C. C. Gates.
Screw Propeller.

Nº 51,446.

Patented Dec. 12, 1865.

Fig. 1.

Fig. 2.

Fig. 3.
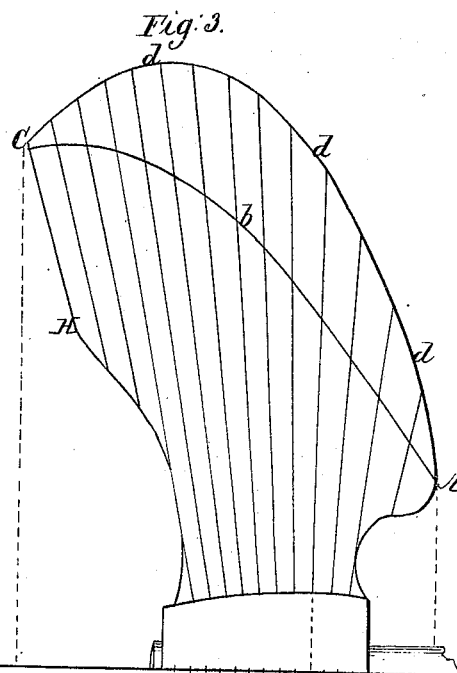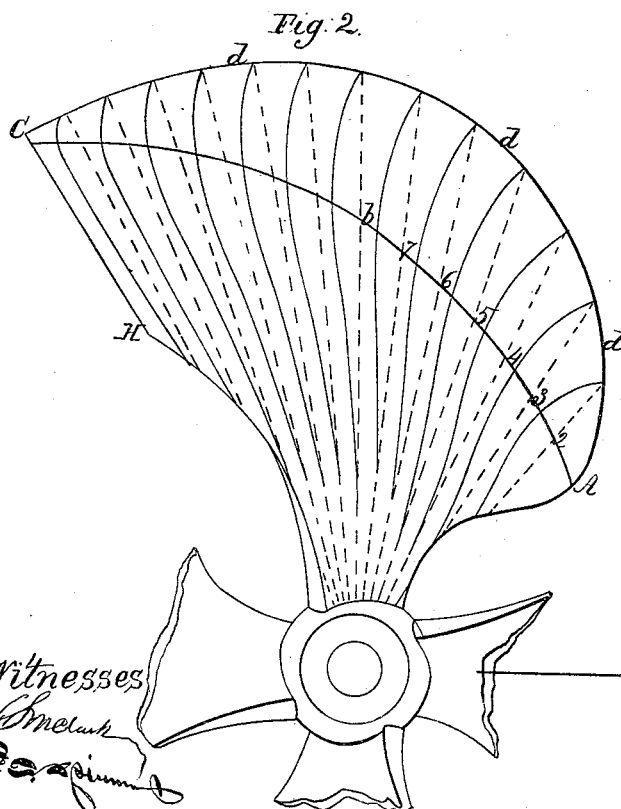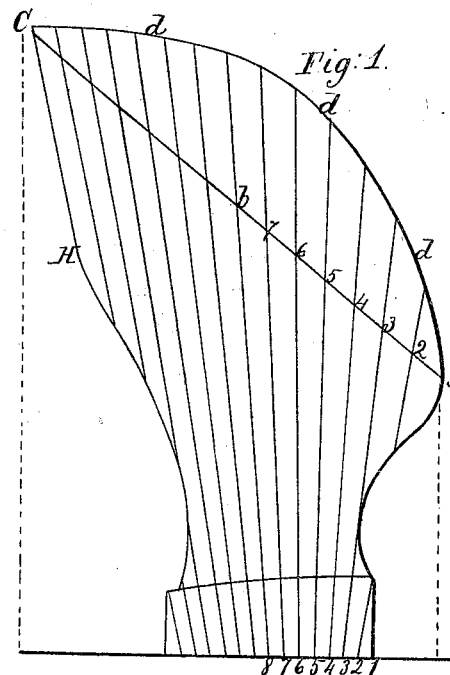
Witnesses

Inventor.
Charles C. Gates.

