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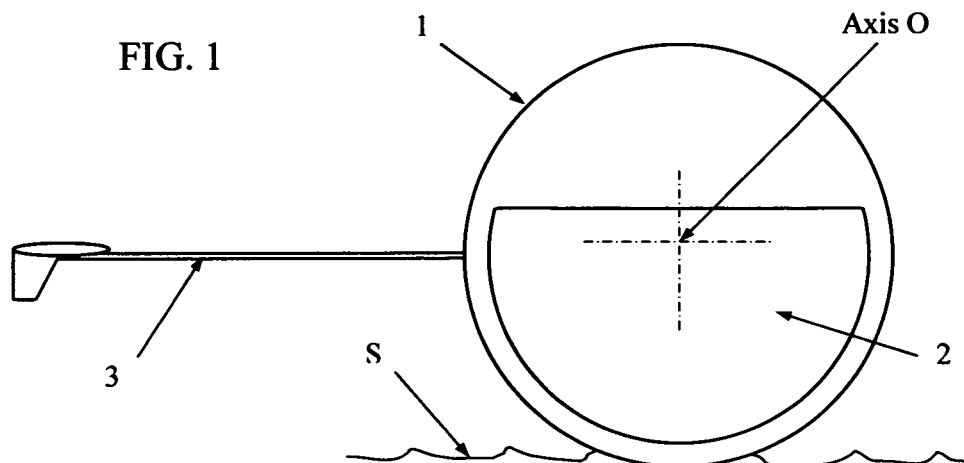
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(54) **Speedboat or high speed watercraft with dynamic hull**

(57) The vehicle can be referred as a type of speedboat, because it is designed for very high speed on water. Preferably, the vehicle consists of a hollow shell 1 of circular section that floats and spins on the surface S of the water. The engine 2, which also includes the cabin, is located inside the shell 1. The output shaft of the engine 2 drives the shell 1 about axis O. As the shell 1 spins,

the viscous forces between the spinning surface of the shell and the liquid, cause movement of the vehicle. Means of preventing counter rotation, of the engine 2 inside the shell about axis O are included. This is provided by the weight of the engine, which hangs low and off-centered about axis O; and by the aerodynamic uplift acting on the tail 3, through the lever arm action on the frame of the engine 2.



Description

FIELD OF THE INVENTION

[0001] This invention relates to a vehicle that is meant to move at very high speed on the surface of liquid element, such as seas or lakes, for the purpose of leisure, sport, travel, and other activities. For that matter, the vehicle can be called a type of speedboat, in spite of the lack of resemble to a conventional speedboat. The vehicle can also be designed amphibious in order to move on most solid surfaces.

BACKGROUND

[0002] Vehicles such as ships, boats, speedboats, rafts, etc (In particular, all vehicles of the type that are in contact with the liquid element) are able to move on the surface of liquid element, by overcoming the resistance that opposes the motion of these vehicles. The resistance is mainly due to the viscous forces between the immersed part of the vehicle and the liquid element.

[0003] If at low speed the viscous force is proportional to the speed of the vehicle, at higher speed, the force is approximately proportion to the square of the speed of the vehicle. Hence, the power and size of the engine rapidly grows out of proportion, for relatively little gain in speed of the vehicle.

[0004] Furthermore, the enormous viscous forces acting on these vehicles, together with the turbulent nature of the liquid surface, greatly affect the stability of these vehicles at higher speed, making them unsafe.

[0005] The object of this invention is to provide for such a vehicle, which is less affected by these inconveniences, hence, making it possible to travel safely and economically on the surface of liquid element at much higher speed.

[0006] Accordingly, this invention provides for a vehicle, where the resistance due to the viscous forces, increases less rapidly with speed, than it is usually the case with conventional boats. In order to achieve this, the immersed part of the vehicle include a dynamic body or components, which interacts with the viscous liquid element in such a way that it reduces the viscous forces that oppose the motion of the vehicle and, produces a reaction force on the body of the vehicle, causing it to move in the direction of the force.

[0007] Preferably the dynamic body, which is in contact with the liquid element, consists of a large hollow spheroid object which constitutes the hull and spins about a horizontal axis. The viscous forces between the spinning external surface of the object and the liquid element cause the forward movement of the vehicle.

[0008] Stability of the vehicle is ensured by a low center of gravity and the inertia of the rotating object that increases with the speed of the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The preferred embodiment of the invention is described with reference to the accompanying drawings in which:

Figure 1 is a sectional side elevation of the vehicle and shows the three main components: the shell; the engine; and the tail.

