

July 23, 1940.

L. J. JOHNSON ET AL

2,209,301

OUTBOARD MOTOR

Filed Nov. 16, 1935

5 Sheets-Sheet 1

Fig. 1.

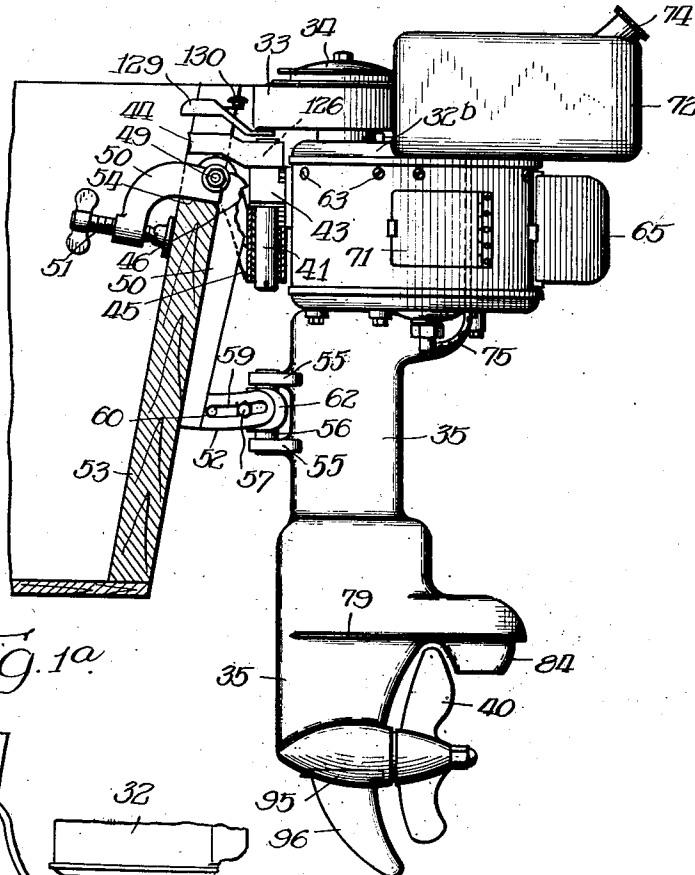


Fig. 1a.

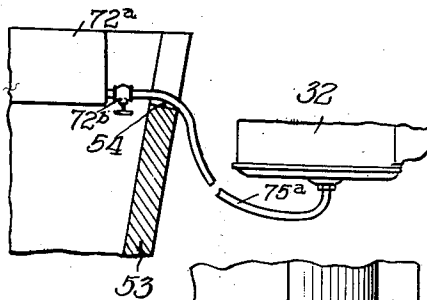
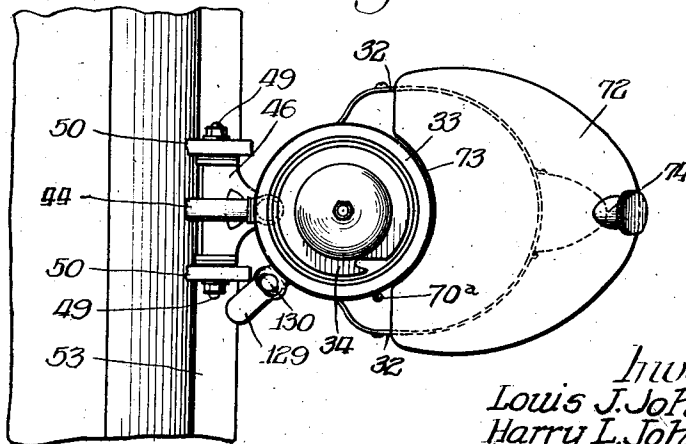


Fig. 2.



