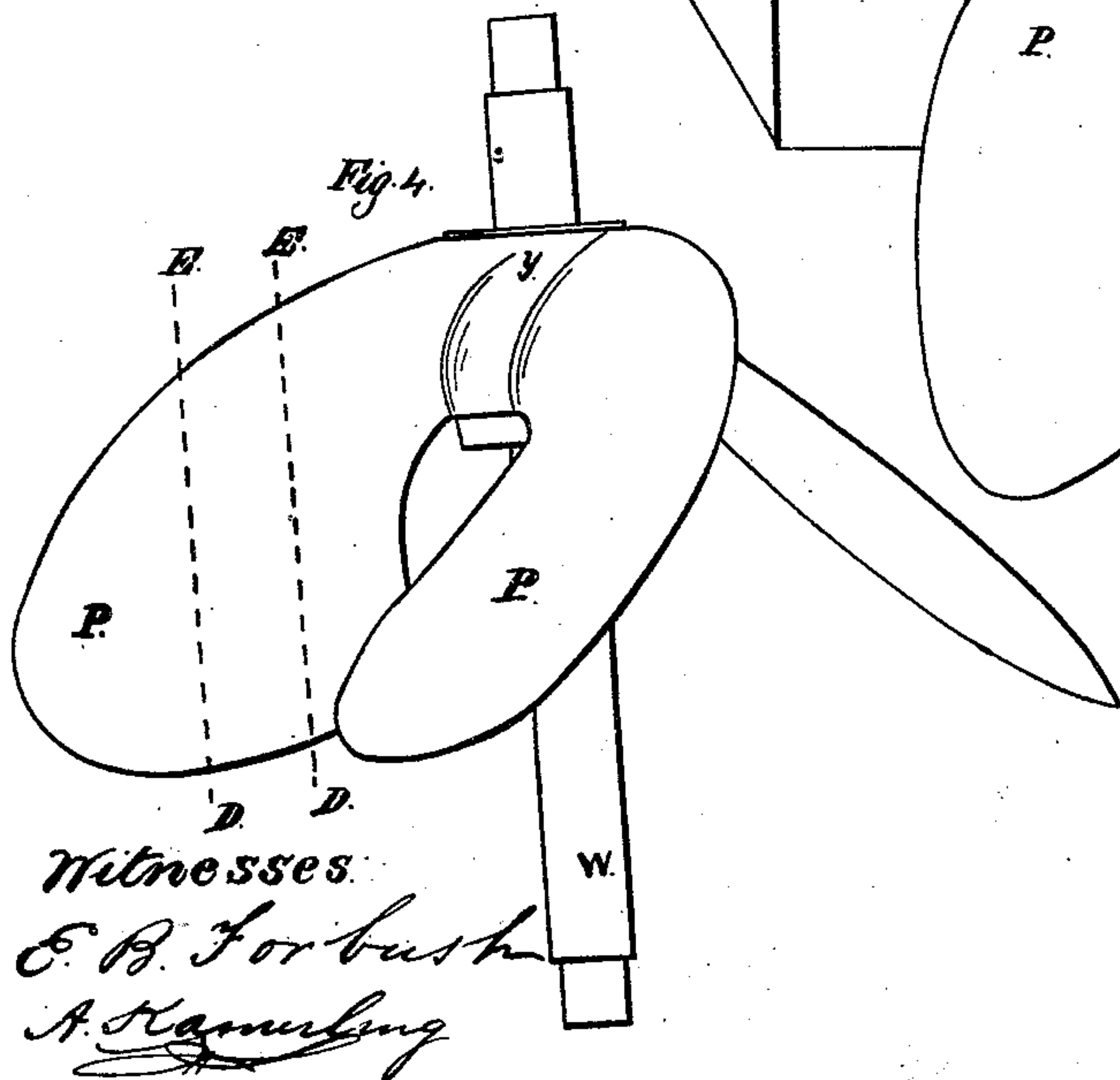
