(Model.)

H. HAUSSMANN.

MARINE PROPELLER.

No. 547,210. Patented Oct. 1, 1895.

Fig. 1.

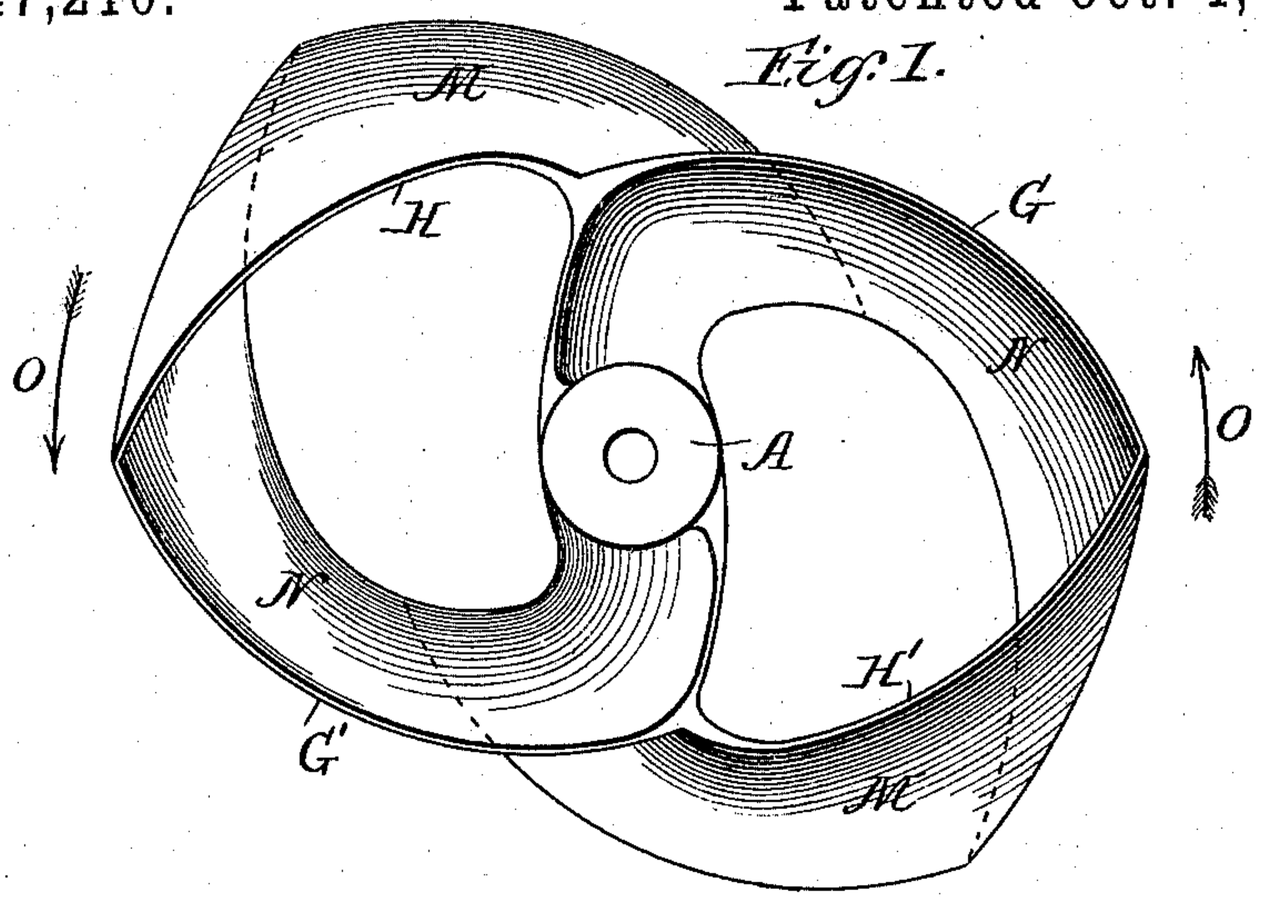


Fig. 2.