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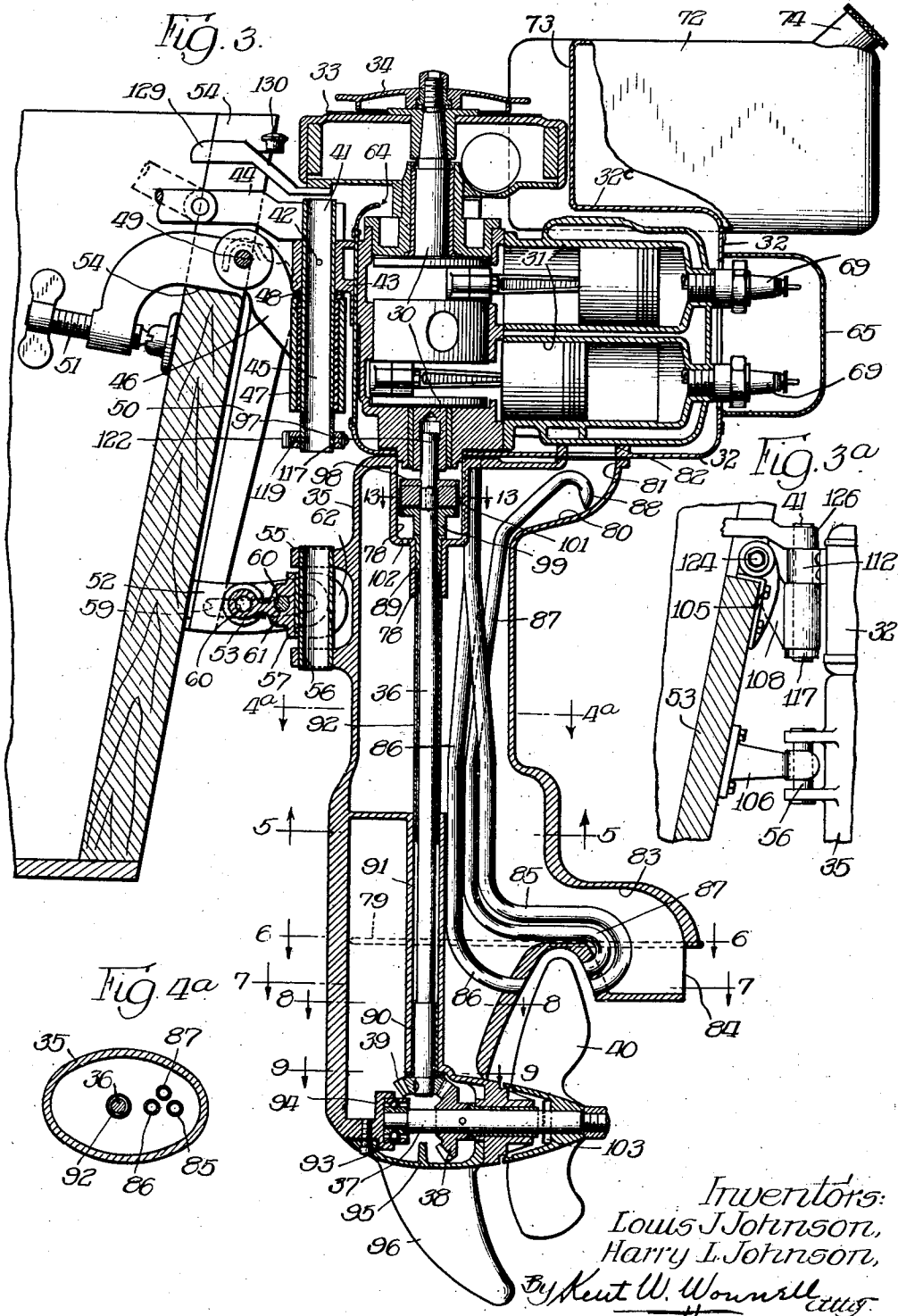
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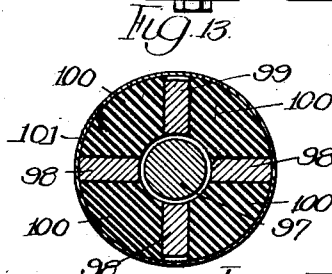
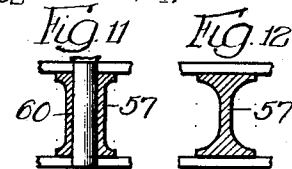
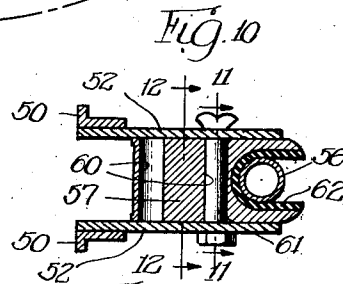
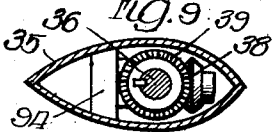
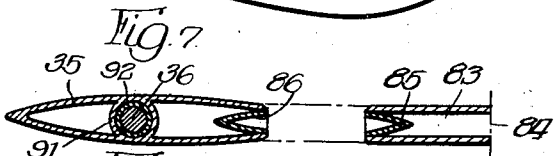
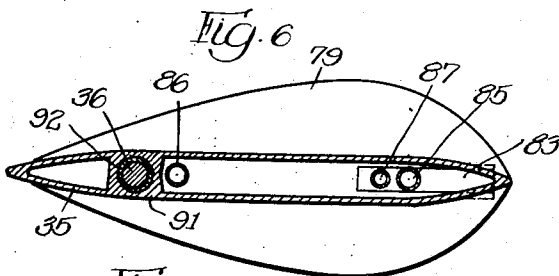
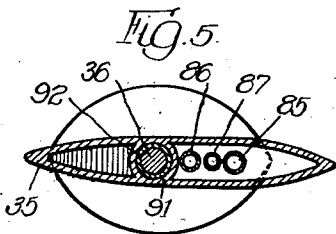
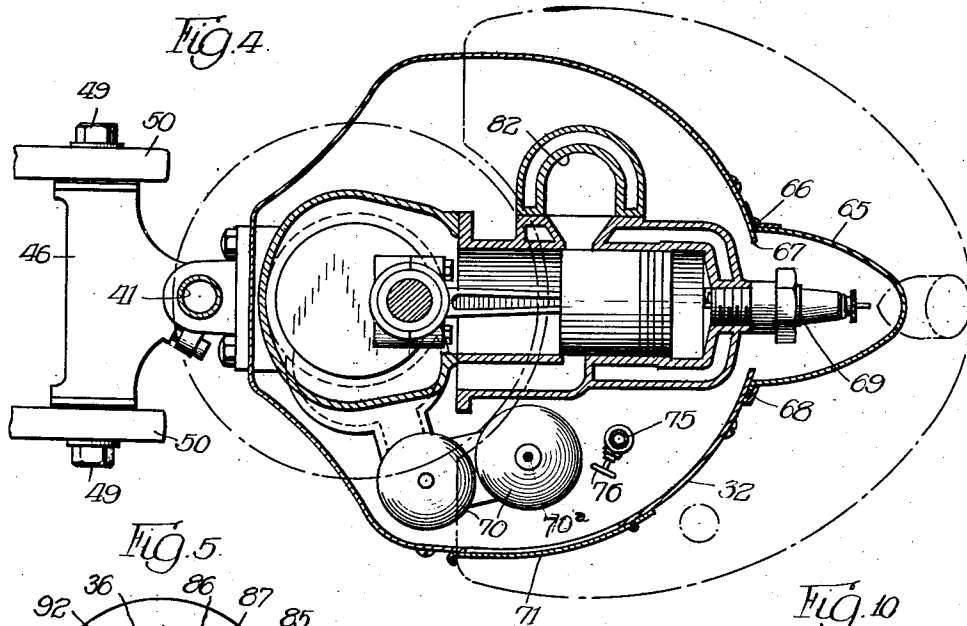
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OUTBOARD MOTOR

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5 Sheets-Sheet 3



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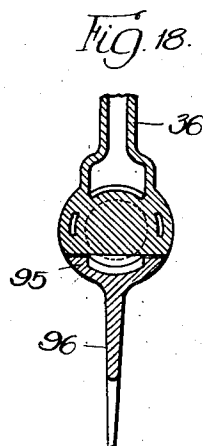
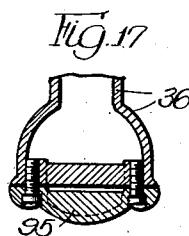
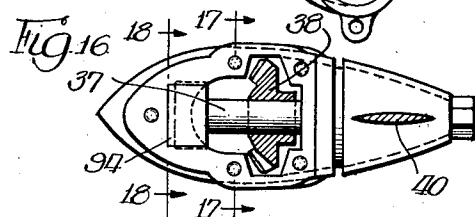
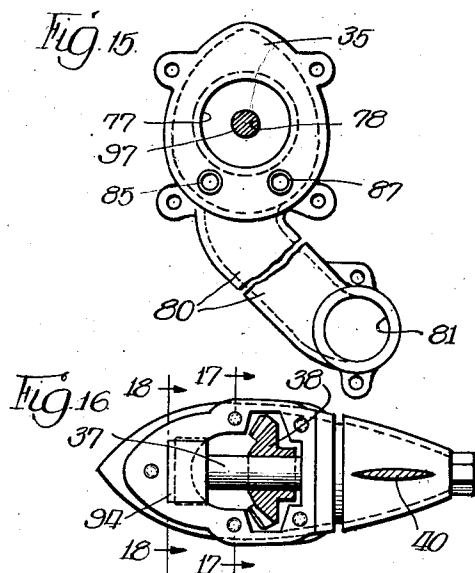
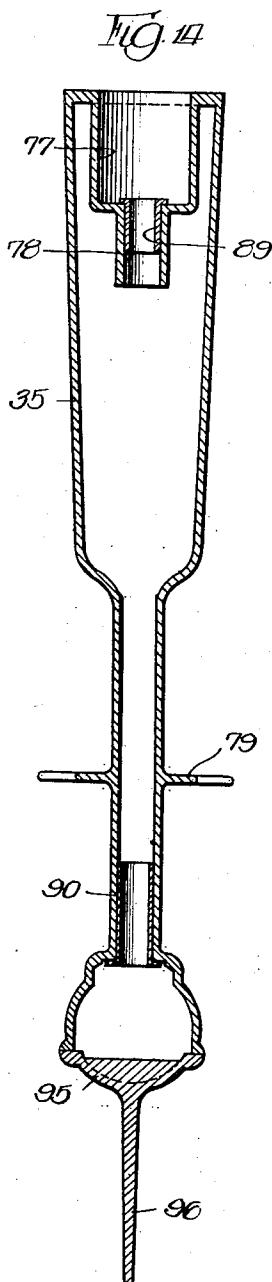
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OUTBOARD MOTOR

