Sept. 22, 1931. L. J. JOHNSON ET AL 1,824,740

WATER PROPULSION DEVICE

Filed May 31, 1929 2 Sheets-Sheet 1

Fig-1

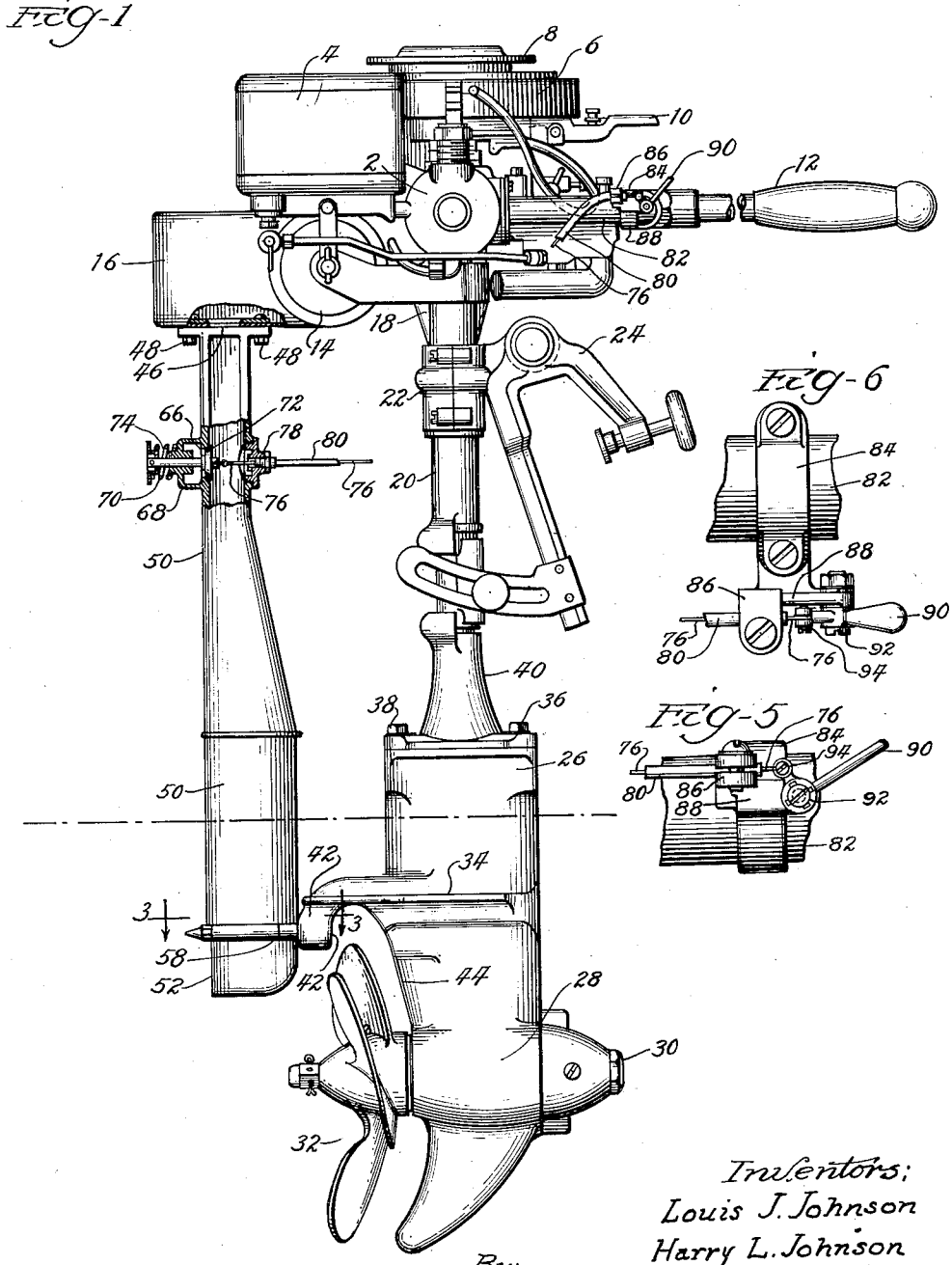


Fig-6

Fig-5

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WATER PROPULSION DEVICE

Filed May 31, 1929 2 Sheets-Sheet 2

Fig-2

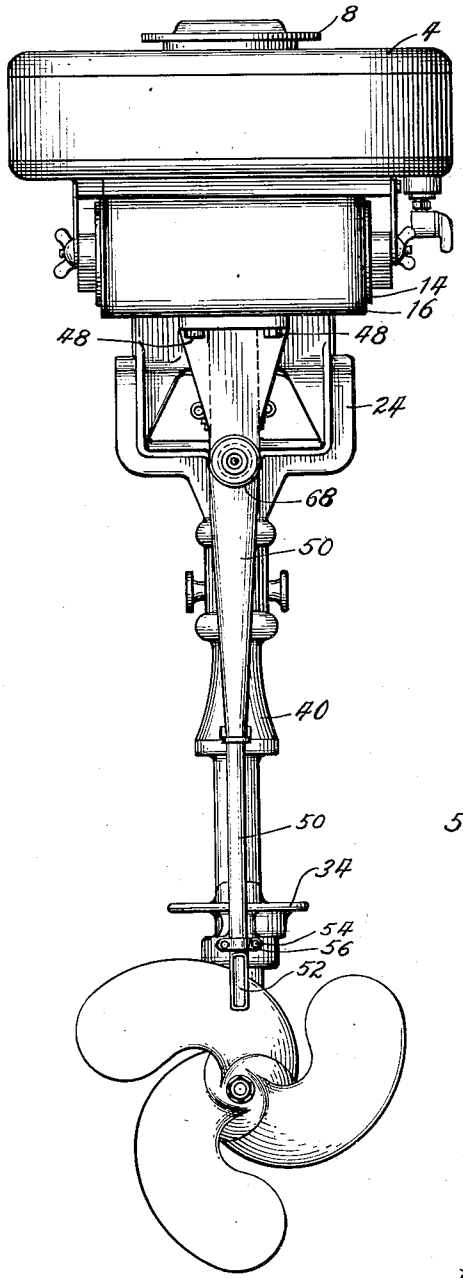


Fig-3

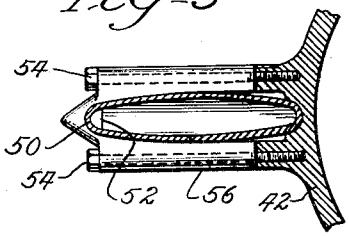
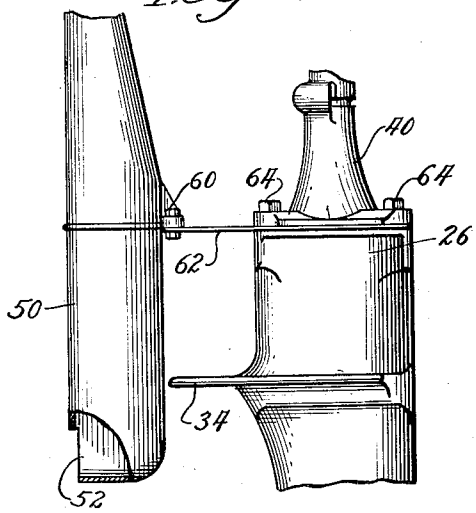


Fig-4



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UNITED STATES PATENT OFFICE

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WATER PROPULSION DEVICE

Application filed May 31, 1929. Serial No. 367,569.

Our invention relates to water propulsion devices, and more particularly to such constructions of the outboard or inboard motor type.