Figure 2 shows the front elevation of the vehicle where the shape of the shell is spherical.

Figure 3 again shows the front elevation of the vehicle, but in the case where the shell is not perfectly spherical, but made flatter at the poles on either side, like a doughnut or a disk.

Figure 4 is the plan of the vehicle showing the main subcomponents that form part of the tail.

Figure 5 is the side elevation of the vehicle.

Figure 6 shows the vehicle with the tail in a lowered position and trailing on the surface of the liquid element.

DESCRIPTION OF PREFERRED EMBODIMENT

[0010] The Preferred embodiment of the invention is described below.

[0011] As shown in figure 1, the vehicle consists of three main components. They are labeled as: the shell 1; the engine 2; and the tail 3, for convenience of description.

[0012] The dynamic body resembles a shell and for that reason is referred as the shell 1. It is a large hollow object, which rest on the surface S of the liquid element. It has high buoyancy, so that only a relatively small portion of it is immersed in the liquid. It is made of light but strong material so as to withstand shock and resist deformation. The shell 1 is preferably transparent or includes transparent windows placed uniformly along its perimeter, so that the pilot and passengers seated inside the shell 1 can see through, in order to navigate and look around.

[0013] The section of the shell 1 is circular, as shown in figure 1. When the shell 1 spins about a horizontal axis O (the axis O passes through the center of the shell 1 and is normal to the side elevation and the direction of motion of the vehicle), the viscous forces between the immersed part of the shell and the liquid element, cause the vehicle to move horizontally in a direction, opposite to the movement of the shell at the points of contact on the surface of the liquid element. In another word, as the shell 1 spins about the axis O, it rolls on the surface of the liquid element.

[0014] The vehicle may consist of an assembly of several shells 1, but this ultimately affects the stability of the

vehicle at high moving speed. Preferably, the vehicle consists of a single shell 1 or at the most, two separate objects on either side of the output shaft of the engine 2.

[0015] As shown in figure 2, the shape of the shell 1 could be spherical, as this shape offers a high stability in all direction, especially when the center of gravity is low.

[0016] However a shell 1, in the shape of a doughnut or a disk, as shown in figure 3, or even a thin cylinder, is preferred as it offers less resistance to air during forward movement.

[0017] The engine 2 is lodged inside the shell 1. The output shaft of the engine 2 lies on the same axis O and connects to either side of the internal parts of the shell 1, by appropriate supports. The engine 2, which is the heaviest component, hangs downward from the axis O. The output shaft of the engine 2 drives the shell 1 in rotation about axis O, freely without any mechanical obstruction.

[0018] As shown in figure 2 and figure 3, the external surface of the shell 1 is equipped with an appropriate number of blades or paddles 4 of suitable size around the whole perimeter at regular intervals. This ensures high viscous forces with the liquid element as the shell 1 spins about axis O. In order to improve the drag coefficient of the shell 1, due to the interaction of the blades 4 with the surrounding air, the blades 4 may include such features that allow them to protrude from the surface of the shell 1 only when they are immersed in the liquid element. These blades 4 may include other features that allow them to retract inside the shell, so that the vehicle can move on dry surface without causing damage to the blades 4.

[0019] The engine 2 includes all subcomponents such as: the motor; the fuel reservoir and batteries; the transmission gears; the output shaft; the pilot and passenger cabin; and other navigational and control equipment. The subcomponents are arranged in such a way that the center of gravity is the furthest away from the output shaft. The engine 2 would usually be the heaviest component, in comparison to the other two components 1 and 3, combined.

[0020] When the vehicle is at rest, the engine 2 hangs downward with its center of gravity vertically below the axis O. The very low center of gravity gives the vehicle a good vertical stability as it floats on the external surfaces of the shell 1.

[0021] Although the vehicle may oscillate and sway in all directions because of the turbulent surface of the liquid, it will not capsize. When the vehicle is moving, the stability improves further with the speed, due to the inertia of the shell 1 spinning at full speed.

[0022] As the engine 2 drives the shell 1 with the application of a certain amount of torque in one direction, the engine 2 experiences an equal and opposite reaction torque about the axis O. This reaction tends to rotate the engine 2 inside the shell 1, in the opposite direction. This situation is highly undesirable, as this affects the passengers, slow down and destabilize the movement of the

vehicle. Hence, a counter-torque of equal amount has to be applied to the engine 2 so as to prevent counter rotation of the engine 2, about axis O.