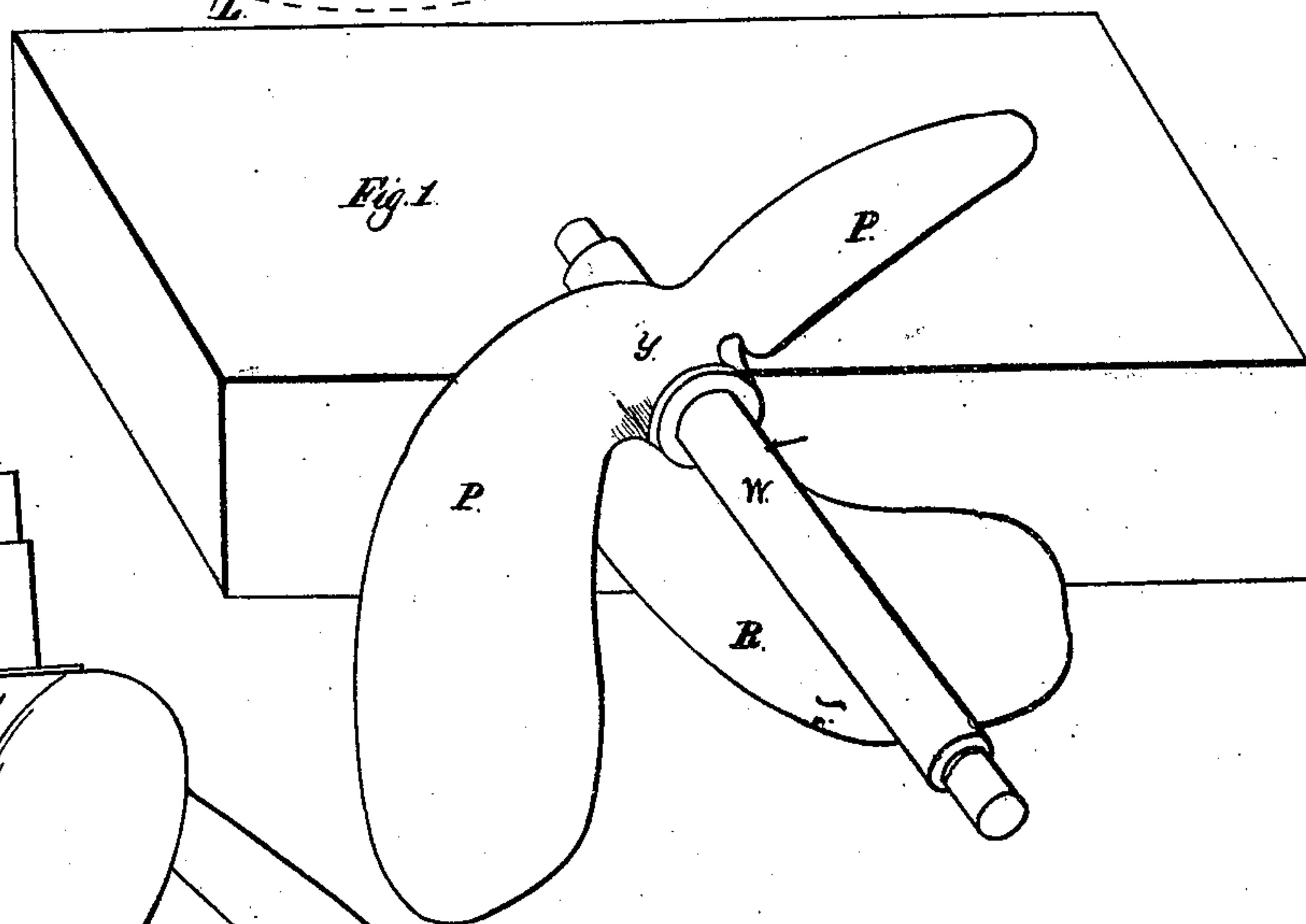
