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L. A. RUNTON ET AL

2,918,316

COLLET FOR VARIABLE PITCH PROPELLER HUB

Filed July 26, 1957

2 Sheets-Sheet 1

Fig. 1.

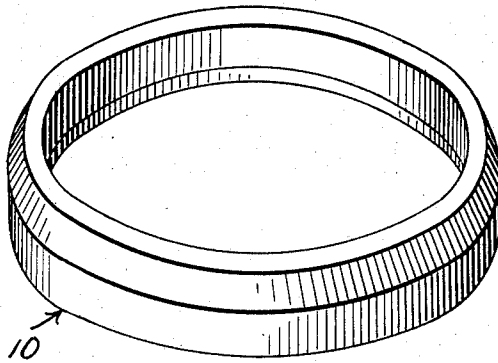


Fig. 2.

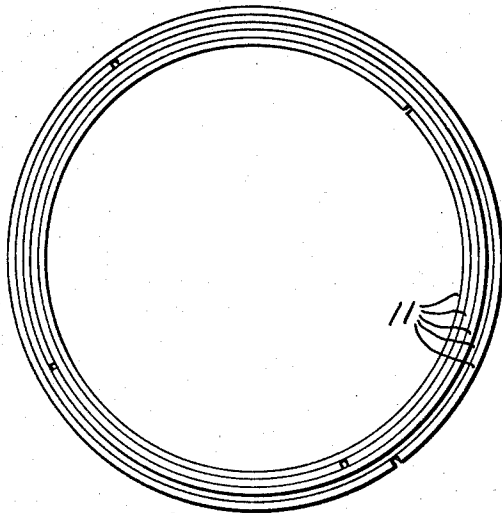


Fig. 3.

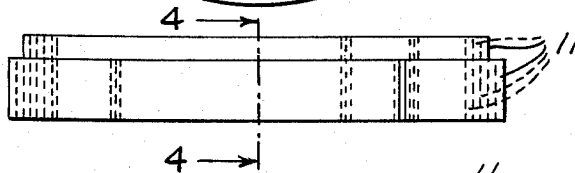
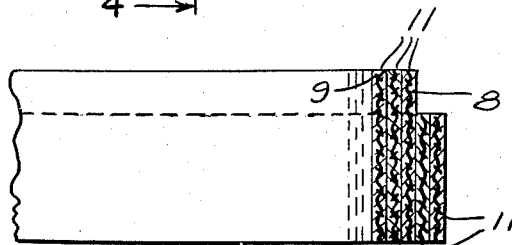


Fig. 4.