One of the objects of our invention is to provide means for discharging the engine exhaust gases below the normal water level and at a point to the rear of the propeller, and within the stream-line of the propeller carrying gear housing, whereby to eliminate objectionable noise and odors without substantially increasing the frictional resistance which the submerged gear housing presents to the body of water through which it travels.

Still another object of our invention resides in providing a simple type of construction for conducting the exhaust gases directly from the muffler downwardly and for discharging them through a stream-lined conduit carried by and at the rear of the turnable propeller carrying housing so that these engine exhaust gases are discharged below normal water level and at the rear of the propeller race and well within the stream-line contours of the propeller carrying housing and in a manner so as not to substantially increase the resistance which this submergible under structure offers to the body of water in which it is submerged.

Yet another object of our invention resides in the novel and simple construction and arrangement of this stream-lined underwater exhaust discharge and its connection to the muffler and to the propeller carrying housing whereby it is not only rigidly held in position at the rear of the propeller carrying housing but is turnable therewith as a unit during the steering operation.

Still another object of our invention resides in the novel manner in which we have arranged the rigid connection between the propeller carrying housing and this stream-lined under water exhaust conduit for rigidly holding it in operative position on the turnable propeller carrying housing.

Still another object of our invention resides in the construction of the muffler providing a portion overhanging the rearmost portion of the propeller carrying housing and the manner in which we have connected the stream-lined underwater exhaust conduit to the bottom of said muffler and in a manner such that it will lie directly at the rear of the rearmost portion of the anti-cavitation plate on the propeller carrying housing, so as to discharge rearwardly of the propeller.

Yet another object of our invention resides in the provision of a simple attachment, having one or all of the before-mentioned characteristics, which is capable of being attached to any type of motor so as to convert the same from a type wherein the exhaust gases are discharged above water to a type wherein the gases are discharged below normal water level.

Still another object of our invention resides in the provision of an exhaust cut-out in the stream-lined underwater exhaust conduit for temporarily discharging the exhaust gases above normal water level as for a starting operation.

A further object of our invention is to provide an outboard or inboard motor with an underwater exhaust manifold rigidly carried by the submergible gear casing and adapted to discharge the engine exhaust gases below normal water level, which manifold is constructed and arranged to provide additional steering surfaces to assist the propeller in steering.

These and other objects of our invention will be apparent from a perusal of the following specification when taken in connection with the accompanying drawings, wherein:

Figure 1 is a side perspective view of one form of our improved invention, certain of the parts at the upper portion of the underwater exhaust conduit being broken away to show a cut-out valve;

Figure 2 is an end view of the same;

Figure 3 is a sectional view on line 3—3 of Figure 1;

Figure 4 is a side view of a modified form of our invention;

Figures 5 and 6 are views taken at right angles of the control for the exhaust cut-out.

Referring now to the drawings in detail, our invention comprises a water propulsion device generally in the form of an inboard

or outboard motor and comprising a power head including engine cylinders 2, the fuel tank 4, the nested fly-wheel magneto 6, and starter 8 and spark control lever 10, tiller handle 12, muffler 14, and muffler extension 16, all mounted and carried by the crank case 18 turning with the tubular sleeve 20 which is adapted to turn in a tubular bearing 22, preferably pivotally carried by the bracket support 24 adapted to be clamped to the rear of a water craft.

In addition, the lower portion of the tubular housing 20 has rigidly connected thereto a propeller carrying gear casing 26 which is of stream-line construction throughout its height. This gear casing has a substantially barrel-like portion 28 in which the propeller shaft 30 has its bearings and on which shaft the propeller 32 is mounted.

