Feb. 4, 1941. A. WAHL 2,230,708

BLADE WHEEL PROPELLER

Filed Nov. 16, 1938

Fig. 1

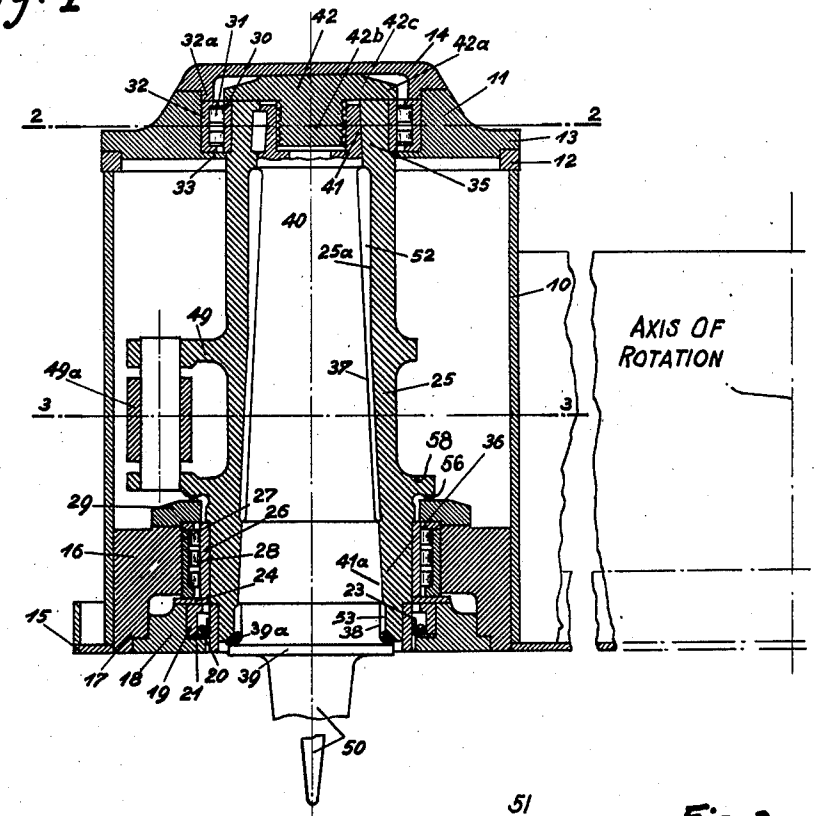


Fig. 2

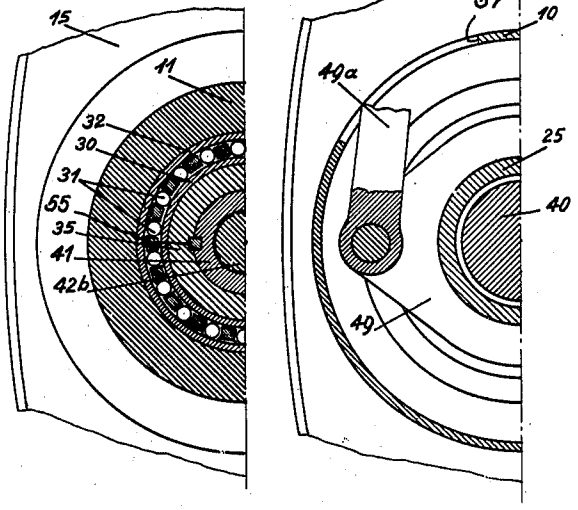


Fig. 3

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BLADE WHEEL PROPELLER

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4 Claims. (Cl. 170—147)

This invention relates to blade wheel propellers of the type known as the Voith-Schneider propeller shown and described in United States Patents to Schneider et al., Nos. 1,681,500; 1,823,169; 2,015,169 and 2,037,069, and is directed more particularly to improvements in journaled portions or shafts of the blades of such blade wheel propellers.

In the blade wheel propellers heretofore used, one of the great difficulties encountered was that if one of the individual blades became damaged or broke, the entire blade wheel was affected and seriously damaged, and it is therefore one of the primary objects of the invention to overcome these disadvantages.

Another objection to the blades heretofore used was that due to a certain bending action of the shaft portion of the blades during their use, the bearings supporting the shaft portions would be subjected to unequal stresses, and in consequence would have unequal wearing qualities.

