Oct. 14, 1924. 1,511,867

D. F. ASBURY

MARINE PROPULSION APPARATUS

Original Filed Sept. 13, 1920 2 Sheets-Sheet 1

Fig. 1.

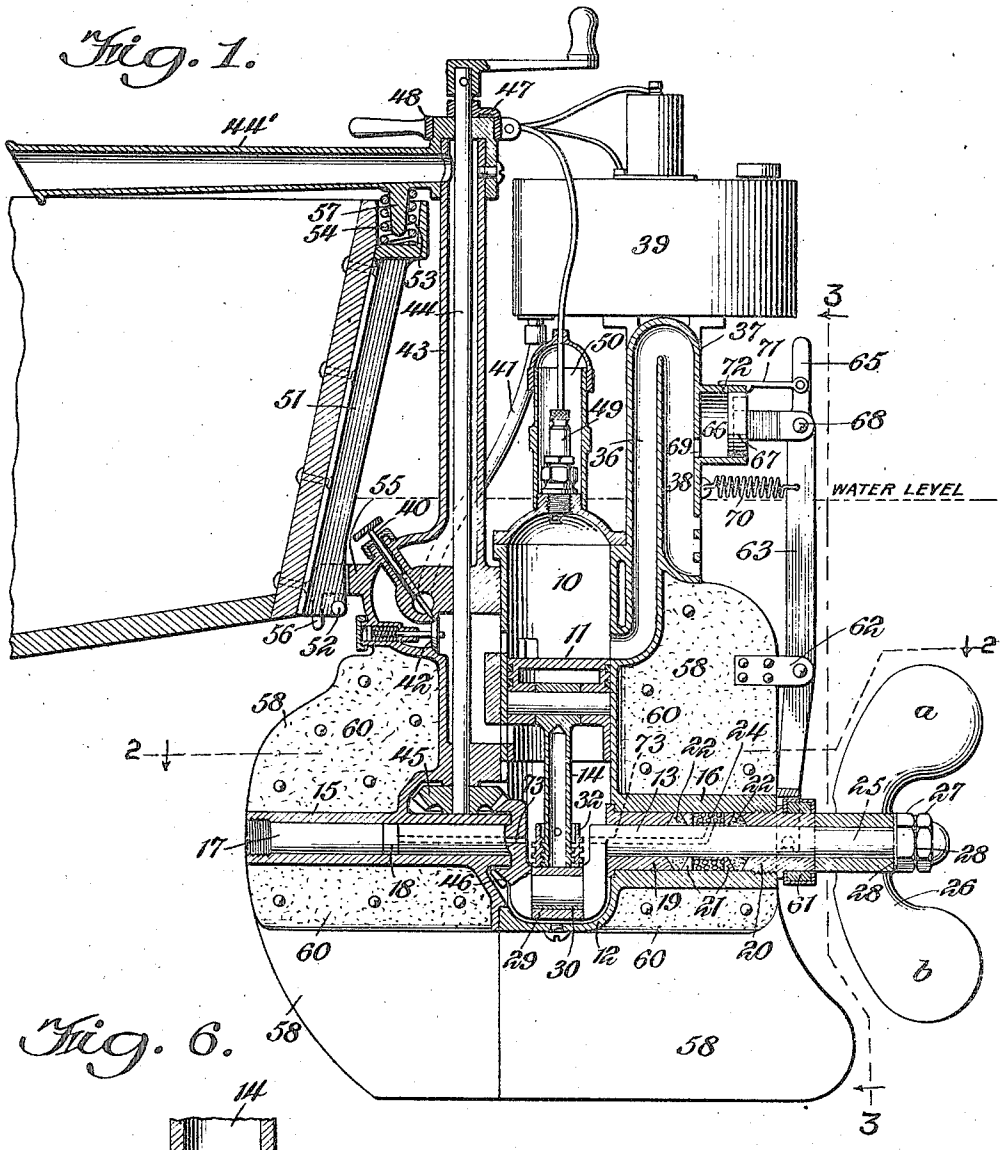


Fig. 6.

