A. A. HOLLE.

SCREW PROPELLER AND THE LIKE.

APPLICATION FILED JAN. 21, 1922.

1,423,113.

Patented July 18, 1922.

3 SHEETS—SHEET 1.

Fig. 1.

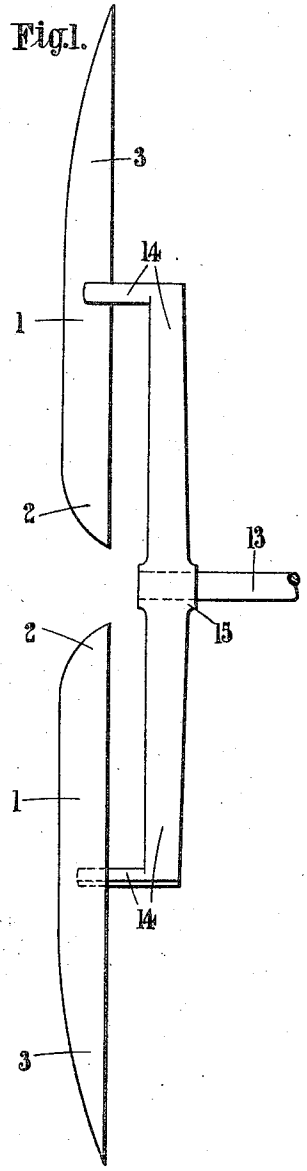
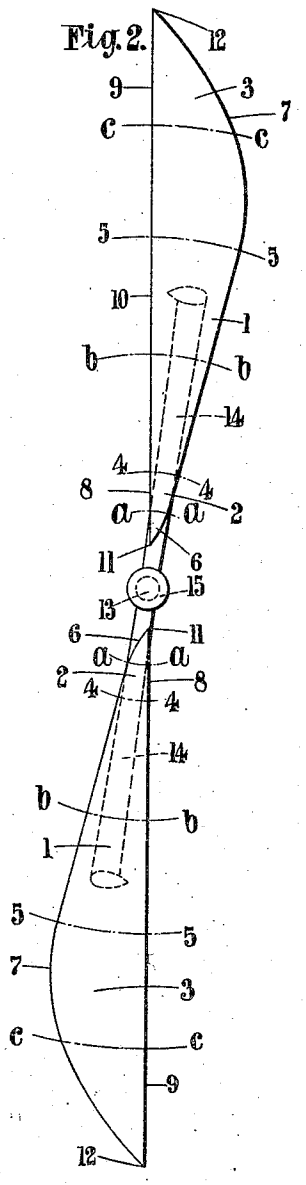


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

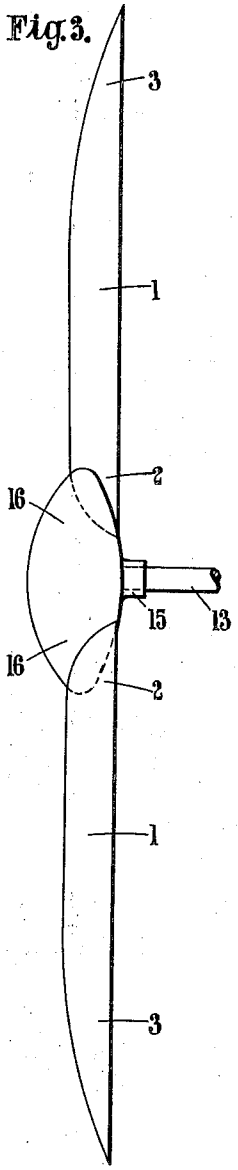
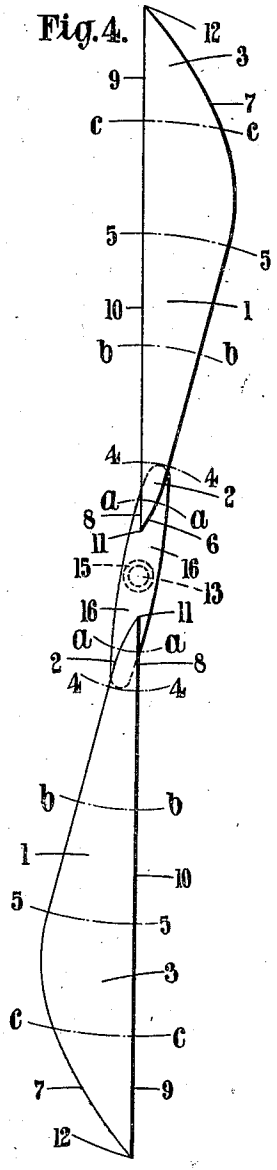


Fig. 4.



