Jan. 4, 1966 J. J. GREBE 3,227,125

PROPULSION UNIT AND CRAFT FOR USE THEREWITH

Filed March 14, 1963

2 Sheets-Sheet 1

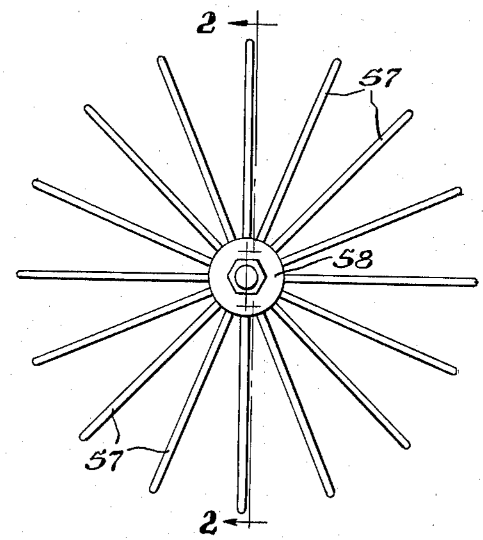

Fig. 1

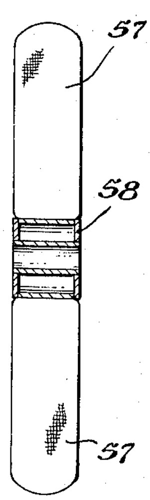

Fig. 2

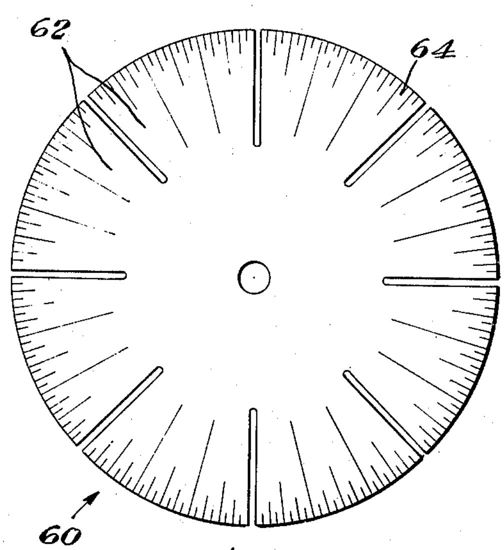

Fig. 3

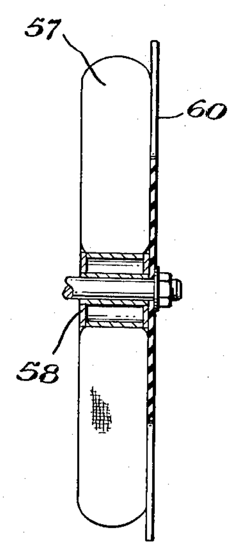

Fig. 4

INVENTOR.
John J. Grebe
BY
C. Kenneth Bjork
AGENT

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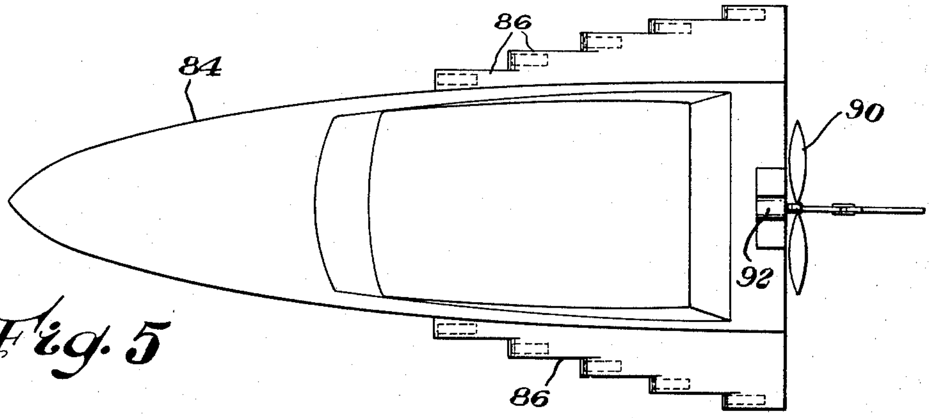