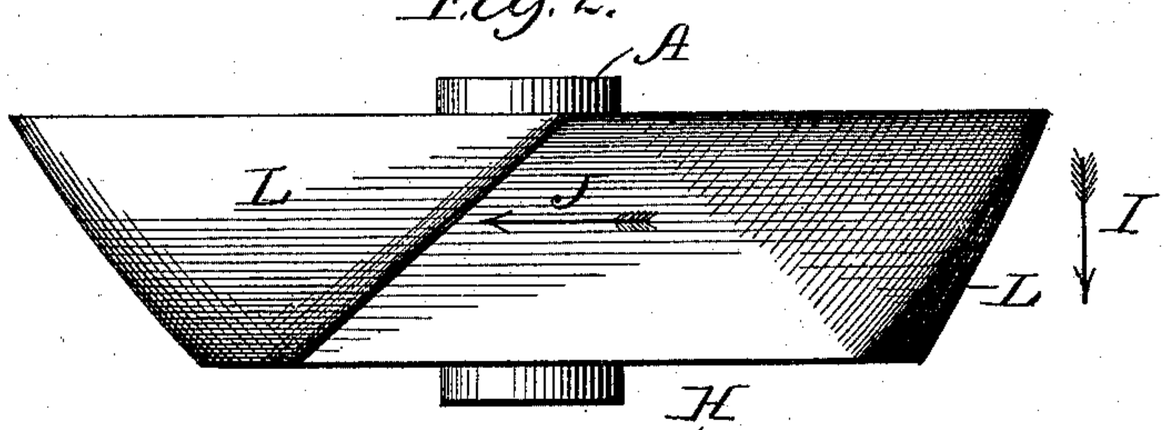


Fig. 3.

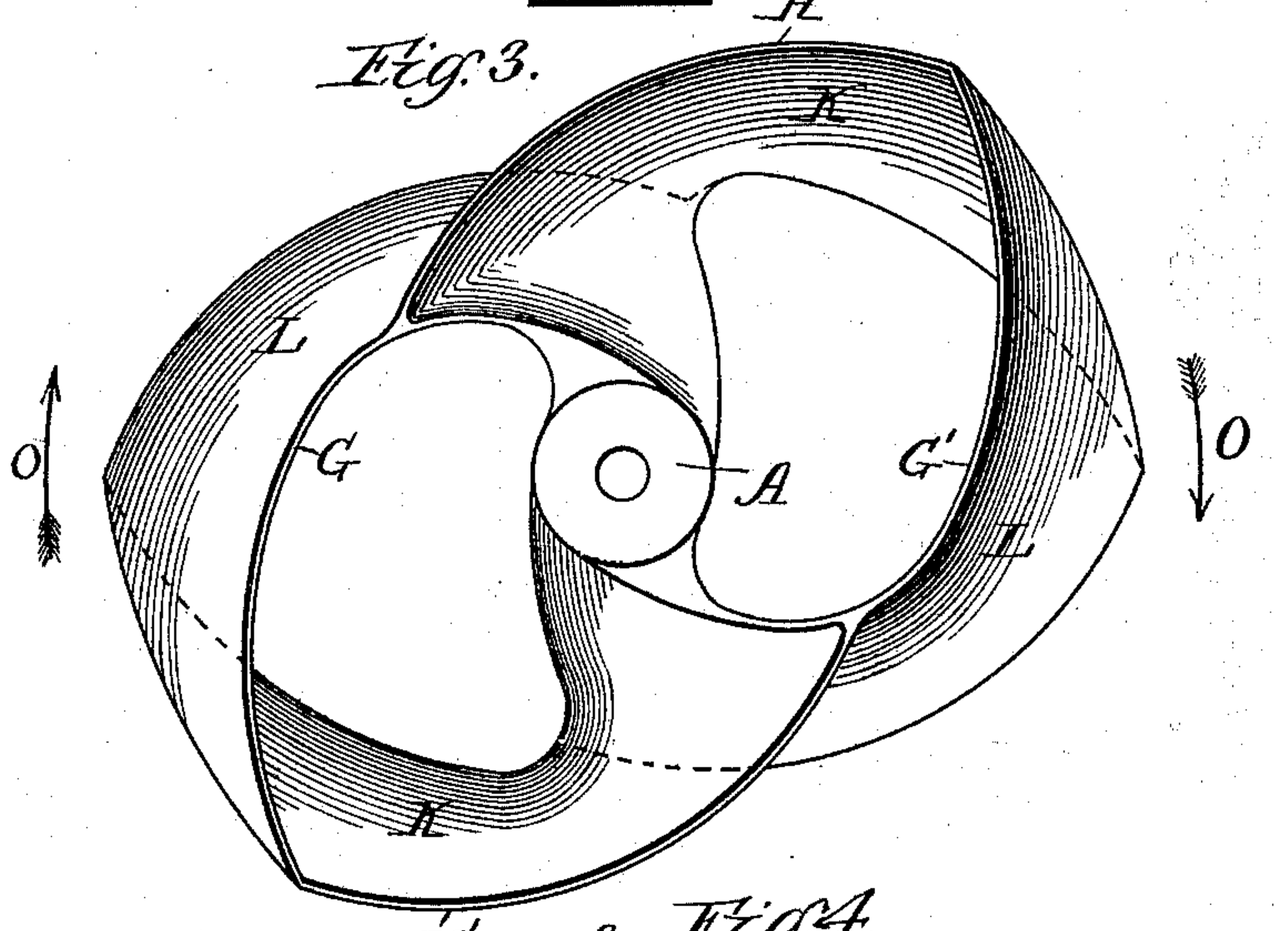
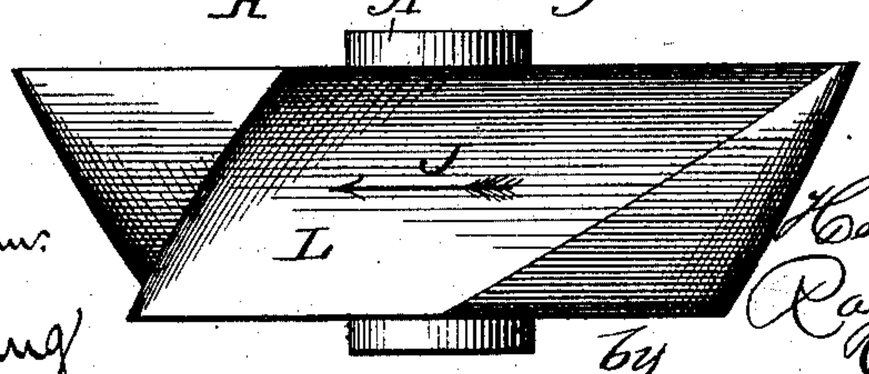


