

(No Model.)

A. W. CASE.
SCREW PROPELLER.

No. 527,045.

Patented Oct. 9, 1894.

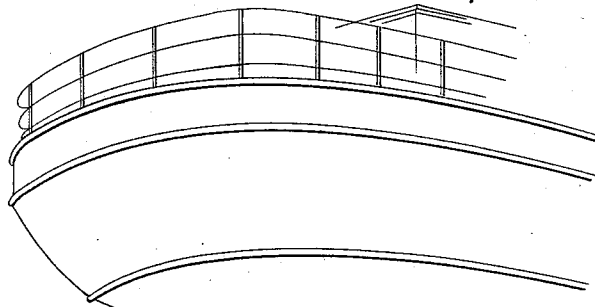


Fig. 1.

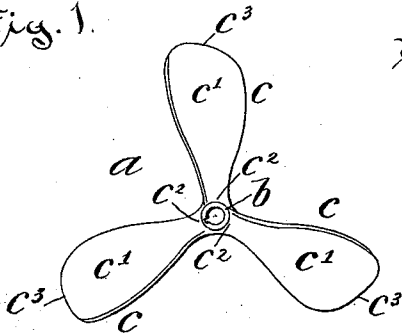


Fig. 2.

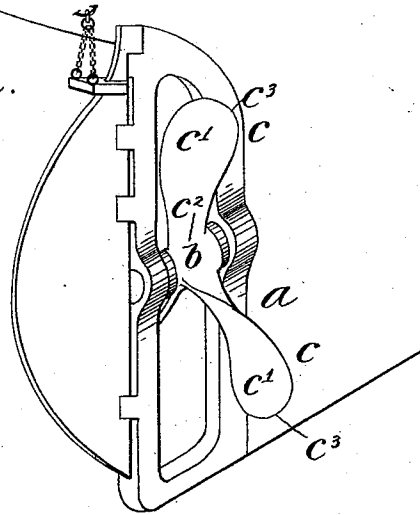


Fig. 3.

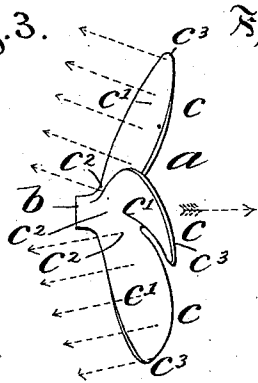
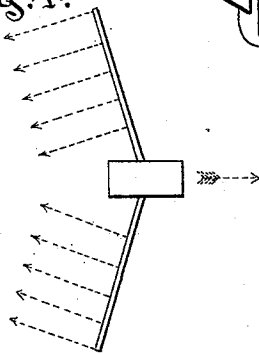


Fig. 4.



Witnesses:

Joseph Arthur Cantin.
Arthur B. Jenkins.

Invention:

Alfred Wells Case
by Chas. L. Burdett,
attorney.

UNITED STATES PATENT OFFICE.

ALFRED WELLS CASE, OF HIGHLAND PARK, CONNECTICUT.

SCREW-PROPELLER.

SPECIFICATION forming part of Letters Patent No. 527,045, dated October 9, 1894.

Application filed November 1, 1893. Serial No. 489,694. (No model.)

To all whom it may concern:

Be it known that I, ALFRED WELLS CASE, of Highland Park, in the county of Hartford and State of Connecticut, have invented certain
5 new and useful Improvements in Screw-Propellers, of which the following is a full, clear, and exact description, whereby any one skilled in the art can make and use the same.

My within invention relates more particularly to that form of screw propellers which forms the subject matter of United States Letters-Patent granted to me May 9, 1893, and numbered 496,857, said patent describing and covering broadly a genus or type new in
15 the peculiar form, location and disposition of the blades which causes the working surface to thrust outwardly as well as rearwardly against the water in which the screw turns. In my said prior patent the species of propeller which was selected to illustrate the idea
20 embodies an arm extending radially from the hub with a broadened working surface or fluke set at an angle with the arm, the blade considered as a whole (that is including arm and lobe) having a marked angle in the
25 length of the blade, that is the arm and the lobe are set at an angle with each other lengthwise.

My within invention is embodied in a species
30 of the wheel of my improved type, the blade being inclined forward as to substantially its whole length from the root of the blade at the hub to the outer extremity of the blade, so as to locate the blade as a whole from the hub
35 out with a working surface inclined forward at an angle with the axis of the shaft to which the screw is secured, and arranged to thrust outwardly as well as rearwardly against the water as the blades revolve in the rotation of
40 the shaft. A line produced backward from and normal to any part of the working surface of the blade would extend outwardly as well as rearwardly, and diverge from the line of the axis of the shaft.