Directly above the upper-most path of travel of the propeller blades of the propeller 32, the gear casing 26 is provided with an outwardly and preferably integral anti-cavitation plate 34 which extends above the path of travel of the propeller blades. The gear casing 26 extends upwardly well above the anti-cavitation and considerably above normal water level and is stream-lined to a point above normal water level, all as set forth in our prior pending application. The upper portion of the gear casing 26 has bolted as by means of the bolts 36 and 38, a short tubular housing 40 which is the part that is secured directly to the lower part of the tubular casing 20. It will be understood that this tubular casing 20 entirely surrounds the engine drive shaft extension which passes downwardly through the gear casing 20 and connects by means of the usual bevel gear connection to the propeller shaft 30. In our present construction, we have shown the gear casing as of a type wherein the lower portion of the anti-cavitation plate is formed with a depending extension 42 providing a water gathering mouth located directly to the rear of the path of travel of the propeller blades so that these blades will force water into this water gathering mouth 42 and from thence up through the gear casing 26 through the hollow tubular sleeve as by means of suitable conduits up to the water jacket of the engine, and then, if desired, by another conduit downwardly again to discharge under water at a point marked 44 on the drawings, which forms a water outlet at this point which is directly in front of the path of travel of the propeller blades, so that the latter will assist in drawing the water through the system in their rotation.

In our present invention, we provide a very simple construction for conducting these exhaust gases from the muffler 14 directly downwardly and for discharging the same into the water below the normal water level, which level is approximately at the level of the line indicated in dotted lines. This construction permits these exhaust gases to be delivered rearwardly of the propeller blades and rearwardly of the anti-cavitation plate whereby not to interfere with the function of either of them. At the same time, this exhaust conducting conduit is located directly within the stream-line surfaces of the gear casing 26. This will be made evident from an inspection of Figure 2 of the drawings which is a rear view of Figure 1 and clearly shows the exhaust conducting member to be within such stream-line surfaces.

In carrying out our invention, we provide a muffler of improved construction. This muffler comprises a cylindrical portion 14 from which integrally projects the extension 16, the rear surface of which lies substantially in line with the rearmost vertical wall of the gasoline tank and which also overhangs the rearmost portion of the anti-cavitation plate. Our improved muffler is formed of stainless steel throughout and by reason of the extension 16 provides a relatively large expansion chamber to provide sufficient expansion to prevent undue back pressure due to the underwater exhaust feature. In addition, by providing this muffler extension, or rather by extending the muffler rearwardly so as to vertically overhang the rearmost portion of the anti-cavitation plate or rearmost portion of the propeller carrying housing, we are enabled to arrange an underwater exhaust manifold for connection directly to the underside of this muffler so that the same can depend vertically downwardly or substantially vertically downwardly and attach to the rearmost portion of the propeller carrying gear casing in a position so that the exhaust gases passing downwardly from the muffler through this manifold will be discharged at the rear of the propeller zone and directly behind and within the confines of the stream-line sides of the gear casing. In order to carry out these provisions, we provide the muffler extension 16 with an opening in its bottom as at 46 and attach thereto as by means of bolts 48 a hollow stream-line manifold 50. This manifold 50 at its top is provided with a preferably rectangular outwardly extending flange suitably ribbed on its vertical sides for strength and provided with port holes by which it may be attached to the edges of the bottom of the manifold surrounding the opening 46. This manifold which is of stream-line construction and which presents rather broad lateral faces is provided at its rearmost portion with a slotted opening 52 which serves to shoot exhaust gases outward in a substantially vertical column well within the stream-line surfaces of the underwater exhaust manifold 50 and those of the gear casing 26.

In order to hold this underwater exhaust manifold securely and rigidly in position,

the rear portion of the water gathering mouth 42 is preferably formed with rearwardly disposed lugs providing a central seat adapted to receive the front edge of the manifold. In addition, we provide a yoke 56 which receives therethrough two bolts 54, the inner ends of which thread into the extension on the rear of the water gathering mouth 42. In this manner the manifold is securely clamped or secured to the rear portion of the water gathering mouth and anti-cavitation plate of the gear case housing. If desired as an alternative construction, we may provide the forward portion of the manifold with outwardly extending lugs adapted to receive bolts for screwing into the rear face of the water gathering mouth thereby eliminating the necessity of the yoke 56.