Fig. 5

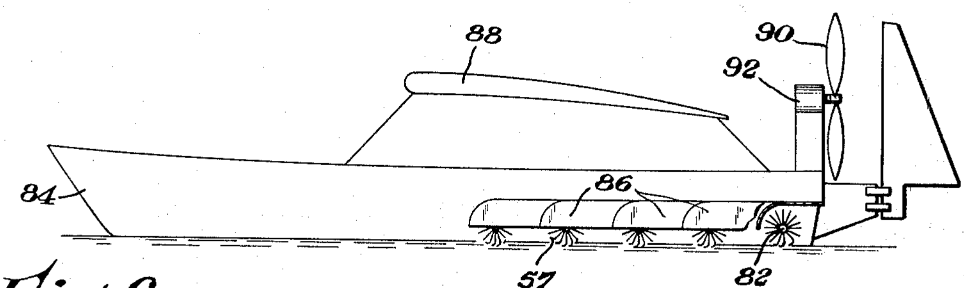

Fig. 6

INVENTOR.
John J. Grebe
BY C. Kenneth Bjork
AGENT

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1

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PROPULSION UNIT AND CRAFT FOR USE THEREWITH

John J. Grebe, 1505 W. St. Andrews Drive, Midland, Mich.

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14 Claims. (Cl. 115—1)

This invention relates to a novel suspension and propulsion unit and more particularly is concerned with a novel suspension and propulsion unit for marine and land craft which simultaneously, by rotating masses, provides upward lift through centrifugal force action and horizontal movement by striking the surface of the fluid medium with which the unit is in contact and to its use in combination with such craft.

It is a principal object of the present invention to provide a novel centrifugal force lift unit for a craft which also propels the craft by contacting the surface of a fluid medium with downwardly moving deflectable rotating masses.

It is also an object of the present invention to provide a novel suspension and propulsion unit for power driven marine craft which unit has rapidly rotating deflectable masses which both lift and propel the craft along the surface of the medium with which it is in contact.

It is another object of the present invention to provide a novel combined lift and propulsion apparatus for marine vehicles whereby during operation of the vehicle there is a minimum of penetration of the water surface.

It is an additional object of the present invention to provide a novel lift and propulsion means for power vehicles wherein lift is imparted to the vehicle during motion from the propulsion unit operating under centrifugal force in tension.

It is yet another object of the present invention to provide an efficient power vehicle that can skate or skim along the surface of both rough or smooth water or a soft terrain at high speeds.

It is an additional object of the present invention to provide a marine craft wherein power of operation is supplied directly to movable paddle-type members.

It is a further object of the present invention to provide a light weight propulsion unit for use in driving a craft at high speeds which unit takes advantage of centrifugal force action in tension as a prime base for load support, in contrast to the conventional compression member supports ordinarily employed.

It is also an object of the present invention to provide a marine vehicle supported in part and propelled by the novel suspension units of the present invention which can operate at both high and low speeds in rough and calm waters.

It is another object of the present invention to provide a novel power craft for marine propulsion which can incorporate aerodynamic control for providing the maximum in smoothness of ride, but which also permits the momentum transferring masses to substantially follow the contour of the water.

It is a further object of the present invention to provide a propulsion unit for marine craft which unit has at least one member for contacting water wherein the member or members of the unit are flexibly supported so as to change with the water motion but which at the same time uses the substantially horizontal component of the force engendered between the member or members and the water as a means for providing thrust for acceleration and deceleration and for overcoming frictional resistance from wind, spray and from movement of the craft through the water.

It is also an object of the present invention to provide

2

a propulsion device for a marine vessel wherein high efficiency of energy transmission from the unit to the water and correspondingly high conversion of this energy into lift and thrust is realized.

These and other objects and advantages readily will become apparent from the detailed description of the invention presented hereinafter with reference to the accompanying drawings.

In the drawings:

FIGURE 1 is an elevation of one embodiment of a suspension and propulsion unit of the present invention.

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1.

FIGURE 3 is an elevation of a cover member for use with the suspension and propulsion unit depicted in FIGURE 1.