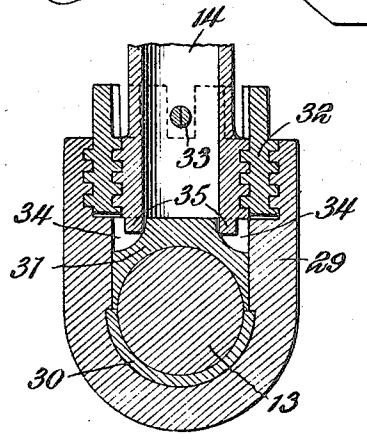
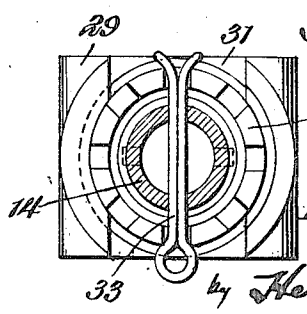


Fig. 7.



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Fig. 2.

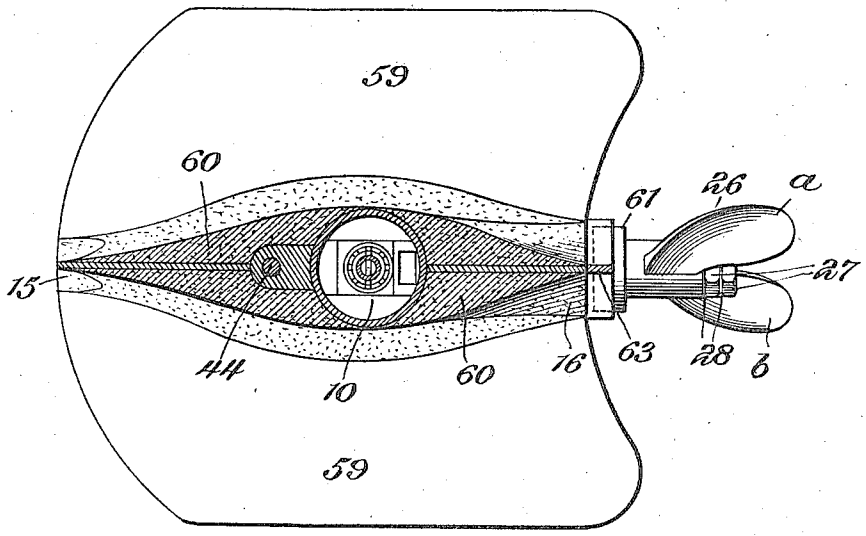


Fig. 4.

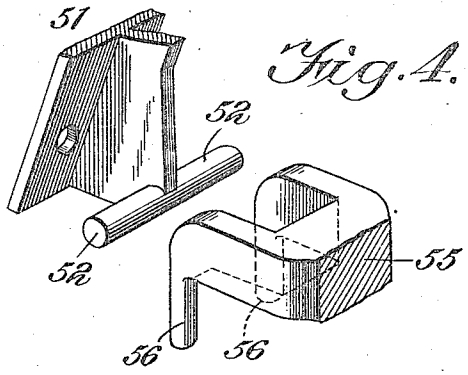


Fig. 3.

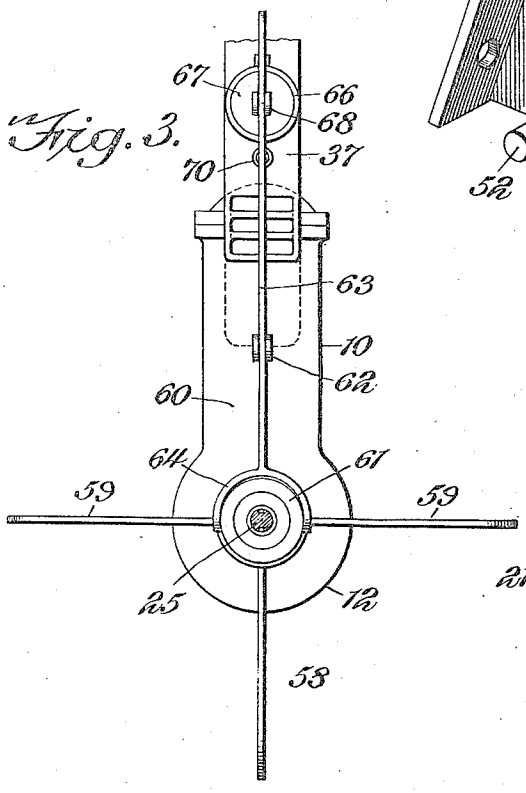
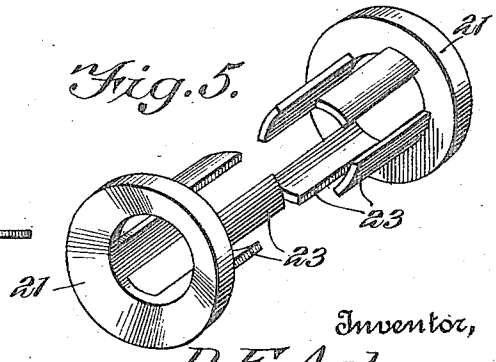