As a modification of the means for holding this underwater exhaust manifold in position, I have shown in Figure 4 a construction wherein the manifold is provided intermediate its height with a forwardly projecting lug 60 provided with suitable bolt holes to receive a relatively stiff metallic plate or shim 62 which is securely bolted between the lower gear casing and the short connecting section 40 as by means of the bolts 64. Thus, it will be seen that by means of this construction, the underwater exhaust conduit is securely held at the upper-most part of the gear casing 26 and not by means of means at the cavitation plate. This type of construction is particularly adaptable where the cavitation plate is not provided with an underwater gathering mouth, the absence of which makes it convenient to arrange for an attachment at this point.

The foregoing construction by reason of its simplicity and by reason of its method of attachment to the gear casing and muffler of a standard outboard or inboard motor, makes it especially adaptable as an attachment for converting an outboard motor or inboard motor in which the exhaust is discharged above normal water level, to an underwater exhaust type.

It will be noted that the sides of the stream-line underwater exhaust manifold provide substantially broad water engaging faces which provide additional steering surfaces for the water propulsion device and that these steering surfaces of the manifold, together with those of the stream-line gear casing, when turning with the propeller, assist the latter in steering. It will be understood, of course, that the manifold, if rigidly mounted on the gear casing, turns with the latter during the steering operation.

In order to permit facility of starting and easy running at low speeds, we prefer to provide means for discharging these exhaust gases coming from the muffler, directly to the atmosphere and not below water, so as to eliminate the creation of back pressure at starting and low speeds. In carrying this out, we have provided the underwater exhaust manifold 50 with an opening 66 in the side wall thereof and have provided such side wall with a laterally extending yoke 68 forming a boss for the stem 70 of a slidable valve 72 adapted to open and close said port. In addition, a spring 74 normally urges this valve to seated position to close the port.

There is a control mechanism for lifting the valve from its seat at starting and slow speeds which consists of a wire or flexible connector 76 connected to the opposite face of the valve from which the steam projects and passing through a nipple 78 mounted in that wall of the manifold 50 opposite the valve opening. This flexible connector or wire 76 is housed in a tubular sleeve 80 which passes upwardly to any suitable controlling mechanism preferably mounted on the body of the motor. As a convenient mounting, we provide the tiller rail 82 with a clamp 84 having a lateral extension 86 which securely holds this tubular sleeve 80 surrounding the flexible wire or rod 76. In addition, this clamp 84 is provided with an extension 88 in which is pivotally mounted a lever 90. oscillatable about the axis 92. This lever has an extension 94 which connects rigidly to the end of the wire 76 whereby on oscillation of this lever, the wire can be pulled to open the valve from its seat.

It will be thus seen that by reason of our improved construction, we provide a very simple type of underwater exhaust which may be originally built into the outboard or inboard type of motor or may be added thereto for converting a non-underwater exhaust type to an underwater exhaust type. It will be seen that we have accomplished this in a manner so as not to add to the resistance which the submergible parts present to the water in which they are submerged. This is accomplished by mounting the underwater exhaust manifold directly within the lateral stream-line faces of the gear casing and at a point to the rear thereof, and in a manner so that it will be rigid with the gear casing and turn therewith during the steering operation. It will also be seen that this relatively broad-faced underwater stream-line manifold, provides additional steering surfaces which give a rudder effect to assist the propeller in steering. It will also be seen that in order to permit of this mounting, we have extended the muffler rearwardly so as to overhang the propeller carried by the lower portion of the gear case and in this way permit a construction wherein the underwater exhaust manifold depends vertically downwardly and thereby conducts the exhaust gases in the shortest possible path to the water under which they are exhausted.