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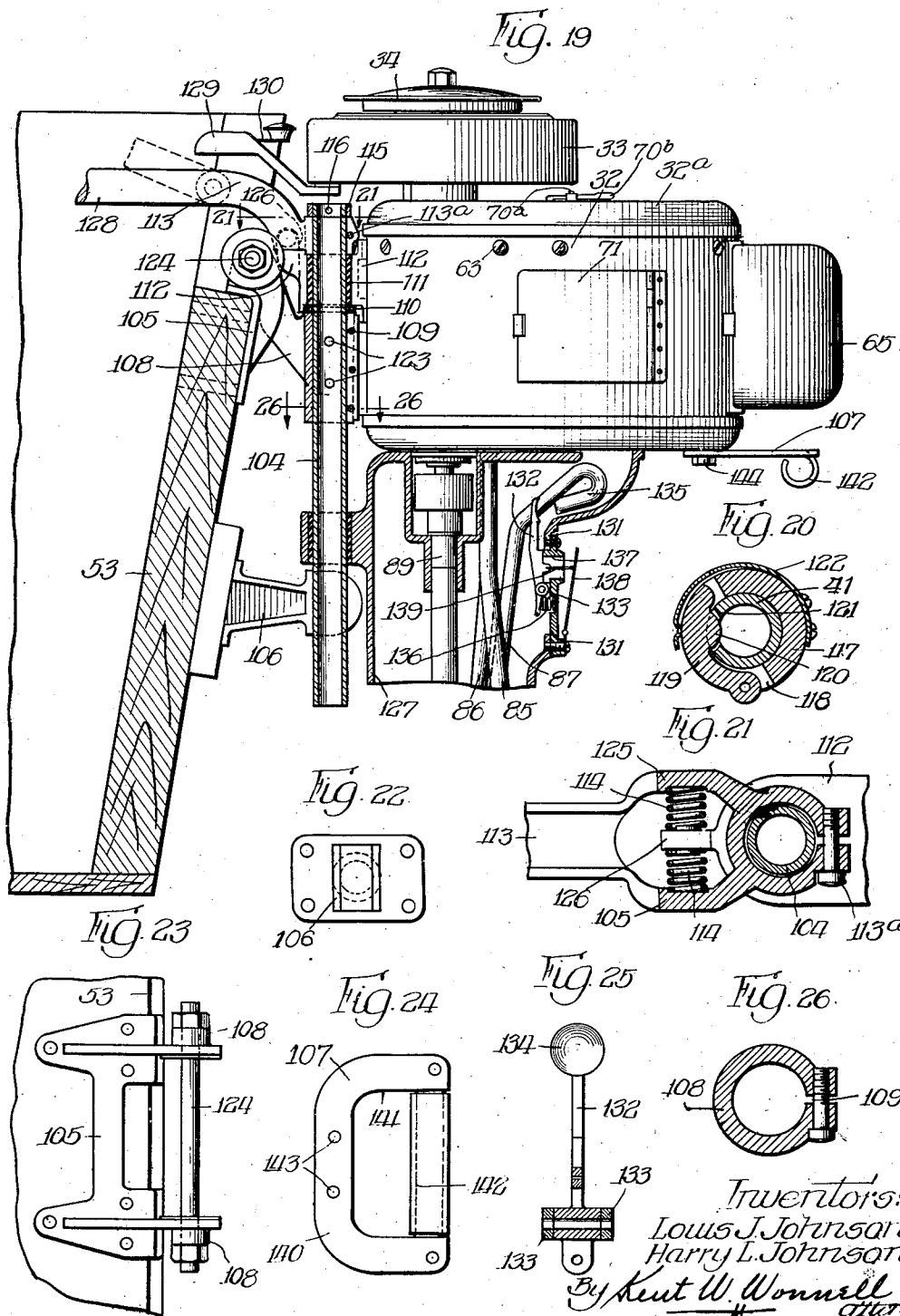
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OUTBOARD MOTOR

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

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OUTBOARD MOTOR

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Application November 16, 1935, Serial No. 50,127

38 Claims. (Cl. 115-18)

This invention relates in general to an outboard motor of the type mounted for steering about a vertical axis and tiltable about a horizontal axis, and has more particular reference to the detailed construction of the supporting, enclosing, driving, cooling and other component parts.

Among the important objects of the invention are: to provide an improved support for mounting the motor about a vertical axis other than the driving axis, forward of the power head and below the top of a boat to which it is applied; to provide a tilting axis near the top and in advance of the power head and the steering axis; to provide improved means for detachably mounting an outboard motor in fixed permanent brackets attached to a boat; to provide a power head enclosure substantially water-tight but with openings for air and exhaust with doors for accessibility and with drip connections at the bottom; to provide a motor casing of smooth symmetrical lines attached between the power head and the lower unit; to provide a lower unit which embodies a combined drive shaft casing, muffler, exhaust and cooling pipe container; to provide a drive shaft casing having a shock absorber cavity separate from the interior of the casing which constitutes a muffler chamber; to provide a drive shaft casing having improved means for supporting and installing the drive and propeller shafts therein; to provide an improved exhaust cut-out actuated by the operation of the propeller and a water cooling line therefrom; to provide easy steering; to reduce weight and costs; to provide up and down adjustment of the motor and to improve the appearance of the outboard motor by confining it substantially within the forward and aft lines of a boat; and in general to produce the outboard motor structure herein shown and described.

