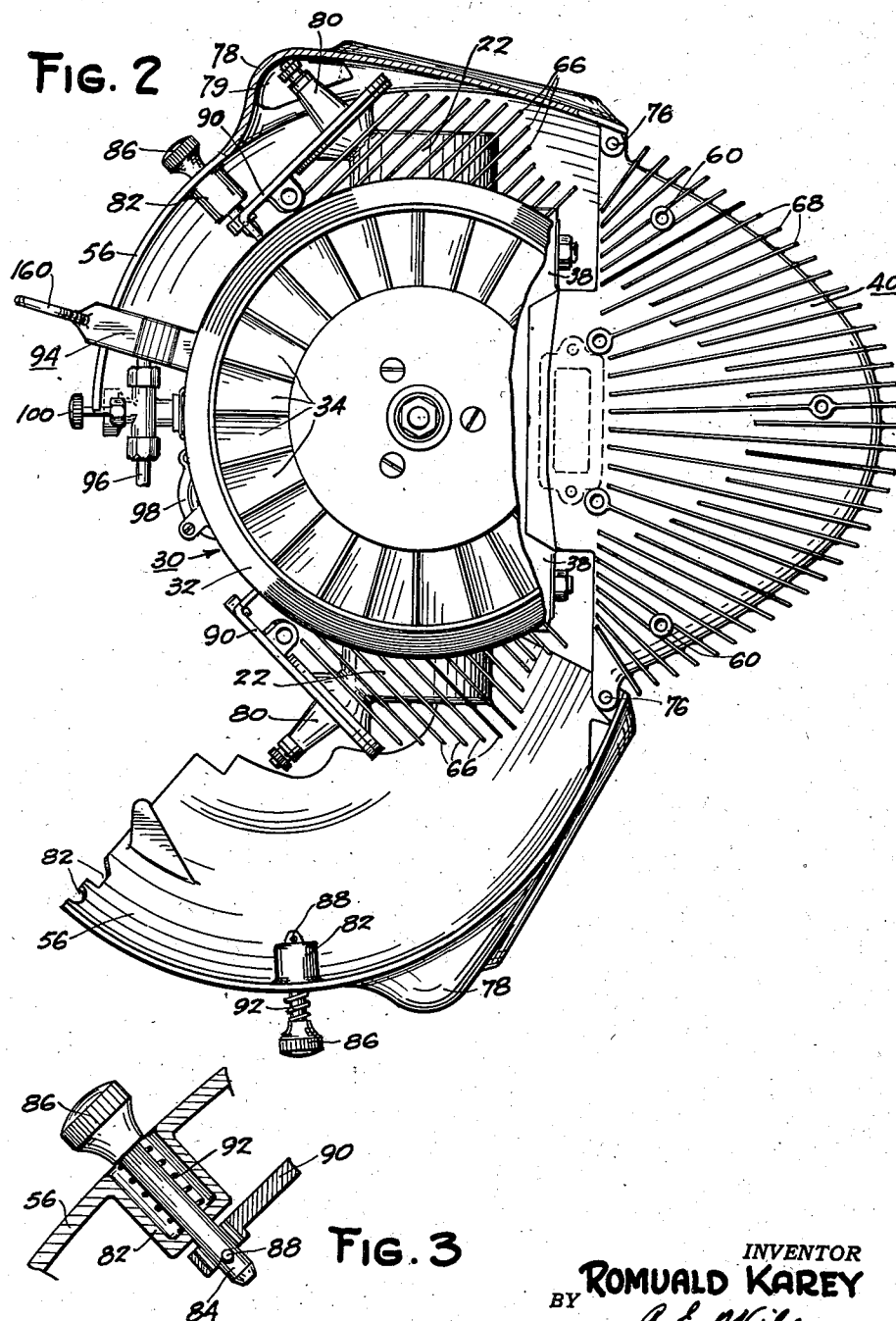
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FIG. 4

