A. W. Thompson.

Screw Propeller.

No. 7,907. Patented Jan. 21, 1851.

Fig. 1.

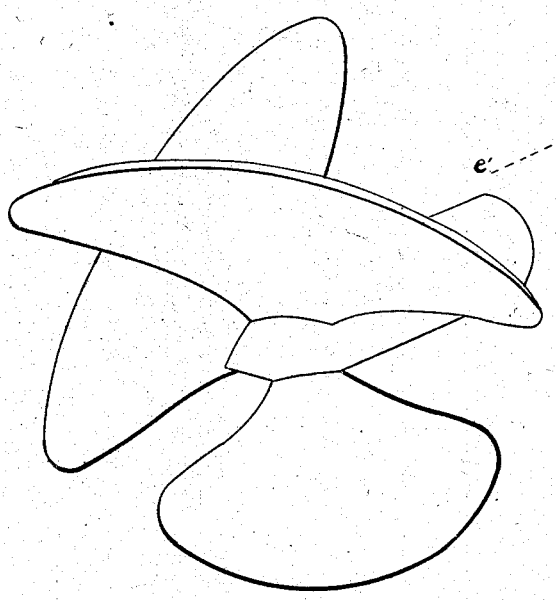

Fig. 2.

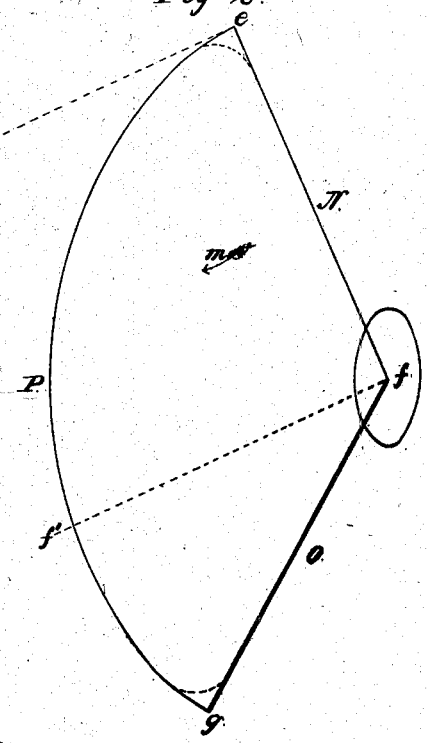

Fig. 3.

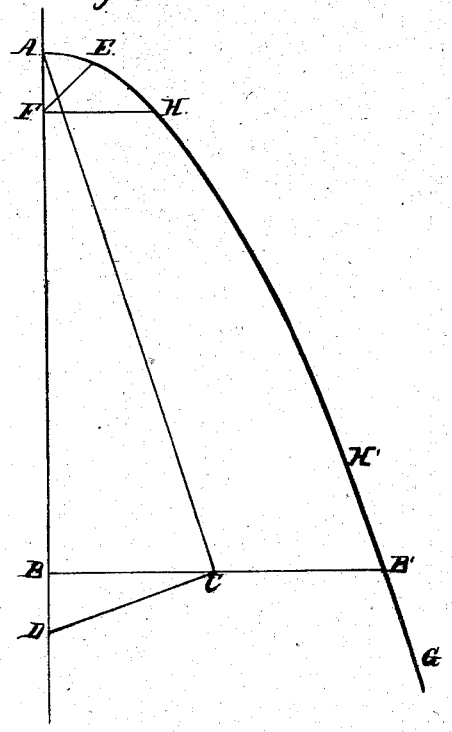

Fig. 4.

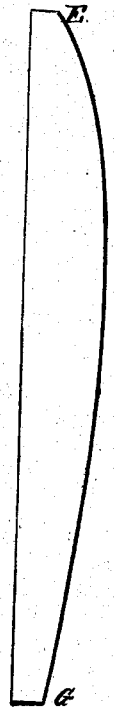

Fig. 5.

UNITED STATES PATENT OFFICE.

AMBROSE W. THOMPSON, OF PHILADELPHIA, PENNSYLVANIA.

PROPELLER.

Specification of Letters Patent No. 7,907, dated January 21, 1851.

To all whom it may concern:

Be it known that I, AMBROSE W. THOMPSON, of the city and county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Propellers for Ships; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view of the propeller. Fig. 2 is a plan of one of the wings. Fig. 3 is a diagram illustrative of the mode of construction and Figs. 4 and 5 are plans of templates herein after described.

Similar letters refer to similar parts throughout.

Screw propellers for vessels as generally constructed are defective in many respects, the chief of which is that they expend a large proportion of the power employed in driving them in imparting a useless lateral movement to the water.