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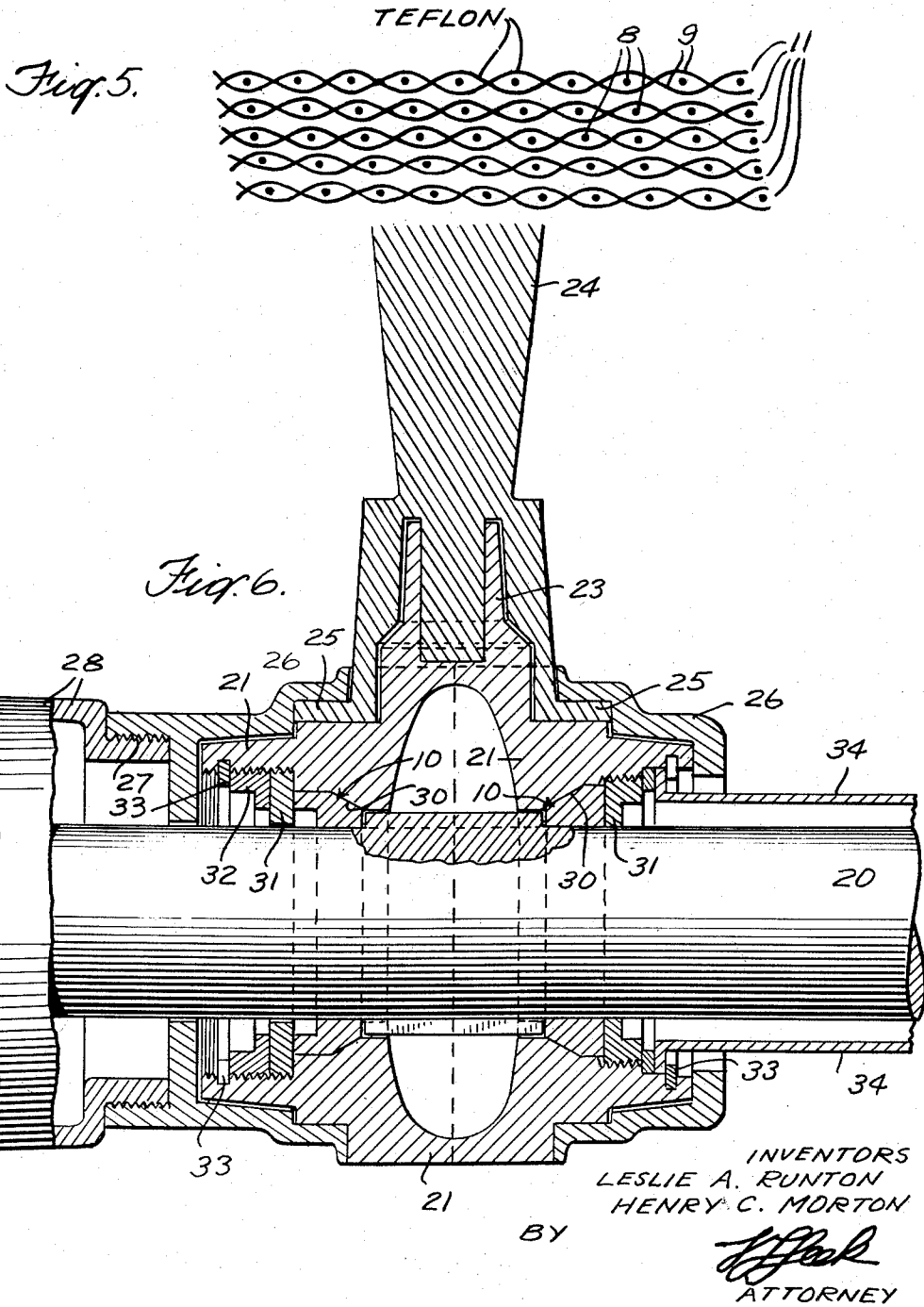
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COLLET FOR VARIABLE PITCH PROPELLER HUB

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1 Claim. (Cl. 288—17)

This invention relates to propeller collets and more particularly to collets for securing and centering the hubs of variable pitch airplane propellers.

An object of the invention is to provide a collet of the above type having novel and improved characteristics.

Another object is to provide a collet of the above type having improved wearing qualities.

Another object is to provide a collet of the above type which in use does not tend to score or injure the propeller shaft.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

The nature of the invention will be better understood from the following description, taken in connection with the accompanying drawings in which a specific embodiment has been set forth for purposes of illustration.

In the drawings:

Fig. 1 is a perspective view of a collet embodying the invention;

Fig. 2 is a plan view of the collet before molding;

Fig. 3 is a side elevation of the collet before molding;

Fig. 4 is an enlarged fragmentary section taken on line 4—4 of Fig. 3;

Fig. 5 is a detail view of the fabric plies from which the collet is formed; and

Fig. 6 is a detail view of a portion of a variable pitch propeller assembly illustrating the use of the collets.

Referring to the drawings more in detail the collet 10 (Fig. 1) is composed of a plurality of plies 11 (Figs. 2 to 5) of woven fabric web having warp yarns 9 running circumferentially and filler yarns 8. The yarns may consist of asbestos, cotton, spun Dacron (a condensation product of ethylene glycol and terephthalic acid), nylon, Orlon (a polyacrylonitrile) linen, jute, or the like, or other material capable of bonding to an impregnant. In order to withstand high temperatures the yarns are preferably composed of asbestos. However, the warp yarn 9 of the inner ply 11 may be composed of multifilament Teflon (tetrafluorethylene) which has a low coefficient of friction and has practically no cold flow even under high pressures.