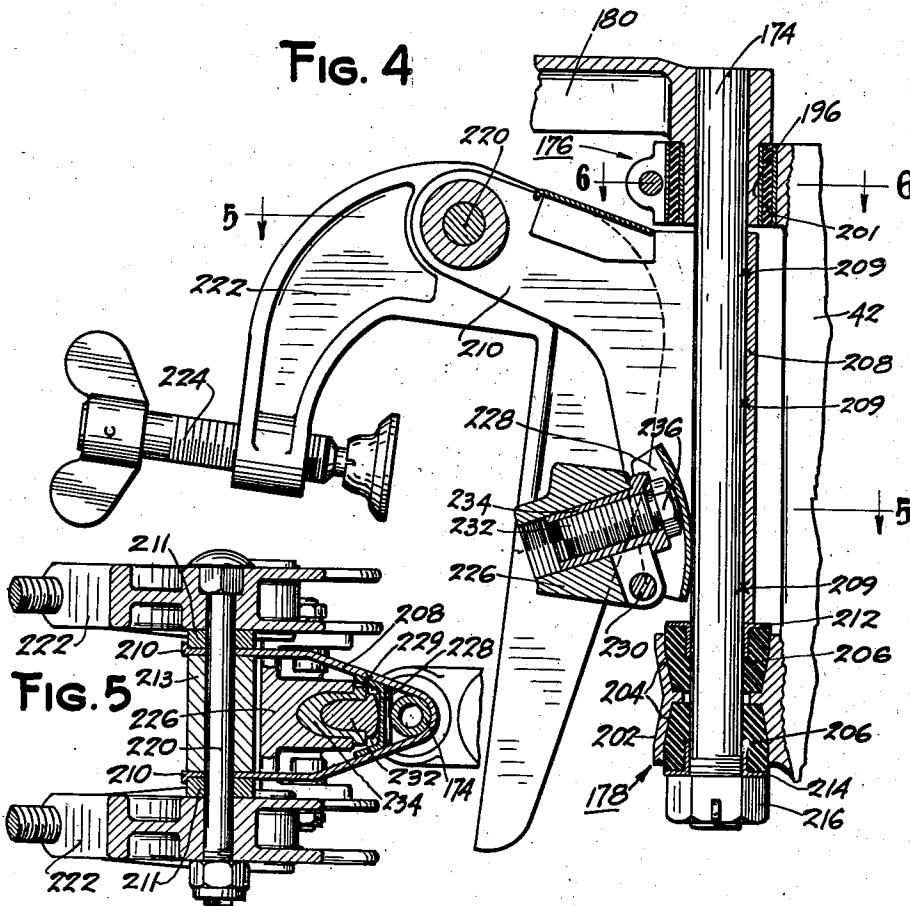


FIG. 5

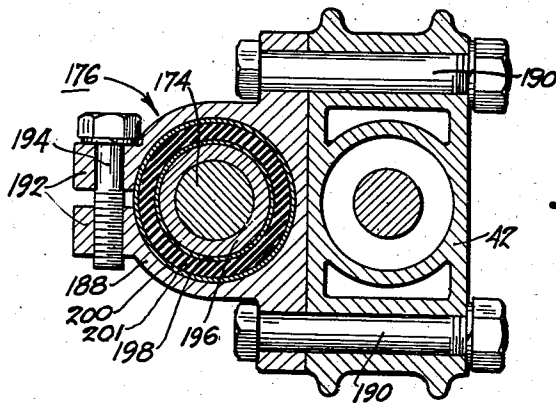


FIG. 6

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FIG. 7

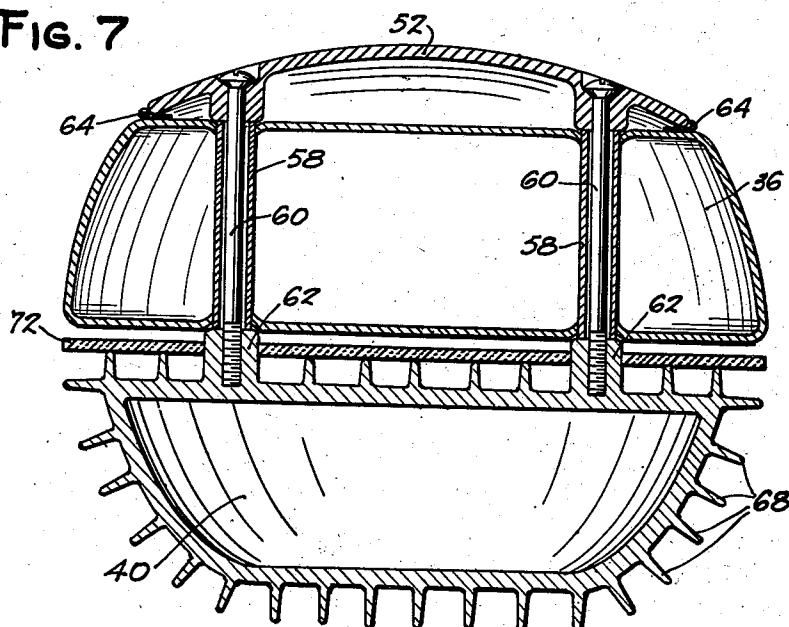


FIG. 8

