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D. N. CLARK

AQUATIC PROPELLER

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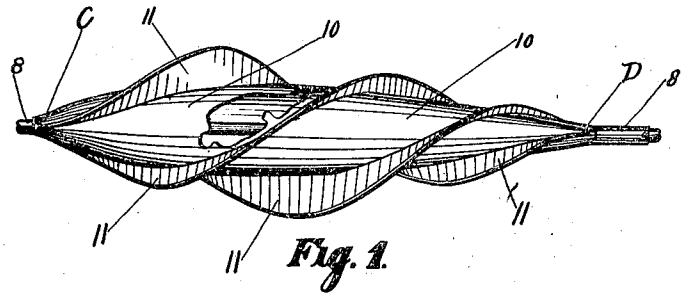


Fig. 1.

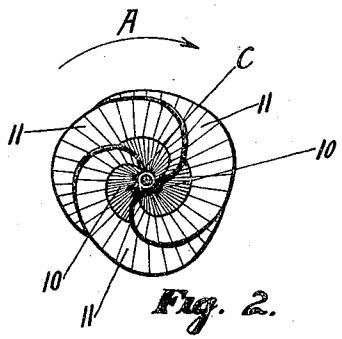


Fig. 2.

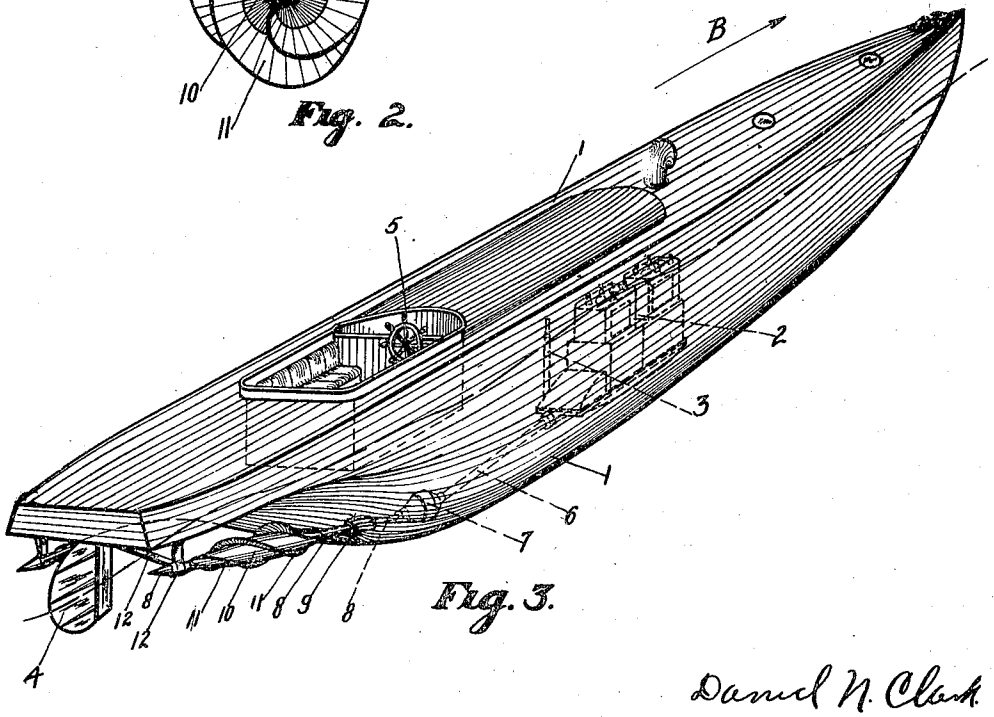


Fig. 3.

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UNITED STATES PATENT OFFICE.

DANIEL N. CLARK, OF LOS ANGELES, CALIFORNIA.

AQUATIC PROPELLER.

Application filed May 31, 1922. Serial No. 564,824.

To all whom it may concern:

Be it known that I, DANIEL N. CLARK, a citizen of the United States of America, a resident of Los Angeles, in the county of Los Angeles, State of California, have invented a new and useful Improvement in Aquatic Propellers, of which the following, when read with reference to the accompanying drawings, is such a full, clear, and exact specification embodying the invention in its preferred form as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates generally to aquatic propellers and has for its main object to provide a propeller with greatest efficiency at all distances from the axillar center.

Another object is to provide spiral-helical vanes constructed around a streamlined body portion, this body portion being so streamlined that it will pass through the water at relatively high velocities affording the least possible resistances.

Another object is to provide a propeller having the greatest possible strength and highest possible efficiency involving the least amount of head resistances as the propeller passes through the water and the greatest possible and proportional strength to withstand peripheral velocities and directional thrust.

