May 30, 1933. J. W. HARVEY 1,911,192

MOTOR BOAT

Filed Dec. 12, 1932

Fig. 2.

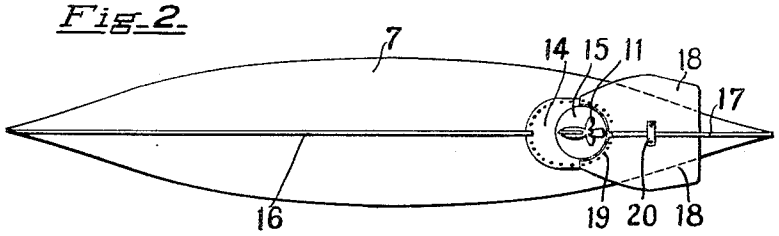


Fig. 1.

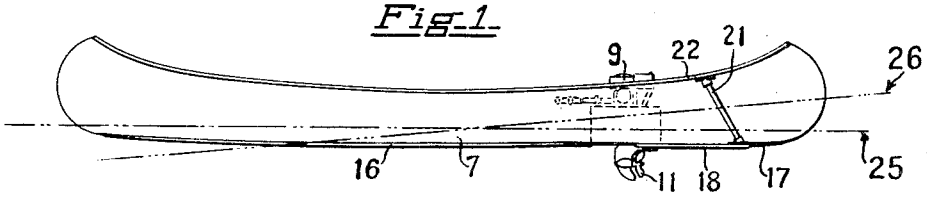


Fig. 3.

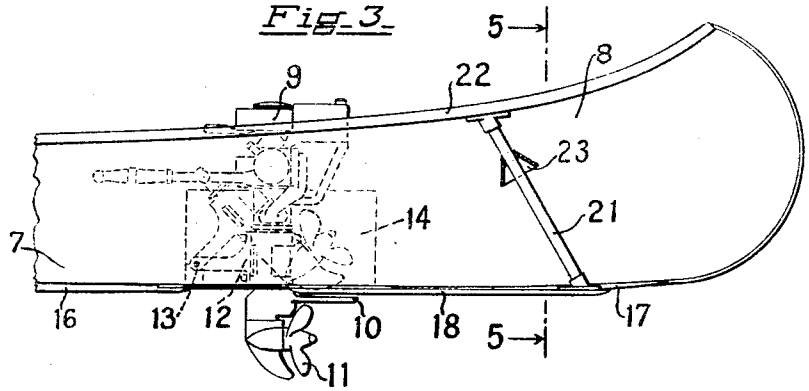


Fig. 4.

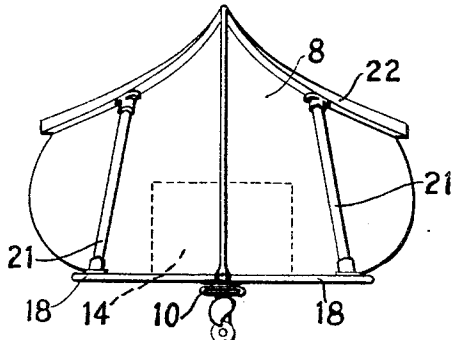


Fig. 5.

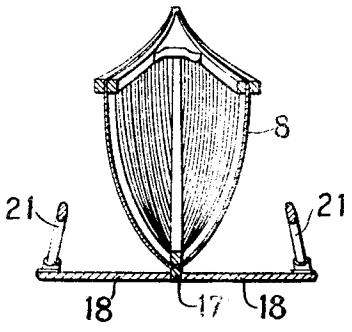
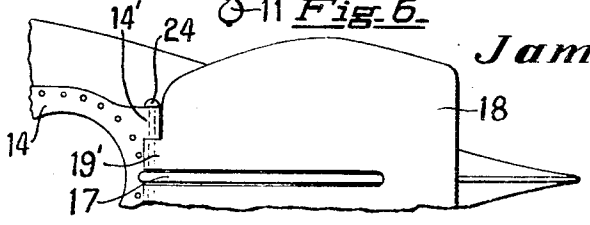


Fig. 6.



