Oct. 7, 1941. H. A. WITTEMAN 2,258,399

PROPELLER STERN BEARING

Filed May 10, 1940 2 Sheets-Sheet 1

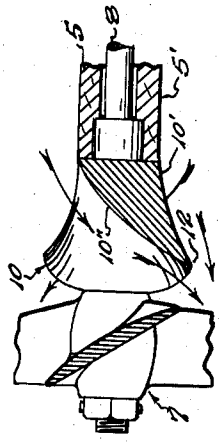


Fig. 3.

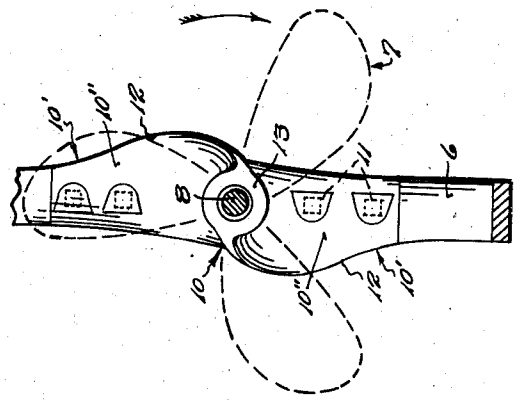


Fig. 2.

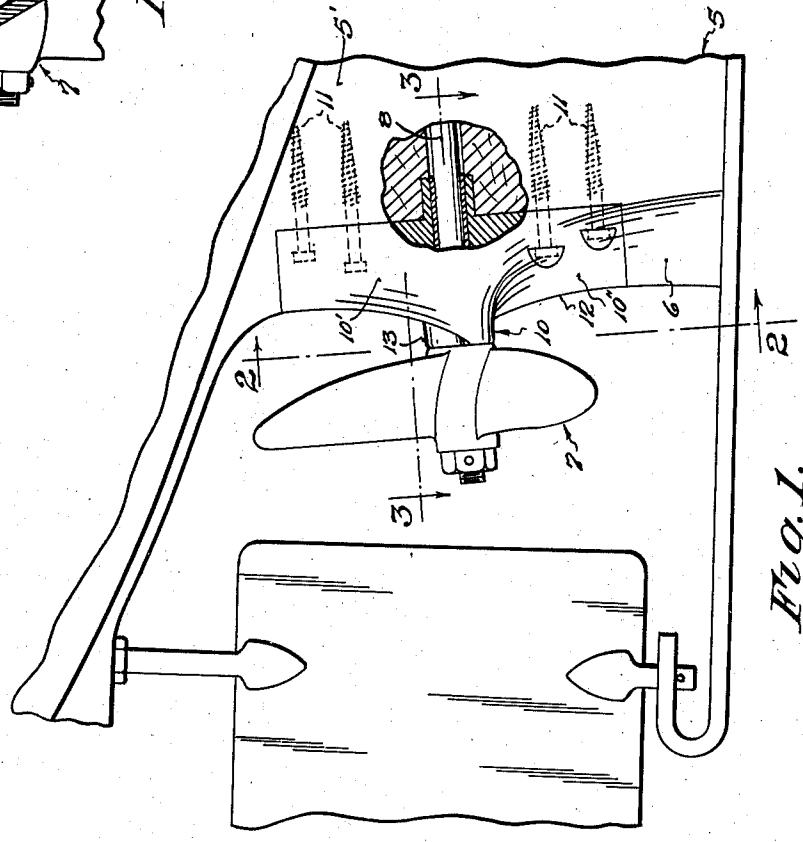


Fig. 1.

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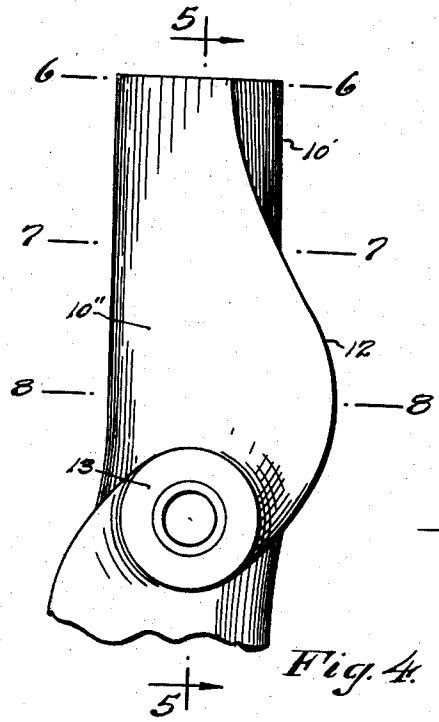


Fig. 4.