Fig. 5.



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Patented Oct. 14, 1924. 1,511,867

UNITED STATES PATENT OFFICE.

DORSEY FROST ASBURY, OF WASHINGTON, DISTRICT OF COLUMBIA.

MARINE PROPULSION APPARATUS.

Application filed September 13, 1920, Serial No. 409,622. Renewed August 16, 1922. Serial No. 582,247.

To all whom it may concern:

Be it known that I, DORSEY F. ASBURY, a citizen of the United States, and resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Marine Propulsion Apparatus, of which the following is a specification.

My invention relates to marine propulsion apparatus and has particular reference to improvements in outboard or portable motors of the type embracing in a single small unit a complete propelling mechanism, my purpose being to overcome some of the more noteworthy disadvantages encountered and manifested in the use of present types of motors of this character.

It is well known that present types of outboard motors subject the craft to which they are attached to excessive vibration which is not only extremely disagreeable to the craft's occupants, but is harmful to the craft itself, and it is one of the important objects of my invention to overcome this objectionable feature by providing a motor of such construction and manner of arranging and connecting it with a craft that vibration of the craft due to operation of the motor will be eliminated.

In accomplishing the foregoing I have been enabled to eliminate considerable of the noise and racket resulting from operation of prior types of outboard motors; to provide a clean, out of sight, light weight motor of greatest efficiency because its power is delivered direct to the propeller; to overcome the "run around" effect of outboard motors and provide for automatic straight steering; and to minimize the number of essential parts and mechanisms, and provide a compact apparatus easily assembled and unlikely to get out of order.

The features of novelty whereby I am able to accomplish the foregoing are susceptible of embodiment in various mechanical structures and uses such as are illustrated in the accompanying drawings, but it is to be understood that the structures shown are merely intended to disclose the essential features of my invention in a preferred form and that the scope of my invention is as defined in the appended claims.

In the drawings, wherein like characters of reference denote corresponding parts in the different views—

Fig. 1 is a central vertical section through my improved propelling apparatus showing the same connected to a craft;

Fig. 2, a horizontal section on the line 2—2 of Fig. 1;

Fig. 3, a transverse section on the line 3—3 of Fig. 1;

Fig. 4, a detail perspective showing the manner of connecting the motor with the craft;

Fig. 5, a detail perspective showing the relative arrangement of the packing rings for the power shaft;

Fig. 6, an enlarged section of the connection between the connecting rod and the crank shaft; and

Fig. 7, a plan of what is shown in Fig. 6.

Referring to the drawings in detail, it will be observed that my improved propulsion apparatus consists of an explosion motor including essentially a cylinder 10, piston 11, crank case 12, crank shaft 13 and connecting rod 14. To facilitate the construction and assembly of this motor the same is preferably embodied in two main parts, that part including the cylinder, crank case proper, and other parts, and a second part adapted to be bolted or otherwise secured to the first part and including the fuel mixing devices and the housing for the timer shaft, timer gears etc. The motor is preferably of the two cycle type in which the explosive mixture is forced into the explosion chamber by being first compressed in the base or crank case 12, and said crank case includes fore and aft housings 15 and 16, respectively within which the crank shaft finds bearings, the housing 15 being plugged by a member 17 and a bearing or block 18 of lignum-vitæ or other suitable material being interposed between the inner end of this member and the adjacent end of the crank shaft to receive the end thrust imparted to said crank shaft in motors of this type, wherein the propeller is secured directly to the crank shaft.

