June 11, 1929. H. L. JOHNSON 1,716,962

WATER PROPULSION DEVICE

Filed Aug. 25, 1926

Fig. 1.

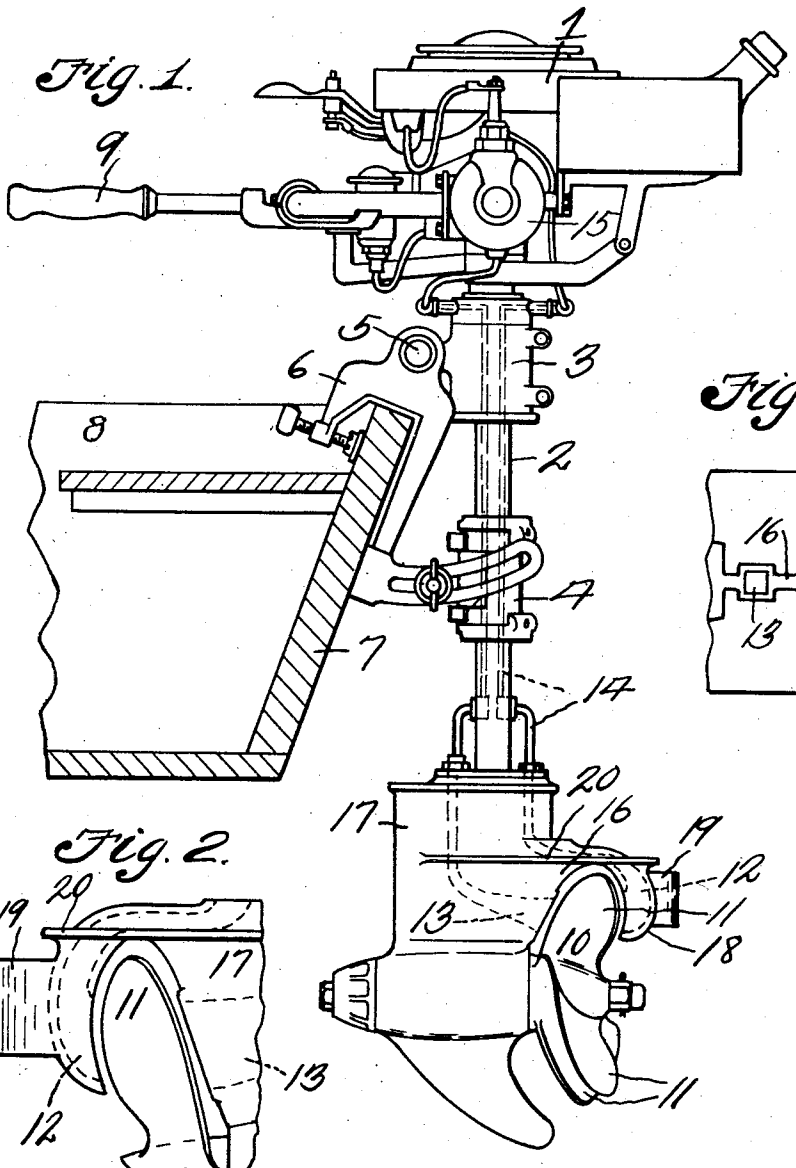


Fig. 3.

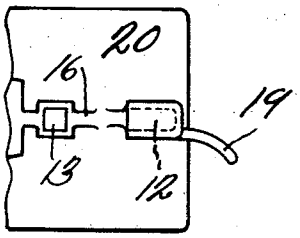
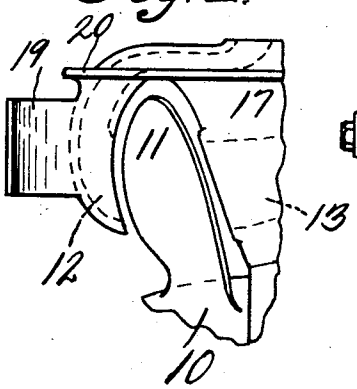


Fig. 2.



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UNITED STATES PATENT OFFICE.

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WATER PROPULSION DEVICE.

Application filed August 25, 1926. Serial No. 131,534.

The invention relates to water propulsion devices, particularly of the outboard or inboard motor type. In the present instance, the invention is illustrated as applied to an outboard motor, particularly of the pivotally mounted type wherein the motor as a whole is pivotally moved during the steering operation, and has for its object to provide the lower end of the motor rearwardly of the propeller with a water resisting plate against which the water is forced by the propeller, and which plate counteracts the side movement of the motor as well as the pivotal movement thereof in its bearing, thereby allowing the operator to steer a straight course while holding the tiller and without the strain on the hand, incident to the side throw referred to.