It will also be seen that our simple con-

struction and manner of attaching the same to the gear casing either at the anti-cavitation plate or above the same adapts the underwater exhaust construction to various types of outboard and inboard motors.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In combination with a water propulsion device having a power head including an internal combustion engine, having a muffler, a sleeve surrounding the extended driveshaft of the engine having a propeller carrying casing at its lower end which is of streamline construction, an underwater exhaust attachment for said propulsion device comprising an exhaust manifold having means for attachment to the gear casing, and means engaging said attaching means and said gear casing for rigidly holding said manifold in position at the rear of the gear casing, and within the streamlined lateral sides of the gear casing, said manifold being constructed and arranged to discharge the exhaust gases below normal water level and at the rear of the propeller.

2. A marine motor comprising in combination with a power head having a muffler, a tubular sleeve depending from said power head and adapted to enclose the engine driveshaft, a streamline gear casing mounted on the lower end of said tubular sleeve and carrying the propeller, said gear casing having an anti-cavitation plate extending therefrom and overlying the path of travel of the propeller blades, an underwater exhaust manifold connecting with the muffler to receive exhaust from the motor, and extending downwardly and connected to the rear of the gear casing, said manifold being constructed and arranged to discharge the exhaust gases below normal water level and at the rear of the propeller, said manifold being of streamline construction and being disposed within the streamlined side faces of the gear casing.

3. In a device of the class described, the combination of a marine motor having a self-contained power plant and driveshaft, of a sleeve surrounding said driveshaft and provided with a propeller carrying casing of streamline conformation on its lower end, said casing having an extending anti-cavitation plate adapted to overlie the uppermost path of travel of the propeller blades, and a streamlined underwater exhaust manifold connecting with the exhaust of the engine and depending downwardly, and means for attaching the lower portion of said manifold to the rear portion of the anti-cavitation plate of said casing and for rigidly holding the same to the casing to turn therewith and within the streamline confines of said casing, said manifold having a discharge port facing away from the propeller and constructed and arranged to discharge the exhaust gases below normal water level and rearwardly of the propeller.

4. In a device of the class described, the combination of a self contained power plant of the marine motor type and having a substantially vertically depending driveshaft, a sleeve surrounding said driveshaft, a propeller carrying casing mounted on the lower ends of the sleeve and being of streamline formation, a substantially streamline underwater exhaust manifold connected with the engine exhaust and having means adapted for connection with the gear casing, and a rigid plate connected to the upper part of said gear casing and to said means on the manifold for rigidly holding the manifold securely in position at the rear of the gear casing and so as to turn therewith, said manifold having an underwater exhaust opening adapted to discharge the exhaust gases to the rear of the propeller.

5. In a marine motor, in combination with the self contained power plant having a vertically depending driveshaft and the tubular sleeve surrounding said driveshaft, said tubular sleeve having a lower section provided with a bolt receiving flange, a propeller carrying gear casing of streamline construction having bolt receiving openings in its top, a metallic plate securely fastened between the flange on the lower end of said tubular casing and the top of said gear casing and by the bolts passing therethrough, and an underwater exhaust manifold connected with the engine exhaust, said manifold having a forwardly extending lug adapted to attach to said rigid plate whereby said manifold is securely held to said propeller carrying gear casing and at the rear thereof, said manifold having an opening for projecting the water below normal water level and at the rear of the path of travel of the propeller blades.

6. An outboard motor having a self contained power head and a tubular sleeve surrounding the vertically depending engine driveshaft, said tubular sleeve having on its lower end a propeller carrying gear casing of streamlined conformation, means for turning said tubular sleeve for turning the propeller carrying casing for steering, said propeller carrying casing having an extending anti-cavitation plate overlying the path of travel of the propeller and a muffler having a discharge opening disposed rearwardly of and above the anti-cavitation plate, a depending underwater exhaust manifold secured to said muffler and projecting downwardly to the rear of the anti-cavitation plate, and means for connecting said manifold to the gear casing, said means being constructed and arranged to hold the same rigidly in position and to turn therewith, said manifold being of substantially streamline construction and constructed and arranged to discharge the exhaust gases below nor-

mal water level and rearwardly of the propeller.