UNITED STATES PATENT OFFICE.

CHARLES C. GATES, OF ALBANY, NEW YORK.

IMPROVEMENT IN THE CONSTRUCTION OF SCREW-PROPELLER BLADES.

Specification forming part of Letters Patent No. **51,446**, dated December 12, 1865.

To all whom it may concern:

Be it known that I, CHARLES C. GATES, of the city and county of Albany, in the State of New York, have invented a new and improved method of Forming Propeller-Blades; and I do hereby declare the following to be a full and exact description of the same, reference being had to the annexed drawings, making a part of the specification, in which—

Figure 1 is the formula for the construction of the blades, and Fig. 2 a plan of the curves on the acting-surface of the blades, and Fig. 3, a perspective side elevation of one of the blades.

The nature of my invention relates to the manner of constructing propeller-blades, so as in their revolutions to give the water a centrifugal action on the blades' acting-surface, thereby receiving an increasing impetus, yet confining the water within the outer curve and finally throwing the water off directly aft, by means of curved lines as combined with the various angles of the staves with the line of shaft, said curved lines giving the form of each particular stave, they being of various widths, and also as to their various thicknesses and taper or wedging forms. The acting-surface of the blades (at the hub only) have the form of a helix or line of a screw, and at the outer curve, only, they lie in a plane, the area of the blades' surface conforming to the various curves and tapering thicknesses of the staves and their relative angles.

The following description will enable others skilled in the art to make and use my invention.

The blades are formed, as in the ordinary manner of construction, by gluing each stave together relatively to its curves and the required pitch or angle, Fig. 1 being a formula as it lies wholly in a plane, it being given for the purpose of showing the manner of producing the forms of staves, they each being of various lengths and thicknesses. The line of clearance being giving fore and aft, I then draw a straght line of the required angle with line of shaft and respectively to the wheel's dimensions to C, it being the extreme of the blade aft, as shown in Fig. 1. Then dividing said line equally into any given number of spaces, I also divide on the center line the hub's length, which is about half the wheel's cleavance (fore and aft) into the same given number of spaces, the hub being thrown forward for the purpose of throwing a majority of the staves at a greater angle aft with line of shaft. I then draw straight lines from the division points 1 2 3 4, &c., at the hub-center, through their respective divisions 1 2 3 4, &c., on line A *b* C to the outer curves, A *d* C, of blade, said curve being subject to alterations so as to conform with line A *b* C. Fig. 2 is to show the acting-surface of the blades, also showing the line A *b* C to be a curved one, and also equally divided with the same given number of spaces 1 2 3 4, &c., of formula, and with their respective radii equal with those of the formula. I then draw from the hub's center-radiating lines, as shown in red ink, through the division-points to the outer curve of blade; and then from the intersecting-points 1 2 3 4, &c., on the curved line A *b* C, I set back about two-thirds of each division for the purpose of forming curved lines, (said curves giving the form of each particular stave.) Then from the radiating lines at the outer curve, A *d* C, I draw concave lines, intersecting them at the two-third division of each space on line A *b* C, then receding until they gradually assume convex lines and tangenting the radiating lines from the hub center. The concavity or dishing-surface of the blade is produced by said curved lines and gradually flattening at an increased radius on line A *b* C until it conforms with a straight line at C. The lapping surface for gluing the staves together are relative to the required thickness for strength and the angle of blades. After the blades being formed I then cut away from A and H to the hub's surface several of the outer staves for the purpose of lessening the vacuum and drag on the back of the blades, the back of the blades then being chamfered to an edge to facilitate its passage through the water.

I am aware that lines of a plane have been used by others, also the increasing edges of blades, therefore, I do not claim, broadly and irrespective of construction, such devices; but

What I do claim, and desire to secure by Letters Patent, is—

The manner of forming the blades by their irregular curves and widths and unequal thicknesses of staves, as combined and arranged as specified, and for the purpose set forth.

CHARLES C. GATES.

Witnesses:
    S. M. CLARK,
    F. E. SPINNER.