A further object is to provide a deflecting plate rearwardly of the propeller, said deflecting plate curving rearwardly and outwardly in the direction of rotation of the propeller, and against which plate water projected rearwardly by the propeller engages and counteracts the pivotal movement of the motor, thereby relieving the strain on the operator's hand while gripping the tiller during a steering operation.

A further object is to provide the lower end of the drive shaft casing with a casting which supports the propeller and propeller shaft and said casting with a member arching the upper side of the propeller and having intake and discharge ports leading to the engine jacket, and a water resisting deflecting plate carried by said casting rearwardly of the propeller blade, and by the rear portion of the portion of the casting which arches the propeller. Also to provide the casting adjacent the upper side of the propeller with an anti-cavitation plate, and which plate is preferably formed integral with the casting, and additionally braces the portion of the casting arching the upper side of the propeller.

A further object of my invention resides in providing the propeller-carrying-casing with an anti-cavitation plate arranged so as to directly overlie the path of travel of the propeller blades, and in forming the exterior surfaces of this casing relatively broad and smooth and extending them upwardly well above the plane of the anti-cavitation plate, whereby not only to permit the housing to travel through the water with minimum resistance and to provide rudder surfaces to assist in steering, but also to permit the flowing water to pass closely about the rear of the housing above the anti-cavitation plate to assist in preventing cavitation at the propeller. A further feature of this aspect of my invention resides in the fact that the propeller-carrying-casing as thus constructed, provides an enclosing housing for the drive and propeller shafts, the geared connections therebetween, and also for one or more water passages leading to the water jacket of the engine and terminating on the exterior face of the housing below normal water level, by which arrangement the propeller-carrying-casing can move through the water with minimum resistance and cooling water can be delivered to the water jacket of the motor.

With the above and other objects in view the invention resides in the combination and arrangement of parts as hereinafter set forth, shown in the drawings, described and claimed, it being understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawing:—

Figure 1 is a side elevation of an outboard motor showing the devices applied thereto.

Figure 2 is a detail view in elevation of the right side of the deflecting plate and portions of the adjacent mechanism.

Figure 3 is a bottom plan view of a portion of the anti-cavitation plate and the water resisting plate.

Referring to the drawing the numeral 1 designates the motor, which motor is provided with a downwardly extending drive shaft casing 2, which drive shaft casing is rotatably mounted in a bearing member 3 and 4 in the usual manner, and the motor as a whole is pivotally connected at 5 to the bracket 6, and which bracket in turn is securely clamped to the rear end 7 of a boat 8. In motors of this general type, the motor as a whole is pivotally moved in the bearing members 3 and 4 during a steering operation, and at which time the operator grasps the tiller 9. It has been found that during a steering operation it is necessary for the

operator to maintain a firm grip on the tiller 9, and the hand and arm of the operator is under strain, particularly in long runs, and which strain is caused by the tendency of pivotal movement of the motor as a whole in the direction of throw of the propeller 10, and which throw not only has a tendency to cause the motor as a whole to have a pivotal movement, but also the rear end of the boat to have a lateral movement in the direction of throw of the propeller.

Propeller 10 is driven in the usual manner and in the present case the blades 11 thereof pass between the intake port 12 and the discharge port 13. During the rotation of the propeller, water is driven through the port 12 through the pipe 14 to the water jacket 15 of the engine, and is sucked as well as discharged through the port 13 by the propeller blades as they pass through the arched portion 16 of the casing 17. The arched portion of the casing 17 arches the upper side of the propeller and terminates rearwardly thereof in the portion 18. Extending rearwardly and outwardly from the portion 18 is a deflecting plate 19, and against which deflecting plate water forced rearwardly by the blades 11 of the propeller engages and counteracts the pivotal movement of the motor as a whole as well as the side throw, thereby relieving strain on the hand of the operator while grasping the tiller 9 during a steering operation. It will be noted that the deflecting plate 19 curves in the direction of the direction of rotation of the propeller, which causes the side throw and pivotal action, consequently the current of water which is projected rearwardly by the propeller blade will impart sufficient power on the curved plate 19 to counteract the pivotal tendency as well as the side throw. It will be noted that plate 19 curves to the right, however it is to be understood with a left hand propeller the plate may be reversed in its position.