In the accompanying drawings illustrating the preferred and modified forms of the invention;

Fig. 1 is a side elevation with some parts in section, of an outboard motor in accordance with this invention as applied to the transom of a boat;

Fig. 1^a is a fragmentary view showing a fuel tank in the boat and its connection to the motor power head;

Fig. 2 is a top view of the construction shown in Figure 1;

Fig. 3 is a sectional view of the motor shown in Fig. 1;

Fig. 3^a is a sectional assembly of a quick take-down pivot tube and fixed boat brackets;

Fig. 4 is a transverse sectional view through the power head;

Figs. 4^a, 5, 6, 7, 8 and 9 are sections taken on the lines 4^a-4^a, 5-5, 6-6, 7-7, 8-8, and 9-9 respectively of Fig. 3;

Fig. 10 is a section of the lower bracket support;

Figs. 11 and 12 are sections taken on the lines 11-11 and 12-12 respectively of Fig. 10;

Fig. 13 is a section through the shock absorber taken on the line 13-13 of Fig. 3;

Fig. 14 is a vertical section through the drive shaft casing;

Fig. 15 is a top view of the drive shaft casing shown in Fig. 14;

Fig. 16 is a sectional view of the lower end of the drive shaft casing with the skeg removed;

Figs. 17 and 18 are sections taken on the lines 17-17 and 18-18 respectively of Fig. 16;

Fig. 19 is a side elevation with parts in section illustrating an improved detachable mounting;

Fig. 20 is a sectional view of the detachable locking device at the bottom of the pivot pin shown in Fig. 3;

Fig. 21 is a section of the steering handle or tiller taken on the line 21-21 of Fig. 19;

Fig. 22 is a face view of the lower fixed bearing bracket shown in Fig. 19;

Fig. 23 shows the upper fixed bearing bracket as shown in Fig. 19;

Fig. 24 illustrates a carrying handle;

Fig. 25 illustrates the operating lever for the fluid pressure cut-out shown in Fig. 19; and

Fig. 26 is a section of the bearing clamp taken on the line 26-26 of Fig. 19.

Among the advantages claimed for outboard motors in accordance with the present invention are a reduction of weight, a reduction of noise because the power head is installed rearwardly of the transom, and a reduction of expense in providing a motor which is not necessarily of the full pivot steering type. Locating the power head, including the fly-wheel, below or practically below the upper edge of the transom not only improves the motor appearance but also lowers the center of gravity and makes a boat more stable and less likely to overturn. A motor of this structure is easy to steer; it has less parts subject to salt water corrosion; it provides more efficient underwater structure and more efficient propeller water pumping; and provides a more substantial lower unit. Enclosing the power head, except the fly-wheel magneto, further improves the appearance, makes more pleasing the lines of the motor itself and of a boat to which it is

applied, reduces the noise from the power head and makes the power head less subject to defects of operation due to water splashing and exposure of the parts without sacrificing any necessary adjustment which is easily effected by a projecting part or through doors provided in the casing.

Referring more particularly to the drawings, the power head comprises an engine and a flywheel magneto, said engine having a vertical crank shaft 30 and adjacent parallel cylinders 31 fired alternately and enclosed by a casing 32, the upper end of the crank shaft projecting above the casing and supporting a flywheel magneto 33 and a rope starter plate 34.

Secured together are the engine, the casing 32, and the lower unit casing 35, said casings 32 and 35 forming a single casing, the casing 32 having a portion clamped between the engine and the lower unit casing 35. Said casing 35 houses a vertical drive shaft 36 and a horizontal propeller shaft 37 connected to the drive shaft by gears 38 and 39.

To mount the outboard motor shown in Figs. 1 and 3 for tilting and steering, a pivot tube 41 is rigidly fixed by a pin 42 in a bracket 43 attached to the motor. The tube has an upper projecting portion for the attachment of a handle 44 which extends forwardly into a boat for steering, and a downwardly projecting portion mounted in a split clamp 45 of a pivoting bracket 46 attachable to a boat transom with an interposed bearing tube 47 of rubber or the like, and with metal and rubber washers 48 at the top of the clamp 45 between it and the brackets 43. Said casing 32 is clamped between the bracket 43 and the engine.

The pivoting bracket 46 is mounted upon a horizontal pivot 49 (see Figs. 2 and 3) carried by the boat attachment bracket 50 between its parallel arms, which may be of the conventional removable type as shown in Figs. 1 and 3, having an inside clamping screw 51 and lower outside thrust socket arms 52, and removable with the motor from the transom 53 of a boat.

In being thus attached to the upper portion of the engine rather than to a bearing surrounding the shaft below the engine it is possible to position the outboard motor at a relatively low position with respect to the top of the boat, which is further lowered in regular outboard motor boats by providing a recess 54 in the upper edge of the transom, in which the attachment bracket 50 is ordinarily seated.

Extending forwardly from the casing 35 are spaced projections 55 in which a tube 56 is mounted in line with the bearing tube 41 and for engaging a thrust socket 57 mounted between the projecting arms 52 (see also Figs. 10, 11 and 12) at the lower end of the attachment bracket 50, the arms having slots 59 and the thrust socket 57 having a number of perforations 60 in the portion between the arms 52 so that a fastening bolt 61 inserted through one of the holes and engaging the arms 52 will provide considerable adjustment for the thrust socket. The inside of the thrust socket may be provided with a flexible cushion 62 of rubber or other suitable material for cushioning the vibration of the motor with respect to the boat, which is also one of the functions of the resilient sleeve 47.

The casing 32 surrounds the power head and a cover 32^a as shown in Fig. 19, or a partial cover 32^b as shown in Fig. 1, is attached thereto at intervals by fastening screws 63. As shown in Fig.

3 the bottom 32^c of a fuel tank 72 may form a partial cover for the casing. Around the top adjacent the upper crank shaft bearing but beneath the magneto flywheel is an opening 64 for the admission of air for combustion, which is substantially splash-proof because it is covered and overlapped by the magneto 33. The casing is preferably of smooth symmetrical and unbroken lines, narrower at the front as shown in Fig. 4, to permit a maximum swing for steering. At the rear end of the casing is an extension 65 having a hinge 66 at one side of a rear opening 67 and a hook 68 at the other side to close the extension over spark plugs 69 at the ends of the cylinders 31.

The casing also encloses a carburetor 70 at one side of the engine which is adjacent a hinged door 71 so that the carburetor can be adjusted through the casing by opening the door. A shaft or controlling member 70^a may extend from the carburetor through the top of the casing and may have an adjustment arm or lever 70^b accessible from the outside of the casing.

A fuel tank 72 may be supported on top of the casing 32 forming a portion of the cover of the casing with a forward recess 73 partially embracing the magneto 33. It has a fill pipe 74 adjacent the upper rear end and a fuel pipe 75 (see also Fig. 4) extending at the side of the engine inside of the casing 32 with a hand valve 76 within the casing and accessible through the door 71 for controlling the supply of fuel to the carburetor 70. This fuel tank is also smooth and symmetrical in outline and stream-lined in shape. It projects only slightly above the rear end of a boat to which the engine is applied. A fuel tank 72^a as shown in Fig. 1^a may be located within the boat and connected to the carburetor by a fuel pipe line 75^a through the fitting at the bottom of the casing 32, the fuel line preferably extending over the transom recess 54 and connected to the tank 72^a by a shut-off valve 72^b.

