(No Model.)

P. A. N. WINAND.

SCREW PROPELLER.

No. 606,322. Patented June 28, 1898.

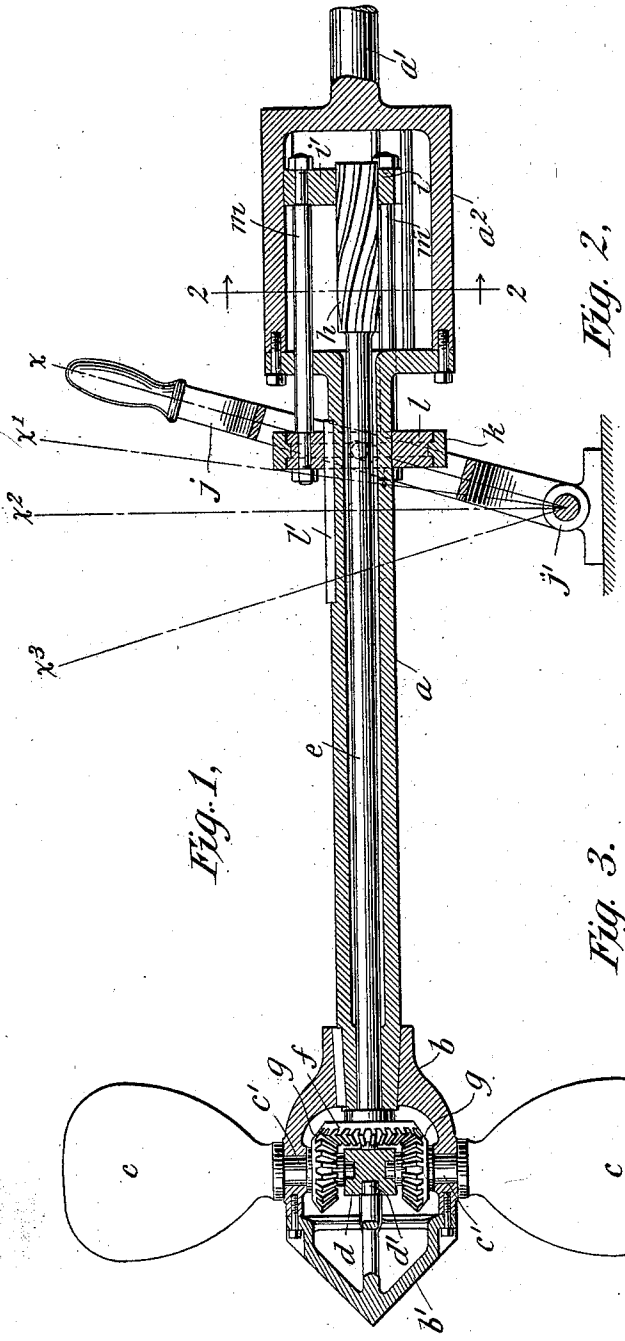


Fig. 1.

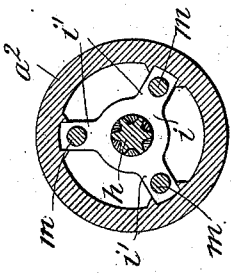


Fig. 2.

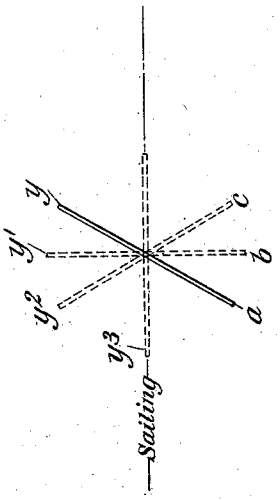


Fig. 3.

WITNESSES:

C. E. Ashley

H. W. Lloyd

INVENTOR:

Paul A. N. Winand

By his Attorneys

Baldwin, Davidson & Wright

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

PAUL A. N. WINAND, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE OTTO GAS ENGINE WORKS, OF SAME PLACE.

SCREW-PROPELLER.

SPECIFICATION forming part of Letters Patent No. 606,322, dated June 28, 1898.

Application filed January 13, 1896. Serial No. 575,364. (No model.)