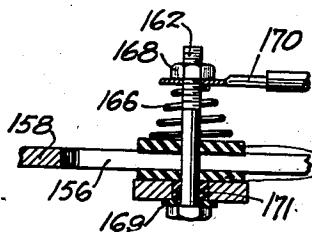
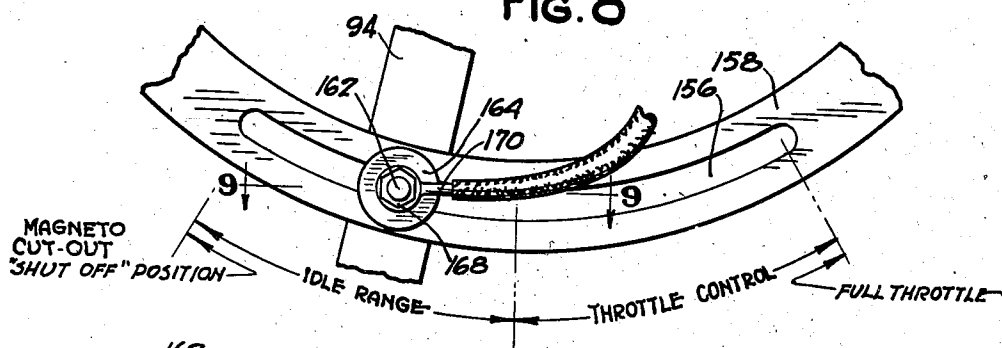


FIG. 9

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FIG. 10

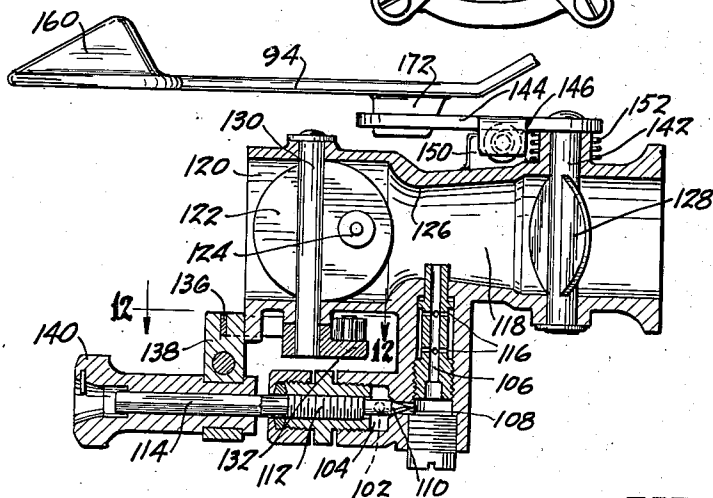
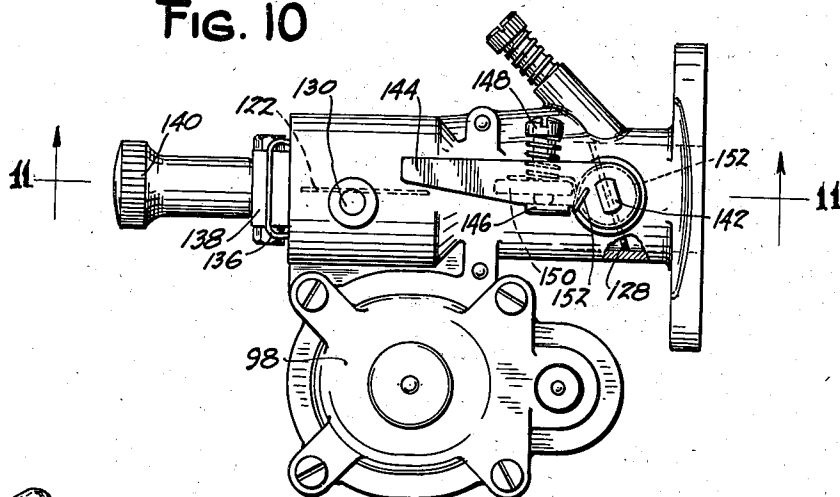


