No. 787,084. PATENTED APR. 11, 1905.

W. T. DONNELLY.

APPARATUS FOR THE PROPULSION OF SHIPS.

APPLICATION FILED JULY 8, 1904.

Fig. 1.

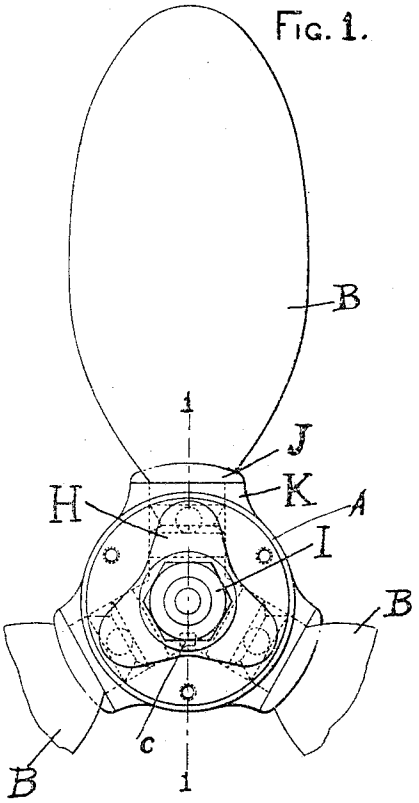


Fig. 2.

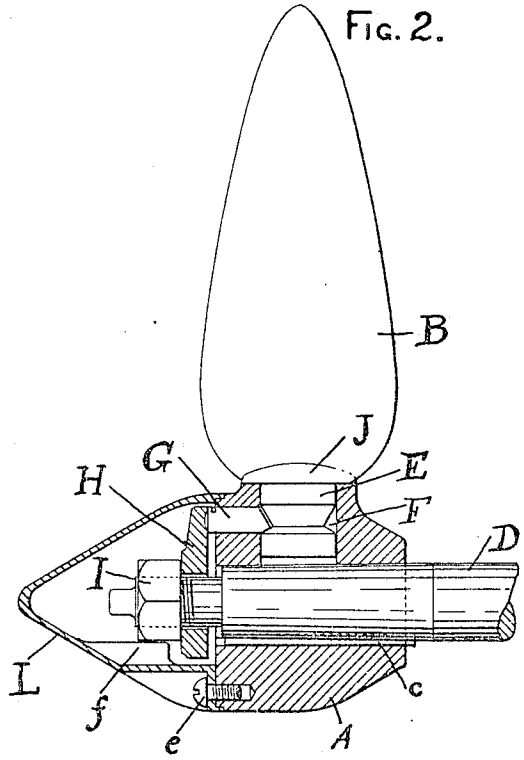


Fig. 3.

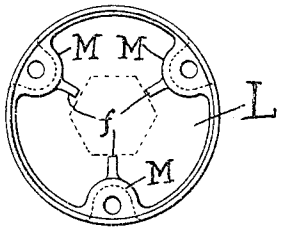


Fig. 4.

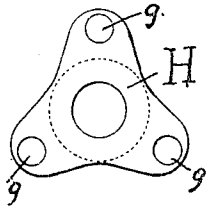


Fig. 5.



Fig. 6



Fig. 7.



WITNESSES:

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No. 787,084. Patented April 11, 1905.

UNITED STATES PATENT OFFICE.

WILLIAM T. DONNELLY, OF BROOKLYN, NEW YORK.

APPARATUS FOR THE PROPULSION OF SHIPS.

SPECIFICATION forming part of Letters Patent No. 787,084, dated April 11, 1905.

Application filed July 8, 1904. Serial No. 215,705.

To all whom it may concern:

Be it known that I, WILLIAM T. DONNELLY, a citizen of the United States of America, residing at Brooklyn, in the county of Kings, city of New York, and State of New York, have invented a certain new and useful Improvement in Apparatus for the Propulsion of Ships, of which the following is a specification.

My invention relates to that class of propellers in which the blades or arms of the propeller are made separate from the hub, so that the pitch of the propeller may be changed to better adapt it to the work to be done; and my invention specifically relates to certain new and useful improvements in the manner of making and securing the blades to the hub, and of interlocking and protecting the various parts.

I am aware that it is not new to provide propellers with adjustable blades, as most large vessels are now so provided, but the methods of construction which answer for very large sizes of propellers are not suitable or practicable for smaller ones; and it is my particular object to provide a practicable method of adjustable-blade construction for the propellers of small high-speed boats.

It is also part of my object to provide means not only of changing the pitch of the propeller, but also to make it possible to substitute longer or wider blades quickly and readily after a propeller has been attached to the boat.

In the accompanying drawings, Figure 1 is a rear view of the propeller with the cap removed and with two of the blades broken away. Fig. 2 is a sectional view of the hub and cap on the line 1 1, Fig. 1. Fig. 3 is a view of the cap, showing the inside with the tail-nut indicated by dotted lines. Fig. 4 is a face view of the star-washer. Fig. 5 is a side elevation of the same, partly in section. Figs. 6 and 7 are detail views of one of the pins used to secure the arms or blades.