The lower unit casing 35 is preferably a hollow unitary casting formed with a recess 77 in the top for receiving a shock absorber and with a tubular extension 78 to provide a bearing for the drive shaft 36. The lower portion of the casing is thin, substantially stream-lined from front to rear, has an integral anti-cavitation plate 79, and the stream-lining portion extends well above the anti-cavitation plate where it may be rounded outwardly as shown more clearly in Figs. 4^a and 14, to provide a muffler space entirely surrounding the drive shaft 36 and its surrounding casing 92, and to provide a discharge for the exhaust gases.

At the upper end of the casing there is also a rear exhaust extension 80 having a top opening 81 which extends to one side as shown in Fig. 15, and communicates with the engine exhaust passage 82 for directing the products of combustion downwardly into the hollow casing 35. Above the propeller 40 the casing 35 arches the upper portion of the path of travel of the propeller blade on both sides thereof providing an exhaust passage 83 which terminates in a discharge opening 84 behind and below the anti-cavitation plate which extends above and rearwardly thereof.

Within the casing 35 is a tube 85 having its lower end extending through the wall of the passage 83 directly to the rear of the upper path of travel of the propeller blades for receiving cooling water therefrom and directing it to the water jacket of the engine from whence it is re-

turned through a pipe 86 extending through the casing 35 and having its lower end terminating in the forward side of the upper path of travel of the propeller blades so that the cooling water for the engine is circulated through the pipes 85 and 86 by the propeller.

Another water pipe 87 extends from the rear side of the propeller arch upwardly in the casing and has a hook 88 at its upper end turned downwardly against the lower muffler extension 30 to provide a cooling water spray forced by the propeller 40 through the tube 87 and discharging from the upper end thereof to condense the hot gases from the engine and to cool the interior of the casing, the water pipes, and the engine shaft therein.

The shaft 36 is mounted in a bearing 89 at the top of the casing and in a bearing 90 at the bottom of the casing. Between the reduced or thinner lower portion of the casing in which there is a sleeve 91 loosely surrounding the shaft 36 and the upper bearing extension 78, the shaft is preferably enclosed in a separate sleeve 92 which protects it from direct contact with any hot gases in the muffler or the upper portion of the casing 35.

In the lower end of the casing 35 the propeller shaft 37 is positioned at right angles to the shaft 36 and has an end bearing 93 seated in a socket 94 in the casing. In the bottom of the propeller shaft housing is an opening closed by a cover 95 to which the skeg 96 is attached. To install the shaft 36 the cover 95 is removed, the shaft is inserted from the bottom, and the propeller shaft 37 is then placed in position meshing the gears 38 and 39 and attaching the propeller thereto in a well known manner.

At the upper end of the shaft 36 is a shock absorber seated in the recess or cavity 77 and comprising a short shaft section 97 secured to the lower end of the engine crank shaft and rotatable with it. A collar 98 (see Figs. 3 and 13) attached to the top shaft section and a collar 99 attached to the drive shaft 36 in this cavity each have two projections 100° apart between which four pieces 100 of rubber are inserted with a casing 101 attached to the upper collar and surrounding the rubber pieces which holds them in place and prevents oil from the bearing coming in contact with the rubber. In the bottom of the recess 73 is a drain opening 102 for any oil or water. This shock absorber is light, inexpensive and affords protection for the shaft driving gears 38 and 39, shear pin and other parts. It is easily accessible by removing the power head from the lower unit. For installations with this type of shock absorber the propeller 40 is provided with a frangible shear pin 103 which connects it with propeller shaft 37.

In the structure shown in Figure 19 a number of different features are shown. The bearing for steering consists of a single pivot tube 104; the boat mounting comprises upper and lower fixed brackets 105 and 106; the muffler casing is provided with an automatic exhaust outlet closed by the cooling water; a steering handle has a shake-proof connection; the fuel tank is omitted from the motor and a separate fuel tank may be provided as in Fig. 1^a. A simple carrying handle 107 is also shown which may be applied to any motor.

The pivot tube 104 is clamped tightly in a tilting bracket 108 by a split clamp 109 so that it does not turn therein. The upper end of the tube extends through washers 110 and through

a rubber bearing sleeve 111 within the supporting bracket 112 of the motor, and a split steering handle 113 is clamped by screw 113^a for frictional adjustment on the upper end of the tube 104, the tiller handle having spaced sides 125 (see Fig. 21) between which extends a projection 126 from the motor bracket 112 with a spring 114 between the projection and each side of the handle to cushion the steering movement, to absorb the torque shock, and to prevent the vibration of the motor from being transmitted through to the steering handle. Thus the motor is turned about the axis of the tube 104 with resultant easy steering because of the small diameter of the pivot shaft 104. At the top of the tube 104 is a limiting collar 115 held in place by a pin 116.

At the lower end of the tube 41 is a quick take-down catch (see Figs. 3, 3^a and 20) consisting of a collar 117 having a slot 118 in which a locking arm 119 is pivoted. This arm has a projection 120 adapted to engage a milled slot 121 in the side of the tube where it is held in yielding engagement by a spring 122 attached to the collar 117. To remove the catch it is rotated in either direction until the projection 120 rides out of the slot 121 whereupon the catch may be moved endwise of and removed from the tube.

In the construction illustrated in Figure 19, the engine casing 32 and the drive shaft housing 127 form a casing. In said construction the casing 32 is clamped between the drive shaft housing 117 and the engine, and is also clamped between the engine and the bracket 108.

Instead of the quick take-down pivot tube 41 structure being assembled with the removable bracket construction of Fig. 3, it is preferably combined with supporting brackets 105 and 106 permanently attached to a boat transom 53 as shown in Fig. 3^a with the locking device 117 at the lower end of the pivot tube 41. The tiller 126 may also be attached to the tube 41 by the shake-proof handle structure shown in Fig. 21. To remove the quickly detached structure it is necessary only to release and slip off the locking device 117, and to raise the motor until the tube 41 slips out of the tilting clamp 109. Similarly the pivot tube 104 may be assembled with a bodily removable boat bracket 50 as shown in Fig. 3, if desired.

The lower end of the pivot tube 104 extends a distance below the lower thrust bracket 106 and intermediate the ends of the tube are transverse holes 123 so that the motor may be raised for adjustment and held in position by inserting a pin in either one of the openings 123 above the tilting clamp 109, and the tube is adjustable up and down with the motor for vertical adjustment of the propeller, and is held in any adjusted position by the clamp 109.

The stern brackets 105 and 106 are rigidly attached to a boat transom 53, the tilting bracket 108 is mounted upon a horizontal pivot pin 124 and the motor is turnable for steering by means of the handle 113 which has a pivot forward hand grip extension 128 which projects into the boat. A control lever 129 with an ignition stop button 130 extends from the magneto adjacent and above the handle 113 where it is freely accessible and movable for varying the speed, and the button for stopping the motor.