FIG. 11

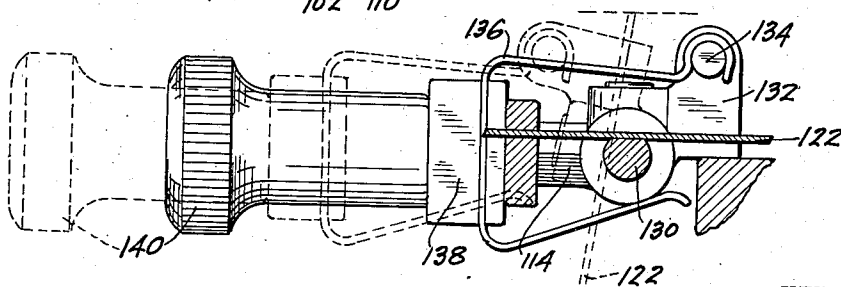


FIG. 12

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UNITED STATES PATENT OFFICE

2,256,831

OUTBOARD MOTOR

Romuald Karey, South Bend, Ind., assignor to
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a corporation of Delaware

Application April 23, 1938, Serial No. 203,726

4 Claims. (Cl. 115-18)

This invention relates to marine propulsion devices and more particularly to that type of marine propulsion device known as an outboard motor.

An object of this invention is to provide an outboard motor having a multi-cylinder engine, wherein the associated parts thereof are designed in such a manner as to produce a compact unit which may be manufactured economically.

Another object of the invention is to provide novel readily accessible means for actuating the spark and throttle controls of the engine.

A further object is to provide a single lever control mechanism for actuating the throttle and spark controls and to ground the magneto to stop the engine.

A further object is to provide a carburetor having improved choke and fuel valve control means.

A still further object of the invention is to provide an air cooled outboard motor wherein the power unit fuel tank and exhaust outlet means are proportioned in such a manner as to permit of the use of a high degree of streamlining.

Yet a further object of the invention is to provide hinged doors in the side walls of a streamlined casing surrounding the engine to permit easy access to the vital units of the engine to facilitate adjustment or repair thereof.

Another object of the invention is to provide means for directing air from a bladed flywheel positioned above the engine crankcase to cool the crankcase and engine cylinders, as well as to cool the novel exhaust outlet means positioned beneath the fuel tank of the engine.

Yet a still further object of the invention is to provide adjustable friction means to hold the spark and throttle control means from undesirable movement due to vibration.

Another object is to provide a resilient means between the power unit and the tiller to prevent vibration from being transmitted from the engine to the operator.

Yet another object is to provide a streamlined fuel tank having reinforcing cylindrical passageways therethrough to receive fastening means.

A further object is to provide an outboard motor fuel tank so shaped as to surround a portion of the power unit and proportioned to cooperate with the associated units in presenting a streamlined structure.

Another feature of the invention resides in the provision of air cooled exhaust outlet means having radially extending cooling fins wherein the outlet means is shaped to provide an expansion chamber adjacent the engine cylinders and proportioned to cooperate with the associated units in presenting a streamlined structure.

A further feature of the invention is the pro-

vision of novel means to vary the angle between the drive shaft of the motor and the transom of the boat.

Other objects and advantages of this invention will be apparent from the following detailed description thereof, considered in connection with the accompanying drawings, submitted for purposes of illustration only and not intended to define the scope of the invention, reference being had for that purpose to the subjoined claims.

In the drawings, wherein similar reference characters refer to similar parts throughout the several views:

Figure 1 is a side elevational view, partly in section, of my novel outboard motor assembly;

Figure 2 is a plan view of the outboard motor illustrated in Figure 1 with the fuel tank and top cover plate removed;

Figure 3 is a sectional view of the latching means on an enlarged scale;

Figure 4 is a partial sectional view of the attaching and steering mechanism illustrated in Figure 1;

Figure 5 is a sectional view taken on the line 5-5 of Figure 4;

Figure 6 is a sectional view taken on the line 6-6 of Figure 4;

Figure 7 is a sectional view taken on the line 7-7 of Figure 1;

Figure 8 is a fragmentary plan view showing portions of the throttle and spark levers and the quadrant defining the path of movement thereof;

Figure 9 is a sectional view taken on the line 9-9 of Figure 8;

Figure 10 is a plan view of the carburetor for the engine of my outboard motor;

Figure 11 is a sectional view taken on the line 11-11 of Figure 10; and

Figure 12 is a sectional view taken on the line 12-12 of Figure 11.