The object of my invention is to increase the efficiency of these instruments by lessening this defect and it consists in constructing each blade of a propeller of such form that any section of it either parallel with or at right angles to the entering edge of the blade, shall be a parabolic curve whose peculiar form depends upon the pitch and diameter of the propeller and upon the number of blades with which it is fitted; so that when these three quantities are known the curvature of the blades can be determined by following out an invariable rule as herein after stated.

The general form of a propeller constructed upon my improved plan may be understood by supposing a cylinder equal in length and diameter with the propeller, to be divided by planes radiating from the axis into as many equal parts as there are blades in the propeller, and by supposing that the blades have the shape of so many partitions extending obliquely to the axis from the one extremity of one plane to the diagonally opposite extremity of the next succeeding one. The lines where the planes bound these oblique partitions will be the edges at which the blades enter and leave the water, and each of these partitions, or blades as we may now call them, will approximate in form to a triangular plate (viz 2) which is bounded by two equal straight sides N, O, and one curved side P. The vortex *f* of the two straight sides is the point where the blade touches the axis of the propeller and the lines N and O will be respectively the entering and leaving edges of the blade. If now we denote the pitch of each blade or its length in the line of the axis, by the letter *p*, the diameter of the propeller by *d*, and the number of blades by *n*, when these three quantities are given the peculiar curve to be given to the blades (whose general form is that of the above described partitions) may be found as follows: Draw a straight line A D, Fig. 3, at any point B, on this line and perpendicular to A, D, draw the line B, B′, equal in length to half the diameter of the propeller or d^2, from the point B set off on the line A D a point A at a distance from B equal to the pitch of the blades or *p*. The point A is the vertex of the parabola of which the line A D is the axis, the distance A B is the abscissa, and B B′, is the ordinate at the point B′. The focus of the parabola may be found in the usual manner by dividing the ordinate B B′ into two equal parts at C, draw the line A C, and C D perpendicular to A C. From A on the axis A D set off the distance A F, equal to B D; the point F will be the focus of a parabolic curve A B′ G which may be drawn in any of the usual methods.

When this curve has been obtained the next operation is to construct three curved templets. One Fig. 4 being convex and having so much of the parabolic curve as extends from the point E, where a line F E drawn at an angle of 45° to A D cuts the curve, to a point G at a distance from E equal to the extreme length *e g* of the propeller blade. The two other templets are to be concave as shown at Fig. 5 their length being rather greater than the extreme breadth of the blade and their curvature being so much of the parabolic curve as extends from the point H where the focal ordinate F H cuts the curve to a point H′ at a distance from H equal to the length of the templet. These templets being made, set the two concave ones at right angles to the entering edge *e f* of the blade, the end H of one being at the front point *e* of the blade and extending as shown by the line *e e′*, and the end H of the other at the vertex *f* of the two straight lines N, O, and extending as shown by the line *f f′* parallel to *e e′*. Then place the convex templet upon the concave ones at the entering edge

N, the point E of the templet being at the point *e* of the blade, and move the templet in the direction indicated by the arrow *m* over the concave edges of the two other templets, taking care to keep the plate always parallel to the line N and the point E in contact with the line *e e'*. The curve generated by thus moving the templet will be the curve required, as all sections of it made parallel with the entering edge N will have the form of the parabolic curve of the convex templet, while all sections taken perpendicular to the entering edge will have the form of the parabolic curve of the concave templets. The curved figure thus obtained is that of the acting face M of the propeller blades; the hinder face R is at such a distance from the acting face, that the thickness of metal between the two shall be sufficient to withstand the strain, and the edges of the blade should be thinned down to enable it to pass easily through the water. As the sharp extremities of the blades are of little use in the propulsion of the vessel I prefer to round them off as shown at Figs. 1 and 2.

Molds for casting propeller blades of this form may be formed in practice by embedding the concave templets in their proper relative positions in the molding sand or loam and by sweeping over them the convex templet in the manner above described. The edges of the blade may then be formed to the proper shape and the mold is completed by inverting upon these a curved cap of the curvature of the back of the blade which may be molded in any convenient manner. If it be deemed advisable the mold may be made from a pattern instead of by sweeping it to the proper shape; in which case the curves of the pattern must be determined by means of templets applied in a manner similar to that above described. The several blades which constitute a propeller may be cast separately or they may be cast in one piece with the hub. In this general description of molding the blades I have not deemed it necessary to mention in detail the form and construction of the flasks, the tempering of the sand or loam, the drying of the mold, and other points which are well known to the founder and are in daily practice, and which are not peculiar to the casting of my propeller.

What I claim as my invention and desire to secure by Letters Patent is—

A propeller constructed as herein described in such manner that any one of its blades in any line drawn either parallel or perpendicular to its entering edge shall have the curvature of a parabola produced as herein set forth.

A. W. THOMPSON.

Witnesses:
S. H. MAYNARD,
THOMAS H. WOOD.