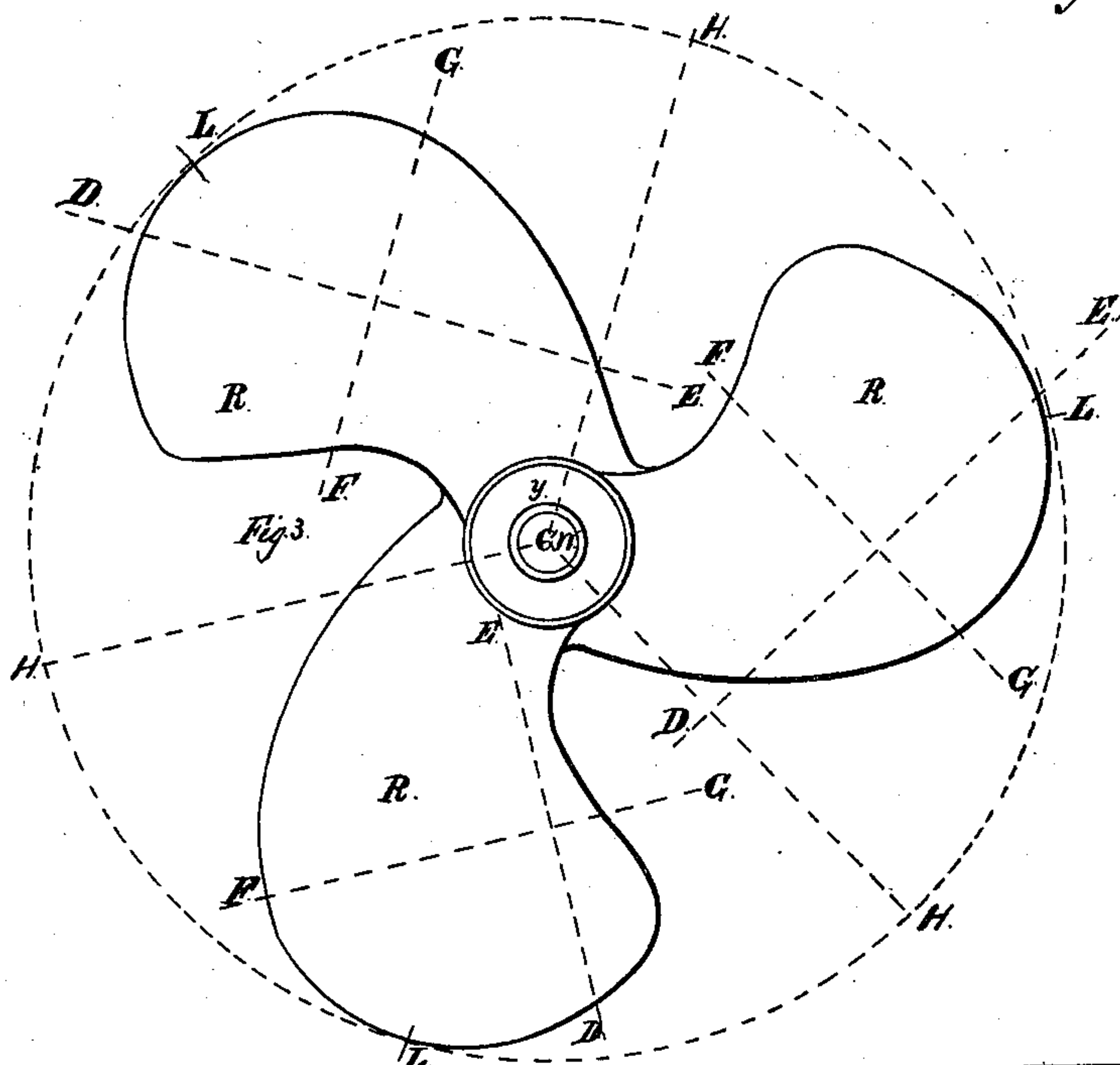