Referring more particularly to the drawings, it will be observed that I have illustrated my invention as embodied in an outboard motor wherein an air cooled engine having a crankcase 20 and opposed cylinders 22 is utilized to drive a propeller 24 to move a boat, to which the motor may be attached, through the water.

The lower end of the crankshaft of the engine is connected to the propeller 24 by means of vertically and horizontally extending shafts interconnected by gears positioned in a housing 26. The upper end of the crankshaft carries the oscillatory field member 28 of a magneto and a flywheel 30. The flywheel 30 has a conical shaped rim section 32 and a plurality of air directing blades 34 extending from the hub to the rim thereof.

In an effort to conserve space and to present as attractive appearance as possible, a fuel tank 36 is shaped to surround the engine.

The exhaust gases from the cylinders 22 of the engine are directed through spaced passages 38 to an expansion chamber 40 shaped to underlie the fuel tank 36 and proportioned to cooperate with the fuel tank and the other units to present a streamlined structure. The exhaust gases are discharged from the expansion chamber 40 to a downwardly directed enlarging passageway formed in upper and lower drive shaft housing members 42 and 44. As the exhaust gases pass downwardly they are cooled by the air flowing over the housing members and by the water flowing past the lower housing member 44. The gases contract as they flow downwardly, and are discharged through a rearwardly directed exhaust outlet member 46 carried by the lower housing member 44. The lower housing member 44 is provided with an anti-cavitation plate 48 positioned to overlie the propeller 24.

A cover member 52 having a series of apertures therein is positioned to overlie the flywheel 30 and is shaped to engage the upper surface of the fuel tank 36. A starting wheel 54 fixed to the upper end of the engine crankshaft projects through the cover member 52 and is provided with notched sections to engage the end of a rope to be wrapped around the wheel to start the engine by rotating the crankshaft as the rope is pulled from the wheel. It will be obvious of course that if desired, a starting mechanism of the type disclosed in the copending application of Frank V. Kuznitz, Serial No. 180,264, filed December 17, 1937, may be utilized instead of the starting wheel 54.

Referring now more particularly to Figures 1 and 2, it will be observed that the cover member 52, the fuel tank 36, the exhaust expansion chamber 40, and a pair of generally vertically disposed hinged doors 56 cooperate to present a streamlined structure of pleasing artistic appearance.

As more clearly shown in Figure 7, it will be observed that the fuel tank 36 is provided with generally vertically extending cylindrical tubes 58 welded or otherwise secured therein to receive bolts 60 and to reinforce the tank. The bolts 60 pass through the cover member 52 and the fuel tank 36 and are threaded into bosses 62 carried by the expansion chamber 40 to hold the three units securely together. A strip of resilient material 64 such for example as leather is interposed between the cover member 52 and the fuel tank 36 to prevent the emission of noise due to vibration.

The crankcase 20 of the engine is provided with radially extending heat dissipating flanges to facilitate the transmission of heat therefrom. The engine cylinders 22, the expansion chamber 40 and the upper portion of the housing member 42 are also provided with heat dissipating flanges 66, 68 and 70 to assist in the rapid cooling of these elements.

A shield 72 formed of asbestos or other heat resistant material is interposed between the upper surface of the expansion chamber 40 and the lower surface of the fuel tank 36 to prevent the flow of heat to the fuel tank 36.

An air directing scoop 74 is positioned to underlie the rearward extremity of the flywheel 30 and to direct air downwardly and forwardly to impinge upon the finned crankcase of the engine to adequately cool it.

In the operation of this device, the blades 34 of the rotating flywheel 30 draw cooling air downwardly through the apertures in the cover

plate 52. The air directing scoop 74 and the vertically disposed doors 56 direct the air to flow over the crankcase and engine cylinders to cool the engine. A portion of the air flows rearwardly between the expansion chamber and the fuel tank, thereby cooling the expansion chamber, and is discharged at the rear. The remainder of the air flows downwardly and is discharged at the bottom of the doors 56 and passes over the heat radiating fins 70 carried by the upper portion of the housing 42 to cool the downwardly flowing exhaust gases.

The generally vertically disposed doors 56 are hinged as at 76 and are shaped to be adjacent to the fins 66 of the cylinders. Indentations 78 insulated as at 79 are formed in the doors 56 to accommodate spark plugs 80. The ends of the doors remote from the hinges 76 are apertured at 82 to accommodate the projecting control means hereinafter more fully described. It will be apparent of course that when the doors 56 are swung to the open position, the operator has free access to the vital units of the engine to make any desired adjustments or repairs.