FIGURE 4 is a front view of the unit of FIGURE 1 having the cover member of FIGURE 3 mounted in place.

FIGURE 5 is a plan view of a single hulled boat having a multiplicity of the present novel propulsion units.

FIGURE 6 is an elevation, partly in section, of the craft depicted in FIGURE 5.

The propulsion unit

In general the propulsion unit of the present invention comprises a disc or spoke wheel-like member having a multiplicity of movable weights, i.e. deflectable mass members, spaced at intervals around its outer periphery. This unit rotates around its central hub in operation whereby the weighted masses are forced outwardly from the center of rotation. As these mass members contact the liquid or fluid medium over which the craft to which the unit is attached is being operated, the masses are forced inwardly toward the center, the whole operation taking place on a regular basis.

In this operation, as the rotating masses strike or slap the fluid medium the craft is lifted an amount equal to the difference in the downwardly and upwardly directed centrifugal force of the mass members. Simultaneously, the craft is propelled horizontally in a direction opposite to the horizontal component of this force. Additionally, as the mass members lose contact with the fluid medium, they again are directed outwardly thereby serving to provide lift by centrifugal force action as these members continue their revolution.

The suspension and propulsion unit as shown in FIGURES 1 and 2 can have a multiplicity of movable mass units, i.e. radial flexible vane members, in the form of rope, straps, cable, chain or other flexible members **57** having one end affixed to a substantially cylindrical core **58** and the other end free so as to impinge on the surface of the fluid medium at whatever level it is found as these mass members **57** approach and contact this surface during each revolution of the unit. Preferably, these flexible members **57** will have their free end, i.e. the end opposite to that attached to the core or hub **58** of the unit, weighted for additional mass effect. As depicted in the figures, the members **57** are fully extended for purposes of clarity. However, it is to be understood that depending upon their inherent degree of flexibility, at rest they may collapse upon themselves, that is they do not need to be self supporting so as to extend radially outward from the hub. The efficiency of this unit can be upgraded still further by providing a cover **60** as shown in FIGURE 3 for the outer face of the unit. This cover **60** is substantially circular in configuration and slotted at intervals from its outer periphery in toward the center to divide the relatively thin member **60** into a number of pie-shaped segments **62**. The edge of each segment **62** is directed angularly outwardly to catch the fluid medium as the unit rotates thereby providing an additional slapping action and increased lift. Advantageously, each of the outwardly bent portions of the individual segments **62** in turn is slit radially into a number of smaller components **64** to give greater flexibility to this portion of the cover **60** which ordinarily strikes the fluid medium during operation.

The actual weight of the mass members to produce highly efficient operation is generally achieved by use of multiple members ranging from an ounce or less up to twenty pounds or more.

The various embodiments and species of the novel suspension and propulsion unit presented hereinbefore are not meant to be limiting but have been presented as being illustrative of a number of operable mechanisms encompassed by the present inventive apparatus.

In general, the propulsion unit is rotated in operation at a rate sufficient to impart at least partial lifting from centrifugal force to the vehicle being propelled. Depending both on the speed of rotation of the propulsion unit and the mass of the movable mass members, as the rotational velocity of the unit is increased, the vehicle is supported to an ever increasing degree by the generated centrifugal force and less and less from upward pressure from the medium below on which the vehicle is being operated supporting the hull or body of the vessel or craft and or the propulsion unit or units themselves. The actual rotational velocities employed range from about 20 feet per second up to 100 feet per second or more depending on the actual lift and drive desired.

The actual amount of life obtainable from centrifugal force for a given propulsion unit can be determined from the following equation:

$$F = \frac{1}{2}\frac{mv^2}{gr}$$

where,

F is the weight lifted (pounds)

m is the effective net mass of the movable mass members of the propulsion unit (pounds) for any one condition of impact with the surface,

v is the angular velocity of the propulsion unit (feet per second),

g is the acceleration from the force of gravity (feet per second^2), and

r is the effective net radius of the propulsion unit (feet), for the particular conditions of momentum transfer.

