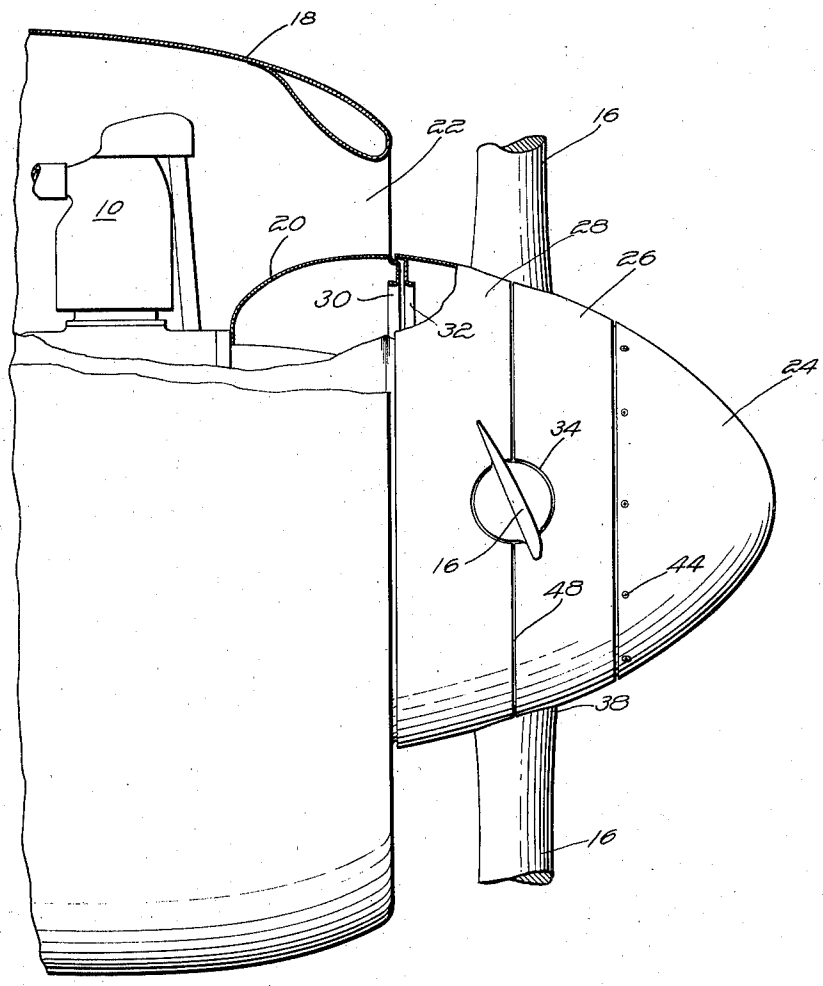
May 31, 1949. E. W. RADTKE 2,471,895

SPINNER MOUNTING

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Fig. 1.



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Fig. 2.