The doors 56 may be retained in the closed position by means of spring pressed latch mechanisms housed in inwardly extending cylindrical indentations 82 in the side walls of the doors. A rotatable shaft 84 having a manually operable knob 86 extends through the indentation 82 and is provided with a cross pin 88 in the end thereof to slide through a slot and engage in a groove in a bar 90 fixed to the head of the engine cylinder 22. A spring 92 interposed between the knob 86 and the bottom of the indentation 82 serves to urge the shaft in the outward direction to hold the pin 88 in engagement with the bar 90. To close the door the shaft 84 is rotated to such a position that the pin 88 will pass through the slot in the bar 90. The shaft is then rotated until the pin 88 engages in the groove in the bar whereupon the knob 86 is released permitting the spring 92 to urge the shaft 84 outwardly to hold the pin in the groove and hold the door 56 closed.

Attention is particularly directed to the fact that an improved single lever control mechanism 94 is provided to actuate the throttle and spark controls of the engine.

Fuel is supplied from the fuel tank 36 through a conduit 96 to the float chamber 98 of a plain tube carburetor, a manually operable valve member 100 (Figure 1) projecting outwardly from the motor being provided to shut off the fuel flowing through the conduit 96.

Referring more particularly to Figures 10 to 12, it will be observed that fuel from the float chamber 98 is delivered by gravity through an orifice 102 to a restricted chamber 104 adjacent one end of the main fuel nozzle 106. The chamber 104 communicates with the main fuel nozzle 106 by way of an orifice 108 controlled by a tapered metering pin 110 having a threaded portion 112 and a square section 114 extending beyond the threaded portion. As the fuel flows up the main fuel nozzle 106 it is diluted with a small quantity of air admitted through the transversely extending passageways 116 and is delivered to the main induction passage 118 of the carburetor.

Air is admitted to the induction passage through an air inlet passage 120 controlled by a choke valve 122 having a spring pressed poppet relief valve 124 positioned therein to admit a small quantity of air when the choke valve 122 is in the fully closed position.

It will be observed that the main fuel nozzle 106 communicates with the induction passage 118 at the most restricted section of a venturi 126 positioned intermediate the choke valve 122 and a butterfly throttle valve 128 which controls the flow of fuel and air through the induction passage 118 to the crankcase 20 of the engine. The combustible charge is by-passed to the combustion chambers of the engine cylinders during the operation of the engine in a well-known manner.

The choke valve 122 is mounted on a shaft 130 rotatably mounted in the walls of the induction passage 118. One end of the shaft 130 has an actuating lever 132 fixed thereto. The portion of the lever 132 remote from the shaft 130 is provided with a pin 134 adapted to receive one end of a U-shaped spring 136 operably connected by means of stop member 138 to a manually controlled knob member 140 slidably mounted on the square section 114 of the metering pin 110. As the knob 140 is pulled outwardly, toward the dotted line position on Figure 11, the spring 136 exerts a force on the pin 134 to rotate the lever 132 and the shaft 130 to move the choke valve 122 in the direction to close the air inlet passage 120, thereby decreasing the amount of air admitted and increasing the richness of the mixture supplied to the engine.

Attention is called to the fact that the knob 140 engages the square section 114 of the metering pin 110. The quantity of fuel supplied to the fuel nozzle 106 can therefore be controlled by rotating the knob 140 to move the tapered metering pin 110 to vary the size of the orifice 108, thereby controlling the richness of the mixture supplied to the engine.

The throttle valve 128 is fixed in a shaft 142 rotatably mounted in the walls of the induction passage 118. A lever 144 fixed to one end of the shaft 142 may be employed to rotate the shaft to vary the position of the throttle valve 128 to control the speed of the engine. An ear 146 carried by the lever 144 abuts a fixed stop 150 fitted with an adjusting screw 148 adapted to control the initial or closed position of the throttle valve 128.

Yielding means, such for example as a concentrically wound spring 152 connected to the ear 146 carried by the lever 144, and the stop member 150, operates to urge the lever 144 in the direction to close the throttle valve 128.

The time of ignition of the charge in the combustion chambers of the engine may be controlled by oscillating the element 164 carrying the magneto field 28 of the magneto by means of the lever 94. The lever 94 is oscillatably mounted in an arcuate shaped groove 166 formed in a quadrant member 158 fixed with reference to the cylinders 22 of the engine. The outer end of the lever 94 is provided with a fin shaped manually operable member 160 projecting outwardly beneath the fuel tank 30.