The plies 11 may be composed of sections of seamless tubes or sleeves or may comprise strips wound around a core into cylindrical form. If the plies 11 are composed of strip material the joints are staggered for strength.

The laminated fabric may be impregnated with a high strength phenolic bonding resin derived from the reaction product of phenol, cresol or a homologue with formaldehyde under controlled conditions.

The width of the various plies may be selected to conform generally to the shape of the finished product so as to facilitate the molding operation. In the form shown the inner plies 11 are somewhat wider than the outer plies.

The plied fabric is first impregnated with the uncured bonding resin as above described. The treated base

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is preheated to remove the solvent and the resin content polymerized until a residual volatile content of 5% to 7% is attained.

After assembly of the treated fabric into a preform, the impregnated ring is placed in a mold and molded under heat and pressure into the desired finished form, as shown in Fig. 1. The conversion of the resin into a thermoset form may be accomplished at a temperature of 300° F. to 350° F. for from thirty to sixty minutes at pressures of 10 tons to 100 tons, depending upon the area of the object being molded.

The finished collet 10 is shown in Fig. 1 as having cylindrical inner and outer surfaces. The outer cylindrical surface in part is chamfered forming a frusto-conical cone. Other contours may be formed according to the end use of the product.

The bonding resin is not capable of bonding to the Teflon yarn. However, it bonds to the filler yarns 8 and to the yarns of the inner plies to form a rigidly bonded unit wherein the Teflon is held in place mechanically.

Since the Teflon yarn is held in position both mechanically by the interwoven yarns and by the bonding agent, it will not deform or "creep" under heavy pressures thus greatly extending the useful life of the collet.

Fig. 6 shows the application of the collets 10 to a conventional type variable pitch propeller assembly for airplanes.

Referring more particularly to Fig. 6, a shaft 20 which is driven by the motor (not shown) carries a hub member 21 which is connected thereto by splines. The hub 21 is provided with the usual number of sockets 23 in which propeller blades 24 are seated. The blades 24 are shown as provided at their innermost ends with radial flanges 25 which are engaged by a split housing 26 for securing the blades in place. The split housing 26 is secured by internal threads 27 to a rotating housing 28 carried on the shaft 20.

The hub 21 is provided with spaced recesses 30 in which collets 10 are secured by means of ring nuts 31. The collets 10 serve as centering and supporting elements to center the hub with respect to the shaft and to take up vibration. The ring nuts 31 may be secured by a lock nut 32 and the assembly held in fixed position by a snap ring 33. A housing 34 which extends over the forward end of the shaft 20 to house the variable pitch control motor (not shown) is secured in place by the forward snap ring 33, which also keeps the ring nut 31 in place against collet 10.

It is understood that a particular type of variable pitch propeller mechanism has been shown for purposes of illustration and that the collets 10 may be used as centering or packing rings with any of the standard types of variable pitch propellers wherever such centering rings are normally required.

What is claimed is:

A bearing member comprising a collet having a frusto-conical periphery, said collet comprising an inner ply and at least two outer plies, said inner ply being of greater width than said outer plies, said inner ply being a fabric web in which the warp consists essentially of multifilament Teflon yarns and the filler of yarns of a resin bondable material, said outer plies being fabric webs in which both the warp yarns and the filler yarns are composed of a resin bondable material, and the inner ply and the outer plies being joined together by a cured thermosetting bonding resin which impregnates both the inner ply and the outer plies with the Teflon yarn of the inner ply being embedded in a held by the bonding resin and by the filler yarns of resin bondable material, the Teflon

yarn on the inner surface of the collet being exposed to constitute the bearing surface of the collet.

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