Because these propulsion units rotate in operation and ordinarily have relatively high angular velocities in ordinary operation, it is not desirable to use large diametered units nor is it necessary to use large movable mass members to obtain high centrifugal forces and good lift. Therefore, multiple units of relatively small radius and havig relatively light weight mass members readily are employed in the propulsion of large craft. The total lift and propulsion obtained from a given unit, as has been clearly set forth hereinbefore, is dependent on the combined relationship of the movable mass units and the speed of rotation of the unit.

At high operating speeds, the actual amount of water per second engaged by the relatively small mass units of the propulsion device effectively is as great as that engaged by a single large blade at low speed. Since lift is a function of mass acceleration per unit time, at these high rotational speeds water acts as a hard body when it is contacted or slapped by the movable mass units. Thus, a minimum of engagement with the water by these mass members, is directed such that substantially all of the thrust is directed downwardly and rearwardly, as readily is achieved by the instant unit, provides a highly efficient operation with such minimum water displacement at the minimum velocity and energy loss.

In actual operation of the present novel propulsion device, the integral projection or flexible movable mass members of the propulsion unit slap or contact the water or fluid medium with a force such that they dynamically deflect the water leaving a shallow "trough" or "hole" therein which approximates the displacement that the hull of the craft would have produced if it were floated. These members then continue to press further on the medium as the revolution of the unit continues. It is this action which provides the thrust for overcoming friction during vehicle propulsion as well as inertia during startup. Conversely, during deceleration the press or push of the members on the medium provide a desired braking action.

In operation, as can be seen from the figures, the propulsion unit ordinarily does not completely bury itself under the water, for example with use with marine craft, but only engages the water to a limited extent. It is the slapping or pushing action of the movable mass members against the surface of the medium being contacted with simultaneous outward movement of those members not in contact with the minimum that provides the centrifugal force lift action of the present unit. Further, the slapping action, as has been set forth directly hereinbefore, also serves to propel the craft to which the unit is attached by being designed to direct the flow of surface water opposite the direction of craft movement.

Power for driving the propulsion unit is supplied from any suitable energy source that results in the production of the desired thrust or pull.

Diesel engines, gasoline powdered automotive and aviation engines, turbines, turbo-prop units, nuclear power sources, electrical power units, combination steam and gas turbines and the like power generators delivering energy can be employed to directly drive the propulsion units. These power generators can be utilized with appropriate gear reduction and power transmission units if desired.

Additionally, rotary motion can be imparted to the propulsion unit of the present invention attached to one end of a shaft having an off-center eccentric or cam vibratory unit affixed to its other end whereby vibrational motion is transformed into rotary motion. In this particular drive arrangement, an effective propulsion unit can be produced from a series of small-diametered units mounted in a circular arrangement around the end of the shaft wherein each of the units has its center core or hub parallel to the long axis of the vibrating shaft member.

A differential drive means is particularly effective for use with the present propulsion unit where units are mounted on both sides of a single hulled craft. With such a drive means, the amount of lift can be varied for each of several or more propulsion units in a given craft thereby assuring stability of operation. To illustrate: when quartering a wave, the propulsion unit or units on the hull engaging the greater height of water observes the greatest resistance and requires maximum torque. The unit or units in the trough of the wave simultaneously require an increase in velocity to reach the water at a lower level in order that the desired lift and buoyancy be obtained on the hull at the same time. This is desirable since the thrust applied to the surface of the water and correspondingly the movement of the water must be compensated by a higher velocity since the individual movable mass units of the propulsion unit or units in the trough engage the water surface for a shorter period of time and to a much lower depth of penetration though it is at a higher velocity because of the longer radius. The further compensation in lift between the units on the opposite sides of the hull readily is aided through the differential drive whereby the angular velocity increase desired in the propulsion unit or units in the trough of the wave is imparted thereto thus tending to equalize the energy and consequent thrust transmitted to each side.

Conveniently, the entire power unit, drive and present novel propulsion unit are assembled into an integral unit whereby the power unit, suspension means, drive and propulsion unit readily can be removed from a craft as a single unit.

Depending upon the size and type of craft in which the propulsion unit is to be employed, the power unit ranges from a small power generator capable of delivering several horsepower up to large power generators providing hundreds of horsepower and in the case of submarines or large ships even thousands of horsepower.