Port 12 extends upwardly through the arched portion 16 of the casing 17 and formed integral with said arched portion 16 and casing 17, and located adjacent the upper side of the propeller is an anti-cavitation plate, which plate prevents cavitation and at the same time forms a brace for the arched portion 16 of the casing and eliminates the necessity of making the arch 16 relatively heavy, which in turn would cause a bulky structure and unnecessary resistance as the motor moves through the water.

The propeller carrying casing 17 which is rigidly mounted on the lower end of the tubular sleeve or casing 2 surrounding the drive shaft forms a housing for the lower end of said depending drive shaft, for the propeller shaft on which the propeller 10 is mounted, and for the geared connections therebetween. It also houses the water discharge passage 12 and the water intake passage 13 which extend upwardly therethrough and connect with suitable passages within the enclosing casing 2 leading to the jacket of the motor. This propeller-carrying-casing 17 is provided with relatively broad smooth and unbroken exterior surfaces both below and above anti-cavitation plate 20. This plate 20 preferably directly overlies the uppermost path of travel of the propeller blades 11, and it will be seen that the outer walls of this casing extend from the barrel-like portion 21 of the casing upwardly considerably above the anti-cavitation plate. In fact, the anti-cavitation plate is located substantially midway the top of the casing and the barrel-like portion of the casing in which the propeller shaft is directly mounted. By means of this construction, when the device is propelling the boat through the water, the water will flow with minimum resistance past these relatively smooth and substantially stream-line surfaces, thereby cutting down resistance to a minimum. By extending these smooth surfaces of the casing upwardly for a considerable distance above the anti-cavitation plate 20, the water flowing past the surfaces of the casing which are above the anti-cavitation plate will tend to follow the wall surfaces at the rearmost part of the casing and will flow inwardly and rearwardly above and over the anti-cavitation plate, thus creating a substantial body of flowing water directly over the cavitation plate and thus assisting the latter in preventing the formation of air pockets or cavitation at the propeller. In addition, by thus forming this propeller-carrying-casing with these relatively smooth walls which extend a considerable distance upwardly and also rearwardly, I provide relatively broad surfaces giving a rudder effect to assist the propeller in its steering movements as for instance when the housing is angularly turned to steer the boat in different directions.

From the above it will be seen that means is provided in connection with an outboard motor whereby the pivotal action of the motor as well as the side throw incident to the rotation of the propeller is obviated, consequently strain on the helmsman is relieved. It will also be seen that the deflecting plate 19 may be formed integral with the casing 17, as well as the anti-cavitation plate, consequently can be made in a single casting, thereby reducing the cost of manufacturing to a minimum.

The invention having been set forth what is claimed as new and useful is:

1. The combination with a pivotally mounted outboard motor, a rotatable propeller carried by said motor, a casing, a member carried by said casing and arching the side of the propeller and having intake and discharge ports, of a deflecting plate carried

by said member arching the propeller and located rearwardly of the propeller, said deflecting member extending outwardly in the direction of rotation of the propeller.

2. The combination with an outboard motor, a propeller carried by said motor, a casing, a member carried by said casing and arching the upper side of the propeller and having intake and discharge ports, and a deflecting plate carried by said arching member and disposed rearwardly of the propeller and extending in the direction of rotation of said propeller.

3. The combination with the lower end of an outboard motor, a propeller carried by said lower end, of a member arching said propeller and terminating rearwardly thereof, a deflecting plate carried by said member rearwardly of the propeller, said deflecting plate extending laterally in the direction of turn of the propeller in constant relation to said propeller.

4. The combination with a pivotally mounted outboard motor having a propeller, of a water deflecting plate disposed adjacent said propeller and forming means whereby pivotal movement of the propeller is obviated in the direction of turn of the propeller.

5. The combination with an outboard motor pivotally mounted and having a propeller, of means disposed rearwardly of the propeller and forming water resisting means whereby pivotal action of the motor in the direction of turn of the propeller is prevented as the motor moves through the water.

6. The combination with an outboard motor having a propeller shaft casing, a propeller, a member arching one side of the propeller, of an anti-cavitation plate carried by the casing and the member arching the propeller and located above the propeller.

7. The combination with an outboard motor having a propeller shaft casing, a propeller, a member arching one side of the propeller, a water resisting member carried by said arching member and extending in the direction of rotation of the propeller, of an anti-cavitation plate carried by the casing and the arching member.

8. The combination with an outboard motor casing, a propeller, a member carried by the casing and arching the propeller and having intake and discharge ports, a water resisting member carried by the arching member and an anti-cavitation plate carried by the casing at opposite sides thereof and by the member arching the propeller.