Sheet 1, 2 Sheets.

G. W. Swartz.
Screw Propeller.

No 17,943.

Patented Aug. 4, 1857.



Witnesses:

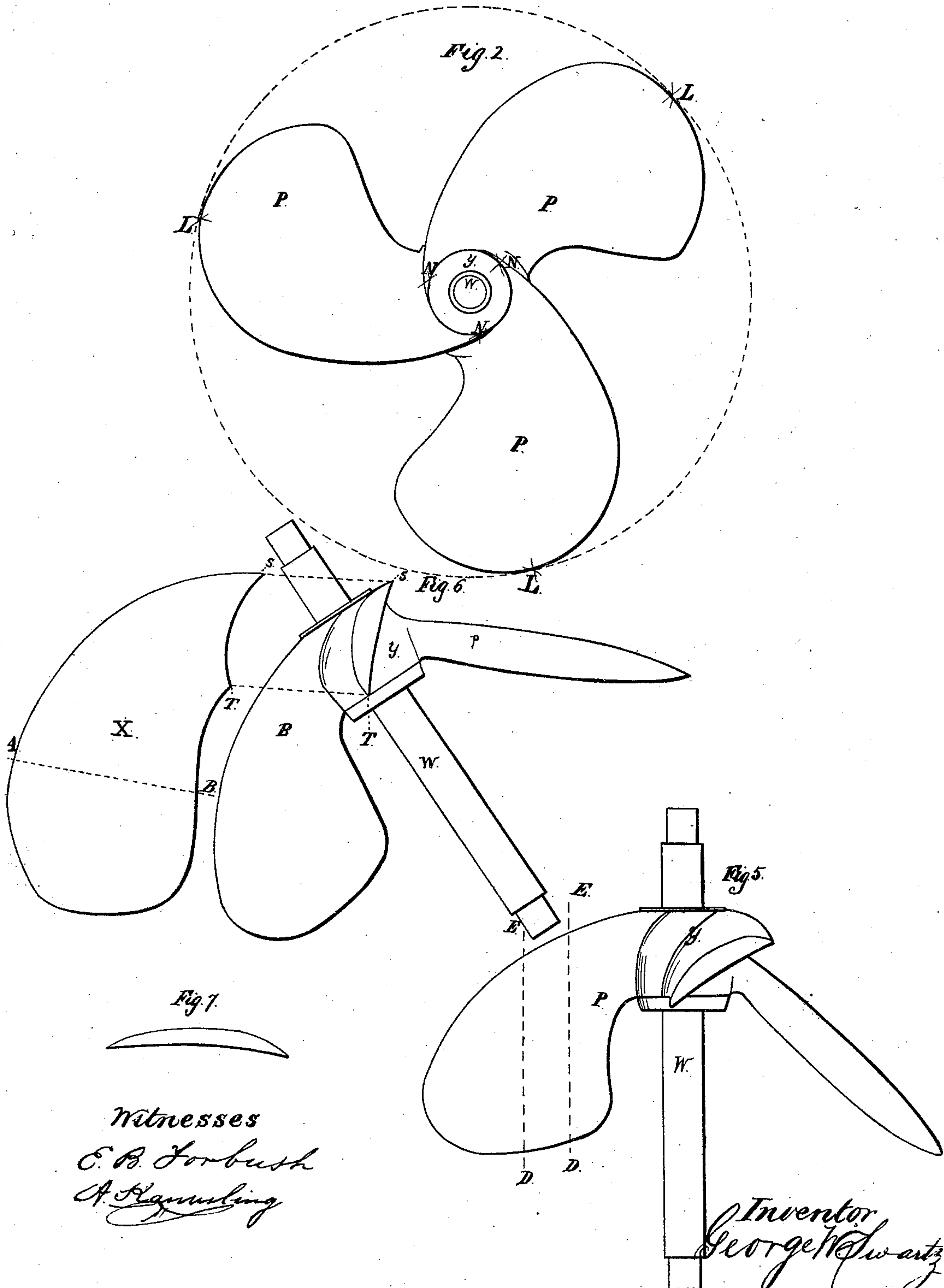
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UNITED STATES PATENT OFFICE.

GEORGE W. SWARTZ, OF BUFFALO, NEW YORK.

PROPELLER-BLADE.

Specification of Letters Patent No. 17,943, dated August 4, 1857.

To all whom it may concern:

Be it known that I, GEORGE W. SWARTZ, of the city of Buffalo, in the county of Erie and State of New York, have invented a
5 new and Improved Propeller-Blade; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and the letters of reference marked thereon.

10 The propeller blades on their outer periphery or entering edge, when revolving describe the surface of a half globe (or nearly so) whatever may be the diameter of the wheel or the pitch of the blades.

15 The blade is made convex, concave and straight—that is to say, the blade is convex on its outside surface, on lines drawn in any direction across it. Straight lines drawn on the inside or face and lengthwise of the
20 blade, and parallel with the plane of the wheel's axis, die wholly in the surface. Lines crossing these show a concave surface.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

25 The propeller has three wings or blades and three distinguishing features.

Figure 1, is a perspective view. Fig. 2, is a plan (front view) showing the front or
30 outside surface of the blades. Fig. 3, is a plan (rear view) showing the inside surface of the blades. Fig. 4, top view (partly perspective) placed so as to bring one blade directly over the shaft. Fig. 5, top view
35 (partly perspective) one blade being taken off above the hub. Fig. 6, top view, one blade being cut off close to the hub, to show its lines of connection to the hub. Fig. 7,
40 section of blade on line A B, (Fig. 6,) showing the curve crosswise of the blade.