An automatic exhaust cut-out (Figs. 19 and 25) is mounted upon a plate 131 secured in an opening adjacent the upper end of the lower casing 7

unit and comprising a lever 132 mounted in ears 133 projecting inwardly from the plate and one end of the lever having an enlarged extremity 134 disposed directly opposite the downwardly bent end 135 of the cooling water tube 87 and having a spring 136 installed between the other end of the lever and the inside of the plate 131 which tends to press the enlarged end 134 toward the bent tube end 135. In the plate 131 is an exhaust opening 137 and a closure 138 pivoted to the plate has a link 139 connecting it to the lever 132 between its pivotal point and the enlarged end so that the spring 136 tends to press the closure 138 to open position and the water driven up the tube 87 and impinging the enlarged end 134 of the lever is sufficient to overcome the spring and close the atmospheric cut-out. Thus when the motor is starting the exhaust is opened to atmosphere but after the motor is running the propeller pumping water through the tube 87 actuates the lever 131 to close the atmospheric exhaust outlet and to keep it closed under normal running conditions. If the cut-out is opened during ordinary running conditions, it is an indication that the propeller pump may not be operating properly to cool the engine.

A simple carrying handle 107 for any motor of this kind comprises a plate 140 (Fig. 24) having a central opening 141, the material of which is curled about one edge to form a rounded grip 142 and the opposite edge is provided with perforations 143 through which fastening bolts 144 are inserted for securing it to a suitable portion of the motor.

With this type of motor it may be also desirable to install the fuel tank within the boat without a gravity feed as indicated in Fig. 1^a, and to use a hand pressure pump, or pressure from the motor to raise the fuel to the carburetor. In many boats the sheer line is high enough so that the fuel tank may be installed to use a gravity feed.

In operation, the outboard motors as shown herein are installed upon the transom of a boat either by means of a detachable bracket, or by fixed brackets and a detachable vertical pivot pin about which the motor is rotated on an axis different from that of the crank shaft for steering; the motor is started by a rope starter wound in connection with the starter plate, and the adjustment of the carburetor is made from the top or through the opening in the casing; the speed is controlled by the carburetor and the ignition handle which also carries a circuit breaker button for short circuiting the current supply to the spark plugs. The features of novelty in the construction and operation of the motor are set forth in the description and as the operation of these parts is either therein set forth or clearly apparent, no further description of the operation is believed necessary.

It is however an important structural feature that the motor is so mounted that it is rotatable for steering upon a pivot in advance of the motor, which makes it possible to mount the power head well below the top of a boat transom to which it is attached, thereby lowering the center of gravity of the boat, and that by enclosing the power head in a splashproof casing which is of smooth and unbroken lines, a motor of more pleasing appearance is produced, the noise due to the engine operation is reduced, and in fact the noise is practically eliminated by the enclosing casing and the underwater exhaust. The power head casing and the drive shaft housing

are in effect the unitary casing extending from a level substantially at the top of the boat to the region of the propeller, protecting the motor from splash even though the entire power plant is at a low level.

The structural features above described also are designed and intended to reduce the labor and expense in assembling the parts which are greatly reduced in number by adopting a unitary lower casing which combines with it a muffler chamber and discharge passages for the engine exhaust. This casing design requires that the interior thereof be cooled in order to protect the drive shaft and the cooling arrangement shown additionally operates an atmospheric exhaust cut-out and improves engine operation by condensing the exhaust vapors.

We claim:

1. In a marine power plant, in combination, a power head including an internal combustion engine, an elongated propeller shaft housing secured to said head, a supporting bracket adapted to be secured to the stern of a boat, said supporting bracket and said power head having cooperating portions for swingingly carrying said power head about an axis substantially parallel with and forwardly of said elongated housing, said cooperating portions including an elongated cylindrical member disposed within an enclosing member permitting the quick detachment of said power head from and attachment to said supporting bracket, and readily releasable means for preventing the accidental detachment of said power head from said supporting bracket.

2. A marine power plant comprising a power head, a propeller shaft housing extending downwardly from said head, said head including a water-cooled internal combustion engine, a fly wheel above said engine, said power head having on its upper surface an air intake for combustion air, said fly wheel being disposed above said air intake in protecting relationship with said air intake to guard said intake against splashes of water.

3. A marine power plant having a power head including an internal combustion engine, an elongated drive shaft housing secured to said head, a drive shaft within said housing operatively connected with said power head, a propeller operatively connected with said drive shaft, supporting means for swingingly mounting said power plant about an axis forwardly of said power head, tiller means for swinging said power plant comprising rod means pivoted about said axis and means connecting said rod means to said power head comprising cushioning means between said rod means and said power head.

4. A marine power plant having a power head, an elongated drive shaft housing secured to said head, a drive shaft within said housing operatively connected with said power head, a propeller operatively connected with said drive shaft, supporting means for swingingly mounting said power plant about an axis forwardly of said power head and approximately parallel with said drive shaft, said supporting means including a non-rotatable cylindrical member, tiller means having adjustable frictional clamping relationship with said cylindrical member, and cushioning means between said power head and said tiller means.

5. In a marine power plant, in combination, supporting means adapted to be secured to the stern of a boat, said supporting means including a cylindrical member, a power head, a drive

shaft housing secured to said power head, said cylindrical member being disposed forwardly of said power head and said housing, said power head and housing being rotatably mounted with respect to the axis of said cylindrical member, and cushioning means embracing said cylindrical member for reducing vibration shocks set up by said power head.

6. In a marine power plant, in combination, supporting means adapted to be secured to the stern of a boat, said supporting means including a cylindrical member, a power head, a drive shaft housing secured to said power head, said cylindrical member being disposed forwardly of said power head and said housing, said power head and housing being rotatably mounted with respect to the axis of said cylindrical member, tiller means swung about the axis of said cylindrical member, and cushioning means between said power head and said tiller means for reducing vibration shocks set up by said power head.

7. In a marine power plant, in combination, supporting means adapted to be secured to the stern of a boat, said supporting means including a non-rotatable cylindrical member, a power head, a drive shaft housing secured to said power head, said cylindrical member being disposed forwardly of said power head and said housing, said power head and housing being rotatably mounted with respect to the axis of said cylindrical member, tiller means swung about the axis of said cylindrical member, cushioning means between said power head and said tiller means for reducing vibration shocks set up by said power head, and means for adjusting the frictional engagement between said tiller means and said cylindrical member.

8. In a marine power plant, in combination, supporting means adapted to be secured directly to the stern of a boat, said supporting means including a freely tilting bracket, a power head, a drive shaft housing secured to said power head, and a cylindrical member secured to said power head forwardly of said power head and said housing, said cylindrical member having rotatable relationship with said bracket.

9. In a marine power plant, in combination, supporting means adapted to be secured to the stern of a boat, said supporting means including a tilting bracket, a power head, a drive shaft housing secured to said power head, and a cylindrical member secured to said power head forwardly of said power head and said housing, said cylindrical member having rotatable relationship with said bracket, said cylindrical member having a readily detachable abutment member adjacent to its lower extremity for limiting upward movement of said power plant relative to said bracket.