9. A propulsion device for water vehicles comprising a stationary support carrying a bearing, a drive shaft casing mounted to turn in said bearing, a motor having its drive shaft disposed within the drive shaft casing and said shaft passing downwardly through said casing, a housing mounted on the lower portion of the drive shaft casing and turnable therewith for steering, said housing being formed with a substantially horizontal barrel-like portion, a propeller shaft mounted within said barrel-like portion, and having a driving connection with the motor drive shaft, a propeller on said propeller shaft, said housing extending upwardly from said barrel-like portion and provided considerably below its top with an anti-cavitation plate extending rearwardly therefrom and overlying the path of forward travel of the propeller blades, and said housing having substantially vertical internal inlet and outlet passages leading to and from the water jacket of the engine both passages opening below normal water level.

10. A propulsion device for water craft comprising a stationary support carrying a bearing, a drive shaft casing mounted to turn in said bearing, a motor mounted on the upper end of said drive shaft casing with its drive shaft disposed within the drive shaft casing, said shaft passing downwardly therethrough, a housing mounted on the lower portion of the drive shaft casing and turnable therewith for steering, said housing being formed with a substantially horizontal barrel-like portion adapted to house the propeller shaft and its driving connection with the motor drive shaft, a propeller on said propeller shaft, said housing extending upwardly from said barrel-like portion and provided with an anti-cavitation plate extending rearwardly therefrom and overlying the forward path of travel of the propeller blades, said housing having smooth and unbroken outer wall surfaces at each side thereof extending upwardly from the said barrel-like portion to said plate and upwardly well above said plate to the top of the housing, and said housing having substantially vertical internal inlet and outlet passages leading to and from the water jacket of the engine both passages opening below normal water level.

11. A propulsion device for water craft comprising a stationary support carrying a bearing, a drive shaft casing mounted to turn in said bearing, a motor mounted on the upper end of said drive shaft casing with its drive shaft disposed within the drive shaft casing and said shaft passing downwardly therethrough, a housing mounted on the lower portion of the drive shaft casing and turning therewith, said housing including a substantially horizontal barrel-like portion, a propeller shaft mounted within said barrel-like portion and having a driving connection with the motor drive shaft, a propeller on said propeller shaft, said housing extending upwardly

from said barrel-like portion and provided well below its top with an anti-cavitation plate extending rearwardly therefrom overlying the path of forward travel of the propeller blades and said housing having a substantially vertical internal passage leading to the water jacket of the engine, said passage opening at a point below normal water level.

12. A propulsion device for water craft having a stationary support carrying a bearing, a drive shaft casing mounted to turn in said bearing, a motor mounted on the upper end of said drive shaft casing with its drive shaft disposed within the drive shaft casing and said shaft passing downwardly therethrough, a housing mounted on the lower portion of the drive shaft casing and turnable therewith for steering, said housing being formed with a substantially horizontal barrel-like portion, a propeller shaft mounted within said barrel-like portion and having a driving connection with the motor drive shaft, a propeller on said propeller shaft, said housing having an anti-cavitation plate extending rearwardly therefrom overlying the path of forward travel of the propeller blades, said housing having unbroken outer wall surfaces at each side extending upwardly from the said barrel-like portion to said plate and from said plate upwardly a substantial distance to the top of the housing, and said housing having a substantially vertical internal passage leading to the water jacket of the engine, said passage opening below the normal water level.

13. The combination of a water propulsion device having a vertically extending turnable propeller shaft casing provided with an internal water passage, opening below normal water level, a propeller mounted thereon, means for turning said casing for steering, said casing having an anti-cavitation plate cast integral therewith and located in a plane above the propeller.

14. The combination of a water propulsion device having a vertically extending turnable propeller shaft casing provided with an internal water passage, opening below normal water level, a propeller mounted thereon, means for turning said casing for steering, said casing having smooth and unbroken walls extending upwardly and provided with an integrally cast anti-cavitation plate substantially midway of its height and in a plane above the propeller blades.

In testimony whereof I affix my signature.

HARRY L. JOHNSON.

DISCLAIMER

1,716,962.—*Harry L. Johnson*, South Bend, Ind. WATER PROPULSION DEVICE. Patent dated June 11, 1929. Disclaimer filed May 6, 1942, by the assignee, *Johnson Brothers Engineering Corporation.*

Hereby disclaims claims 11, 12, 13, and 14 of said Letters Patent.

[*Official Gazette June 2, 1942.*]