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Patented May 30, 1933 1,911,192

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MOTOR BOAT

Application filed December 12, 1932. Serial No. 646,743.

Safety, speed and economy of operation are highly desirable characteristics of small power boats. Comfort, quietness and ease of handling and beaching are also important. To attain all of these advantages in a boat of conventional shape and construction and at a minimum expense is my main object. Various of these features appear to be inconsistent and it has taken several years and a great many experiments to solve the problem.

The drawing illustrates a small boat which is generally streamlined at and near the water line. With such a boat I employ a motor of the type of my Patent 1,874,988 with a propeller located as near as possible to the stern so as to leave a maximum passenger and cargo space forward of the motor and keep the noise, smell and vibration of the motor as far as possible from the passengers. Such an arrangement, however, with heavy and powerful motors produces great instability and makes the boat cranky and slow. I, therefore, apply stabilizing plates to the bottom of the boat immediately above and extending aft the propeller and find remarkable effects are produced. Speed is increased as much as fifty percentum and the boat rides substantially level and banks on the turns automatically at full speed. In fact, it is nearly impossible to tip the boat over. Such a boat can be run up on a beach without damage for the propeller automatically withdraws into the boat and the boat then rests on the keel and the stabilizer.

Fig. 1 is a side view of a boat embodying my invention.

Fig. 2 is a bottom plan view of the same.

Fig. 3 is a side elevation of the stern end on a larger scale and showing in dotted lines the retracted propeller.

Fig. 4 is a view from the stern end of the boat.

Fig. 5 is a section on the plane of the line 5—5 of Fig. 3.

Fig. 6 is a fragmentary bottom view showing a hinged and adjustable stabilizer.

In its preferred form the boat is rather flat along the bottom 7 with the sides rounding slightly and the bow and stern rising gradually from the center fore and aft. Both ends are tapered away as shown at 8 to a comparatively sharp stern, thus providing a hull which is substantially streamlined in horizontal section and therefore adapted to travel through the water with a minimum resistance.

The motor 9 is of the internal combustion type preferably provided with an underwater exhaust 10 arranged above and behind the propeller 11. The motor housing is rotatably carried by a sleeve or bracket 12 which is hinged at 13 within a casing 14, as set forth in my patent above referred to. This casing has an opening which is normally closed by the plate 15 carried by the bracket or sleeve 12.

The boat is preferably provided with a comparatively shallow keel section 16 forward of the propeller and the keel section 17 aft the propeller.

The stabilizer plates 18, 18 are secured to the bottom of the boat on each side of the keel section 17. The front end of each of these stabilizer plates may be secured at 19 directly to the rear edge of the bottom of the casing 14. The inner edges of these stabilizer plates are also preferably connected to the keel section 17 in any suitable manner and may be connected together by a cross strap 20 for additional reinforcement. A strut 21 is secured to the outer rear corner of each of the stabilizer plates and to the side rail 22 of the boat. These struts are preferably streamlined in cross section so as to afford the minimum resistance to movement through the water and they are preferably inclined forwardly as shown so that the water will not travel up the struts into the boat. A guard 23 may be mounted on each strut as additional means to prevent water from traveling upwardly.

The normal water line of the boat with a light load is approximately on the line 25, as shown in Fig. 1, but when the boat is under way the bow rises due to the resistance of the water and the stern is drawn down due to the action of the propeller.

Without the stabilizer plates the tendency of the boat is to take up a new water line

along the line 26. It will be obvious, however, that when the boat is on such a water line it is very unstable because the displacement of the stern does not increase as the stern goes down due to the tapered torpedo-like stern. It is also obvious that a boat traveling on this water line 26 would meet with great resistance and consequently would not be capable of making any effective speed. It will also be noted that when traveling on the water line 26 the bow rides high in the air where it is exposed to the wind and therefore the boat is very hard to steer. By adding the stabilizer plates, however, at the point shown it is found that the boat immediately changes its characteristics and will travel on a substantially level keel even at high speed. These plates 18 however should not be confused with members which are sometimes used on hydroplanes or boats which travel almost solely on the surface.