Referring to the drawings: Figure 1 is a detail view in rear elevation of a propeller embodying my invention. Fig. 2 is a perspective view showing the screw propeller in position on the shaft of a ship. Fig. 3 is a
45 detail view in side elevation of my improved screw propeller; the dotted lines illustrating

the direction of thrust of the working surfaces. Fig. 4 is a diagram view illustrating the angular position of the blades of a propeller of the prior art and with dotted lines
55 indicating the inward direction of the thrust of the working surface of the blades of such propellers.

In the accompanying drawings the letter *a* denotes my improved propeller as a whole in
60 which a hub *b* is provided with a plural number of blades *c*, each extending radially from the hub and arranged at regular intervals about it. Each blade is provided with a working surface *c'* located as to its general
65 surface at an angle transversely of the axis of the shaft, or as it may be called on the pitch of a screw, meaning in this instance by the pitch the spiral plane developed by the revolution and forward movement of the blade
70 as a whole in the rotation of the shaft. Substantially the whole extent of this working surface from the root *c²* of the blade at the hub to the outer extremity *c³* is inclined forward, that is a line touching the center of the
75 blade at the hub and extending through the center of the width of the blade would be inclined forward toward the direction of movement of the axis of the screw propeller. This
80 working service of the blade is not necessarily flat, that is with all points of the surface contained in a plane, but the surface is so shaped and curved as to conform to a spiral plane, or to what is called a spiral pitch or an
85 expanding pitch, the surface being however flat as compared with the rounded back of the blade on which the metal is built out so as to provide for the necessary strength in the structure. It is an essential requirement
90 of my invention, however, that this working surface as a whole shall be so located, forwardly inclined with reference to the axis of the shaft or hub, that a line normal to this
95 working surface at any point will diverge from the axis *x-y* (indicated by dotted out-
lines in Figs. 3 and 4 of the drawings) when prolonged. As explained in my former patent my improved screw propeller in this regard differs from all propellers of the prior
100 art in that the result of the revolution of the screw when fixed to a shaft and in use as a propeller is to thrust outwardly as well as

rearwardly against the surrounding mass of water in which the screw is immersed.

It has been the aim in prior screw propellers to cause the water to be thrown directly to the rear or to cause it to be thrown inward substantially as indicated in the diagram view in Fig. 3 of the drawings in which the central line of the blade merely is illustrated. The thrust of the screw of the old art against the water is inwardly as well as rearwardly, the idea being that the water should be made to converge, whereas in a wheel embodying my improvement a directly contrary end is sought and obtained. It was formerly supposed that an outward thrust was objectionable and means have been employed, as flanges on the ends of blades, to prevent the outward slip of water.

In carrying my improved idea into effect no obstacle is offered to the outward flow of the water and the blade is purposely forwardly inclined at an angle with the axis of the shaft so as to obtain the outward as well as rearward thrust against the water in the operation of the screw.

It has been customary in making a screw propeller to provide each blade with a working surface which should conform as nearly as possible to that angular plane with reference to the axis of the shaft developed by the forward revolution and movement of the blade during one complete turn about the axis of the shaft. This general direction of spiral movement of the blade I have called the angle of the pitch and such working surface of the blade of the propeller of the old art is located on one side only of the blade, the other side being of such shape as resulted from the proper thickening of the blade as already described. Such a screw propeller is not usable if turned end for end and fixed upon the shaft for the reason that it would then be deprived of a suitable working surface no part of which could be properly and efficiently operative, but in my improved propeller screw the forwardly inclined blade has a special working surface, constructed as described, from which the water is thrust out-

wardly as well as rearwardly owing to the described forward inclination of the blade. 50

It is essential in the specific form of my invention herein described that the blades should be inclined substantially from the hub to the outer end of the blade while being located also on some selected angle of pitch, both these points of degree of forward inclination of the blade and angular location of its surface transversely of the axis of the shaft being matters that as to their exact degree are determined by the size of the wheel and of the character of use of the vessel on which the wheel is to be used, that is whether the ship is to be built for speed alone, or towing purposes. While the precise angle of forward inclination of the blade is not essential yet a considerable forward inclination substantially as much as fifteen degrees is desirable. 65

Another essential requirement of my invention is that the working surface of the blade shall be one developed by a substantially straight generatrix as distinguished from a working surface which is spherical and curved both lengthwise and crosswise of the blade. 75

I claim as my invention—

A screw propeller comprising a hub with projecting blades, each of which is a counterpart of the other in shape and in its position with relation to the axis of the hub and to its plane of revolution around the same, and which has its uninterrupted working surface described by a straight generatrix and extending without break from the hub to the outer end of the blade, said working surface being set on an angle across the axis of the hub, and also inclined forwardly from the hub to the outer end of the blade, whereby each blade operates to thrust outwardly as well as rearwardly when in motion, all substantially as described. 80 85 90

ALFRED WELLS CASE.

Witnesses:

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