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3 SHEETS—SHEET 3.

Fig.5.

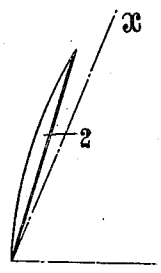


Fig.6.

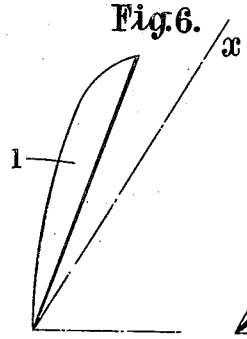


Fig.7.

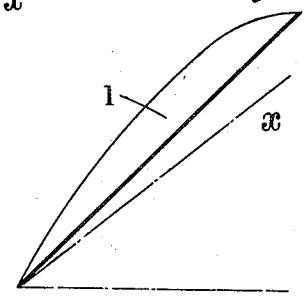


Fig.8.

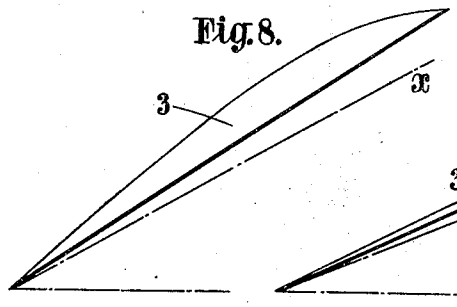
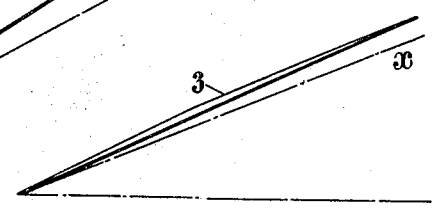


Fig.9.



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UNITED STATES PATENT OFFICE.

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SCREW PROPELLER AND THE LIKE.

1,423,113. Specification of Letters Patent. Patented July 18, 1922.

Application filed January 21, 1922. Serial No. 530,952.

To all whom it may concern:

Be it known that I, ALEXANDER ALBERT HOLLE, a subject of the Queen of the Netherlands, residing at 60 Oxford Terrace, Hyde Park, in the administrative county of London, England, have invented certain new and useful Improvements in Screw Propellers and the like (for which I have filed an application in Great Britain No. 17,313/20, filed June 25, 1920), of which the following is a specification.

This invention relates to screw propellers, water mills, windmills and like mechanism which operates either by direct pressure on, or is operated by the pressure of, the fluid in relation to which it rotates, and it consists of an improved form of blade which has for its object to obtain increased thrust and increased efficiency and to render the use of such mechanism of relatively small diameter economically possible.

With these and other objects in view the invention comprises the various novel features of construction, combination and arrangement of parts hereinafter fully described and specified in the claims hereto appended.

In the accompanying drawings in which like parts are denoted by similar characters of reference:—

Figs. 1 and 2 are views in elevation and plan of one form the invention may assume.

Figs. 3 and 4 are similar views of another form, and

Figs. 5, 6, 7, 8 and 9 are views in transverse section on line *a*, *a;* 4, 4; *b*, *b;* 5, 5; and *c*, *c;* in Figs. 2 and 4.

The blades of the improved propeller each consist of three essential parts, a main or central part 1 which is of quadrangular shape in plan, and two end parts 2 and 3 which in plan are so cut away from their points of junction on the lines 4, 4 and 5, 5 respectively with the main or central part 1 that the leading edges 6 and 7 of the parts 2 and 3 are swept back until they meet the trailing edges 8 and 9 of said parts which are continuations of the trailing edge 10 of the main or central part 1.