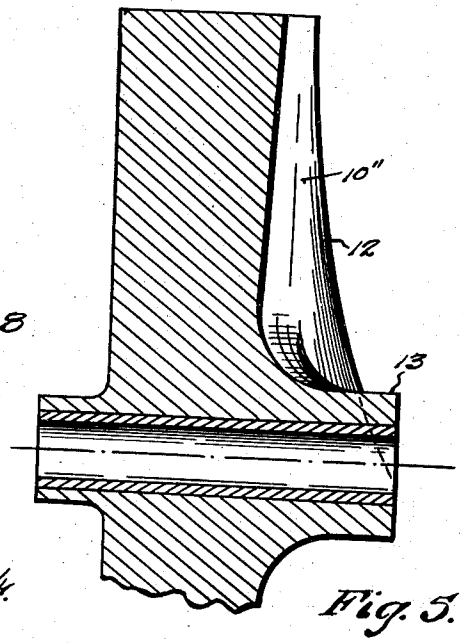


Fig. 5.

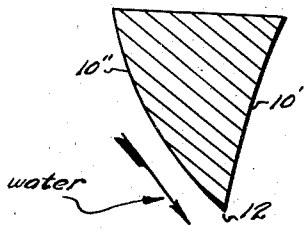


Fig. 6.

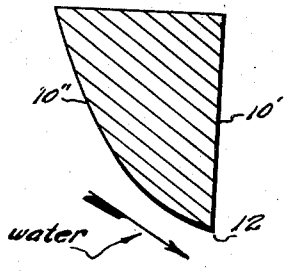


Fig. 7.

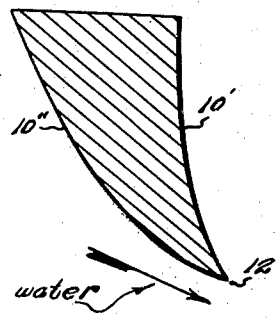


Fig. 8.

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UNITED STATES PATENT OFFICE

2,258,399

PROPELLER STERN BEARING

Harvey A. Witteman, Seattle, Wash.

Application May 10, 1940, Serial No. 334,310

6 Claims. (Cl. 115—34)

This invention relates to propeller stern bearings, and has for its object to provide a stern bearing for the propeller of a marine vessel so engineered as to materially reduce the dead water which ordinarily obtains to the immediate rear of the stern post, and in fact to provide a stern bearing which operates as a directrix in that it initiates a spiral flow of the water column into the driving faces of the propeller blades. Otherwise and more generally stated, the object of my invention is to reduce to a minimum the percentage of slip, thereby materially increasing the propulsion efficiency of the wheel, by maintaining a solid condition of the water which the wheel acts upon.

The invention essentially consists in a stern bearing, either independently of or in complement with a stern post or a strut, produced in the manner of a two-bladed stationary screw having the blade pitch reversely disposed to the pitch of the propeller used therewith, these stationary blades more or less following the contour of a propeller blade and replacing the normal deadwood or skeg.

The invention more particularly consists in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the drawings:

Figure 1 is a fragmentary side elevational view with parts broken away and shown in section and illustrating the stern of a vessel equipped with a bearing constructed in accord with the preferred embodiment of the present invention.

Fig. 2 is a transverse vertical section on line 2—2 of Fig. 1.

Fig. 3 is a horizontal section on broken line 3—3 of Fig. 2 and representing, by arrows, the directed course of the water column acted upon by the propeller, each of such views 1 through 3 being more or less general only and serving primarily simply as an indication of the manner of the invention's application in relation to the propeller with which the same is used.

Fig. 4 is a fragmentary rear end elevation to an enlarged scale detailing the bearing.

Fig. 5 is a longitudinal vertical section on line 5—5 of Fig. 4 to indicate, principally, the manner in which the frontal face of the bearing is caused to belly in or, otherwise stated, develop a "rake" on its vertical median line; and

Figs. 6, 7 and 8 are horizontal sections taken on the respective lines 6—6, 7—7 and 8—8 of Fig. 4 and showing, through a comparison of the mean directional flow of the water column over the frontal face of the bearing, the manner in which the bearing acts to direct the water into the propeller at substantial right angles to the twisted plane of the latter, namely at substantial right angles to a plane which is relatively flattened in terms of the transversal at the tips of the propeller blades and is given a twist approaching the longitudinal or keel line of the vessel at the hub ends of the blades.

In said drawings, the numeral 5 denotes the keel, 6 the stern post, 7 the propeller, and 8 the shaft of a conventional motor-powered vessel. 10 designates the stern bearing through which the shaft is journaled and which in effect forms a part of the stern post, said bearing being secured in position by lag screws 11.

It may be here again stated that my stern bearing, in effect, is produced to the general shape of a two-bladed propeller screw characterized, principally, in that the pitch of the blade-forming surfaces is reversely disposed to the pitch of the propeller used therewith, in other words a left-hand helix of the one in association with a right-hand helix of the other. The intended end is that of promoting a directed flow of the water column into the blades of the propeller in a solid rather than the normally broken form with an elimination of the air pockets which primarily are responsible for pulsation or vibration through the drive shaft. In accomplishing this end I feather the rear edge 12 of the bearing, which is to say that portion thereof exposed beyond the hub 13, and produce this feather edge as can be best seen from an inspection of Fig. 2 such that, in end elevation the same above and below the horizontal center line of the bearing is definitive of an evolvent generated in opposite directions about said hub 13 as an evolute, this evolvent in its initial development being extended laterally a material distance beyond a longitudinal prolongation of what may be considered as the back face 5' of the keel and as the same unwinds outwardly being given a reverse curve at the outer limits merging with the perpendicular at a point intermediate the vertical center line of the bearing and said longitudinal prolongation of the keel face 5', it being understood that such back face of the keel lies, above the hub, at one side of the bearing and, below the hub, at the opposite side. The back face 10' of my bearing, which is to say the surface which acts as a continuation of the back face 5' of the keel, merging therewith and terminating at its rear limits in the feather edge 12, is given a very appreciable

