June 23, 1925. 1,543,261

P. HICKMANN

PROPELLER

Filed June 4, 1924

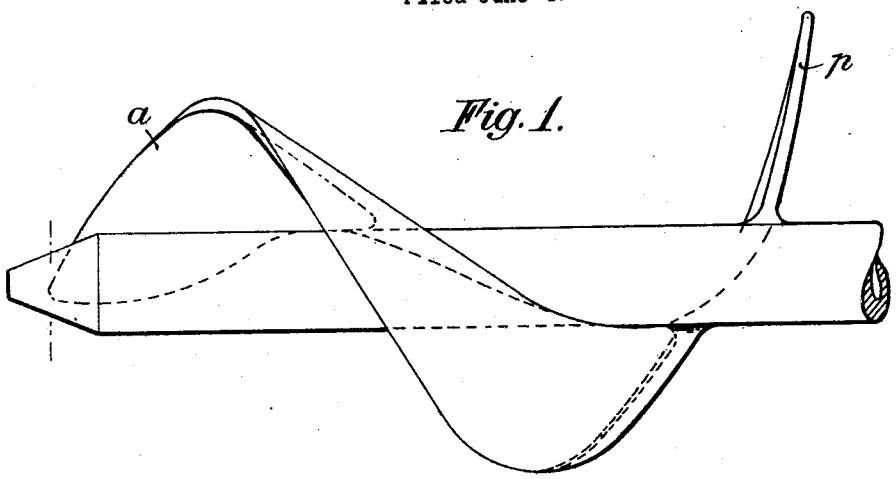


Fig. 1.

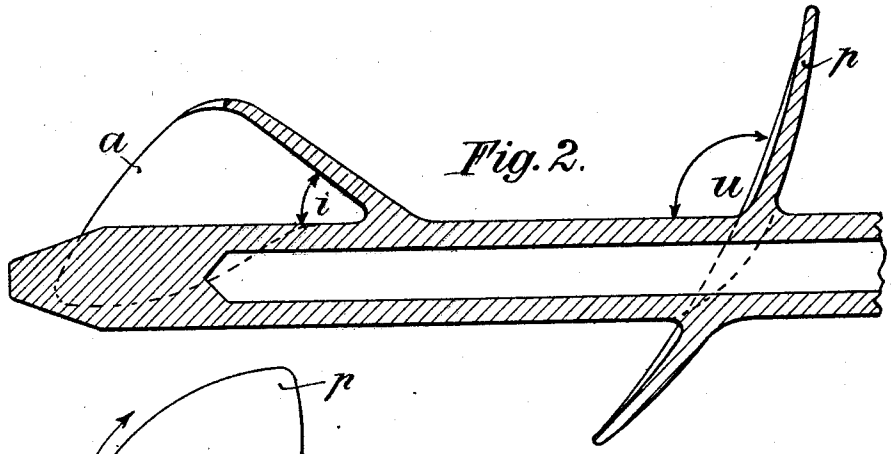


Fig. 2.

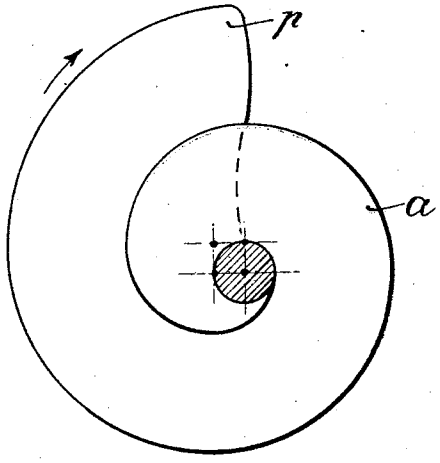


Fig. 3.

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UNITED STATES PATENT OFFICE.

PAUL HICKMANN, OF CHEMNITZ, GERMANY.

PROPELLER.

Application filed June 4, 1924. Serial No. 717,863.

To all whom it may concern:

Be it known that I, PAUL HICKMANN, merchant, a citizen of the Republic of Germany, residing at Chemnitz, Saxony, Germany, have invented certain new and useful Improvements in Propellers, of which the following is a specification.

My invention relates to an improved propeller particularly adapted for use in apparatus or vessels for aerial navigation or in vessels on the water.

The object of my invention is to provide an improved propelling screw of the stated type in which the propeller is constructed in a manner that the generatrix, at the inner end of the blade, lies approximately perpendicular to the axis of the shaft, while the same, towards the rear end thereof, adopts a gradually increasing inclination, so that the pitch correspondingly increases from the fore end towards the rear of the blade. In a preferred construction I shape the front end of the blade so that the generatrix will intersect the axis at an obtuse angle and the blade end will be inclined in the direction towards the front end of the shaft to afford an advantageous scooping action.