Another objection was that in the event a blade would break off inside the housing of the propeller, the oil in the housing would flow out and be lost, or the sea water would flow into the housing.

The object of this invention is to provide a unitary structure of a shaft end of a blade with an auxiliary casing therefor, so that in the event of a blade being lost or breaking at its shaft portion, the auxiliary casing for the shaft end would prevent oil from passing out of the propeller housing and at the same time prevent sea water from entering the housing.

A further object is to so arrange the shaft end that any bending moments would be permitted to take place unimpeded, the bearings, however, due to the arrangement of parts, being uninfluenced by such bending moments, since in the improved device the bearings are spaced exterior to the auxiliary casing and are therefore uninfluenced by any actions of the blade shaft.

Other advantages of the improved device will appear from the following description.

The invention consists in providing a shaft end of a blade of a blade wheel propeller with an auxiliary casing which is locked to the shaft end, and which casing permits the shaft end to carry out its bending movements, without injuriously affecting the bearings, thereby providing a self-contained unit overcoming certain of the disadvantageous features of the shafts of blade wheel propellers heretofore used.

The invention consists further in huggingly engaging the shaft end of a blade with the auxiliary casing.

The invention consists further in providing the shaft end of a blade with conical surfaces at the exterior thereof engaging conical surfaces in registration therewith interior of the auxiliary casing.

The invention consists further in fastening the operating lever upon the auxiliary casing instead of upon the shaft end.

Finally, the invention consists in providing a seal directly upon the auxiliary casing instead of upon the shaft end of the blade as heretofore used.

The structure as pointed out includes an entirely closed auxiliary casing in which the shaft end of a blade is disposed.

The invention will be further described hereinafter, and an embodiment thereof will be shown in the drawing, and the invention will be finally pointed out in the claims.

In the accompanying drawing:

Figure 1 is a vertical central section of the shaft end of a blade with the improved auxiliary casing surrounding the same, surrounded in turn by the blade wheel propeller housing, the oil usually used in such a housing being contained between the walls of such housing and the auxiliary casing;

Figure 2 is a horizontal section taken on line 2—2 of Figure 1; and

Figure 3 is a horizontal section taken on line 3—3 of Figure 1.

Similar characters of reference indicate corresponding parts throughout the various views.

Referring to the drawing, and more particularly to Figure 1, the housing 10 has a cap 11 thereon to close the upper portion thereof. This cap is formed of three parts in the embodiment shown in the drawing, these three parts consisting of a ring 12, a second ring 13, and a top portion 14 supported in turn on the ring 13.

The lower part of the housing 10 is closed by means of a ring 16 which has a shoulder portion 17 into which seats another ring 18. The lower end of the housing 10 is provided with a horizontal extension 15 forming the bottom of the propeller housing.

Within the ring 18, at its interior portion, is a cut out which is followed by a sealing member 19, garter spring 20, and a flexible member 21 held at one end between the sealing member 19 and the member 18, and at its other end overlapping the spring 20. The spring 20 presses the flexible member against a sleeve portion 23.

Above the member 18 is a washer member 24 which supports two race members 26 and 27, between which rollers or needles 28 are disposed in a manner well known. This roller or needle bearing structure is held in position by an upper ring member 29. Between this ring member 29 and a lateral projection 58 of the casing 25 is an axial thrust ring 56.

In the upper part of the structure shown in Figure 1 there are arranged within a cut-out portion of the ring 13 the race members 30 and 32, between which rollers or needles 31 are arranged in the well-known manner. The cut-out in the ring 13 is arranged so as to provide a flange 33 which acts to support the bearing structure 30, 31 and 32. A flange 32*a* of the cap portion 14 holds the race 32 in position, and an extended portion 42*a* of the member 42 holds the inner race 30 in position. This member 42 is arranged in the form of a screw, in that it has a central portion 42*b* exteriorly screw-threaded, and the laterally extending portion 42*c* which extends over the upper part of the shaft end 40 of the blade 50 and also extends over the uppermost portion of the casing 25. The upper portion of the casing 25 has a conical bore diverging from its uppermost end inwardly, and the upper part of the end 40 of the blade 50 has a conical shape in registration with said bore. The lower part of the shaft end 40 of the blade 50 has a conical portion also, registering with a conical bore of the casing 25. The two conical parts of the shaft end 40 are indicated by 41 and 41*a*, and the two conical parts of the casing 25 are indicated by the characters 35 and 36.