concavity as the same approaches the hub part of the bearing, this concavity having its greatest prominence at that point in the generation of the evolvent edge 12 where the latter has its maximum lateral protrusion. The opposite or frontal face 10'' is, on the other hand, crowned in the manner of the non-working side of the propeller and, as best seen from an inspection of Figs. 6 through 8, the mean inclination of the face is relatively steep at its outer limits and flattens out progressively with the approach toward the hub. This inclination is relatively critical and such that the water column flowing past the same is caused to travel into working engagement with the blades of the propeller at substantial right angles to the varying planes defined by the twist of the latter.

Of considerable import to the efficiency of my bearing is the fact of the frontal face 10'' being bellied in, a characteristic which can be readily seen when viewing the rear profile of the face 10'' from a position looking diagonally toward the bearing, and the greatest prominence thereof is on the vertical median line. The developed "rake" functions to draw the water column toward the hub of the bearing and by the resulting compacting of the water exert a compression pressure thereon to eliminate the presence of air pockets and in consequence obtain such a solidity of the water as assures an augmented grip of the propeller.

In the case of a strut installation, the two blades of the stern bearing are or may be produced with a greater pitch with both the frontal and back faces originating in a feathered edge disposed substantially on the vertical center line of the propeller shaft, the terminating or rear edge, considered in end elevation, being given a sinusoidal contour more or less corresponding to the stern post installation.

It is believed to be apparent that the heretofore encountered obstruction to the flow of water as the same swirls about the skeg or strut, as the case may be, is to a large extent eliminated by my equivalent of a two-bladed stationary propeller serving the office of a stern bearing for the driving propeller of a vessel. I intend that no limitations be implied by reason of the foregoing specific description excepting as such limitations are brought into the hereto annexed claims to define over prior knowledge in the art of marine vessel propulsion.

What I claim is:

1. A stern bearing for the propeller of a marine vessel produced in the form of a two-bladed screw having its helix generated in a direction opposite to the helix of the propeller used therewith and characterized in that the planes of curvature of the frontal faces of the bearing blades reversely correspond to those of the propeller blades, which is to say that the inclinations of the frontal faces of said bearing blades at the inner and the outer ends of the same generally correspond in the respective instance with the inclinations of the outer and the inner ends of the propeller blades.

2. A stern bearing for the propeller of a marine vessel produced in the form of a two-bladed screw having its helix generated in a direction opposite to the helix of the propeller used therewith and characterized in that each blade provides a frontal face curved to recede inwardly from a longitudinal prolongation of the related side of the keel and a back face curved to extend outwardly a material distance beyond a longitudinal prolongation of the other side of the keel, the former of said faces being crowned and the latter concave.

3. A stern bearing for the propeller of a marine vessel produced in the form of a two-bladed screw having its helix generated in a direction opposite to the helix of the propeller used therewith and characterized in that the opposite facing surfaces of each blade merge in a feather edge which, considered in rear elevation, is definitive of an evolvent generated about the hub of the bearing as an evolute with the involute line modified at the outer limits by a reverse curvature.

4. A stern bearing for the propeller of a marine vessel produced above and below the bearing proper with blades of which each blade is formed with a rearwardly sloping back face receding outwardly, considered in relation to the vertical center line of the bearing from a longitudinal prolongation of one side of the keel and an inwardly sloping frontal face traversing the vertical center line of the bearing and meeting in a feather edge with said back face, the engineering of said blades being such that, considering a succession of cross-sections taken at radially spaced intervals through the length of the blade, the edge thereof which provides the frontal face describes a mean line approximately at right angles to the longitudinal median line of a corresponding section taken through the blade of a propeller used therewith.

5. A stern bearing for the propeller of a marine vessel produced above and below the bearing proper with blades of which one blade is formed with a rearwardly sloping frontal face receding inwardly from one side of the blade and the other blade formed with a rearwardly sloping frontal face receding inwardly from the other side of the blade, each of said sloping frontal faces traversing the vertical center line of the bearing, the engineering of said blades being such that, considering a succession of cross-sections taken at radially spaced intervals throughout the length of the blade, the edge of each section corresponding to the frontal face of the blade describes a mean line approximately at right angles to the longitudinal median line of respective corresponding sections taken through the blade of a propeller used therewith.

6. A stern bearing according to claim 5, wherein said frontal faces, viewed in profile from a position diagonally to the rear of the bearing, are bellied in to define a "rake" in proximity of the hub part of the bearing.

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