To guard against movement of the lever 94 with reference to the quadrant 158 due to vibration, an adjustable friction control means is provided. Referring to Figures 8 and 9, it will be observed that a bolt 162 projects through the lever 94 and the quadrant 158. Insulating friction means 164 are positioned on opposite sides of the quadrant 158 and yielding means such as a spring 166 is positioned between the quadrant 158, but insulated therefrom by washer 164, and a nut 168 threaded on the bolt 162. A ground wire 170 from the magneto is connected to the bolt 162. This bolt is insulated with reference to

the quadrant 158 by means of the insulating friction means 164; however, when the lever 94 is swung to the extreme left-hand position (Figure 8), the bolt 162 contacts the metal of the quadrant 158 and grounds the magneto to stop the engine. The bolt 162 is also insulated from the lever 94 by means of an insulating washer 169 and tubing 171, to prevent the magneto being grounded through the lever 94. The ignition is advanced by moving the lever 94 to the right as viewed on Figure 8.

As illustrated in Figure 11, it will be observed that the ignition control lever 94 carries a downwardly projecting lug 172 designed to engage the end of the throttle control lever 144 of the carburetor to actuate it when the ignition control lever has moved to approximately the mid section of the groove 166 in the quadrant 158.

It will thus be observed that an improved single lever control mechanism is provided wherein the magneto is grounded to stop the engine when the lever 94 is moved to the extreme left-hand position when facing the device; the spark is progressively advanced throughout the range of movement of the lever 94 to the right, and the throttle is opened to accelerate the engine when the lever 94 is moved from the mid position to the right. As the lever 94 is moved from the extreme right-hand position, the spring 152 holds the throttle control lever 144 in engagement with the lug 172 on the lever 94, thereby closing the throttle 128 and decelerating the engine.

The outboard motor may be clamped to the transom of a boat by means of the clamping and steering mechanism more clearly shown in Figures 4, 5 and 6.

A generally vertically disposed shaft 174 is clamped to the upper drive shaft casing 42 by means of upper clamping member 176 and lower supporting lug 178. The upper end of the shaft 174 is provided with a radially extending steering lever 180. A manually operable member 182 preferably of resilient material, is hingedly connected to the outer end of the radially extending lever 180 by means of a bolt 184. A stop member 186 is provided to prevent the member 182 from swinging downwardly with reference to the lever 180 beyond a predetermined point; however, the member 182 is free to swing upwardly about the bolt 184.

The steering of the boat is effected by turning the entire motor assembly about the shaft 174 as an axis. It will be noted that the axis of the shaft 174 is parallel to and positioned forwardly of the vertically extending drive shaft of the engine. Because of this mounting, the torque reaction of the engine is less effective to rotate the motor assembly about the steering shaft as an axis so as to affect the steering of the craft.

The upper clamping member 176 comprises a cylindrical bracket 188 fixed to the upper drive shaft casing 42 by bolts 190 or other suitable means. The bracket 188 is provided with radially extending projections 192, one of which is threaded to receive an adjusting bolt 194 passing through the other to tighten the clamp.

The inner end of the lever 180 which engages the shaft 174 has a section of reduced diameter 196. A pair of concentric rings 198 and 200 are interposed between the section of reduced diameter 196 of the lever 180 and the clamp 188. Resilient material 202 such for example as rubber is vulcanized or otherwise secured between the rings 198 and 200 to absorb vibration from the engine. The inner ring 198 is a drive fit on the

section of reduced diameter 196, and the clamp 188 is tightened to securely engage the outer ring 200.

The lower supporting lug 178 comprises a generally cylindrical member 202 formed integral with the drive shaft housing 42. The cylindrical member 202 is formed with inversely disposed conical shaped surfaces 204 adapted to receive resilient conical shaped members 206 formed of rubber or other suitable material surrounding the shaft 174, metallic ferrules 212, 214 engaging the members 206 to confine them during compression.

A swivel bracket 208 embraces the shaft 174 between the supporting member 176 and lug 178 and is fixed thereto preferably by arc welding, as indicated at 209. The oppositely disposed flanges of the bracket are formed at their upper portions into forwardly projecting members 210 which are pivoted by means of a tilting shaft 220 to the boat engaging bracket 222. Friction washers 211 of Bakelite or other similar material are provided between the boat brackets 222 and the arms 210 of swivel bracket 208. A sleeve 213 is positioned between the arms 210 to permit functioning of the friction members when proper adjustment is made on the tilting shaft 220. The bracket 222 has a manually operable adjusting screw 224 to clamp the motor assembly to the transom of the boat.

