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A. A. KNUDSON.

MEANS FOR PREVENTION OF WEAKENING PROPELLER SHAFTS BY ELECTROLYSIS.

APPLICATION FILED APR. 5, 1902.

NO MODEL.

Fig. 1.

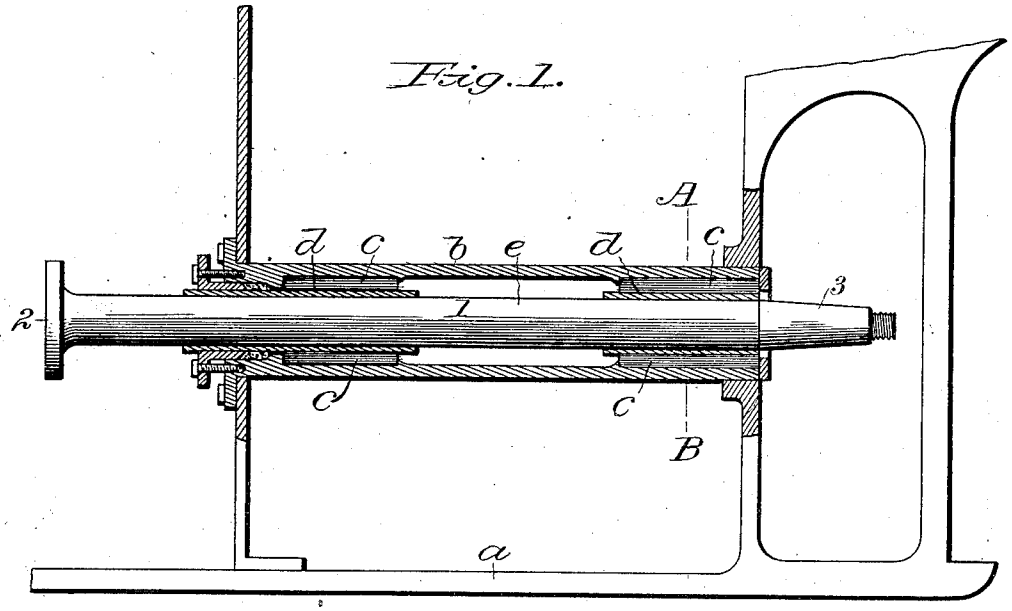
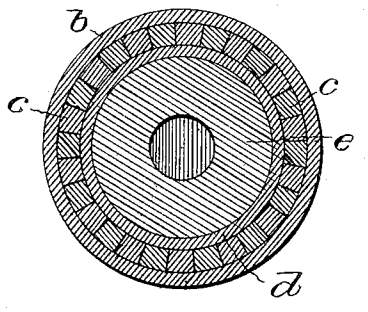


Fig. 2.



Witnesses

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No. 727,382. Patented May 5, 1903.

UNITED STATES PATENT OFFICE.

ADOLPHUS A. KNUDSON, OF BROOKLYN, NEW YORK.

MEANS FOR PREVENTION OF WEAKENING PROPELLER-SHAFTS BY ELECTROLYSIS.

SPECIFICATION forming part of Letters Patent No. 727,382, dated May 5, 1903.

Application filed April 5, 1902. Serial No. 101,586. (No model.)

To all whom it may concern:

Be it known that I, ADOLPHUS A. KNUDSON, a citizen of the United States of America, and a resident of the borough of Brooklyn, New York city, in the State of New York, have invented a new and useful Improvement in Means for Prevention of Weakening of Propeller-Shafts by Electrolysis, of which the following is a specification.

It has long been known that where dissimilar metals—such as brass or other alloys of copper, hereinafter termed "bronze," and iron or steel, hereinafter termed "steel"—are placed in close proximity to each other and immersed in sea-water, or sea-water is allowed to flow or penetrate between them, galvanic action or electrolysis will result, causing a disintegration or reduction in weight of the electropositive metal. In such cases where the respective metals are steel and bronze, for example, the steel being electropositive to the bronze, the two are chemically acted upon by the sea-water and a current of electricity leaves the electropositive metal for the negative metal. In conformity with a law of electrical action wherever currents leave a metal under such conditions or under conditions similar to those above described such metal is more or less reduced and weakened. In the construction of modern war-ships and ships of the merchant marine this action has been recognized as the cause in many instances of the weakening of what is termed the "tail-shaft," which carries the screw-propeller, and as the explanation of accidents to the tail-shaft resulting in the loss of the propeller and the serious delay of the vessel. The action in this case is due to the employment of one or more "liners," of bronze, upon the tail-shaft, of steel, and the penetration of the sea-water between the shaft and the respective liners and its chemical and electric contact with the electrically-opposite metals or alloys—that is to say, with metals of different polarity. Such liners are commonly shrunk upon the shaft, and thus made secure thereon with or without the aid of rivets extending through the walls of the shaft into the customary longitudinal bore. Whether or not such rivets are employed it is impracticable to render the joints between the shaft and the respective liners water-tight, and the sea-water eventually penetrates between the two metals, as above stated, and produces the electrolytic action. The electrolytic action in this case manifests itself in various ways; but mainly and most seriously in what is termed "annular nicking," where the ends of the respective liners are opposed to the shaft. Such annular nicking obviously invites cracks and frequently results in a break in a shaft and the loss of the propeller. By such an accident the lives of the passengers are placed in great danger and serious financial loss to the owners of the ship is involved. Various means have been proposed for preventing such weakening of propeller-shafts by electrolysis; but so far as I am advised the difficulty has heretofore remained without a known remedy that is effective.

The object of the present invention is to render impossible the galvanic action of electrolysis above described, and thus to prevent so weakening the propeller-shaft.

The invention consists in certain novel combinations of parts hereinafter set forth and claimed.

A sheet of drawings accompanies this specification as part thereof.

Figure 1 of the drawings represents a longitudinal section through the stern-bearing of a modern vessel, exposing to view the tail-shaft. Fig. 2 represents a cross-section, on a larger scale, at A B, Fig. 1.

Like reference-letters indicate like parts in both figures.

The framework *a* at the keel of the ship is provided with the customary stern tube or casing *b*, of cast-iron, provided internally with bearings *c*, of lignum-vitæ. Within said bearings liners *d* are secured upon the tail-shaft *e* in any known or improved manner. Instead of making such liners *d* of a metal or alloy of different electric polarity from the tail-shaft *e*, as heretofore, I make them of a metal or alloy that is of the same or substantially the same polarity as the tail-shaft, and thus prevent any galvanic action or effect thereon of sea-water and effectively protect the shaft against electrolysis.

With a tail-shaft *e* of nickel-steel, which is a preferred material therefor, I make the liners *d* of wrought-iron containing a sufficient proportion of nickel to render it of the same

or substantially the same polarity as nickel-steel.

For the purposes of the present invention the tail-shaft *e* will in all cases be of the metal or alloy known as "nickel-steel;" but the wrought-iron of the liners *d* may be alloyed with other metals, provided the liners are of the same or substantially the same polarity as the tail-shaft.

Having thus described said improvement, I claim as my invention and desire to patent under this specification—

1. The combination of a propeller-shaft of nickel-steel and liners secured upon said shaft and constructed of an alloy the basis of which is wrought-iron and of the same or substantially the same electric polarity as said shaft, for the prevention of the weakening of said shaft by electrolysis.

2. The combination of a propeller-shaft of nickel-steel, and liners of wrought-iron containing nickel and of the same or substantially the same electric polarity as nickel-steel, whereby any weakening of such propeller-shaft by electrolysis is prevented, substantially as hereinbefore specified.

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Witnesses:

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