10. In a marine power plant, in combination, supporting means adapted to be secured to the stern of a boat, said supporting means including a tilting bracket, a power head, a drive shaft housing secured to said power head, a cylindrical member secured to said power head forwardly of said tilting portion and said housing, said cylindrical member having rotatable relationship with said bracket, and tiller means swung about the axis of said cylindrical member, said tiller means including cushioning means reacting with respect to said power head.

11. In a marine power plant, in combination, supporting means adapted to be secured to the stern of a boat, said supporting means including

a tilting bracket, a power head, a drive shaft housing secured to said power head, a cylindrical member secured to said power head forwardly of said tilting bracket and said housing, said cylindrical member having rotatable relationship with said bracket, and tiller means swung about the axis of said cylindrical member, said tiller means including cushioning means reacting with respect to said power head, said tiller means having adjustable frictional clamping relationship with said cylindrical member.

12. In a marine power plant, in combination, supporting means adapted to be secured to the stern of a boat, said supporting means including a tiltable bracket and also including a cylindrical member, a power head, a drive shaft housing secured to said power head, said cylindrical member being disposed forwardly of said power head and said housing, said power head and housing being rotatably mounted with respect to the axis of said cylindrical member and being mounted upon said cylindrical member, and adjustment means for adjusting the longitudinal position of said cylindrical member with respect to said bracket.

13. In a marine power plant, in combination, a power head, a drive shaft housing secured thereto, means for supporting said power plant at a relatively low level from the stern of a boat, a casing for said power head for protecting said power head from water splash, said head including an internal combustion engine having a carburetor and a fly-wheel, the upper portion of said casing comprising a cover, said cover comprising a fuel tank, said casing having an intake for combustion air located below and in position to be protected by said fly-wheel.

14. The combination, in a marine motor system with an exhaust passage provided with an under water discharge port and an above water discharge port, of means for closing said above water discharge port, means for directing cooling water from the propeller of said system to other parts thereof, said closing means for said above water discharge port being responsive to the force of the water in said cooling water directing means.

15. A marine power plant having a power head, an elongated drive shaft housing secured to said head, a drive shaft within said housing operatively connected with said power head, a propeller operatively connected with said drive shaft, supporting means for swingingly mounting said power plant about an axis forwardly of said power head and approximately parallel with said drive shaft, said supporting means including a cylindrical member adapted to be fastened to the transom of a boat, and tiller means adapted to turn said power plant and having adjustable clamping relationship with said cylindrical member.

16. A marine power plant having a power head, an elongated drive shaft housing secured to said head, a drive shaft within said housing operatively connected with said power head, a propeller operatively connected with said drive shaft, supporting means for swingingly mounting said power plant about an axis forwardly of said power head and approximately parallel with said drive shaft, said supporting means including a cylindrical member adapted to be fastened to the transom of a boat, tiller means adapted to turn said power plant and having adjustable clamping relationship with said cylindrical member, and cushioning means between said power head and said tiller means.

17. The combination with a boat of a casing

pivoted thereto for steering and hinged for upward movement, and a driving motor mounted in the casing, extending below the casing and tending to press the lower part of the casing toward the boat.

18. In a device of the character described, the combination with a boat transom, of a bracket applied thereto and including a horizontal pintle, a bracket element mounted thereon, a vertical pintle carried by said bracket element, and a casing pivoted on said vertical pintle for dirigible and tilting movement with respect to said boat and adapted to house a boat propelling device mounted in said casing exteriorly of said boat.

19. The combination with a boat having a transom, of a casing aft thereof, means providing a fulcrum adjacent the transom on which said casing and transom are pivotally connected for relative swinging movement in a vertical plane, said means having a second substantially upright fulcrum connecting it with said casing for accommodating pivotal movement of said casing bodily in a horizontal plane, an engine housed within the casing and supported therein to partake of the two movements thereof, and an engine driven propelling means carried by the casing and operatively connected with the engine, said casing having thrust transmitting means for limiting the movement of the casing about said first mentioned fulcrum in the direction of thrust of said propelling means.

20. The combination with a boat having a transom, of a transom bracket provided with a transversely extending fulcrum adjacent said transom, means pivoted on said transverse fulcrum providing an upright fulcrum aft thereof, casing means provided on said upright fulcrum and having a portion beneath both of said fulcrums for transmitting forward thrust to said boat, an engine housed within said casing and supported thereby to partake of the movement of said casing about both of said fulcrums, and engine driven propelling means carried by the casing and operatively connected with the engine, said casing being oscillatable for steering about said upright fulcrum and being oscillatable about said transverse fulcrum to clear submerged obstacles.

21. The combination with a boat having a transom, of a transom bracket provided with a transversely extending fulcrum adjacent said transom, means pivoted on said transverse fulcrum providing an upright fulcrum aft thereof, casing means provided on said upright fulcrum and having a portion beneath both of said fulcrums for transmitting forward thrust to said boat, an engine housed within said casing and supported thereby to partake of the movement of said casing about both of said fulcrums, and engine driven propelling means carried by the casing and operatively connected with the engine, said casing being oscillatable for steering about said upright fulcrum and being oscillatable about said transverse fulcrum to clear submerged obstacles, the portion of said casing connected with said upright fulcrum comprising substantially the top forward part thereof, whereby the top of said casing is substantially at the level of the top of said transom and said engine is disposed substantially wholly below said level.

22. In a device of the character described, the combination with a transom bracket having a transom-engaging portion, of a casing having a top substantially at the level of said portion, means hingedly connecting said casing top with

said transom bracket portion, an engine housed within said casing below the top thereof and provided with an upright drive shaft projecting downwardly, propelling means operatively connected with said drive shaft to receive motion therefrom, said propelling means being located vertically below a part of said casing, said casing having a portion below its hinged connection with said bracket in a position for thrust transmitting cooperation with the transom of a boat on which said bracket is suspended.

23. In a device of the character described, the combination with a boat transom, of a casing having a top portion substantially at the top level of said transom, means providing a hinged connection on a transverse fulcrum between said casing and said transom, an engine mounted within said casing, said casing providing a substantially complete enclosure therefor, a propeller rotatable upon a horizontal axis and disposed directly beneath a portion of said casing, and driving connections from said engine to said propeller extending substantially vertically downwardly, said casing being adapted to exclude water from said engine, and said casing and transom being adapted to baffle the transmission of engine noise to the boat.

24. A thrust member for limiting forward tilting movement of a marine power plant relative to the transom of a boat, said thrust member including a bifurcated member adapted to be secured to the transom of a boat, said bifurcated member having arcuate slots in the bifurcations thereof, an abutment member disposed between said bifurcations, said abutment member having a plurality of holes disposed transversely thereof, and a pin adapted to be disposed in any one of said holes and in said slots, and means for clamping said pin with respect to said bifurcations.