[0023] The low center of gravity of the engine 2 provides some of this counter-torque. As the shell 1 is driven in one direction, the engine 2 also starts to rotate in the opposite direction about axis O. As the center of gravity of the engine 2 is displaced in the direction of the movement of the vehicle, the weight of the engine 2 produces a counter-torque, which is proportional to the horizontal distance from the center of gravity of the engine 2, to the vertical axis passing through the center of the shell 1. When the magnitude of the counter-torque equals the magnitude of the torque delivered by the engine 2 to the shell 1, the engine 2 stops rotating. The counter-torque reaches a maximum, when the angle of inclination of the center of gravity of the engine 2 about axis O, to the vertical is 90 degrees. As this method may not provide all the counter-torque necessary to prevent the engine 2 from rotating, additional counter-torque is provided by the tail 3.

[0024] The main components of the tail 3 are shown in figure 4 and figure 5. It consists of a rigid and strong pair of extension rods 5, which acts as a lever arm and connects a pair of primary wings 6 located at the back of the vehicle, solidly to the frame of the engine 2 at the axis O. The underside of each primary wing 6 includes a rudder 7. The extension rods 5 are also joined together on the side of the wings 6, by a transversal rod 8, so that the tail 3 forms a rigid structure. The tail 3 may include a pair of secondary wings 9, connected solidly to the extension rods 5, at the front.

[0025] The section of the wings 6 is designed in the shape of an aerofoil or inclined at an appropriate angle, so as to produce a vertical uplift when the vehicle moves forward. At cruising speed, the vertical uplifts on the wings 6 provide a counter-torque on the engine 2, by the level arm action of the extension rods 5, about axis O. The right amount of counter-torque needed to prevent rotation of the engine 2 is obtained by adjusting the magnitude of the uplifts on the wings 6, and this is usually done by changing the geometry of the wings 6 such as, modulating the angle of deflection of the wings 6 or flaps incorporated in the wings 6.

[0026] The wings 6 or wings 9 are also used to steer the vehicles at cruising speed, just like aircrafts. For example, if the uplift on the left wings or the drag force of the right wings were increased, the axis of spin of the shell 1 would tilt to the right causing the vehicle to turn to the right, and vice versa

[0027] The extension rods 5 also include such features that enable the wings 6 to be lowered, so that they trail on the surface of the liquid or to be raised above the surface of the liquid as required. Each time the extension rods 5 are adjusted to a new position, they are firmly secured to the frame of the engine 2.

[0028] When the vehicle is at rest or is moving slowly, as shown in figure 6, the wings 6 (which are made buoy-

ant) are lowered so that they float and trail on the surface of the liquid, as shown in figure 6. In this configuration, the rudders 7 dip under the surface of the liquid. In the amphibious version of the vehicle, a pair of wheel is provided at the lower tips of the rudder 7, so as to prevent the wings from trailing on hard surfaces and getting damaged. The pair of rudder 7, or the wheels, allows steering of the vehicles at low speed when the aerodynamic method of steering is not efficient.

The reaction of the liquid on the primary wings 6, as they trail on the surface of the liquid also provides a strong counter-torque on the engine 2. This may be use to advantage during acceleration phase when the engine 2 delivers high starting torque, for the vehicle to reach cruising speed rapidly. The wings 6 may then be raised out of the liquid, as the vehicle gathers sufficient speed and can rely entirely on the aerodynamic uplifts on the wings 6.

[0029] The optional pair of secondary wings 9 does not usually provide any uplift during normal cruising. Its main purpose is to stabilize the vehicle whenever it bounces over the turbulent liquid surface. On such occasion, the secondary wings 9 are quickly deflected so as to produce uplift. The uplifts on the primary wings 6 and the secondary wings 9 are automatically readjusted so as to rebalance the forces acting on the vehicle, in such a way that, the vehicle could touch down as smoothly as possible and resume its movements on the surface of the liquid element.

[0030] As mentioned earlier, the pilot cabin and the passengers are found somewhere in the engine 2. Access trap needs to be provided on the side of the shell 1 for the passengers to gain access to the cabin. The pilot cabin would resemble the cockpit of an airplane and is well insulated from the external environment. The pilot commands from his seat all the systems on board. As such a vehicle may be designed to cross oceans at high speed, it must then be equipped with a state of the art navigation system. A GPS guided system and automatic anti-collision system should be some of the basic equipment, so as to cruise long distances safely and on automatic mode, similar to aircrafts.