The rearwardly extending portion of the crank shaft 13 projects through spaced bearing sleeves 19 and 20 fixed in the housing 16, the latter sleeve projecting slightly beyond the end of said housing as shown, and between said bearing sleeves are arranged a pair of gland rings 21, and between each of these gland rings and the adjacent end of the respective bearing sleeves is arranged packing material 22. Each gland ring has

formed thereon a plurality of spaced fingers 23 and the fingers of the respective rings are adapted to intermesh and enclose the crank shaft at the point where a cavity exists between the rings due to their relative spaced arrangement. These fingers serve to prevent a number of coil springs 24, arranged between the gland rings to maintain them properly engaged with the packing 22, from contacting with the shaft, plural springs being used to assure even pressure of the rings against the packing, which packing is for the purpose of preventing water from leaking around the shaft and finding its way into the crank case of the engine. The shaft is reduced in diameter as at 25 where it extends beyond the end of the bearing sleeve 20, to receive the hub of a propeller 26, which is keyed to said reduced end of the shaft and is additionally secured thereon by nuts 27, one of which serves as a lock for the other, and between the inner propeller securing nut and the propeller and between the nuts themselves are arranged felt or other similar gaskets or washers 28 to prevent leakage around the reduced portion of the shaft. It will thus be noticed that there is a running fit or contact between adjacent ends of the sleeve 20 and the hub of the propeller and that this is the only point where it is possible for water to gain access to the crank shaft, and then only when the engine is in operation, since means has been provided which will be particularly described hereinafter to prevent leakage at this point when the engine is idle.

My motor is designed to be water cooled and is adapted to operate when submerged, being therefore jacketless, and as it travels in water it is important that its bulk be reduced to a minimum in order to offer the least resistance to its progress. I have therefore designed a novel means of connecting the crank shaft with the connecting rod 14 so that the crank case may be reduced to the smallest practicable size. This connecting means embodies a substantially U-shaped block 29, arranged to embrace the crank pin of the crank shaft 13, and provided at its connecting or bight portion with a bearing 30 for the crank pin. Adapted to be inserted between the legs of the block 29 is a shoe 31, forming the second half of the bearing for the crank pin. The lower end of the connecting rod 14 is externally threaded and the legs of the U-block are internally threaded, the threaded portion of the rod being somewhat smaller in diameter than the threaded portion of the block, and the end of the connecting rod is adapted to be inserted between the legs of the block into contact with the shoe 31 and a nut 32, having internal threads, engaged with the threaded portion of the rod, and external threads, for engagement with the threads of the legs of the U-block, is then rotated to engage said last mentioned threads to secure all of said parts together and in place, where they are locked by a cotter pin 33 passing through the connecting rod and received in recesses in the nut. In order to prevent rotation of the connecting rod the shoe 31 has one or more recesses 34 cut in its upper face and the lower end of the rod has a gib or lugs 35 for engagement in these recesses, and while this is a preferred construction it is apparent that the arrangement might be reversed by recessing the rod and providing lugs or gibs on the shoe, or the desired result might be accomplished in some other manner. To disconnect the rod from the block it is only necessary to remove the cotter and then rotate the nut to disengage the threads between it and the legs of the block, whereupon the block, shoe, rod, and nut may be readily relatively separated and also removed from the crank pin.

The exhaust from the motor passes upward through a passage 36 in a casting 37, formed either integral with or separate from the cylinder 10, and thence downward through a second passage 38 in said casting, and finally out through the open end of said second passage, the casting 37 serving as a support for a fuel tank 39 which in turn acts as a support for the coil and batteries of the ignition system for the engine.

Suitably arranged in the second main part of the engine is a fuel regulating needle valve 40, to which fuel is supplied from the tank 39 through a pipe 41, and also arranged in said second main part of the engine, adjacent to the valve 40, is an air valve 42 to which air is supplied through a hollow vertically arranged steering column 43, to the upper end of which is secured a hollow tiller 44', whereby air may enter said column. By this arrangement the operator of the apparatus may grasp the tiller in the usual manner to hold the motor steady when it is desired to start the same, and with the same hand may partially or fully close the air entrance end of the tiller to thereby choke the air supply to the motor and thus facilitate the starting operation.

