Nov. 17, 1931. K. M. GRIER 1,832,808

ELECTRIC MOTOR BOAT

Filed Jan. 11, 1930 2 Sheets-Sheet 1

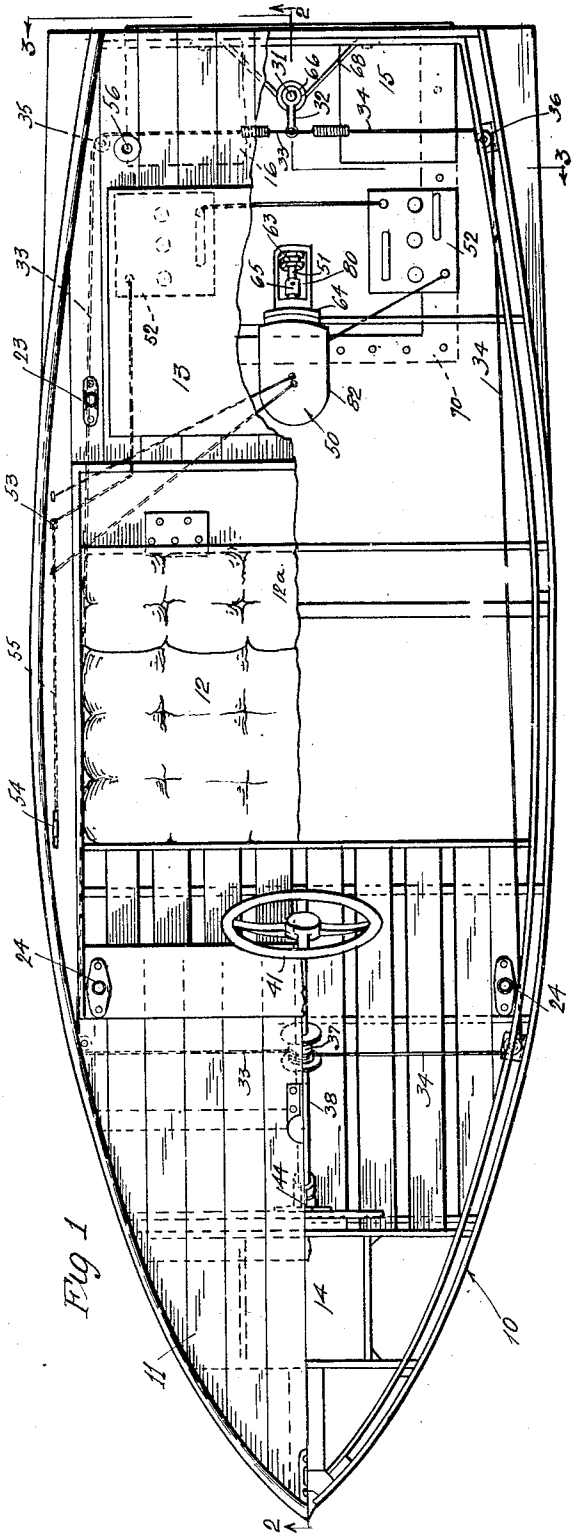


Fig 1

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Fig. 2

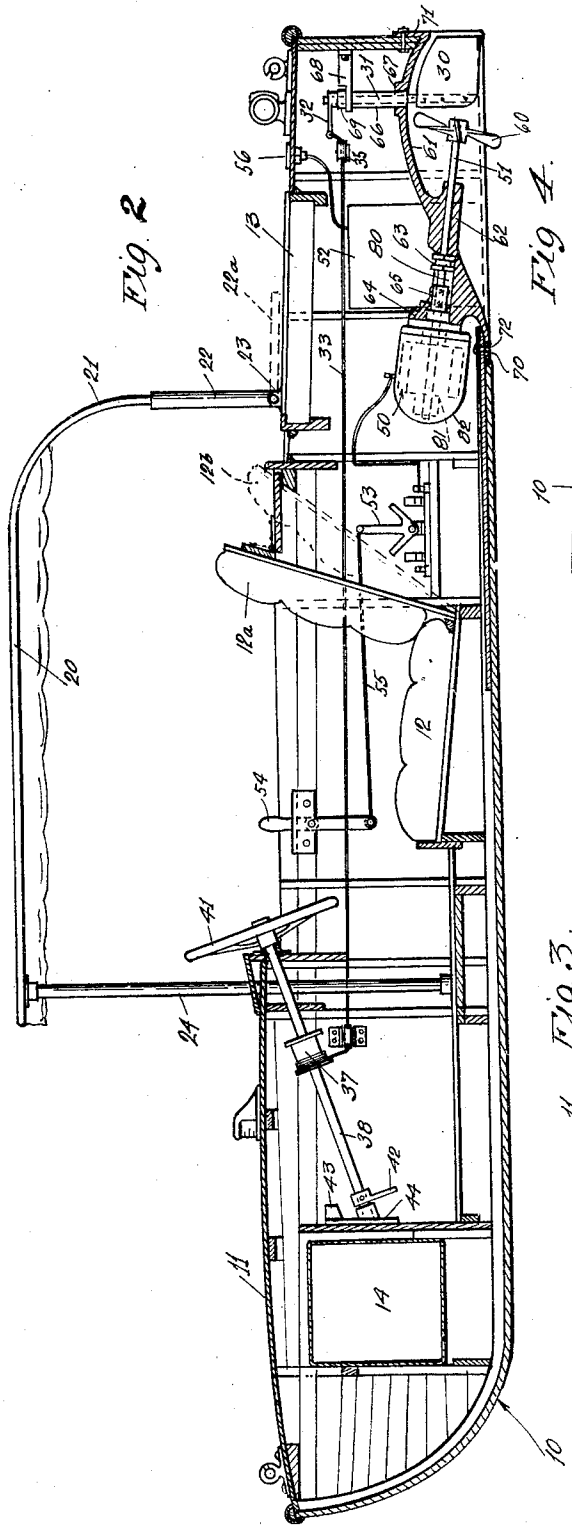


Fig. 4.

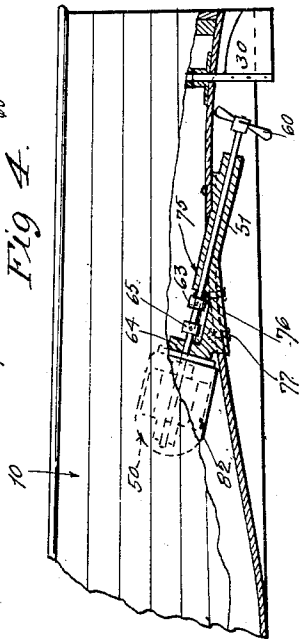
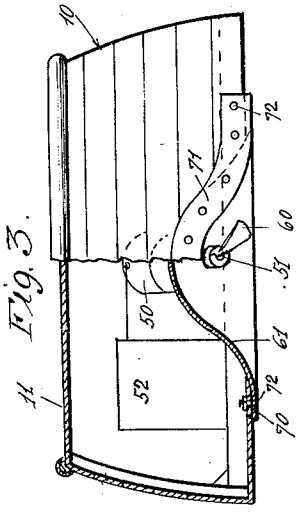


Fig. 3.



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UNITED STATES PATENT OFFICE

KENNETH M. GRIER, OF NORTH HOLLYWOOD, CALIFORNIA, ASSIGNOR TO KAYMO ELECTRIC SPEED BOAT CORPORATION, LTD., OF LOS ANGELES, CALIFORNIA, A CORPORATION OF NEVADA

ELECTRIC MOTOR BOAT

Application filed January 11, 1930. Serial No. 420,114.

This invention has reference to electrically propelled motor boats; and it is a general object of the invention to provide a boat of this character which is particularly suited for use as a rental pleasure craft on shallow park lakes and the like, by virtue of its general economical construction and its capability for operating with extremely low power consumption, thereby enabling the use of a comparatively simple and light weight motor and power source. The propulsion of small light weight boats of the present types by internal combustion engines is found to be impractical because of the unfamiliarity of the average user of the boat with the operation of the engine, and also due to its comparatively high original and maintenance costs, noise of operation, and the necessity for a heavier hull construction than would be required were the motor light and vibrationless. Electric motive power is particularly satisfactory for boats of this type, primarily because of its quiet operation and the fact that it may be controlled merely by making simple indicated adjustments. In operating such small boats as the