Fig. 4.



Witnesses.
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UNITED STATES PATENT OFFICE.

HERMANN HAUSSMANN, OF CHICAGO, ILLINOIS.

MARINE PROPELLER.

SPECIFICATION forming part of Letters Patent No. 547,210, dated October 1, 1895.

Application filed September 27, 1893. Serial No. 486,639. (Model.)

To all whom it may concern:

Be it known that I, HERMANN HAUSSMANN, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Marine Propellers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to improvements in that class of marine propellers known as "screw propellers," in which heretofore the propeller-blades have generally consisted of sections of a double, triple, or quadruple screw or conveyer radiating from a common hub, the many types thereof being now so common and well understood in the art as to require no further description beyond the bare statement that the nearest approach to my invention known to me is that class of screw propellers in which the blades are spirally disposed upon a cylindrical hub, and therefore radiate therefrom in varying planes intersecting the axis of the hub or the axis of rotation of the propeller at right angles thereto. The objections to these prior forms of screw propellers, arising from the slip and drag which necessarily accompany such construction, are also well understood in the art of marine engineering, and allowance is generally made for a loss of at least a third of the effective horse-power, which is offset by the slip and drag of the propeller; and yet a further and important objection to this class of propellers is the danger of fracture of the blades, which radiate unsupported from the center or hub of the propeller.

The prime object of this invention is to avoid the drag to which the prior form of propellers are subjected and at the same time to reduce the slip to the minimum, thereby securing the maximum efficiency in propelling force.

Another object is to avoid the danger of breaking or fracturing the screw-blades by having the propeller of such form that the blades afford mutual support to each other at their outer ends.

These objects are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a propeller embodying my invention; Fig. 2, a side elevation thereof; Fig. 3, a rear elevation of the same, and Fig. 4 a side elevation thereof in the position shown in Fig. 1.

Similar letters of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A indicates the hub, perforated longitudinally for reception of the shaft, or in any known and suitable manner arranged for the application of rotative power thereto. From this hub or center revolve the blades G, G′, H, and H′, each blade being the duplicate of the other, and there being any desired number of such blades revolving from the same hub. The plane of the surface of each blade G, G′, H, and H′ constantly changes from the tip or outer end thereof to the butt or point of its attachment to the hub, the planes preferably not intersecting the axis of the hub, although throughout the length thereof extending at a generally oblique angle to said axis, the angularity increasing from the tip or outer end to the butt of the blade. These blades, it will be observed, are in the form of involute spirals, evolving from the centers at opposite sides of the axis of the hub and at an angle thereto, and this distinctive feature of the blades, in the form of involute spirals at an angle to the axis of their support, I regard as the essential and novel feature of my invention.