Extending through the column 43 is a shaft 44 which carries a bevel gear 45 at its lower end arranged in meshing relation with a similar gear 46 formed on the crank portion of the crank shaft 13. The upper end of this shaft carries a contact making and breaking device 47, operating in conjunction with a timer 48 carried by an adjacent portion of the column or tiller, for producing at proper times a spark in the plug 49 in the head of the cylinder 10, the plug being encased by a water tight housing 50, and the upper end of the shaft 44 being additionally

provided with means whereby it may be utilized to impart rotation to the crank shaft through the gears 45 and 46 for starting the engine.

My apparatus, as described in the foregoing, is particularly adapted for the propulsion of small craft, although susceptible of use for various other purposes, but when used for the former purpose is adapted to operate when submerged, being connected with and supported by the craft in a novel and peculiar manner whereby the objects set forth in the beginning of this specification are accomplished.

The manner of connecting the apparatus with the craft includes means whereby the apparatus is yieldably supported for movement in all transverse directions, said means consisting of a bracket 51 of T-shaped cross section secured to the craft and carrying at its lower end a pair of oppositely disposed lateral lugs 52 which are spaced from the craft, while at its upper end it is provided with a socket 53 to receive a coiled vertically acting compression spring 54. The engine has secured thereto or formed thereon a bifurcated member 55 including a pair of relatively spaced downwardly extending legs 56 adapted to straddle and cooperate with the lugs 52 to connect the apparatus with the craft, and the tiller 44′ carries a downwardly extending lug 57 adapted to be received interiorly of the coil spring 54 whereby the apparatus is yieldably supported when the motor is in operation the forward portion of the legs 56 contact with the bracket 51 on the craft, whereby the craft is pushed forward, and when the motor is reversed said legs engage the lugs 52 to exert a pull to move the creaft rearwardly. The legs 56 are so relatively disposed with respect to the longitudinal axis of the motor as to compensate the "run around" tendency of the propeller to thereby assure straight steering of the craft at all times except when the apparatus is swung by means of the tiller 44′ upon the lug 57 as a pivot to effect turning of the craft.

It is well known that the principal vibration of a motor of the type shown in the drawings is in the plane of rotation of its crank shaft, and while the yieldable connection between the craft and motor serves to relieve the craft of considerable of the motor's vibration, the motor itself being prevented from vibrating to any appreciable extent by means of fore and aft vertical and horizontal fins or blades 58 and 59, respectively, secured to the motor in any preferred manner, and adapted to operate against the water's inertia to hold the motor steady. Preferably, the motor and these fins or blades have secured thereto bouyant material 60 of cork or the like whereby the craft is relieved of a portion of the weight of the apparatus, and this material is of streamline contour or shape in order that the apparatus as a whole may offer the least resistance to its progress through the water.

I have provided means operable both manually and automatically to prevent leakage of water between the sleeve 20 and the hub of the propeller. This means preferably consists of a flexible band 61, slidable on the projecting end of the sleeve 20 and the surface of the propeller hub which is alined therewith. A bracket 62 is secured to one of the blades or fins 58 and to this bracket is pivoted an intermediate portion of a lever 63, one end of which is formed into a yoke 64, connected to the flexible band 61, whereby movement of the lever will slide the band on the sleeve and hub, while the other end is provided with a handle or grip 65 whereby it may be manually operated. Formed on the exhaust casting 37 is a cylindrical extension 66 and fitting this extension is a plunger 67, connected to the lever near its handle, as at 68. A small port or opening 69 is provided in the exhaust casting to permit a portion of the exhaust products to enter the cylindrical extension, and act against the plunger during operation of the engine to move and hold the lever outward and consequently move and hold the band out of engagement with the hub of the propeller to permit free rotation of the latter. When the engine is stopped, however, exhaust pressure against the plunger ceases and a contractile coil spring 70 which connects the lever with the exhaust casing is then free to act to automatically move the lever to dispose the band in covering relation with adjacent portions of the sleeve 20 and the hub of the propeller whereby leakage at this point is prevented. It is thus apparent that when the engine is idle the sleeve is disposed in contact with a rotatable part of the apparatus, thus rendering the engine hard to start until the sleeve has been moved out of contact with such rotatable part, and therefore, inasmuch as it is impracticable for the operator to manually hold the lever in position to dispose the sleeve out of contact with the propeller hub and at the same time perform other operations incident to starting, means consisting of a latch member 71 pivoted to the lever and engageable with the cylindrical extension has been provided to accomplish this purpose. Thus, just prior to starting the engine the lever 65 is moved outward until the latch 71 engages with the cylindrical extension to hold the band out of contact with the propeller hub. The apparatus is then free to be operated and the engine is started, whereupon part of the exhaust products entering chamber 66 escapes through a small opening 72 in the cylindrical extension and constantly acts against a portion of the latch to hold the