After the screw 42 has been inserted into the screw-threaded recess of the shaft end 40 of the blade 50, and the screw 42 rotated, the shaft end 40 is drawn upwardly and thereby the conical surfaces 41 and 41*a* ride upwardly in the conical parts or bores 35 and 36 until such time when an intimate and snug fit in the nature of a locking action has been obtained. The portions of the shaft end 40 of the blade 50 immediately below the conical surface 41, as also immediately below the conical surface 41*a*, are subcaliber, and the inner wall 25*a* of the casing 25 is somewhat bored out so that spaces 52 and 53 are formed between the shaft end 40 and the inner wall of the casing. The subcaliber of the shaft end 40 between the two conical surfaces 41 and 41*a* is indicated by 37, and the subcaliber below the conical surface 41*a* is indicated by 38. This shaft end 40 has also a collar portion 39, and below this the actual blade 50 extends.

It will be noted that in proximity to the collar 39 of the blade 50, the lowermost end of the casing 25 extends, this being surrounded by a sleeve 23 against which the yieldable member 21, which passes over the spring 20, presses the sleeve inwardly so as to have a tight fit against the lowermost end of the auxiliary casing 25.

Between the lowermost end of the casing 25 and the collar 39 a sealing ring 39*a* is provided.

The casing 25 has at one end thereof a lateral extension 49 forming a lever arm, and this is connected with an operating rod 49*a* in a manner well-known whereby the blades are shifted to give them an oscillatory movement during the rotation of the blade wheel propeller.

It will be seen from the foregoing that the auxiliary casing 25 is entirely closed at its top portion, and it, itself, forms a closure for the contents of the propeller housing 10. In consequence, blade 50 with its shaft end 40 may be inserted into the auxiliary casing 25 or removed therefrom without in any manner influencing the action of the contents of the propeller housing 10.

The auxiliary casing 25 extends over the entire shaft end 40 of the blade 50, and the coacting conical surfaces bring about a fastening or locking action whereby both the auxiliary casing and the shaft end of the blade form an entity in respect to forces acting upon them. The anti-friction bearings referred to act upon the casing instead of upon the shaft end of the blade, and in consequence bending movements of the blade at its shaft end between conical parts 41 and 41*a* may readily take place without influencing the anti-friction bearings, the spaces 52 and 53 enabling such movements to take place independent of their influence upon the auxiliary casing.

Due to the entire closure of the auxiliary casing 25, the oil is sealed within the propeller housing and no oil can pass out of the propeller housing when the shaft end or root 40 of the blade breaks causing the blade itself to fall out, nor can sea water enter the propeller housing, as was the case heretofore when the shaft end of a blade broke or was injured.

Furthermore, by the arrangement described, should a blade be injured or break off while the propeller is in actuation, the propeller may continue in its operation until the ship reaches its next landing place when a new propeller blade may be readily substituted.

Moreover, the sealing action at the lower part of the shaft end 40 of the blade 50, heretofore described by the sleeve acting upon the exterior portion of the casing 25 through the interaction of the flexible member 21 has the advantage of being independent of the blade or its shaft end so that the blade can be readily substituted in the auxiliary casing without this sealing device being affected.

A further advantage is that while in the use of propeller blades of this type of blade wheel propeller experienced and skilled men were necessary to substitute one blade for another, the arrangement forming the basis of the invention enables unskilled attendants to make the substitution, in view of the substantially automatic action of locking the shaft end of the blade as described.

The life of the anti-friction bearings is considerably increased when arranged in the manner described.

A key 55 is disposed between the upper conical part of the member 40 and the conical part 35 of the casing 25.

By the interlocking of shaft end 40 with the auxiliary casing 25, the rotary shifting of the casing 25 by means of the lever 49 operated by rod 49*a*, also oscillates the blade 50. The opening 57 in each housing 10 for the passage of the rod 49*a* does not permit entrance of sea water, since surrounding each housing 10 for each shaft end of each blade is the blade wheel propeller housing for the support of all such blades, which blade wheel propeller housing is closed against access of sea water, it being filled with oil. It is generally indicated by 51. 15 forms the bottom wall of the blade wheel housing.