7. An outboard motor of the type wherein the self contained power plant is provided with a vertically depending sleeve surrounding the extension engine shaft, and wherein the sleeve is provided at its lower portion with a propeller carrying gear casing of streamline construction, an underwater exhaust manifold connected with the engine exhaust, said manifold being rigidly attached to the gear casing for turning therewith and having a discharge opening located below normal water level so as to discharge the exhaust rearwardly of the propeller, said manifold having a valve control opening located above normal water level, a valve normally spring pressed to seat upon said opening and a flexible cable connected to said valve and having an operating member for operating the valve to open the same against the tension of the spring.

8. In a marine motor construction, in combination with the power unit including the internal combustion engine provided with a substantially vertically depending shaft carrying a flywheel magneto and rope starter on its upper end above said engine, and having a gasoline tank provided with a cut-out portion nesting the flywheel magneto and rope starter, of a tubular sleeve surrounding the vertical extension of the drive shaft, a gear case housing fixed to the lower end of said tubular sleeve and carrying a propeller, of a muffler connected to the exhaust ports of the engine, said muffler comprising a cylindrical portion adjacent the cylinders, said cylindrical portion having a box-like extension projecting from its rearmost side with a discharge opening in the bottom wall of the extension.

9. In a marine motor of the character indicated, in combination with the internal combustion engine power plant having a vertical depending driveshaft, a hollow tube surrounding said driveshaft and provided on its lower end with the propeller carrying gear casing, a muffler connected with the exhaust ports of the internal combustion engine, said muffler extending rearwardly so as to overlie the rearmost portion of the propeller carrying gear casing, said extension having an aperture in its bottom wall and an extension pipe connected to said opening, the lower portion of said exhaust pipe being of streamline construction and extending downwardly at the rear of the propeller carrying casing and adapted to discharge exhaust gases below normal water level.

10. An underwater exhaust attachment for an outboard motor having an engine exhaust muffler and a propeller carrying casing with a plate overlying the propeller, comprising a separate exhaust pipe connected to the muffler at its upper end and to the plate at the lower end and discharging at the rear of the propeller below the uppermost part of its path of travel.

11. An underwater exhaust attachment for an outboard motor having an engine exhaust muffler and a propeller carrying casing with an integral extension overlying the propeller, comprising a separate exhaust pipe connected to the muffler at its upper end, and means to attach it at its lower end to the rear of the extension with the upper part of the propeller between the casing and the pipe, and the pipe having a lower discharge opening at the rear below water level so that the water thrust rearwardly from the propeller will tend to draw the exhaust gases from the pipe.

12. In an outboard motor having a combustion engine and a propeller carrying gear casing, a muffler connected with the engine extending rearwardly to overlie the rearmost portion of the casing and having a discharge opening in its bottom wall, and an exhaust pipe connected to the opening, extending downwardly at the rear of the casing and open at the bottom to discharge exhaust gases below normal water level.

13. A marine motor having an engine exhaust muffler and a propeller carrying casing, a separate exhaust pipe connected at its upper end to the muffler and discharging below water level at the rear of the casing, and a normally closed atmospheric valve in the pipe above normal water level.

14. A marine motor having an engine exhaust muffler and a propeller carrying casing, a separate exhaust pipe connected at its upper end to the muffler and discharging below water level at the rear of the casing, an atmospheric valve in the pipe above normal water level, and manual means for opening the valve to relieve back pressure.

15. A marine motor having an engine exhaust muffler and a propeller carrying casing, a separate exhaust pipe connected at its upper end to the muffler and discharging below water level at the rear of the casing, an atmospheric valve in the pipe above normal water level, means tending to keep the valve closed, and manual means for opening the valve.

In witness whereof, we have hereunder subscribed our names.

LOUIS J. JOHNSON.
HARRY L. JOHNSON.