This boat, notwithstanding the stabilizer plates, remains of the displacement type and the plates 18 remain under water. The water passes by the outer edges of these plates and follows the lines of the tapering stern above the plates. The forward ends of the plates are preferably tapered as shown in Fig. 2 so as to reduce the resistance to movement in the water and to avoid picking up seaweed, grass, etc., which would retard the movement.

The rear ends of these plates are also preferably tapered somewhat so as to facilitate banking when turning the boat. The motor is preferably of the so-called steering type, that is, by turning the main housing on a vertical axis in the sleeve 12 the propeller is shifted to steer the boat. This steering action is highly effective and safe since it automatically causes the boat to bank on the turn even at full speed. Furthermore, the stabilizer plates act in a sense something like bilge keels to prevent the boat from rolling. This is especially effective in case the stern of the boat is loaded more heavily than the bow.

It will be seen that the plates 18 are arranged substantially parallel to the main portion of the bottom of the boat and this has been found most desirable. Experiments made by tilting the plates 18 downwardly at their rear ends show that the action is quite different in this boat from the action of hydrofoils, and the like, because instead of increasing the speed this downward inclination actually seriously interferes with the stability and speed of the boat.

These plates 18 may be of wood and hence are resilient and light and somewhat buoyant but as they are very thin the displacement constitutes but a small factor in their utility.

The struts 21 may also be of wood for lightness and resiliency and in fact their inclined position provides a somewhat flexible connection for the rear ends of the stabilizers so that they are not altogether rigid.

In some cases for instance when it is desired to conduct experiments with boats of different designs and sizes it may be convenient to have the stabilizer plate or plates adjustable.

In Fig. 6 I have shown a plate hinged to the rear edge of the lower flange of the casing. The casing flange may have a hinge knuckle 14′ cast integral therewith and the plate 18 may have a hinge knuckle 19′ held in place by a hinge pin 24, the struts 21 may be lengthened or adjusted longitudinally in any suitable manner to regulate or adjust the depth of the rear edge of the stabilizer plate. In any case however the plates will preferably be located above, aft and on opposite sides of the propeller so as to prevent cavitation.

By removing the hinge pins and detaching the upper ends of the struts the plates can be readily removed and reversely may be replaced.

When the boat is run upon the beach the propeller 11 is automatically retracted into the casing 14, as set forth in my former patent, and the boat comes to rest on the keel sections and the plates 18, which thus serve to prevent the boat from tilting.

The location of the motor within the boat is quite important to the practical utility of the construction and I have found that a position approximately .2 to .3 the length of the boat aft the beam is most generally effective, that is, about .3 to .2 forward of the stern. In this position the motor is removed as far as possible from the passengers and a maximum passenger and cargo space is provided forward of the motor, where the vibration of the motor is also less felt by the passengers.

This location of the propeller also facilitates rapid turning of the boat. The stabilizer plates being located astern of and above the propeller serve to prevent cavitation at high speed, as well as at low speed. It will be noted, furthermore, that the exhaust 10 from the motor is carried quite some distance aft the propeller so that the gases will not interfere with the action of the propeller, which remains in substantially solid water at all times even when turning.

As an illustration of the effect of my invention I might give an example of the factors involved in certain installations which have met with success.

Using a four horse power motor weighing about 39 pounds in a 13 foot canoe about 3 feet wide, 12 inches deep and weighing approximately 50 pounds, without the stabilizers, 10 miles per hour is about the maximum possible speed. With the stabilizers

it is possible to do 16 miles per hour with the same load, a speed which I believe has never before been attained by a motor driven canoe.