The invention has been described in its embodiment as shown as applied to a blade wheel propeller. The invention is applicable to other uses, for instance, wherein the blade 50 is replaced by any other element for transmitting power.

I have shown an embodiment of my invention,

but it is clear that this is capable of variation and modification without departing from the spirit of the invention, and I, therefore, do not wish to be limited to the precise details of constructions set forth, but desire to avail myself of such variations, modifications and adaptations as come within the scope of the appended claims.

What is claimed is:

1. In a blade wheel propeller of the type including a plurality of blade members rotatable with said wheel, about axes perpendicular to the plane of the wheel, said blade members including a shaft end extending inwardly of the wheel and being individually oscillatable during such rotation, said members also including a blade end which projects outwardly from said wheel; the improvement which consists in separate means for supporting each of said blade members comprising a housing for each blade member supported on said wheel and having anti-friction bearings thereon, an inwardly spaced hollow casing rotatably supported on said bearings and cooperating with said housing to form therewith an oil chamber surrounding said casing, means for locking the shaft end of said blade in said casing, and means in said housing cooperating with said casing to oscillate the latter; whereby in the event the blade member breaks at any point inwards of the wheel, no water can enter into said housing or oil escape therefrom through the casing.

2. In a blade wheel propeller of the type including a plurality of blade members rotatable with said wheel, about axes perpendicular to the plane of the wheel, said blade members including a shaft end extending inwardly of the wheel and being individually oscillatable during such rotation, said members also including a blade end which projects outwardly from said wheel; the improvement which consists in separate means for supporting each of said blade members comprising a housing for each blade member supported on said wheel and having anti-friction bearings thereon, an inwardly spaced hollow casing rotatably supported on said bearings and cooperating with said housing to form therewith an oil chamber surrounding said casing, said casing having conical bores therein in horizontal alignment with said anti-friction bearings, said conical bores adapted to cooperate with complementary conical portions on the shaft end of said blade member, means for locking the shaft end of said blade member in said casing, and means in said housing cooperating with said casing to oscillate the latter, whereby in the event the blade member breaks at any point inwards of the wheel, no water can enter into said housing or oil escape therefrom through the casing.

3. In a blade wheel propeller of the type including a plurality of blade members rotatable with said wheel, about axes perpendicular to the plane of the wheel, said blade members including a shaft end extending inwardly of the wheel and being individually oscillatable during such rotation, said members also including a blade end which projects outwardly from said wheel; the improvement which consists in separate means for supporting each of said blade members comprising a housing for each blade member supported on said wheel and having anti-friction bearings thereon, an inwardly spaced hollow casing rotatably supported on said bearings and cooperating with said housing to form therewith an oil chamber surrounding said casing, means for locking the shaft end of said blade member in said casing, means in said housing coperating with said casing to oscillate the latter, and sealing means adjacent the lower portions of said housing and casing and interposed therebetween, whereby in the event the blade member breaks at any point inwards of the wheel, no water can enter into said housing or oil escape therefrom through the casing.

4. In a blade wheel propeller of the type including a plurality of blade members rotatable with said wheel, about axes perpendicular to the plane of the wheel, said blade members including a shaft end extending inwardly of the wheel and being individually oscillatable during such rotation, said members also including a blade end which projects outwardly from said wheel; the improvement which consists in separate means for supporting each of said blade members comprising a housing for each blade member supported on said wheel and having upper and lower anti-friction bearings thereon, an inwardly spaced hollow casing rotatably supported on said bearings and cooperating with said housing to form therewith an oil chamber surrounding said casing, said casing having upper and lower conical bores therein adapted to cooperate with complementary conical portions on the shaft end of said blade member, the upper portion of said shaft end being provided with screw threads, a plug member adapted to span the top of said casing and having a downwardly extending threaded projection adapted to engage with the screw threads on said shaft end of the blade member to lock the latter in place in said casing, means in said housing cooperating with said casing to oscillate the latter, and sealing means interposed between said casing and said housing adjacent the lower bearing, whereby in the event the blade member breaks at any point inwards of the wheel, no water can enter into said housing or oil escape therefrom through the casing.

ALBERT WAHL.