July 7, 1936. M. P. VARGAS 2,046,538

SCREW PROPELLER

Filed Aug. 31, 1933

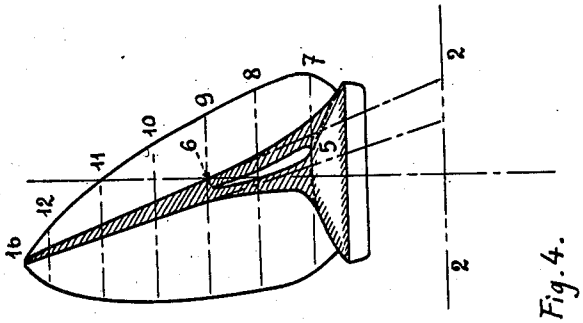


Fig. 4.

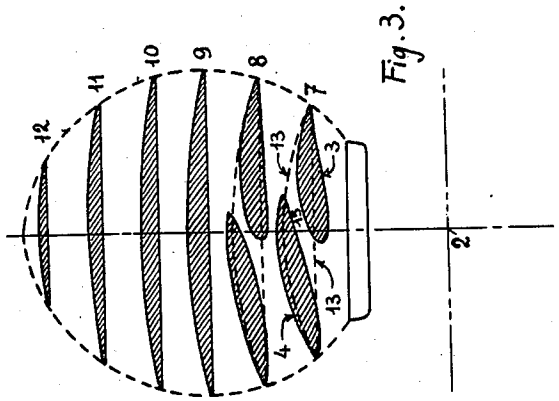


Fig. 3.

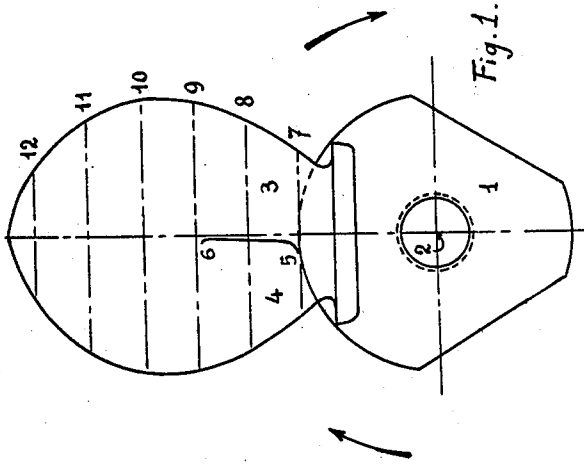


Fig. 1.

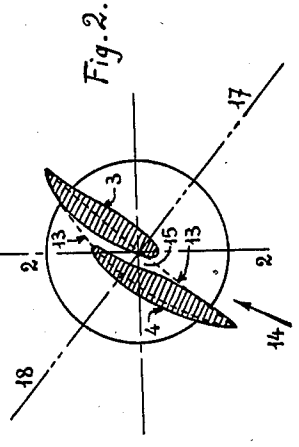


Fig. 2.

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## SCREW PROPELLER

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4 Claims. (Cl. 170—172)

The present invention has for its object a special modification to the track of the screw-propellers, whatever may be the fluid wherein they operate, with a view to attaining a greater perfection in the performance and thence a better efficiency.

To this effect, each blade of the propeller at its base, i. e. at the zone adjacent the hub, instead of being in a sole piece, is subdivided, in radial direction, into two distinct portions or elements, which are separate from each other, so as to constitute an opening or hollow, for the passage of the fluid through the body of the blade, from the front side to the rear one of the latter, with the special features that:

1. The borders or adjacent peripheries of the said parts or elements whereinto the blade is divided at its base, result superposed to each other for a limited width and for the whole height of the opening, when the blade itself is observed in projection over a plane at right angles to the axis of rotation of the screw hub; consequently, on the same projection of the blade no hole, or aperture or hollow whatever is perceived for the passage of the fluid from the front to the rear side, but on the contrary, and in correspondence to the subdivision of the blade, the sole line of contour or projection of the edge of one of the two elements into which the base of the blade is subdivided and which superposes itself to the other;

2. Vice-versa, if the blade itself is observed as lying on a different plane from that which is at right angles to the axis of rotation of the hub and which is mentioned under (1), through the body of the blade a passage or aperture is observed which has a certain width at the base near the hub and which gradually decreases towards the top up to end in the form of an acute angle within the body of the blade itself, such height being correspondent to the contour or projection line of the border of one of the two elements of the blade, and which is observed in the projection of the blade over the plane at right angles to the axis of rotation of the hub beforementioned.

2. Such aperture for the passage of the fluid through the body of the blade, characterized as aforesaid, in addition to whatever dimensions, in relation to the direction of the rotatory motion of the blade, has always the direction from the corner of entry of the blade to that of egress, and may have either a rectilinear or a curvilineal direction.

Independently of the previous characteristics, which form the object of the present invention and which are applied on the single blades of a screw-propeller, the blades themselves may have a nature and form whatever either in respect to the generatrix of the helicoidal surface or in respect to the constant or variable pitch.

In the accompanying drawing there is illustrated, only by way of example, some views of the blades conceived in accordance with the present invention. Fig. 1 is a view in axial direction, i. e. it shows the blade of the screw projected on a plane which is at right angles to the axis of rotation of the propeller hub; Fig. 2 shows in plan view the corresponding section of the blade, at the point of its connection to the hub according to the present invention, observed in the same direction as that of the rotation axis of the hub; Fig. 3 shows the blade upset on the plane at right angles to the axis of rotation of the hub, with the detail of the various sections in the body of the blade itself; Fig. 4 is the cross view of the blades on a plane different from that at right angle to the axis of rotation of the propeller hub.