To all whom it may concern:

Be it known that I, PAUL A. N. WINAND, a subject of the King of Belgium, and a resident of the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Screw-Propellers, of which the following is a specification.

My invention relates to adjustable screw-propellers of that class in which the blades are adapted to be set in different angular positions, and comprises such a construction and arrangement of the various parts and of the controlling device that the blades can be turned on axes passing through their centers over an arc of more than one-quarter of a circle, whereby the propeller may be adjusted without stopping and changing the direction of motion of the motor or engine, with the leading edges of the blades in angular positions on one side of a plane at right angles to the axis of the propeller-shaft to drive the vessel ahead at various speeds, with the blades set in the right-angular plane to stop propulsion, and with the leading edges of the blades on the other side of the right-angular plane to drive the vessel astern. The blades may also be set in planes parallel to or cutting the axis of the shaft, so as to offer a minimum resistance in the water when other power, as sail-power, is used to propel the vessel.

My improved organization comprises a hollow main shaft, a hollow propeller-hub secured thereto, blades mounted on the hub by radially-arranged journals, a shaft in the hollow main shaft, connecting devices between the end of the interior shaft and the inner ends of the journals of the blades, and a controlling device for rotating the internal shaft relatively to the hollow main shaft. I may employ bevel-gears to connect the end of the interior shaft and the inner ends of the journals of the blades, and I may effect the actuation of the interior shaft by a quick-pitch screw on the end thereof, having a nut thereon non-rotatable relatively to the hollow main shaft and contained in a hollow enlargement of the main shaft, and a lever connected to the nut for moving it longitudinally over the screw on the interior shaft. By such an organization full and speedy control can be had over screw-propelled vessels, and this too, if desired, by the pilot or steersman, as the operating-lever may readily be arranged within reach of the pilot or placed under his control.

To describe my invention more particularly, I will refer to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a longitudinal sectional view of my improved screw-propeller mechanism shown applied to a two-bladed screw-propeller. Fig. 2 is a transverse section on the line 2 2, Fig. 1; and Fig. 3 is a diagram showing the different positions in which the propeller-blades may be set.

The rear part of the main shaft a is hollow and may be connected to the solid part a', that extends from the motor or engine, through the medium of the hollow cylindrical chamber a^2, said chamber being shown as integral with the solid part of the shaft and the hollow part attached thereto by a flanged head formed on its end.

To the outer end of the shaft a is rigidly secured, by a key or otherwise, the hollow propeller-hub b, provided with a cap b', secured thereto by screws or bolts. In the sides of the hub b are formed bearings in which are fitted the journals c' c' of the blades c c, the inner ends of these journals being seated in a block d, held on a pin or stud d', which projects from spider-arms in the cap b' of the hub. The seating of the ends of the journals of the blades in this block extends the bearings of the blades, insures their free working, and adds stability and strength to the structure.

In the hollow shaft a is located the shaft e, fitted to rotate in the rear end of the hollow shaft and provided at its end which projects in the hollow hub b with the bevel-wheel f, which meshes into the bevel-pinions g g, secured to the journals of the blades c c. The other end of this shaft e extends into the hollow chamber a^2 of the main shaft and is provided with or has formed on it the quick-pitch screw h, and on this screw is fitted the winged nut i, the wings i' i' of which slide in longitudinal grooves formed in the chamber a^2. This nut is therefore caused to rotate with the shaft a, but is free to be moved longitudinally in relation thereto, and by its longitudinal movement it imparts a rotary movement to the shaft e, and consequently an angular movement to the blades c c through the medium of the bevel-gears f and g g. The

shaft *e* has no end play in the main shaft, such movement being prevented by the hub of the bevel-wheel *f* bearing against the end of the shaft *a* and the end of the shaft *e* bearing against the block *d*.

Longitudinal movement is imparted to the nut *i* from the lever *j*, which is pivoted at *j'* in a bracket or block suitably secured in the desired position through the medium of the ring *k*, connected to the lever *j* by diametrically opposite trunnions, the sleeve *l* inside the ring, connected thereto as regards longitudinal movement by a groove and flange and fitted to slide on the shaft *a* and caused to rotate therewith by the spline *l'*, and the rods *m m*, passing through holes in the flange-head of the shaft *a* and secured by nuts to the sleeve *l* and the wings of the nut *i*.