same out of engagement with the cylindrical extension. When the latch is released incident to starting the engine, however, the lever 65 remains in an outwardly disposed position due to the action of the exhaust against plunger 67, but when the engine is stopped, and the pressure of the exhaust against the plunger diminishes and finally ceases, the spring 70 then acts to restore the normal relation of parts, it being understood that although the diminishing exhaust pressure is incapable of holding the plunger 67 out against the action of the spring 70, it is sufficiently strong to hold the latch raised until the lever has moved inward far enough to render its dropping ineffective to prevent the lever's complete inward movement. On the other hand, it will be apparent that should the engine be started without the band having first been moved from contact with the propeller hub, as previously stated, this will be accomplished by the exhaust acting against the plunger 67 as soon as the engine fires.

From the foregoing it will be noted that when the motor is idle water cannot leak into the crank case, but that when the motor is running water may find its way to the crank shaft, and this will ordinarily be prevented from entering the crank case by packing 22, but to further guard against such leakage I provide the crank shaft with a small longitudinal opening 73 leading from the crank case to the bearing block 18 and to the cavity between the gland rings 21 so that the gases to be exploded, which have a higher average pressure than the pressure of the water, may find their way to the shaft bearings to exclude water from the crank case and also serve as a means of lubricating said shaft and its bearings as well as the packing 22.

The blade *a* of the propeller is constructed heavier than the blade *b* so as to balance the crank of the motor and further assure its smooth operation.

It is believed that the numerous advantages flowing from my improved propelling apparatus, as constructed in accordance with the foregoing, will be readily appreciated and that its operation will be apparent without further detailed description. I desire to point out, however, that the apparatus may be removed from the craft by simply lifting it vertically and that it may be supported above the water by one of the legs 52 being engaged with the socket 53, and further, that when lowering it into the water the bracket 51 will act as a guide and bearing to properly engage it with the craft.

I claim:—

1. In apparatus of the character described, a craft including steering means, and spaced laterally disposed contact points between the craft and steering means movable selectively into and out of engagement with the craft, said contact points being slidable with respect to the craft.

2. In marine propulsion apparatus, the combination with a craft, of a submerged motor yieldably supported by said craft for propelling the same, and a pair of relatively spaced contact points between the craft and motor, both of said contacts being normally in engagement with the boat and being movable singly and selectively into and out of engagement with the craft.

3. In marine propulsion apparatus, the combination with a craft, of a submerged motor yieldably supported against said craft in directions at right angles to the latter for pushing and pulling the same, and a pair of loose relatively spaced contacts between said craft and motor, both of said contacts being normally in engagement with the craft, during both pushing and pulling of the same and movable singly and selectively into engagement with the craft.

4. In marine propulsion apparatus, the combination with a craft and an internal combustion engine for propelling the same, said engine including means for mixing fuel with air, of a hollow tiller leading to said mixing means for supplying air thereto.

5. In marine propulsion apparatus, the combination with a craft and a submerged internal combustion engine for propelling the same, said engine including means for mixing fuel with air, of a hollow steering column leading to said mixing means, and a hollow tiller connected with and communicating with said hollow steering column, whereby air is supplied to said mixing means.