present type by the use of an electric motor, however, considerations of economy and permissible weight, among other items, require that the motor and battery or batteries do not require too much space to be of such weight as to unduly load the boat. Consequently it becomes necessary to utilize with the highest degree of efficiency, the full amount of power available from comparatively limited battery equipment, and to utilize the power at a rate such as will permit the boat to operate for a reasonably long period of time without requiring recharging of the batteries.

These ends are accomplished by designing the motor so as to operate at low voltage and low speed, thereby being particularly adapted to battery power, and by mounting the propeller beneath the boat in a manner such that the full effect of the propeller thrust is made available for propulsion of the boat. In accordance with the invention, the rear bottom portion of the hull is made concave downward or tunneled so as to enable the propeller shaft to be mounted horizontally, and yet keep the propeller substantially above the bottom of the hull. This construction is advantageous in these respects, in that it not only permits mounting of the propeller on a horizontal axis, but also protects it from damage that might result were it projected below or to the rear of the hull; and it permits the direct coupling of the propeller shaft to a horizontally mounted motor shaft without the use of an intermediate universal joint. Since the operating speed of the present type of boat is comparatively low, the water will fill the tunnel at all times and there will be no loss of power due to interrupted flow of water or only partial immersion of the propeller, as would be the case were the boat operated at high speed.