The lower end of the shaft 174 is threaded to receive a nut 216 which when tightened forces the resilient members 206 into engagement with the conical shaped surfaces 204 of the cylindrical member 202. The resilient members 201 and 206 absorb the lateral and vertical vibrations of the engine, thereby preventing the transmission of objectionable vibration to the operator.

Means are provided to vary the angle between the boat engaging bracket 222 and the shaft 174 to accommodate the motor for use with boats having transoms set at varying angles. As illustrated in Figures 4 and 5, the angle varying means comprises a bracket 226 carried by the boat engaging bracket 222. A generally arcuate shaped thrust member 228 is fixed, by welding as indicated at 229, to the opposite interior faces of bracket 208 and bears against the shaft 174 to transmit thrust from the outboard motor to the transom of the boat. A compound angle adjusting mechanism including inner and outer threaded screws 232 and 234 is received in a threaded bore formed in the bracket 226, being clamped in place by means of a bolt 230. The head 236 of the inner screw 232 engages the arcuate shaped guard member 228. The threads of the inner and outer screws 232 and 234 may be of a different pitch to avoid the possibility of vibration changing the adjustment when the motor is in use. To change the adjustment mechanism, the motor assembly is tilted outwardly about the tilting shaft 220 as a pivot, to expose the screw head 236, and the screws 232 or 234 turned until the desired angular relation is obtained.

A protective fin or skeg 238 extending below the gear case housing 26 is provided to protect the propeller 24. In the event that the lower portion of the device strikes a submerged object, the motor will pivot about the tilting shaft 220 to permit the propeller 24 to ride over the object. The handle 182 also hinges upwardly about

the bolt 184 to avoid injuring the operator's hand by contacting a portion of the boat.

While the invention has been described with particular reference to one illustrative embodiment thereof, it is to be understood that the scope of the invention is to be determined only in accordance with the following claims, as many changes may be made in the details of construction without departing from the spirit of the invention.

I claim:

1. An outboard motor comprising an air cooled engine having a crankcase and multiple cylinders, an exhaust expansion chamber positioned adjacent and rearwardly of the cylinders, a bladed flywheel drivably connected to the engine, a ring shaped fuel tank surrounding a portion of the engine, the tank being intermediate the bladed flywheel and the cylinders, a cover plate surmounting the fuel tank, and hinged side-wall doors surrounding a portion of the engine, the fuel tank, expansion chamber, cover plate and side-wall doors being shaped to present a streamlined structure.

2. An outboard motor comprising an air cooled engine having a crankshaft, a crankcase and multiple cylinders provided with cooling fins, an exhaust expansion chamber having cooling fins positioned adjacent and rearwardly of the cylinders, a bladed flywheel carried by the crankshaft, a fuel tank surrounding a portion of the engine, an apertured cover plate surmounting the fuel tank, hinged side-wall doors surrounding a portion of the engine, the fuel tank, expansion chamber, cover plate and side-wall doors being shaped to present a streamlined structure, and an air directing baffle positioned to direct air from the bladed flywheel to cool the engine and expansion chamber.

3. In an outboard motor comprising an internal combustion engine having a magneto, manually operable means including levers to control the magneto, a quadrant having an arcuate shaped groove, connecting means including a bolt between the magneto control lever and the quadrant, a magneto ground wire connected to said bolt, insulating means between the quadrant and bolt to shield the bolt from the quadrant when moved in the groove to all positions except one extreme position.

4. An outboard motor comprising an air cooled engine having a crankshaft and multiple cylinders, an exhaust expansion chamber positioned adjacent and aft of said cylinders, a housing communicating with the expansion chamber and having a downwardly expanding exhaust passageway communicating with an under water exhaust outlet, a bladed flywheel drivably connected to the crankshaft, a ring shaped fuel tank surrounding a portion of said engine, said tank being between the bladed flywheel and cylinders and comprising an air conduit to said cylinders, a magneto driven by the crankshaft, the magneto having a movable element to vary the time of ignition, a spark control lever to actuate the movable element, a carburetor having a throttle valve, a throttle control lever for said valve, means carried by said spark control lever for engaging the throttle control lever, and means for grounding the magneto when the spark control lever is in a predetermined position.

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