Another object is to provide a propeller which will gradually take hold of the water stream from a position immediately adjacent and surrounding the axillar center and by the gradual increasing of the angle of incidence of the vanes constructed around the body portion, as the distance from the longitudinal center is increased, the propeller will be able to gradually take hold of the water and derive therefrom the highest and most efficient thrust with the least molecular disturbance of the water by violent and indefinite motions such as eddies and reverse currents.

Another object is to provide a propeller construction whereby the thrust exerted upon the body portion will be gradually increased until the point of highest efficiency and high peripheral speed is reached and then, as the propeller passes through the water, and as the diameter of the body portion is reduced, the spiral vanes will gradually yield up their hold on the water and thereby permit the said water to pass backwardly therefrom with the least disturbance.

Another object of the propeller is to obviate with the head resistances involved in the present type of blade propellers, a resistance which in other types of propellers, increases proportionately as the velocities increase.

In other types of propellers, as the velocities increase, the head resistances increase at the expense of the efficiency of the propeller and thereby rapidly reach a definite and positive limit beyond which it is impossible to get any additional forward thrust regardless of the engine power exerted in the rotation of such blade propellers, whereas, in the present type of propeller a constant relation is established between the engine power expended and the thrust and efficiency derived therefrom, since it can be readily understood that the streamlined proportions of the central body thereof can be designed according to its displacement and the desired velocity through the water.

Having thus described generally the objects of my invention, though it will be understood that I am not limiting myself to the objects as thus enumerated since other objects will be apparent from the accompanying drawings which form an essential part of this specification.

Figure 1 is a side elevational view of the propeller having a circular body of an ichthyoidal profile and the spiral-helical vanes entwined around the same.

Figure 2 is an end view of the propeller as shown in Figure 1.

Figure 3 is a schematic view of the adaptation of the propeller to a motorboat.

In carrying out my invention as shown in the accompanying drawings in its preferred adaptation, a motorboat body 1 is provided having an engine 2 arranged therein, as shown, with suitable controls 3 for starting the engine, as shown by lever 3, and a means of operating rudder 4 through control wheel 5 whereby the said craft may be guided through the water. By the operation of engine 2, shaft 6 is rotated to which universal joint 7 is connected and rotatably arranged. To universal joint 7 shaft 8 is connected, the said shaft 8 being journaled on bearing 9 within the body of the motorboat hull 1 as shown in Figure 3. Said shaft 8 extends backwardly and becomes the axillar center of the circular propeller body 10 of ichthyoidal profile, as shown in all figures.

Around this ichthyoidal body 10 spiral vanes 11 are arranged. The rear end of the ichthyoidal body of the propeller, by means of shaft 8, is journaled in a bearing provided in brace 12, as shown in Figure 3.

Now it will be seen in operation, after engine 2 is started and by suitable mechanical means through control 3, shaft 6 is rotated carrying universal joint 7 and shaft 8 extending through bearing 9, propeller body 10 is rotated carrying with it the spiral-helical vanes 11. As the said propeller vanes 11 impinge upon the water in an angular position and rotate clockwise, as shown by arrow "A" in Figure 2, as seen from the stern of the motorboat, as shown in Figure 1, the said vanes will produce a thrust which will propel the motorboat through the water in the direction indicated by arrow "B."

Now it will be understood that various changes may be made in the size, relative shape of the body of the propeller and in the relative angle of the spiral-helical vanes arranged thereon.

It will, of course, be noticed that the spiral-helical vanes 11 find their beginning at point "C" as shown in Figures 1 and 2 coinciding with shaft 8, from which point the vanes are gradually increased in size as well as being increased in their angle as the distance from the longitudinal center of the ichthyoidal body is increased until the angle of incidence at, or near, the central portion of the propeller becomes relatively great as the peripheral motions thereat, become relatively great, from which position the said vanes backwardly progress and finally terminate at point "D" in reduced dimensions corresponding to the beginning at point "C". Thus it will be seen that by the rotation of the said propeller the vanes will gradually take hold of the waterstream as the said water-stream moves backwardly along the contour thereof until the central portion of the ichthyoidal body is reached, from which point there is a gradual recession as well as a gradual reduction of the angle of incidence of the said vanes with respect to the normal line of progression through the water and the longitudinal axis of the said propeller.

Of course it will be understood that various changes may be made in the relative arrangement, collocation and coordination of parts without departing from the spirit of this invention. It will also be understood that various shapes may be adapted as well as various angles of incidence acquired in the spiral-helical vanes around the ichthyoidal body of the said propeller whereby either the dimensions of the spiral vanes at both the forward apex, as well as the rear apex, of the said propeller, or at the central portion thereof, are increased in dimensions as well as the angle of incidence of the said spiral-helical vanes so as to compensate for the peripheral velocity of the propeller at, on, or near the most efficient pitchline involving the greatest peripheral velocity.