Similar letters of reference designate corresponding parts throughout the several views of the drawings.

Referring to Fig. 1, A represents the hub of the propeller, B B B the blades, and C the shaft.

Referring to Figs. 1 and 2, the hub A is mounted upon the shaft D in the usual way and prevented from revolving by the key *c*. This shaft is made taper, as shown, or may be provided with a shoulder against which the hub is forced. The blades B are furnished with a pin or round shank E, which enters a corresponding hole in the hub. This shank is provided with an annular notch or groove F, adapted to be engaged by the pin G, which enters the hub from the rear. This pin is acted upon by the star-washer H, which has as many arms as there are blades to the propeller, (in this case three.) The washer is in turn acted upon by the tail-nut I, which is of the usual construction. The result is that the strain of the nut drawing the shaft through the hub reacts through the washer H to the pins G, is transferred by them to the pin E of the blade B, where, due to the formation of the point of the pin, which will be more fully explained hereinafter, it prevents the blade from revolving and at the same time draws it down firmly into its socket, bringing the cap J firmly down against the boss K. After these parts are in place and firmly secured by the nut I the cap L is put on. This cap is secured by the screws *e*, Fig. 2, which alternate around the hub with the pins G. The bosses M, Fig. 3, project inwardly between the arms of the star-washer H. These bosses are provided on the side toward the center with the projection *f*, Figs. 2 and 3, which when the cap is secured in place will lock the nut I and prevent it from turning, as indicated by the dotted lines, Fig. 3.

Figs. 4 and 5 show detail views of the washer H. On each arm of this washer, on the side which comes in contact with the pins G, there is a depression *g*, which corresponds to the rounded head of the pins G and serves when the washer is in place to prevent its rotation.

Figs. 6 and 7 are enlarged views of the pin G. This pin has its entering end at *h* where it comes in contact with the pin E cut away to form an acute or wedging angle with its

line of advance, so that when it is forced into place by the combined action of the parts it acts powerfully upon the part of the pin E with which it comes in contact to draw the blade down into its socket and to bring the cap J firmly against the boss K. The part *k* of the pin G is cut away, as indicated by the dotted lines, so that it will not come in contact with the pin E.

When it is necessary to change the pitch of the propeller after it has been attached to a boat, the cap L is removed and the tail-nut I is loosened, when the blades may be revolved in their sockets to increase or diminish the pitch and then secured in their place by setting up upon the tail-nut I and replacing the cap.

I have shown my invention as applied to a propeller of three blades; but it is of course obvious that the principle and construction applies equally to propellers of any number of blades.

What I claim as new is—

1. A propelling device for ships comprising a rotatable shaft, a hub provided with sockets for blades mounted thereon, detachable blades mounted in said sockets, locking-pins adapted to secure said blades, and means for forcing the propeller axially upon the shaft that acts through pressure upon the locking-pins.

2. A propelling device for ships comprising a rotatable shaft, a hub provided with sockets for blades mounted thereon, detachable blades mounted in said sockets, locking-pins adapted to secure said blades, a washer mounted upon the propeller-shaft, and means for forcing the propeller axially upon the shaft, which acts through pressure upon the washer, and locking-pins to secure the blades in their sockets.

3. A propelling device for ships comprising a rotatable shaft, a hub provided with sockets for blades mounted thereon, detachable blades mounted in said sockets, locking-pins adapted to secure said blades, a washer mounted upon the propeller-shaft, and a tail-nut adapted to force the several parts axially along the shaft and secure them in relative position.

4. A propelling device for ships comprising a rotatable shaft, a hub provided with sockets for blades mounted thereon, detachable blades mounted in said sockets, locking-pins adapted to secure said blades, a washer mounted upon the propeller-shaft, a tail-nut acting to force all parts axially along the propeller-shaft, and a cap or shield covering the tail-nut, secured to the hub and provided internally with projections which prevent the turning of the tail-nut while the cap is in place.

5. In a propelling device for ships, a hub, axially-adjustable blades mounted in said hub and having notches, and locking-pins mounted in said hub their inner ends engaging the notches in said blades, and adapted to force the propeller axially upon the shaft.

6. In a propelling device for ships, a shaft, a hub mounted on said shaft, a tail-nut on said shaft and a cap for said hub provided with projections for engaging and locking said tail-nut.

7. A propelling device for ships comprising a rotatable shaft, a hub provided with sockets for blades mounted thereon, detachable axially-adjustable blades mounted in said sockets, locking-pins, a tail-nut forcing the propeller axially upon the shaft, and means for securing the blades in their sockets by the axial thrust of the tail-nut along the shaft which presses the locking-pins inward.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 6th day of July, 1904.

WILLIAM T. DONNELLY.

Witnesses:
CHARLES W. THOMAS,
RAENS N. YUDIZKY.