A 20 foot boat about 40 inches wide and 13 inches deep and weighing about 94 pounds with the same motor will do only about 9 miles per hour; with the stabilizers this same boat and motor will do 14 miles per hour with 2 persons of combined weight 270 pounds.

The stabilizers can be about 2 feet 3 inches long and 26 inches wide for a 13 foot boat. For a 20 foot boat they can be 2 feet 6 inches long and 28 inches wide. They should be slightly narrower than the full width of the boat or it will slow up the boat on the turns.

In boats of the canoe type it has heretofore been felt that the motor should not be of much more than 2 horse power. So far as I know no one has ever successfully used a 4 horse power motor on a 13 foot canoe. With my invention applied as much as 16 horse power can be advantageously used in a 20 foot canoe weighing about 94 pounds.

As many as six people weighing nine hundred and forty pounds have been comfortably and safely carried at fair speed in a 20 foot canoe with a 4 horse power motor.

The exact size of the stabilizer plates is not critical to the operation of the boat. When constructed and arranged as herein shown they seem to very greatly increase the stability of the boat under practically all conditions and they greatly increase the possible speed and do not have any retarding effect even at slow speed.

I claim:

1. A motor driven boat having a propeller near the stern with keel sections forward and aft the propeller, a stabilizing plate secured each side of the aft keel and substantially parallel with the main bottom of the boat and extending outwardly and rearwardly above the level of the propeller, and inclined struts connecting the rear outer corners of the plates with the rail of the boat.

2. A motor driven boat having a casing with a propeller for steering and having its propeller located about one fourth the length of the boat forward of the stern and having a stabilizing plate secured on each side of the casing above and aft the propeller and substantially parallel with the normal water line of the boat.

3. A motor driven boat having a casing with a tilting propeller mounted near the stern, stabilizing plates hinged to the bottom of the casing adjacent the propeller and extending rearwardly and laterally above the propeller with spaces above the plates into which water can flow from the sides and a supporting strut connecting the rear end of each plate with a side of the boat.

4. A motor driven boat having a tapering stern, a casing with a tilting propeller mounted in the stern, a stabilizing plate secured to the bottom of the casing near the propeller on each side of the center line and extending rearwardly and laterally therefrom and an inclined strut connecting a part of each plate with the side of the boat.

5. A motor driven boat having a tapering stern with a motor and propeller mounted in the stern, the propeller being retractable within the stern and a stabilizing plate hinged at its front end on each side of the boat and extending from near the propeller aft and just above the level of the propeller and adjustable struts holding the rear ends of the plate.

6. A motor boat having a hull which has a substantially flat portion below the water line and with the propeller mounted in the stern immediately below such flat portion and retractable into the boat and stabilizer plates fixed to the flat portion on opposite sides of the center line above the propeller and with their edges permanently extending rearwardly of the boat beyond the rear end of the water line and substantially parallel thereto.

7. A motor boat having a hull which has a substantially flat portion below the water line and with the propeller mounted in the stern immediately below such flat portion and stabilizer plates secured to the flat portion on opposite sides of the center line above the propeller and extending rearwardly of the boat beyond the rear end of the water line and struts secured to the rear ends of these plates and inclined forwardly to an upper part of the hull.

8. A motor driven boat comprising a hull having a flat bottom portion, a propeller retractably supported in the flat bottom portion, stabilizer plates having their front ends secured to the flat bottom portion and forming an extension thereof rearwardly of the propeller with free space for water to flow around the side edges of the plates to facilitate banking when turning, said plates furnishing extended supports for the rear of the boat to permit beaching when the propeller is retracted into the boat.

9. A motor driven boat comprising a hull having a substantially flat bottom portion, a casing supported in said flat bottom portion, a gas engine and propeller mounted to rotate in said casing for steering the boat, the propeller being retractable into the casing to permit beaching the boat, stabilizer plates secured at the rear of the casing and extending substantially horizontal laterally and rearwardly therefrom, and an underwater exhaust outlet for the engine discharging beneath said plates.

JAMES WILLARD HARVEY.