Of course it is understood that this propeller is readily adaptable to any type of water craft of any dimensions from the motorboat to that of the commercial leviathan.

It is also to be understood that instead of spiral-helical vanes, blades may be constructed upon and around the said body.

Having thus described my invention in its preferred form, though without limiting myself to this particular form of adaptation or to the arrangement, collocation or coordination of parts, what I claim and for which I desire to secure Letters Patent are as follows:

1. In an aquatic propeller, the combination; a body, the said body being of ichthyoidal profile and circular in cross-section; and spiral-helical vanes having their beginnings parallel with the longitudinal axis of the said body, thence progressing backwardly and outwardly around and upon the said body as their angle of incidence increases as the diameter of the said body increases until the greatest diameter of body and angle of incidence of the said vanes are attained, thence the said vanes retrograde as the diameter of body decreases and the angle of incidence of the vanes decreases until the said vanes terminate near and parallel with the longitudinal axis.

2. In an aquatic propeller the combination of an ichthyoidal body, spiral-helical vanes constructed around the said body, the said vanes having their beginning in reduced dimensions adjacent to the forward apex of the said body around the longitudinal axis thereof and thereat, thence gradually, outwardly and backwardly progressing around the said body and during these progressions the said vanes change in their angle of incidence with respect to the longitudinal axis thereof by having said angle increased as the distance from the longitudinal axis is increased until the said vanes reach their maximum distance from the longitudinal axis near the central portion of the said body, from thence the said angle of incidence is gradually reduced until the said vanes finally terminate at the rear of the said propeller body at and adjacent to the longitudinal center thereof.

3. In a water-craft the combination of an aquatic propeller rotatably mounted and operatively arranged with an engine carried by the said water-craft, the said pro-

peller having a body element of circular dimension in cross section and of ichthyoidal contour, with spiral-helical vanes constructed around the said body and arranged to rotate therewith, the said vanes having their beginning on lines paralleling the longitudinal axis of the said body, from thence they progress outwardly with and around the contour of the said body, and during these progressions the said vanes have their angle of incidence gradually increased with respect to the normal line of progression of the propeller through the water until the said vanes become adjacent to the surface of the said propeller body acquiring their greatest peripheral motion resulting from the rotation thereof at which point the angle of incidence of the said vanes with respect to the said longitudinal axis acquire their greatest inclination, from thence there is a gradual and corresponding recession of the said vanes and a concomitant reduction in their angularity until they finally terminate at the rear of the said body.

4. In an aquatic propeller operatively and rotatably mounted in a water-craft, the said propeller body having a circular transverse axis and of ichthyoidal contour paralleling the longitudinal axis, spiral-helical vanes constructed around the said body, the said vanes having their angle of incidence gradually changed with reference to the said longitudinal axis and with reference to the normal line of progression of the said propeller through the water, the angularity of the said vanes being arranged according to the relative peripheral velocity of the said vanes as the propeller is rotated transversely to the normal line of progress through the water.

5. In an aquatic propeller, the combination of; an elongated body of ichthyoidal contour, the longitudinal axis of the said body being disposed parallel with the line of progression through the water; and spiro-helical vanes constructed upon the said body, the said vanes having their beginnings forwardly arranged with respect to the said body and relatively adjacent to, and on a plane parallel with, the longitudinal axis of the said body, from thence they recede backwardly on, and progress outwardly around, the said body until they terminate backwardly at, relatively near, and on a plane coinciding with, the longitudinal axis of the said body, the said vanes having their angle of incidence gradually changed with reference to the longitudinal axis of the said body as they outwardly progress around the same until they acquire their incidence on the line of the greatest diameter of the said body, substantially as shown.

6. In an aquatic propeller, the combination of; an elongated body of a relatively ichthyoidal contour and circular in cross section; and vanes of relatively spiro-helical contour constructed on and around the said body, the said vanes having their beginnings parallel with the longitudinal axis of the said body and forwardly thereon and relatively near the said axis thereof, from thence the said vanes retrograde outwardly with, upon and around, the said body and terminate backwardly at, relatively near and on a plane coinciding with, the said longitudinal axis of the said body, the said vanes having their inclination, with respect to the surface of the said body and their angle of incidence with respect to the said longitudinal axis, varied according to the diameter of the said body.

In testimony whereof I have signed my name to this specification.

DANIEL N. CLARK.