6. In marine propulsion apparatus, the combination with a submerged motor having fins to absorb its vibration, of bouyant material of stream-line shape carried by said fins and acting to relieve the support for said motor of a portion of its weight.

7. In apparatus of the character described, a craft including steering means, spaced laterally disposed contact points between the craft and steering means movable selectively into and out of engagement with the craft, and means for propelling said craft, said propelling means acting when in operation to hold said contact points in engagement with the craft.

8. In marine propulsion apparatus, the combination with a craft, of a motor for propelling the same, and a contact between the motor and a surface of the craft, said contact being yieldable in all directions over said surface, whereby vibrations of the motor are prevented from being transmitted to the craft.

9. In a submerged motor having a shaft extending into the water surrounding the

motor, members on the shaft and motor respectively whose surfaces are substantially in alinement, and an elastic tube binding against adjacent portions of said members to prevent leakage therebetween.

10. In a submerged motor having a shaft extending into the water surrounding the motor, a stationary member on the motor, a member on the shaft rotatable therewith, and a device binding against adjacent portions of said members when the motor is idle to prevent leakage of water into the motor, and means for moving said device out of binding relation with one of said members.

11. In a submerged motor having a shaft extending into the water surrounding the motor, a stationary member on the motor, a member on the shaft rotatable therewith, and a device binding against adjacent portions of said members when the motor is idle to prevent leakage of water into the motor, and automatic means for moving said device out of binding relation with one of said members when the motor is in operation.

12. In a submerged motor having a shaft extending into the water surrounding the motor, a stationary member on the motor, a member on the shaft rotatable therewith, and a device binding against adjacent portions of said members when the motor is idle to prevent leakage of water into the motor, and means operated by the exhaust from said motor for moving said device out of binding relation with one of said members when the motor is in operation.

13. In a submerged motor having a shaft extending into the water surrounding the motor, a stationary member on the motor, a member on the shaft rotatable therewith, and a device binding against adjacent portions of said members when the motor is idle to prevent leakage of water into the motor, means operated by the exhaust from said motor for moving said device out of binding relation with one of said members when the motor is in operation, and automatic means for moving said device into binding relation with adjacent portions of said members when the exhaust ceases.

14. In a submerged motor having a shaft extending into the water surrounding the motor, a stationary member on the motor, a member on the shaft rotatable therewith, a device movable into and out of binding relation with one of said members and into and out of binding relation with adjacent portions of both of said members, means for manually moving said device out of binding relation with adjacent portions of said members, a spring constantly urging said device into binding relation with adjacent portions of said members, and a latch member for holding said device out of binding relation with adjacent portions of said members, said latch being releasable by the exhaust from said engine to permit said spring to act.

15. Apparatus of the character described including a motor of the reciprocating piston type adapted to operate when submerged, and blades rigidly connected to said motor and extending at an angle to the direction of reciprocation of the piston and adapted to act against the water in which the motor may be submerged to counteract vibrations due to the reciprocation of the piston.

16. In marine propulsion apparatus, the combination with a craft, of means for propelling and steering the same, and a connection between the craft and said propelling and steering means including a spring yieldable in all directions for supporting the propelling and steering means upon the craft.

17. In marine propulsion apparatus, the combination with a craft, of means for propelling the same, and a connection between the craft and propelling means including a spring yieldable in all directions for supporting the propelling means upon the craft.

18. In marine propulsion apparatus, the combination with a craft, of means for steering the same, and a connection between the craft and said steering means including a spring yieldable in all directions for supporting the steering means upon the craft.

19. In apparatus of the character described, a craft including steering means, and spaced laterally disposed contact points between the craft and steering means movable selectively into and out of engagement with the craft.

20. In apparatus of the character described, a craft including steering means, spaced laterally disposed contact points between the craft and steering means movable selectively into and out of engagement with the craft, and means for holding said contact points in engagement with the craft.

21. In apparatus of the character described, a craft including steering means, a pair of oppositely disposed lugs on said craft, and a bifurcated member including legs engageable with said lugs to flexibly secure the steering means to the craft, said legs being movable selectively into and out of engagement with the craft when the steering means is turned relatively thereto.