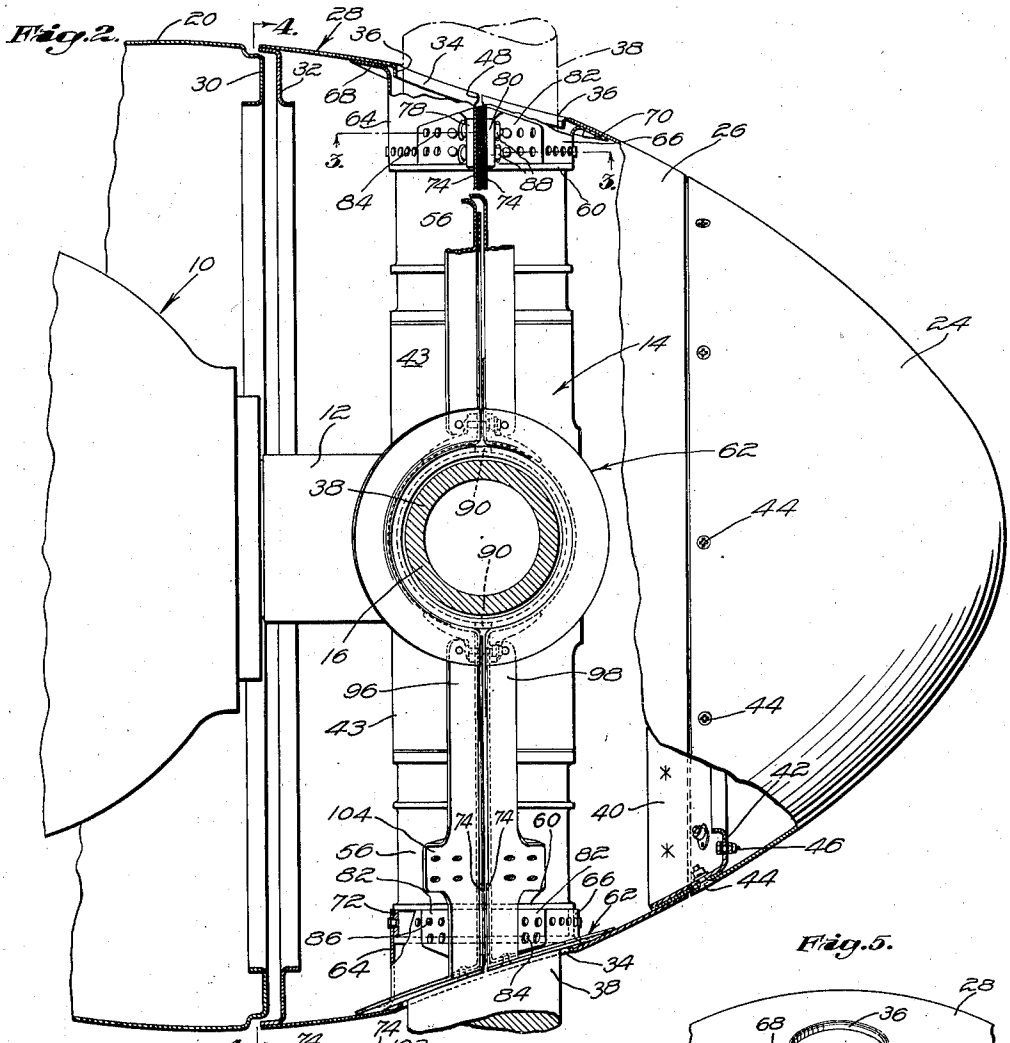


Fig. 3.

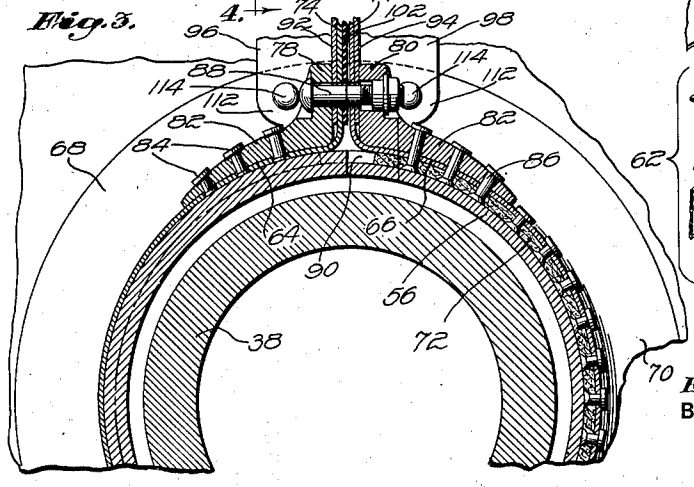
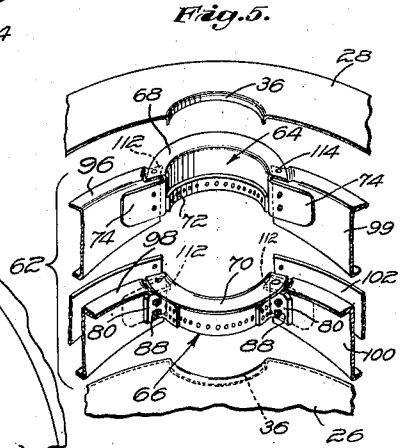


Fig. 5.



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Fig. 4.