[0031] THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

Claims

1. A watercraft comprising of one or more dynamic bodies or components, partly immersed, equipped with blades or paddles on the external perimeter that are in contact with the liquid element, rotating about an axis perpendicular to the direction of travel of the watercraft and driven by an engine, whereby the non-rotating part of the engine is connected to a means or mechanism that produces a counter-torque so as to prevent rotation of the non-rotating part of the engine when the dynamic bodies are rotating.

2. A watercraft as claimed in Claim 1 where the means to produce counter-torque consist of having the axis of the mass center of the engine off-set from the axis of the output shaft of the engine.

3. A watercraft as claimed in Claim 1 where the means to produce counter-torque comprises of components which produces an upward force and which are connected to the non-rotating part of the engine by connecting parts, so as to form a lever arm.

4. A watercraft as claimed in claim 1 where additional components are connected to the non-rotating part of the engine for the purpose of steering and improving stability.

5. A watercraft as claimed in claim 1 where the dynamic bodies or components are designed and shaped so as to provide buoyancy in order to keep the watercraft afloat.

6. A watercraft as claimed in Claim 5 which consists of a single dynamic component of hollow construction with the engine housed inside the component.

7. A watercraft as claimed in Claim 6 where the shape of the dynamic component maybe spherical for high stability.

8. A watercraft as claimed in Claim 6 where the frontal profile of the dynamic component is shaped, in order to have a very low aerodynamic drag.