The above and further advantages and details of the invention having to do more particularly with the construction and arrangement of the parts will be most readily understood and discussed to best advantage from the following detailed description, throughout which reference is had to the accompanying drawings, in which:

Fig. 1 is a plan view of a boat constructed in accordance with my invention, the top and parts of the decking and seats being broken away to reveal the parts in the bottom of the boat;

Fig. 2 is a longitudinal section on line 2—2 of Fig. 1;

Fig. 3 is an elevation and section along the line 3—3 of Fig. 1; and

Fig. 4 is a fragmentary side view of the rear of a hull having a variational form of tunnel, the lower portion of the hull being broken away and the tunnel shown in longitudinal medial section.

Referring first to Figs. 1 and 2, numeral 10 denotes generally a hull of comparatively small and light construction, with the bottom of the hull preferably being nearly flat for purposes of stability, except for the stern construction described later. Decking 11 covers the boat except for the cockpit where the seat 12 is placed. The back of the seat is adjustable to two positions and is shown at 12*a* in the forward position while the dotted lines at 12*b* indicate the rear or reclining position.

The hatch 13 is placed in the after deck to permit access to the batteries and motor. An air tank 14 may be placed in the bow and tanks 15 and 16 in the stern to provide reserve buoyancy sufficient to prevent sinking of the boat should it become overturned.

The top 20 has a rectangular frame 21 with the rearward projections of the sides bent through an arc of 90° to permit insertion into the pipe supports 22. These supports 22 are provided with a hinge bracket 23 attached to the after-deck. Support at the forward end of the top is provided by suitable stanchions 24 upon which the top rests by virtue of its own weight. The top can be quickly tilted rearward on the hinges 23 to permit the embarking and debarking of passengers, and thereafter swung forward to rest on the stanchions 24. When tilted into the rearward position, the shape of the frame permits the top to rest on the after-deck on the normally vertical back of the top. The top may be removed quickly and simply by lifting it out of the pipe supports 22, which then lie flat on the after deck in the position 22*a*. It is within the scope of my invention to use tops other than that illustrated but having the same characteristic connections to the hull that make them particularly suitable for this type of service. Thus a top such as would entirely enclose the cockpit may be used; and the method of attaching the top to the hull permits rapid and easy interchanging of tops or the use of none as preferred.

Steering the boat is effected by means of a rudder 30 at the stern. On the upper end of the rudder shaft 31 is rigidly attached an arm 32 to which are connected the cables 33 and 34 in such a manner as to pull in opposite directions. The cable 33 is led around pulleys 35 and 36 and is wound on drum 37 carried on steering wheel shaft 38. In a similar manner the cable 34 is passed around the pulleys 39 and 40 to the drum 37 where it is wound in a direction opposite to the cable 33. The drum 37 turns with the shaft 38 so that the passenger turning the wheel 41 is able to steer the boat as he desires. Near the lower end of the shaft 38 is rigidly attached an arm 42 so positioned as to strike the lug 43 on the shaft end bearing 44 and so limit the amount of rotation of the shaft in either direction. This prevents breaking of the cables 33 and 34 or the jamming of the rudder 30 and so rendering the boat unmanageable.

Motive power is supplied by a motor 50 coupled directly to the propeller shaft 51. This motor is particularly adapted to the work and is built to operate on storage battery power. It is wound to operate at low speed, since the boat speed is of only secondary importance, and delivers very little power thereby enabling the small battery equipment to drive the boat for several hours. A very heavy frame 81 is used to prevent overheating as a result of continuous service. After the coils are wound they are given several coats of insulating material to waterproof them and the whole assembly covered with a tight fitting metallic case 82 so that trouble due to water entering the motor is entirely eliminated. A switch 53 is interposed in the circuit enabling the operator to start, stop, or reverse the motor by moving the lever handle 54 which motion actuates the switch 53 by means of the rod 55. To expedite charging of the batteries, two sockets 56 adapted to receive a plug from a generator line are placed one on each side of the after deck, one only being shown in Figs. 1 and 2. Connecting the batteries thereto in series enables the charging of the batteries to be carried on without removing them from the boat.

In Figs. 2 and 3 I show a preferred form of tunnel construction in the rear of the hull, by means of which the propeller is mounted for rotation on a more or less horizontal axis, and is yet contained substantially above the bottom of the hull. It is desirable to so place the propeller and rudder that they will not come in damaging contact with submerged objects in shallow water or at docks as a result of careless handling of the boat. It is preferred, for reasons that will later appear, that the shell 61 of the tunnel be formed as a single casting, the flanges 70 and 71 of which are secured by bolts 72 to the bottom and rear portions of the hull respectively. The tunnel may be more or less circular in transverse section, and is comparatively elongated and streamlined in longitudinal section as shown in Fig. 2.