The materials of construction for the present propulsion units are not critical or limiting except that these withstand the operating stresses and not be detrimentally attacked by the medium in which the unit is being operated. Rubber is a suitable construction material for use in preparing the movable mass members of the instant unit since this material possesses a high strength, can be prepared in a variety of predetermined degrees of hardness and firmness, deforms upon impact without structural damage and readily and rapidly returns to its original shape after impact. Further, this material has a desirably high shock absorbing capacity even if it encounters solid materials. Additionally, rubber conveniently can be reinforced with tensile strength improvers in appropriate directions as desired.

Wood, metals, resinous materials and the like also can be employed in the present unit.

Lining the facing of the movable mass members with cellular material such as sponge rubber for example or other open-celled or closed-celled materials markedly increases the shock absorbancy of the unit. Alternatively, the formation of a liquid foam, as by blowing a stream of air at the interface of a liquid medium at the point of contact of the movable mass member also serves as a shock absorbing medium.

The following example will serve to further illustrate the novel propulsion unit of the present invention but are not meant to limit it thereto.

Example 1

A cylindrical core member about 4 inches in diameter and about 2 inches wide was fitted with 16 flat, heavy duty canvas flexible strap-like movable mass members each securely affixed at one end to the core. The movable mass members were positioned at equal intervals around the periphery of the cylinder. Each strap was about 2 inches long and of a width substantially equal to about the width of the cylindrical core. The total weight of the 16 movable mass members was about 10 ounces. The assembled propulsion unit was attached through its center hub to the drive shaft of a variable speed power unit delivering rotary motion.

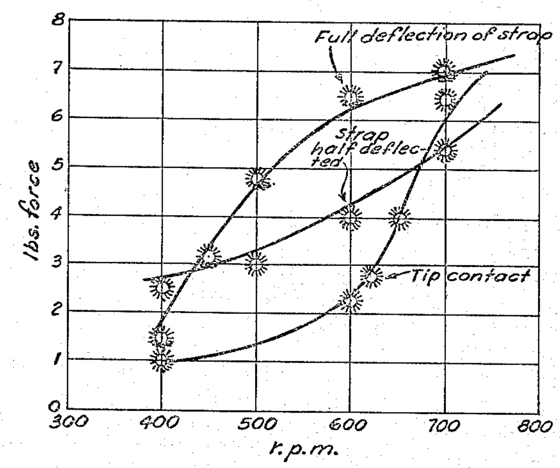
A spring scale having a flat panel fastened in a horizontal position onto the top of the weighing platform was positioned under the propulsion unit. The unit was allowed to rest on the panel and the resulting weight deflection noted thereby determining the tare weight of the propulsion unit.

Tests were run with the propulsion unit raised a predetermined distance away from the panel such that:

(1) the tip of the lowermost flexible mass member just made contact with the panel,
(2) the lowermost flexible mass member contacted the panel up to about its midpoint, and
(3) the lowermost canvas movable mass member contacted the panel up to a point adjacent its connection at the cylindrical core.

A number of tests were run at the various positions using different, predetermined velocities of rotation. The resulting deflection of the panel was measured. The results of these tests are summarized in the graph which follows. In this graph, the positioning of the movable mass members at the various height positions of the unit are depicted by symbols indicating the relative displacement of these members as the unit is rotated. In all cases, the bottom of the symbol represents the positioning of the movable mass members at the point of contact with the panel.

GRAPH



The results of this test clearly show the effect of force by the present novel propulsion unit at the various speeds of operation. This test also indicates that for the higher speeds, even though the radius of the movable mass members is reduced by one half or more, comparable to contacting a high point in the fluid medium or a wave in the water, the force is not much different than when in contact with a low point, i.e. contact by the tip of a substantially fully extended strap. This demonstrates the self-balancing characteristics of the present propulsion unit in that at higher points in the medium being contacted, the mass members are pressed to greater deflections. This in turn reduces the force thereby compensating for the difference in the weight of the flaps, movable mass members, being deflected. Similarly the set of curves shows that an increase in rotational speed can make up for the lighter contact of the flaps over a low trough or dip in the medium of operation.