9. A watercraft substantially as herein described and illustrated in the accompanying drawings.

FIG. 1

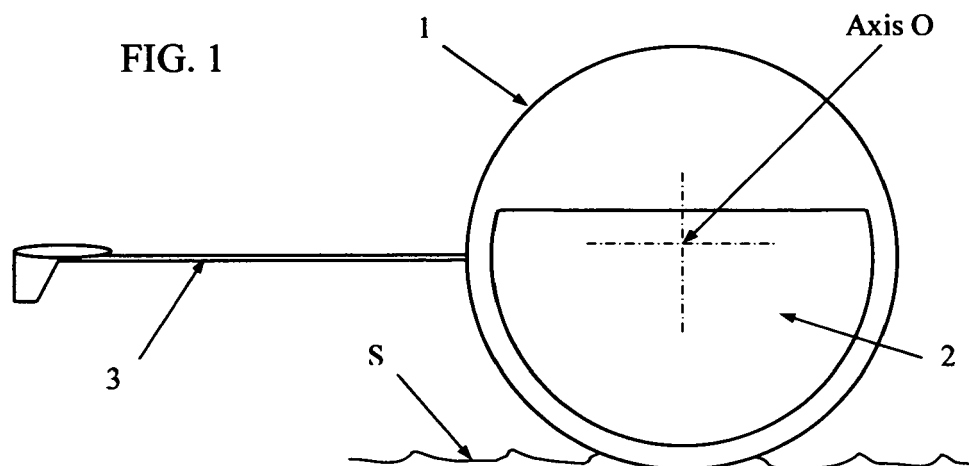


FIG. 2

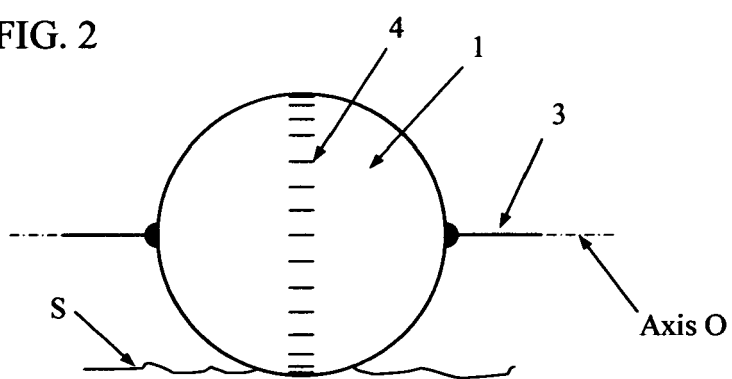


FIG. 3

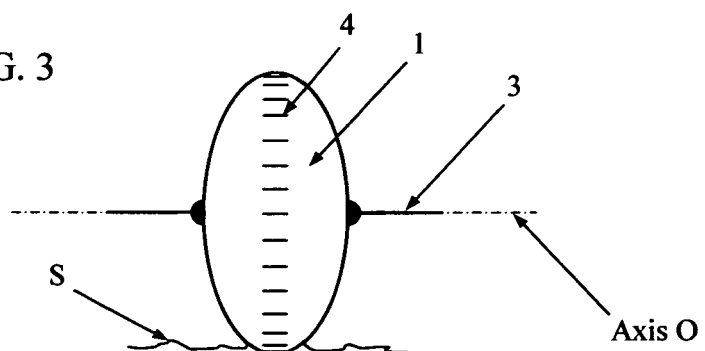


FIG. 4

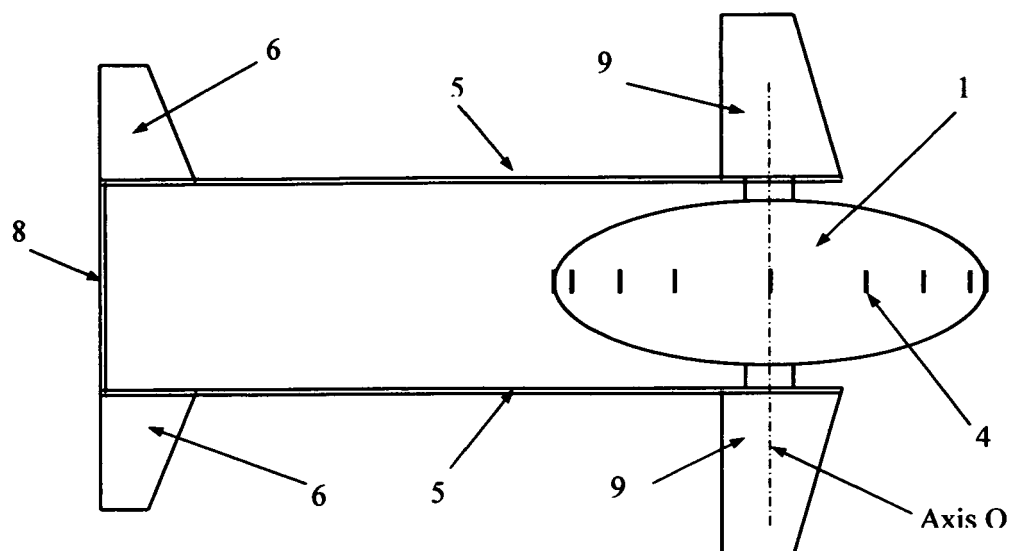


FIG. 5

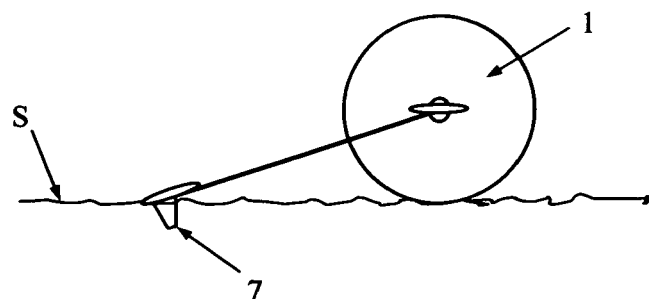
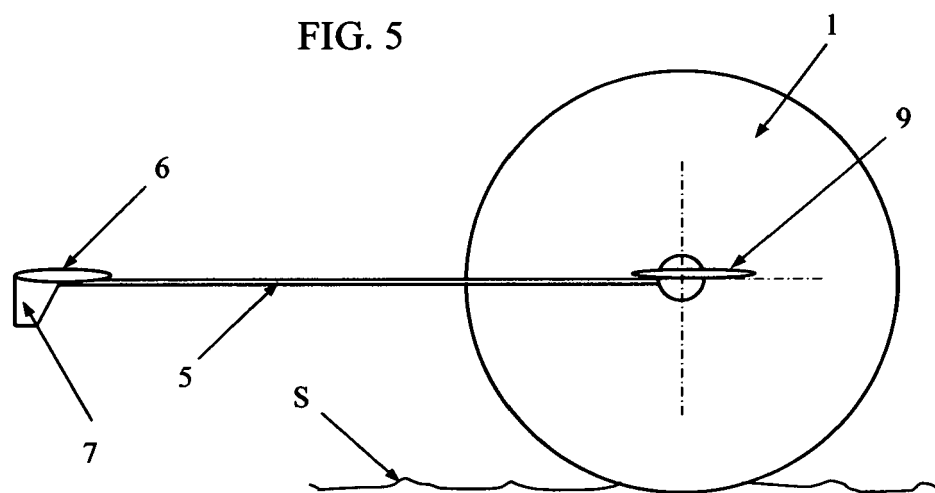


FIG. 6