25. A power plant comprising, in combination, an internal combustion engine including the spark plugs and carburetor thereof, a drive shaft extending downwardly from said engine, a drive shaft housing for said shaft connected to said engine, and a splash-proof casing for said engine having an opening for combustion air and means for preventing access of splash through said opening, said casing being secured in place between said engine and said drive shaft housing.

26. A power plant comprising, in combination, an internal combustion engine including the spark plugs and carburetor thereof, a drive shaft extending downwardly from said engine, a drive shaft housing for said shaft connected to said engine, and a splash-proof casing for said engine having an opening for combustion air and means for preventing access of splash through said opening, said casing being secured in place between said engine and said drive shaft housing.

27. In combination, a power plant including an internal combustion engine, enclosure means enclosing said engine, a drive shaft housing extending downwardly from said engine, said enclosure and said housing being assembled to form a casing, and supporting means for tiltably supporting said power plant, said enclosure being clamped between said supporting means and said engine and between said engine and said drive shaft housing.

28. In combination, a power plant including an internal combustion engine, enclosure means enclosing said engine, a drive shaft housing extending downwardly from said engine, said enclosure

and said housing being assembled to form a casing, supporting means for tiltably supporting said power plant, said enclosure being clamped between said supporting means and said engine and between said engine and said drive shaft housing, said enclosure being a splash-proof member having an opening for combustion air, and baffle means for obstructing admission of water splash through said opening.

29. In combination, a power plant including an internal combustion engine, enclosure means enclosing said engine, a drive shaft housing extending downwardly from said engine, said enclosure and said housing being assembled to form a casing, and supporting means for tiltably supporting said power plant, said enclosure being clamped between said supporting means and said engine and between said engine and said drive shaft housing, said engine having a fly-wheel, said enclosure being a splash-proof member having an opening for combustion air, said fly-wheel being in position to obstruct admission of water splash through said opening.

30. A marine power plant comprising, in combination, a power head including an internal combustion engine, a drive shaft housing secured to said power head, said drive shaft housing including a portion normally disposed above the water line of said plant, said portion of said drive shaft housing embodying an expansion chamber which occupies a substantial proportion of said drive shaft housing above said normal water line, the lower portion of said housing having a passage for discharging gases from said expansion chamber to a region below the normal water line of said power plant, and means for supporting said power head and said drive shaft housing, said supporting means including a vertical pivot the axis of which is disposed forwardly of said head and said housing for swingingly mounting said power plant for steering functions whereby to permit a housing of sufficient size to function as an expansion chamber.

31. A marine power plant comprising, in combination, a power head including an internal combustion engine, a drive shaft housing secured to said power head, said drive shaft housing including a portion normally disposed above the water line of said plant, said portion of said drive shaft housing embodying an expansion chamber which occupies a substantial proportion of said drive shaft housing above said normal water line, said housing having an opening for discharging gases from said expansion chamber, and means for supporting said power head and said drive shaft housing, said supporting means including a vertical pivot the axis of which is disposed forwardly of said power head and said housing for swingingly mounting said power plant for steering functions whereby to permit a housing of sufficient size to function as an expansion chamber.

32. A marine power plant comprising, in combination, a power head including an internal combustion engine, a drive shaft housing secured to said power head, said drive shaft housing including a portion normally disposed above the water line of said plant, said portion of said drive shaft housing embodying an expansion chamber which occupies a substantial proportion of said drive shaft housing above said normal water line, the lower portion of said housing having a passage for discharging gases from said expansion chamber to a region below the normal water line of said power plant, means for sup-

porting said power head and said drive shaft housing, said supporting means including a vertical pivot the axis of which is disposed forwardly of said head and said housing for swingingly mounting said power plant for steering functions whereby to permit a housing of sufficient size to function as an expansion chamber, conduit means for delivering cooling water against the inner surface of said expansion chamber, means providing an above water outlet for exhaust gases from said housing, and means responsive to the force of the water delivered from said conduit means for controlling said outlet.

33. A marine power plant comprising, in combination, a power head including an internal combustion engine, a drive shaft housing secured to said power head, said drive shaft housing including a portion normally disposed above the water line of said plant, said portion of said drive shaft housing embodying an expansion chamber which occupies a substantial proportion of said drive shaft housing above said normal water line, said housing having an opening for discharging gases from said expansion chamber, means for supporting said power head and said drive shaft housing, said supporting means including a vertical pivot the axis of which is disposed forwardly of said power head and said housing for swingingly mounting said power plant for steering functions whereby to permit a housing of sufficient size to function as an expansion chamber, an envelope surrounding said drive shaft to protect said shaft, and water conduits for carrying water propelled by said propeller, certain of said conduits delivering water to said power head for cooling purposes, another of said conduits being positioned to discharge water to the inner surface of said expansion chamber.

34. A marine power plant comprising, in combination, a power head including an internal combustion engine, a drive shaft housing secured to said power head, said drive shaft housing including a portion normally disposed above the water line of said plant, said portion of said drive shaft housing embodying an expansion chamber which occupies a substantial proportion of said drive shaft housing above said normal water line, said housing having an opening for discharging gases from said expansion chamber, means for supporting said power head and said drive shaft housing, said supporting means including a vertical pivot the axis of which is disposed forwardly of said power head and said housing for swingingly mounting said power plant for steering functions whereby to permit a housing of sufficient size to function as an expansion chamber, an envelope surrounding said drive shaft for protecting said drive shaft, and conduit means to discharge water against the interior surface of said expansion chamber.

35. A power plant and mounting means therefor including a power head, a drive shaft housing secured to said head and extending downwardly therefrom, a propeller at the lower portion of said drive shaft housing, means for swingingly mounting said power plant from the stern of a boat about a vertical axis disposed forwardly of said power plant, said supporting means including cylindrical means swingable with said head and shaft, said cylindrical means being positioned to take the thrust against the stern of a boat under normal operative conditions.

36. The combination with a boat of a casing pivoted thereto for steering and hinged for upward movement, and a driving motor mounted in

the casing extending below the casing and tending to press the lower part of the casing toward the boat, said casing embodying a splash-proof member for protecting said driving motor against water splash.

37. In a marine power plant, in combination, a power head, a drive shaft housing secured thereto, means for supporting said power plant at a relatively low level from the stern of a boat, a casing for said power head for protecting said power head from water splash, said head including an internal combustion engine including the carburetor thereof, the upper portion of said casing comprising a cover, and a fly-wheel for said motor, said casing having an intake for combustion

air located below and in position to be protected by the said fly-wheel.

38. A power plant comprising, in combination, an internal combustion engine, a drive shaft extending downwardly from said engine, a drive shaft housing for said shaft connected to said engine, a drive shaft housing for said shaft connected to said engine, and a splash-proof casing for said engine having an opening for combustion air and means for preventing access of splash through said opening, said casing being secured in place between said engine and said drive shaft housing.

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