Although primarily as set forth herein, it has been disclosed that both lift and propulsion are supplied entirely from the present novel suspension and propulsion units, if desired in certain applications conventional airscrew propellers, waterscrew propellers, water jets, air jets, and the like can be employed simultaneously as additional, supplementary or auxiliary driving means or even as the sole power source. However, even with such conventional type driving equipment, the present novel suspension units provide the desired lift through centrifugal force as these rotate during operation of the craft. In such applications, i.e. employing conventional propulsion units, although the present novel units can operate to provide lift, additionally these can be self-propelled thereby to further increase the propulsive drive and versatility of the vehicle. Therefore, it is apparent that the present novel propulsion units enjoy a wide versatility of application.

Craft for use with the propulsion unit

The novel propulsion unit of the present invention can be employed to propel a variety of craft such as marine vessels and craft for use on soft fluid medium such as marshes, mud, snow and the like.

With larger vessels and ships, a multiplicity of units can be mounted along the keel of the vessel inside the hull. In this arrangement, the units are positioned in a compartment or multiplicity of compartments wherein they make direct contact with the water. These then are connected to one or more power generators located inside the hull. Alternatively, the propulsion units can be mounted on the outside of the hull along the side of the ship. With this combination, ease of operation and maintenance of balance readily is obtained by spacing an equal number of the units on opposite sides of the ship.

This latter arrangement of suspension and propulsion units can be employed with a craft having a planing hull to provide a maximum of efficiency with regard to lift and propulsion as well as the ultimate in comfort. One embodiment of such a craft is depicted in FIGURES 5 and 6.

In the illustrated model, which is not meant to be limiting of the invention, a multiplicity of suspension and propulsion units **82** having flexible flap-type movable mass members **57** are positioned at intervals along both sides of the hull **84**. Each of these units extends a distance out from the hull **84** so as to contact the crest of the wave generated by the adjacent member. Each of the units is contained in a separate compartment of a multicompartmented side cowl or shroud **86** which covers the front and top side of the unit as well as the outer face down to about the level of the hub **58**. The use of the cowl **86** increases efficiency of operation by entrapping the air stream generated during rotation of the movable mass members and directs this downwardly to provide additional lift on the hull. Conveniently, either open celled or closed celled foams, e.g. foam rubber, can be attached to the inside of the cowl surface facing the movable mass members to decrease noise transmission and serve as a shock absorber. Additionally, any foam or froth generated during operation is carried against the interior of the compartment thereby acting both as a sound insulator and shock absorber markedly improving the comfort to occupants of the craft.

If desired, the outer face of the units can be covered with the segmented cover described and depicted hereinbefore to further increase the lift imparted to the vessel. Another feature of the depicted vessel is a cabin roof in the shape of an airfoil **88** thereby taking advantage of lift from the air itself as the vessel moves through the water. For aid in control and comfort in the presence of crosswinds, side shields, railing or other similar "spoilers" can be affixed to the side of the deck or superstructure roof running from fore to aft, if desired.

As depicted the illustrated vessel is propelled by an air screw **90** operated by an internal combustion engine **92**. However, it is to be understood that an inboard or outboard marine engine or an annular jet can be employed. With this latter power device which delivers a downwardly directed air jet, the air stream can be directed onto the movable mass members thereby serving to drive these as by an air motor in a highly efficient lifting and propulsion action. Alternatively, the present novel suspension units themselves can be self-propelled thereby either directly propelling the craft or adding to overall horizontal motion if conventional driving mechanisms also are employed.

The present novel craft has the following advantages which leads to a high efficiency of operation and the minimum of contact with the water surface as the vessel skims along over this medium;

(1) The formation of an air cushion between the planing hull and the surface of the water.

(2) The ultimate in smoothness of contact between each of the lift units and the crest of the wave from the preceding unit by positioning these as set forth herein.

(3) The build-up of an air pressure under the hull by the cowl design for the suspension units.

(4) Lift from the airfoil design of the roof member.

These advantages are the result of an efficient coaction of the assembly to engage the maximum amount of water surface coupled with high lift from generated air pressure.