A propeller provided with my involute spiral blades has nearly double the working area of the ordinary radial concentric spiral blades, and therefore a proportionate increase in efficiency for the same power expended, while the shape of the blades is such that practically all drag is avoided and the slip thereof reduced to the minimum. In this construction the involute spiral blades are arranged at an angle to the axis of the hub A, all evolving from the same hub, but cut away at their butts, as shown, so as to produce practically continuous surfaces. It will also be noted that the blades G and H are evolved from the same center, though at opposite angles to each other, while the blades G′ and H′ are also evolved from the same center, but at opposite angles to each other and at the opposite side of the axis from

the center of the blades G and H. As a result of this disposition of the blades the tip or point of the blade G intersects the tip or point of the blade H′, while the tip of the blade H intersects the point of the blade G′, and at these points of intersection the blades are united, either integrally or otherwise, so as to afford mutual support and thereby avoid the danger of fracture of the blades, to which those of the single-propeller type are subjected.

A propeller of this compound type operates exactly the same whether propelling a vessel ahead or astern, for, assuming the vessel to be moving in the direction indicated by the arrow I in Figs. 2 and 4 and the propellers to be rotating in the direction of the arrows J in said figures, the inner surfaces K of the blades H and H′ and the outer surfaces L of the blades G and G′ are the operating faces of the blades, while on reversing the propeller to send the vessel astern the outer faces M of the blades H and H′ and the inner faces N of the blades G and G′ will become the operating surfaces, the effect in both cases being the same. This will be better understood by assuming the curved arrows O in Figs. 1 and 3 to indicate the direction of rotation of the propeller when viewed from the front and rear, respectively, corresponding with the direction of rotation indicated by the arrows J in Figs. 2 and 4. Thus it will be seen that two of the blades are "pulling" and two "pushing" in either direction that the propeller may be revolving, and the propeller will therefore have practically as great efficiency in propelling the vessel astern as in propelling it ahead, the main difference in the efficiency being due to the advantage of the wake which follows the vessel in propelling ahead.

This compound propeller not only avoids practically all of the objections to the prior forms of propeller, but also possesses the advantages over the prior single form of propellers of the maximum strength and rigidity, avoiding all danger of breakage or fracture of the blades, giving greatly increased working area and consequently propelling force, besides working with practically equal efficiency in propelling a vessel either ahead or astern.

It will be observed that in the propeller hereinbefore described the blades are not only in the form of involute spirals, and therefore are not sections of a screw, but they are also straight in cross-section throughout their length, except, of course, at their edges, where the metal may be worked away to form a sharper edge, or where the blade may be slightly thickened at its center for additional strength, the purpose being to have the blade substantially straight in cross-section throughout the length thereof, so that the angularity or inclination of the blades with relation to either their individual axes or the axis of the propeller will gradually decrease from the points to the butts of the blades. None of the lines delineating the plane of the different parts of the propeller-blade radiate from the axis of the propeller, although they do radiate from their individual axes, but at constantly changing oblique angles thereto, all of such lines radiating from a single point, as would the lines delineating the surface of a cone radiate from the apex thereof.

Having described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A propeller, the blades of which are in the form of involute spirals arranged at angles to the axis of the propeller shaft and one half of said blades at angles reverse to the other, all of said blades being straight in cross-section, substantially as described.

2. A propeller, the blades of which are in the form of involute spirals, arranged at angles to the axis of the propeller shaft, and one-half of such blades being arranged at the reverse angle to the other half with their outer ends intersecting and united, all of said blades being straight in cross-section, substantially as described.

3. A propeller, the blades of which are in the form of involute spirals whose axes are parallel with, but eccentric to, the axis of the propeller shaft, one half of such blades being arranged at the reverse angle to the other half, with their outer ends intersecting and united, and all of said blades being straight in cross-section and decreasing in inclination or angularity, with relation to their respective axes, from their points of intersection to their butts substantially as described.

HERMANN HAUSSMANN.

Witnesses:
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