The projection of the blade from the hub is shown in each of the figures.

45 In each of the figures the letter P, represents the outside or convex surface of the blades.

R, represents the inside or face of the blades, which face coincides with straight lines drawn lengthwise of the blade, and parallel with the plane of the wheel's axis
50 and also with curved lines drawn crosswise of the blade.

W, represents the shaft or axis of the wheel, in each of the figures.

Y, represents the hub in each figure.

55 X, (Fig. 6) represents one blade (face side up) as removed or disconnected from

the hub; S T, lines showing the connection of the blade X to the hub; H C, (Fig. 3) central lines, between the points L, L, L, and parallel with the lines F G. D E, (Fig. 3) 60 straight lines, running lengthwise of the blade and lying wholly on the surface; F G, curved lines, running crosswise of the blade and lying wholly on the surface; N, N, N, starting points of the blades as they rise 65 from the hub; L, L, L, (Fig. 2) center of blades or points of greatest diameter.

The line from N to L or entering edge of the blade determines the form of the wheel. The rear edge of the blade from L (or point 70 of greatest diameter) returning to the rear end of the hub may be varied as desired without a departure from the principles of my invention.

My mode of constructing my wheel is as 75 follows:

The diameter of the wheel being given, I proceed to draft or construct a hollow half globe the diameter of whose great circle shall be the diameter of the wheel required. 80 I then divide this half globe on its great circle into three equal parts, as represented by the points L, L, L, Figs. 2 and 3. These points indicate the center of the blades on the line of greatest diameter. I then make 85 a lesser circle inclosing the pole of the half globe, the diameter of which shall be the diameter of the hub. This circle I also divide into three equal parts represented by the points N, N, N, Fig. 2, which points in- 90 dicate the starting points of the blades as they rise from the hub. The wheel (or the pattern for the wheel) is then so constructed as to fit in to this hollow half globe, that is to say, the front end of the hub occupies the 95 lesser circle and conforms to the sphericity of the area thereof. The outer line or entering edge of the blade is made to touch the surface of the hollow half globe, on a line drawn from the starting point N, on the 100 front end of the hub to the center of the blade or point L, whatever may be the width of the blade or its pitch, so that the wheel when revolving will describe the surface of a half globe (or nearly so). 105

The face or inside of the blade is made straight and concave, that is to say, lines (D E, Fig. 3,) drawn lengthwise of the blade and parallel with the plane of the wheel's axis, are straight and lie wholly on 110 the surface of the blade. Lines (F, G,) drawn crosswise of the blade are curved,

and lie wholly in the surface, and show the blade to be concave or curved in the direction crossing the straight lines. These straight and curved lines will be relatively
5 the same with respect to the face of the blade whatever may be the diameter of the wheel, or the length, width, pitch or lead of the blades.

If a wheel of greater diameter and like
10 pitch is required with a corresponding increased length of blade, then the diameter of the great circle of the hollow half globe into which it is to be fitted must be increased to the diameter required, and the rule of construction already given will apply. If the
15 diameter of the wheel to be constructed is to be increased without a corresponding increase in the length of the blade, then the diameter of the hollow half globe, to which
20 the wheel is to be conformed must be increased, so as to give the required diameter of wheel with the required length of blade on any given circle less than the great circle. The length, width and the pitch or
25 lead of the blades may be varied at pleasure in the construction of the wheel with-

out departing from the principles of construction herein set forth. Thus it will be seen that my propeller wheel has three distinguishing features, to wit: First, the
30 spherical or globe feature; second, the straight line feature with respect to the face of the blade; third, the curved line feature with respect to the face of the blade. These three features characterize the principles of
35 my invention and each feature is considered independent of the other.

A pattern being constructed according to the principles herein set forth, the propeller wheel may be molded, cast, fitted up and
40 used in the usual manner.

Having now fully described the nature of my invention and the principles upon which it is based, what I claim and desire to secure by Letters Patent, is—
45

A propeller blade constructed in such a manner as to embody said principles substantially as herein set forth.

GEORGE W. SWARTZ.

Witnesses:

E. B. FORBUSH,
F. C. WHITE.