This same type of system can be employed with large craft with a modification wherein the reach of the movable mass members is extended additionally ahead of the hull or load carrying unit thereby to further extend the amount of engagement of the water surface to provide a relatively stationary medium of support. In effect, such an arrangement provides a triangularly shaped framework of suspension and propulsion units around the hull or load carrying unit.

The angle from the apex of the triangle framework in front of the load carrying unit becomes less as the speed of the craft increases thereby reaching considerably ahead of the load so that the length to width of the base ratio may be 20 to 1 at high speeds.

Propulsion of single hulled vessels of the type depicted hereinbefore by the present novel suspension units also gives the added advantage that the rotating movable mass members incidentally provide appreciable gyroscopic action thereby serving to stabilize the hull. By spacing the propulsion units at predetermined distances apart along the length of a hull, if multiple members are used, an increase in stabilization is achieved without localized high stresses. To counteract the possible tendency for the craft to yaw from gyroscopic action when in contact with a rough medium counter-rotating masses, not contacting the medium of operation and which transfer torque to the present novel units, can be used.

Although the herein described vessels can employ conventional steering action, other control means such as gyroscopes, air foil control, weight shifting, speed ratio control on the individual movable mass units as well as adjustable disc-like rudder member mounted on the drive shaft of the movable mass members advantageously and satisfactorily can serve as directional control members. These rotatable discs also are suitable for use as rotating, lift-producing centerboards.

Additionally, when the disc-members are used as a rudder these also can serve as a brake or resistance in the manner of a sea anchor by turning the member to cross the flow of water. By this action, the movable mass members operate at an increased power to provide lift while operating only at a low forward speed. During acceleration as the desired lift is achieved the drag from the anchor member can be reduced and the speed of the craft increased to the normal operating level. Conversely, these members can be used to impart braking action upon deceleration. Additionally, it is to be understood that conventional sea anchors can be used for this same effect or a combination of the present rudder-discs and sea anchors can be employed.

Although specific embodiments of the present novel suspension and propulsion units have been depicted in combination with certain types of craft for illustrative purposes it is to be understood that any of the hereinbefore described units can be employed with any of a variety of power driven craft. Also, these present novel units can be employed as landing gear on aircraft, particularly being suited for use on amphibian type craft. These units offer the advantage of contact equalization of the landing gear with the minimum of "unsprung" weight. Such units also add lift even before contact with the liquid or fluid medium by centrifugal force energy transfer to the air engaged below the wheel housing, the air pressure itself activating the unit by acting on the movable mass units as the aircraft moves through the air.

Various modifications can be made in the present invention without departing from the spirit or scope thereof for it is understood that I limit myself only as defined in the appended claims.

I claim:

1. A suspension and propulsion unit for a marine craft which comprises in combination;

(1) a wheel-like core member having a central hub, said member being rotatable,

(2) radial flexible vane members around the outer periphery of said core, said vane members being attached to said core so as to be movable a controlled distance outwardly and inwardly from the periphery of said core, the portion of the vane members that

is at the lowermost position during a revolution of said core member impinging against a fluid medium on which said unit is operated thereby being deflected inwardly from the periphery and said vane members being accelerated a controlled distance outwardly from said periphery as said vane members revolve beyond the support from said fluid medium during the rotation of said core, and

(3) an energy source applied to the assembly of said core and said radial flexible vane members whereby said assembly is rotated.

2. A suspension and propulsion unit for a marine craft which comprises;

(1) a substantially cylindrical core member,

(2) a multiplicity of flexible strap-like movable mass members each being affixed by one end to said core at substantially equally spaced apart intervals around the periphery of said core,

(3) the outwardly extended free end of each of said flexible, strap-like movable mass members being deflected inwardly as said members contact the liquid medium in which said craft is operated as said core is rotated and said movable mass members being driven outwardly as said members lose contact with said medium during the revolution of said core.

3. The novel suspension and propulsion unit as defined in claim 2 and having a plate-like, flexible, cylindrical disc cover attached to at least one face, said cover having a diameter at least the same as the effective combined diameter of said core and said flexible strap-like movable mass members at full extension of said mass members.