The development of the screw illustrated, by way of example, in the accompanying drawing forming part of my specification comes very near the original shape of the Archimedean spiral of which, according to my invention, approximately a single winding only is to be utilized and further windings are not required.

The size of the propelling screws depends upon the character and size of the vessel, the bulk of the vessel, the number of revolutions, the type of the motor—steam-turbine, piston steam engine, electro-motor, Diesel engine and the like—the power of the motor or, generally taken, the requirements of the case.

In the drawing showing a preferred embodiment of my invention Fig. 1 is an elevation or side view of the propelling screw with the shaft broken off at the right hand side; Fig. 2 is a longitudinal sectional view thereof and Fig. 3 is a development of the screw.

In the drawing the front end of the blade projects at an obtuse angle u from the shaft whereby an advantageous scooping action is ensured. In the progressive continuation of the blade towards the rear end of the shaft the obtuse angle gradually diminishes more and more so as to terminate in or become an acute angle i at the said end of the shaft. The spiral or helical form of the blade resulting from the described configuration produces, as trials in water have shown, an axially repelling action of a force gradually increasing towards the rear end of the shaft, whereas any expelling action in radial direction or a rolling of the water, as is usually experienced in propelling screws of ordinary construction, could not be observed in a noticeable degree.

This particular action of my improved propelling screw can also be ascertained by means of a small model constructed as shown in the drawing. By quickly turning such model manually in the air it will be found that an air current is produced which has a pronounced tendency of flowing in axial direction and exercising a repelling action in such direction. No whirling or rolling of the air in radial direction occurs in any perceptable degree.

The pressure produced by the screw and increasing gradually towards the rear end thereof acts upon the blade of the screw the centre of gravity of which, in case of a one winding construction, is not within the axis thereof when at rest, in a balancing manner during the working in water owing to the profitable and advantageous surface distribution.

Figure 3 illustrates an example of development and, as it were, the first developing stage of my improved propelling screw. The arrow in Figure 3 indicates the direction of revolution. The end p the generatrix of which projects from the axis of the shaft at an obtuse angle, is the frontal working end of the screw which, in case of a ship, acts, so to speak, to bite into the water in a scooping manner, and the end a is the rear extremity of the screw.

In contradistinction to the hitherto designed propelling screws for use in ships or the like my improved propeller provides a comparatively by far larger surface adapted to exercise a pressure sternwards against the water. Owing to the particular inclined position of the winding surfaces of the blade the fluid or element, such as water, in which the propeller works, is forced towards and along the shaft whereby the efficiency of the propeller is greatly enhanced as compared with the usual propellers which expel the water partially in

radial direction. Consequently for a given maximum efficiency my improved propeller requires but a considerably reduced diameter as compared with propellers of the type hitherto employed and having one or several blades.

My invention is not limited to a propeller having one blade only, but includes within its purview also propellers having a plurality of blades. In the latter case, however, all blades need not extend in full length, but, e. g., in case of a two blade propeller only one blade extends over the whole length whilst the other blade terminates, say, in the second third portion of the entire length of the screw. The reason why a construction of such delineation is preferable and advisable resides in the fact that a power consuming whirl structure on the shaft is avoided thereby.

While I have shown my invention embodied in a single construction, it is not to be inferred that such embodiment represents the only form in which my invention may be carried out practically but is illustrated and described only as illustrative of a form now preferred by me, and to make clear the principle and method of application of my invention. I, therefore, do not of course wish to be limited to the exact detail of the embodiment shown and described, since modifications, as also hereinbefore intimated, are no doubt possible which would still come within the scope of the invention.

What I claim is:—

1. A propelling screw having a blade of a diameter decreasing in length from the front to the rear end with its generatrix at the front end approximately perpendicular to the axis of the shaft and adopting a gradually increasing inclination towards the rear end thereof, whilst the pitch increases from the front end towards the rear end.

2. A propelling screw having a blade of a diameter decreasing in length from the front to the rear end with its generatrix at the front end forming an obtuse angle with the axis so that the front end of the blade is inclined in the direction towards the front end of the shaft, and adopting a gradually increasing inclination towards the rear end thereof, whilst the pitch increases from the front end towards the rear end.

In testimony whereof I affix my signature.

PAUL HICKMANN.

Witnesses:
KARL MARTENS,
CHARL. KERSCHKE.