It will be apparent that when the lever *j* is moved into different positions the blades *c c* of the propeller will be set in different angular positions, and when the lever occupies the position *x* shown in the drawings—that is, in the position for the vessel to be driven ahead—the upper propeller-blade will be set as indicated by the full lines *y*, Fig. 3. When it is desired to stop the action of the propeller in the water, the lever *j* is moved into the position *x'* and the blades are set in a plane at right angles to the axis of rotation of the propeller, as indicated by the dotted lines *y'*, Fig. 3. To reverse the action of the propeller to drive the vessel astern, the lever *j* is moved to x^2, thus setting the upper blade as indicated by the dotted lines y^2. It will of course be understood that the blades may be set and held in any angular position relative to the right-angular plane to vary the propulsive power of the propeller. When it is desired to set the blades to offer the least resistance to the water—that is, when other power than the propeller is used to propel the vessel—the lever *j* is moved into position x^3 and the blades set fore and aft, as indicated by the dotted lines y^3.

It will be observed from the construction and arrangement of the various parts here shown that while full control with a continuously-running motor will he had over the vessel all the parts will perform their functions freely and without interference, the main shaft can be fitted in its bearings as ordinarily and no extra strains applied to them, the blade-changing and controlling devices are inclosed and fully protected and no resistances are offered to the action except what is due to the proper performance of their functions, and that all the parts are simple, strong, and not liable to derangement.

I claim as my invention—

1. In an adjustable propeller, the combination of the rotary propeller-driving shaft, consisting of a hollow portion *a*, and a second portion *a'* connected therewith outside of the circumference of the hollow portion of the shaft, whereby a chamber or space of greater diameter than the hollow shaft is provided between the two portions of the shaft, a propeller-hub carried by the hollow portion of the shaft, propeller-blades mounted in the hub by radially-arranged journals, an adjusting-shaft located within the hollow shaft and rotating therewith, but capable of independent rotary adjustment, motion-communicating means between the end of the adjusting-shaft and the propeller-blades, mechanism located in the space between the two portions of the propeller-driving shaft, operatively connected with the adjusting-shaft and rotating with both shafts, and a shaft-adjusting device stationary with reference to the rotation of said shafts and operatively connected with said mechanism by a loose or sliding connection, whereby the pitch of the blades may be changed while they are being revolved.

2. In an adjustable propeller, the combination of the rotary propeller-driving shaft, consisting of a hollow portion *a*, and a second portion *a'* connected therewith outside of the circumference of the hollow portion of the shaft, whereby a chamber or space of greater diameter than the hollow shaft is provided between the two portions of the shaft, a propeller-hub carried by the hollow portion of the shaft, propeller-blades mounted in the hub by radially-arranged journals, an adjusting-shaft located within the hollow shaft and rotating therewith, but capable of independent rotary adjustment, motion-communicating means between the end of the adjusting-shaft and the propeller-blades, mechanism located in the space between the two portions of the propeller-driving shaft, operatively connected with the adjusting-shaft and rotating with both shafts, a ring connected with said mechanism sliding in the hollow portion of the shaft and rotating therewith, a device or lever stationary with reference to the rotation of both shafts and connected with said ring to slide it in the hollow portion of the shaft to effect the adjustment of the pitch of the blades while they are being revolved.

3. In an adjustable propeller, the combination of a hollow shaft having an enlarged chamber, a shaft in the hollow shaft held against end play but free to rotate therein, a quick-pitch screw on the end of this shaft, a nut fitted on this screw and held in the chamber so as to be movable only longitudinally therein, an operating-lever, a sleeve fitted to slide on the hollow shaft, a trunnioned ring connecting the sleeve and the lever, rods extending from the sleeve through the end or head of the chamber to the quick-pitch nut, and an adjustable screw-propeller on the end of the hollow shaft and controlled and adjusted by the internal shaft.

In testimony whereof I have hereunto subscribed my name.

PAUL A. N. WINAND.

Witnesses:
R. S. REED,
ISAIAH MATTACK.