4. The novel suspension and propulsion unit as defined in claim 3 wherein said cover is slotted at regular intervals, said slots extending inwardly from the outer edge toward the hub thereby to provide a multi-segmented member, the edge of each segment being directed angularly outwardly, said edge containing a number of small slits directed inwardly from the outer periphery to the junction of the outward angular projection and the flat surface of said disc.

5. A marine surface skimmer which comprises in combination;

(a) a hull structure,

(b) a multiplicity of rotatable suspension and propulsion units attached to said hull structure, each of said suspension and propulsion units consisting of a core member and a multiplicity of radial flexible vane members spaced at intervals around its outer periphery, said radial flexible vane members slapping the surface of a fluid medium and being deflected during each revolution of said suspension and propulsion unit and simultaneously propelling said craft in a direction opposite to the horizontal component of this force, said radial flexible vane members being directed outwardly as they lose contact with the surface of said fluid medium during the revolution of said unit thereby providing lift by centrifugal force action,

(c) power means driving said suspension and propulsion units.

6. A novel surface skimming marine craft which comprises in combination;

(1) a planing hull,

(2) a multiplicity of rotatable suspension and propulsion units positioned at intervals along both sides of said hull, each of said suspension and propulsion units consisting of a substantially cylindrical core member and a multiplicity of flexible strap-like members, each of said flexible strap-like members being affixed by one end to said core and having the other end free so as to slap the surface of a fluid medium as said members contact this surface during each revolution of said unit, said strap-like members being affixed at substantially equally spaced apart intervals around the periphery of said core, said flexible strap-like members slapping the surface of the fluid medium and being deflected during each revolution of said suspension and propulsion unit and simultaneously propelling said craft in a direction opposite to the horizontal component of this force, said flexible members being directed outwardly as they lose contact with the surface of said fluid medium during the revolution of said unit thereby providing lift by centrifugal force action,

(3) a superstructure, said superstructure having a roof line in the form of an air foil,

(4) power means for said suspension and propulsion units, and

(5) directional control means for said hull.

7. The craft as defined in claim 6 wherein each of the suspension and propulsion units is displaced a predetermined distance with respect to said hull being positioned so as to contact during operation the crest of the wave generated by the adjacent forward member.

8. The craft as defined in claim 7 wherein each of the suspension and propulsion units is covered with a cowl, said cowl covering the front and top side of said unit and extending over the outer face of said unit down to the level of the center axis of the core member having said movable mass members affixed thereto.

9. The craft as defined in claim 8 wherein the surface of the cowl adjacent the suspension and propulsion unit is fitted with a cellular lining.

10. The craft as defined in claim 6 wherein the outer face of each suspension and propulsion unit is fitted with a flat, disc cover member.

11. The craft as defined in claim 8 provided with an air-screw pusher drive.

12. A novel surface skimming marine craft which comprises in combination;

(a) a planing hull,

(b) a multiplicity of rotatable suspension and propulsion units positioned at intervals along the sides of said hull each of said suspension and propulsion units consisting of a center core member and a multiplicity of radial flexible vane members, each of said radial flexible vane members being attached to said core and being freely movable a controlled distance inwardly and outwardly from the periphery of said core so as to slap the surface of a fluid medium as said radial flexible vane members contact this surface during each revolution of said unit, said radial flexible vane members being affixed at spaced apart intervals around the periphery of said core member, said radial flexible vane members slapping the surface of the fluid medium and being deflected during each revolution of said suspension and propulsion unit and simultaneously propelling said craft in a direction opposite to the horizontal component of this force, said radial flexible vane members being directed outwardly as they lose contact with the surface of said fluid medium during the revolution of said unit thereby providing lift by centrifugal force action,

(c) power means driving said suspension and propulsion units, and

(d) directional control means for said craft.

13. The marine craft as defined in claim 6 wherein the suspension and propulsion units during operation are rotated to provide rotational velocities ranging from about 20 feet per second to about 100 feet per second.

14. The marine craft as defined in claim 12 wherein said rotatable members are positioned at substantially equally spaced apart intervals around the periphery of said core, and the outer face of each of said suspension and propulsion units is fitted with a flat, disc cover member.

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MILTON BUCHLER, *Primary Examiner.*

FERGUS S. MIDDLETON, ANDREW H. FARRELL, *Examiners.*