An elongated bearing or shaft log 62 is cast integrally with the forward inclined wall of the tunnel, and the propeller shaft 51 extends through the bearing from the interior of the hull to within the tunnel. Packing gland 63 is provided at the inner end of shaft bearing in order to prevent leakage into the hull by way of the bearing. Since to rotate the propeller in a normally tight packing gland would require a large portion of the power available, the gland 63 is loose fitting and a sump 80 is provided to retain the small amount of leakage. This can be done since the hydrostatic pressure on the packing gland 63 is quite small. On the inner side of the inclined tunnel wall is cast a support 64 to which is secured the motor 50, the latter being alined with relation to the bearing so as to enable the propeller shaft 51 to be joined directly by the coupling 65 to the motor shaft. This arrangement and mounting of the parts is particularly suitable in that it permits of the direct connection between the motor and propeller shaft, is rigid enough to prevent vibration and misalinement of motor and propeller shafts, and is extremely simple and easily accessible for maintenance

and inspection. To the rear of the propeller and within the tunnel is a rudder 30 mounted on a shaft 31 which extends upward through the top of the tunnel and which has on its upper end the arm 32. This rudder shaft 31 is contained in a housing 66 fitted in the boss 67 and held at its upper end by the bracket 68, said housing and boss forming a shaft bearing mounted directly on the tunnel casting. A packing gland 69 is placed at the top of the housing 66 to prevent the entry of water.

In Fig. 4 I show a variational form of tunnel in which the wooden hull is shaped to form the wall of the tunnel instead of using a separate shell or casting. The numeral 75 denotes generally a combined shaft log and motor mounting carrying the motor 50 in alinement with the bearing so that the propeller shaft 51 can be joined to the motor by the coupling 65 as described above. Flanges 76 are provided to permit attaching the bearing 75 to the hull with the bolts 77. The rudder 30 is mounted in a manner similar to that already set forth.

It will be noticed that the shape of the wooden hull forming the tunnel of Fig. 4 differs from that of the metallic shell used in the tunnel of Fig. 2. It has been found that the shape of the preferred form as shown in Fig. 2 is generally desirable in order to reduce the vertical component of the propeller thrust, which is wasted energy, as well as to provide greater security for the propeller and rudder. It is, however, impractical to shape wood to the outlines wanted and hence it is desirable to resort to a suitable material that can be cast in the desired shape to permit the placing of the propeller shaft in a nearly horizontal position and the inclusion of the propeller and rudder substantially within the tunnel. Thus the preferred form of my invention embodies a cast shell combining the tunnel with the shaft log and motor support and thereby gaining greater overall efficiency of the power plant, better protection for the rudder and propeller, and simplicity of construction and design.

It will be understood the drawings and description are to be considered merely as illustrative of and not restrictive on the broader claims appended hereto, for various changes in design, structure and arrangement may be made without departing from the spirit and scope of said claims.

I claim:

1. An electrically driven boat of the character described, embodying a hull, the rear bottom portion of which comprises a casting shaped to form a tunnel, an elongated shaft bearing formed integrally with the forward wall of said tunnel casting, a motor within the hull, a motor driven shaft extending through said bearing into the tunnel, and a propeller on said shaft, the propeller being contained substantially within said tunnel.

2. An electrically driven boat of the character described, embodying a hull, the rear bottom portion of which comprises a casting shaped to form a tunnel, an elongated shaft bearing formed integrally with the forward wall of said tunnel casting, a motor support integral with said casting and alined with said bearing, a motor mounted on said support, a motor driven shaft extending through said bearing into the tunnel, and a propeller on said shaft, the propeller being contained substantially within the tunnel.

3. An electrically driven boat of the character described, embodying a hull, the rear bottom portion of which comprises a casting shaped to form a tunnel, an elongated shaft bearing formed integrally with the forward wall of said tunnel casting, a motor support integral with said casting and alined with said bearing, a motor mounted on said support, a motor driven shaft extending through said bearing into the tunnel, and a propeller on said shaft, the propeller being contained substantially within the tunnel, a rudder contained substantially within the tunnel, and a rudder shaft bearing mounted on the upper wall of the tunnel for carrying the rudder.

4. An electrically driven boat of the character described embodying a hull, the bottom portion of which comprises a casting shaped to form a tunnel, a propeller contained substantially within the tunnel, said propeller being mounted on said tunnel casting, and a propeller driving motor mounted on said tunnel casting.

In witness that I claim the foregoing I have hereunto subscribed my name this 10 day of December 1929.

KENNETH M. GRIER.