Referring particularly to Fig. 1, 1 denotes the hub of the screw propeller and 2 the axis of rotation of same; 3 and 4 are the two elements, or parts, into which the blade is subdivided at the bottom in the zone adjacent to the hub, and 5—6 is the contour or superposition line of the two bottom elements of the blade, of which the element 3 lies before the other 4.

The lines 7—8—9—10—11 and 12 indicate the various sections effected in the body of the blade, in its three projections represented in Figs. 1–3 and 4.

With reference to Fig. 2, the line 7—7 indicates the plan view of the section 7, shown in Fig. 1, observed in the direction of the axis of rotation of the hub 2 and in which are shown in section (instead of the unique section of the blade indicated in dash line 13—13 as in the ordinary cases) the two elements or parts into which the blade is subdivided at the bottom, in the zone of connection to the hub. In this section it is clearly shown how the two elements superpose on each other with the adjacent sides, in the direction of the rotation axis of the hub 2, i. e. when they are observed on the plane at right angles to the said axis of rotation; whereas, when they are observed in the direction 14, i. e. on a plane different from the one just mentioned, they show all the aperture for the passage of the fluid 15.

With reference to Fig. 3, this shows the lower zone of the blade, adjacent to the hub, with the sections 7 and 8 of the two bottom elements whereinto the blade is subdivided at that point, as

well as the upper zone with the corresponding unique sections, as in the usual cases, and relative to the unique and entire body of the blade 9—10—11 and 12.

With reference to Fig. 4, this shows the side view of the blade, with the detail of the section in radial direction drawn in the body of the blade itself from the plane 17—18 indicated in Fig. 3. Such section is indicated by 5—16, and 5—6 denotes the aperture of hole for the passage of the fluid through the body of the blade, aperture that is obtained thanks to the special subdivision of the blade itself, circumscribed to the base, near the hub.

Though for descriptive reasons the present invention has been based on the foregoing specification and on the accompanying drawing, yet many practical modifications may be made in the realization of the invention. Thus, for instance, it will be possible to modify the shape and width of the passage apertures through the two base elements into which the blade is subdivided, the conformation of the body of these two base elements, etc.; such modifications and others being however included within the scope of the invention as set forth in the following claims.

Having now particularly described and ascertained the nature of the present invention and in what manner the same is to be performed, I declare that what I claim is:

1. A screw blade constituted, in the radial direction, by two different zones of helicoidal surfaces; the first zone which, for about half of the radial length of the blade extends inwardly from the tip thereof and being of the usual screw shape, and the second zone, which adjoins the first zone and which is continued to the boss, into two separate elements; the said elements, and the cross sections of such elements in planes perpendicular to the diametral plane and included between the boss and the limit of the first zone, being arranged one on each side of said diametral plane, one of the said sections being displaced forwardly of the other to the entrance edge of the helicoidal surface of the first of said elements and the exit edge of the helicoidal surface of the second element being located upon the said diametral plane on opposite sides thereof so that, if the entire blade is viewed in elevation in the direction of the axis of rotation of the boss, no aperture is visible in the front face of the blade.

2. A screw blade constituted, in the radial direction, by two different zones of helicoidal surfaces; the first zone which, for about half of the radial length of the blade extends inwardly from the tip thereof and being of the usual screw shape, and the second zone, which adjoins the first zone and which is continued to the boss, into two separate elements; the said elements, and the cross sections of such elements in planes perpendicular to the diametral plane and included between the boss and the limit of the first zone, being arranged one on each side of said diametral plane, one of the said sections being displaced forwardly of the other, the entrance edge of the helicoidal surface of the first of said elements and the exit edge of the helicoidal surface of the second element being located upon the said diametral plane on opposite sides thereof so that, if the entire blade is viewed in elevation in the direction of the axis of rotation of the boss, no aperture is visible in the front face of the blade, the generatrices of the helicoidal surfaces of the two elements into which the blade is subdivided adjacent to the root being parallel to one another, but approaching one another gradually so as to form a single generatrix, thus generating two helicoidal partial surfaces each of which merges into the single continuous helicoidal surface of the first zone of the blade.

3. A screw blade constituted, in the radial direction, by two different zones of helicoidal surfaces; the first zone which, for about half of the radial length of the blade extends inwardly from the tip thereof and being of the usual screw shape, and the second zone, which adjoins the first zone and which is continued to the boss, into two separate elements; the said elements, and the cross sections of such elements in planes perpendicular to the diametral plane and included between the boss and the limit of the first zone, being arranged one on each side of said diametral plane, one of the said sections being displaced forwardly of the other, the entrance edge of the helicoidal surface of the first of said elements and the exit edge of the helicoidal surface of the second element being located upon the said diametral plane on opposite sides thereof so that, if the entire blade is viewed in elevation in the direction of the axis of rotation of the boss, no aperture is visible in the front face of the blade, all the sections transverse and perpendicular to the diametral plane of division of the blade, at the zone adjacent to the boss, the rear contours of the elements being lines parallel to one another.

4. A screw blade constituted, in the radial direction, by two different zones of helicoidal surfaces; the first zone which, for about half of the radial length of the blade extends inwardly from the tip thereof and being of the usual screw shape, and the second zone, which adjoins the first zone and which is continued to the boss, into two separate elements; the said elements, and the cross sections of such elements in planes perpendicular to the said plane and included between the boss and the limit of the first zone, being arranged one on each side of said diametral plane, one of the said sections being displaced forwardly of the other, the entrance edge of the helicoidal surface of the first of said elements and the exit edge of the helicoidal surface of the second element being located upon the said diametral plane on opposite sides thereof so that, if the entire blade is viewed in elevation in the direction of the axis of rotation of the boss, no aperture is visible in the front face of the blade; the thickness of any transverse section of the blade presenting a maximum value at about one third of the length of the section starting from the entrance edge.

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