The shape of the main or central part 1 in cross section is such that its chord gradually increases from its inner side, i. e. from the point 4 to its outer side i. e. to the point 5, and both its camber and its angle of incidence to the helical plane decrease from its inner to its outer side, that is from the point 4 to the point 5.

The cross section of the inner end part 2 is such that its chord, camber and angle of incidence to the helical plane are all gradually increased from its tip 11 to its junction 4 with the main or central part 1 where said chord, camber and angle of incidence coincide with those of said main or central part at that point. The cross section of the outer end part 3 is such that its chord, camber and angle of incidence to the helical plane are all gradually reduced from its junction 5 with the main or central part 1—where said chord, camber and angle of incidence coincide with those of said main or central part at that point—to its tip 12, as is clearly shown in Figs. 5 to 9 in which the lines *x* represent the helical plane.

The blades may either be mounted on the shaft 13 of the propeller by means of radially arranged L-shaped arms 14 carried by a central boss 15 as shown in Figs. 1 and 2, or said blades may be mounted by their inner ends on projections 16 carried by or formed in one with the central boss 15 adapted to be mounted on the shaft 13 as shown in Figs. 3 and 4 said projections being of stream-line form and their points of junction with the blades being such as will not cause any disturbance of the positive pressure along the leading edge of the blades.

What I claim is:—

1. A blade for screw propellers, windmills, and like fluid operating or operated mechanisms comprising a central part and two end parts, the shape in plan of the central part being quadrangular and its shape in cross section being such that its chord gradually increases from its inner side and its camber and angle of incidence relative to the helical plane decreases towards its outer side; and the shape of each of the end parts in plan being such that it is cut away from its point of junction with the central part so as to bring its leading edge back until it meets its trailing edge, which is a continuation of the trailing edge of the central part, and the shape of each of said end parts in cross section being such that its chord, camber and angle of incidence to the helical plane are gradually reduced from their points of junction with the central part to their tips.

2. A blade for screw propellers and the like comprising a central part which is of

quadrangular shape in plan and has such a shape in cross section that its chord increases gradually from the part intended to be nearest to the centre about which the blades rotate and both the camber of its rear surface and its angle of incidence relative to the helical plane decreases from said aforesaid part; and two end parts, each of which is cut away in plan from its point of junction with the central part so that its leading edge is swept back until it meets its trailing edge which is a continuation of the trailing edge of the central part, being so shaped in cross section that its chord, the camber of its rear surface and its angle of incidence relative to the helical plane are gradually reduced from their points of junction with the central part to their tips.

3. A screw propeller or the like comprising a boss, radially arranged arms on said boss, and blades carried by said arms, each of said blades comprising a central part which is of quadrangular shape in plan and has such a shape in cross section that its chord gradually increases from that part nearest to the boss, and both the camber of its rear surface and its angle of incidence relative to the helical plane decreases from that part nearest to the boss, and two end parts each of which is cut away in plan from its point of junction with the central part so that its leading edge is swept back until it meets its trailing edge which is a continuation of the trailing edge of the central part, the shape of each of said end parts in cross section being such that its chord, the camber of its rear surface and its angle of incidence relative to the helical plane are gradually reduced from their points of junction with the central part to their tips.

4. A screw propeller or the like comprising a plurality of blades each of which includes a central part of quadrangular shape in plan and of such a shape in cross section that its chord gradually increases and both the camber of its rear surface and its angle of incidence relative to the helical plane decreases towards the outer end of the blade, and two end parts each of which is cut away in plan from its point of junction with the central part so that its leading edge is swept back until it meets its trailing edge which is a continuation of the trailing edge of the central part, the shape of each of said parts in cross section being such that its chord, the camber of its rear surface and its angle of incidence relative to the helical plane are gradually reduced from their points of junction with the central part to their tips; a boss for carrying said blades; and connecting pieces between said blades and said boss which have a streamline form and are so shaped at their points of junction with the blades that they will not cause any disturbance of positive pressure along the leading edges of the blades.

ALEXANDER ALBERT HOLLE.