22. In apparatus of the character described, a craft including steering means, a pair of oppositely disposed lugs carried by and spaced from the craft, and a bifurcated member carried by the steering means and including laterally spaced legs having angularly extending extremities engageable with said lugs to flexibly secure the steering means to the craft, said legs being movable selectively into and out of engagement with the craft.

23. In marine propulsion apparatus, the combination with a craft, of a motor for

propelling the same and a contact between the motor and a surface of the craft, said contact being slidable in all directions over said surface, whereby vibrations of the motor are prevented from being transmitted to the craft.

24. In marine propulsion apparatus, a craft including steering means, and a contact between said steering means and a surface of the craft, said contact being movable in all directions over said surface.

25. In marine propulsion apparatus, a vertically disposed submergible motor of the reciprocating piston type having laterally disposed blades secured thereto adapted to act against the water in which the motor may be submerged to counteract vibrations due to the reciprocation of the piston.

26. The combination with a driving member, of a device forming a seal to prevent leakage of fluid around said member when the same is idle, and means whereby said seal is maintained broken when the member is in operation.

27. The combination with a driving member, of a device forming a seal to prevent leakage of fluid around said member when the same is idle, means whereby said seal is maintained broken when the member is in operation, and other means acting to prevent leakage of fluid around said member when the same is in operation.

28. The combination with a rotatable member, of a device to prevent leakage of fluid therearound, said device being in contact with said member when the same is idle and being out of contact therewith when the same is running.

29. The combination with a rotatable member, of a device to prevent leakage of fluid therearound, said device being in contact with said member when the same is idle and being moved out of contact therewith automatically when the same is running.

30. In a propulsion apparatus, a fluid body, a shaft extending into said fluid body and carrying a propeller and a seal preventing the leakage of fluid around said shaft when the propeller is idle, said seal being automatically broken when the propeller is in operation.

31. In a propulsion apparatus, in combination, a fluid body, a shaft extending into said fluid body and carrying a propeller, a seal preventing the leakage of fluid around said shaft when the propeller is idle, said seal being automatically broken when the propeller is in operation, and other means to prevent leakage around said shaft when the propeller is in operation.

32. In a propulsion apparatus, a motor, a fluid body, a shaft extending from said motor into said fluid body and carrying a propeller, and a seal preventing the leakage of fluid around said shaft when the motor is idle, said seal being automatically broken when the motor is in operation.

33. Marine propulsion apparatus including a submergible motor having a crank shaft and a crank case, a seal preventing the leakage of water around the shaft into the case when the motor is idle, and means whereby said seal is broken when the motor is started, and maintained broken while the motor is running.

34. In a propulsion apparatus, a motor, a fluid body, a shaft driven from said motor and extending into said fluid body, a seal preventing the leakage of water around said shaft when the motor is idle, and means whereby said seal is broken automatically by the pressure of the exhaust from the motor when the latter is started and maintained broken during operation of the same.

35. In marine propulsion apparatus, the combination with a craft, of propelling means operatively connected to said craft for yielding movement in all directions with respect thereto.

36. In marine propulsion apparatus, the combination with a craft, of means for propelling the same, and a connection between the craft and propelling means including a member yieldable in all directions for supporting the propelling means upon the craft.

37. The combination with a craft, of an outboard motor, and means for operatively connecting the two whereby the motor may yield in all directions with respect to the craft.

38. In marine propulsion apparatus, a submerged motor having a propeller shaft extending exteriorly thereof, a spring, a member, means with which said member coacts under the influence of said spring to provide a seal preventing the leakage of fluid around said shaft into the motor when the latter is idle, and means acting automatically to break said seal when the motor is started.

39. Marine propulsion apparatus including a submergible explosion motor having a crank shaft and a crank case, a seal preventing the leakage of water around the shaft into the crank case when the motor is idle, means whereby said seal is maintained broken when the motor is running, and means whereby leakage of water around the shaft into the crank case is prevented when the seal is broken during operation of the motor.

In testimony whereof I hereunto affix my signature in the presence of two witnesses

DORSEY FROST ASBURY.

Witnesses:
JOHN H. SIGGERS,
FLORENCE A. BLINN.