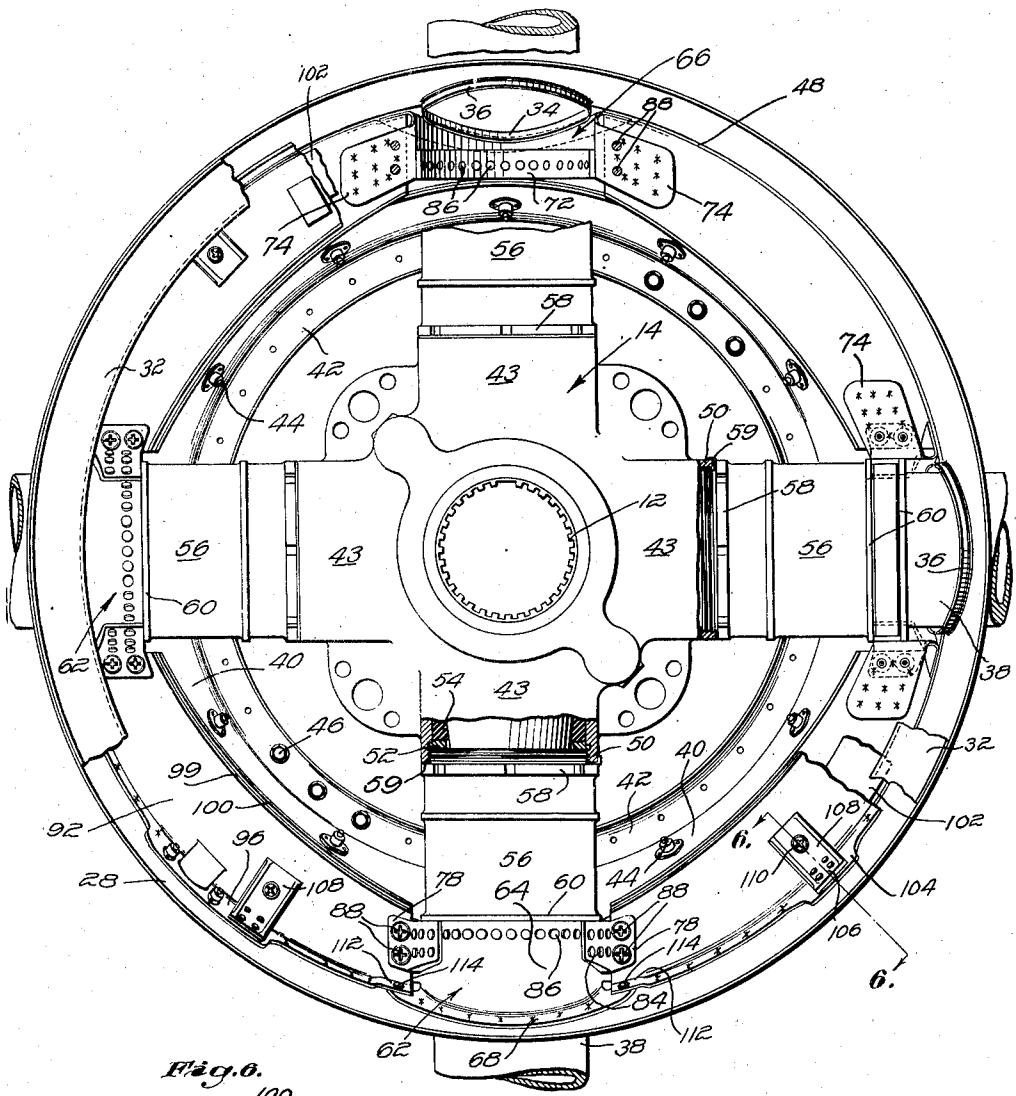
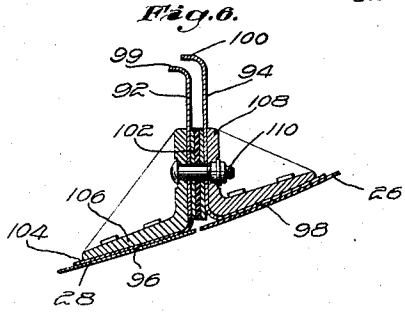


Fig. 6.



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UNITED STATES PATENT OFFICE

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SPINNER MOUNTING

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8 Claims. (Cl. 170—159)

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This invention relates to propeller assemblies and more particularly to spinners such as are carried by the forward end of the propeller shaft and serve as a cover for the hub of the propeller.

It has been the usual practice to support the spinner shell directly from the propeller hub adjacent the propeller shaft. As a result of the high stresses set up in the shell due to centrifugal forces and bending moments this means of supporting the shell has not been entirely satisfactory, and in the case of large diameter spinners now coming into use has proved inadequate.

It is an object of the present invention to provide a propeller assembly including an improved spinner and improved supporting structure therefor.

Another object of the invention is to provide improved spinner and spinner mounting means which provide high strength to resist loading due to forces and moments along or about the three co-ordinate axes of the propeller.

A further object of the invention is to provide spinner supporting means affording firm support for the cutouts in the shell through which the propeller blades pass to the hub.

Another object of the present invention is to provide a spinner construction which is easy to assemble on the propeller and which locates the spinner accurately relative to the axis of rotation of the propeller without the necessity for adjustments in assembly.

A still further object of the invention is generally to improve the construction and operation of propeller spinners.

These and other objects and advantages of the invention will be apparent from the following detailed description of one embodiment of the invention shown for purposes of illustration in the accompanying drawings.

In these drawings:

Fig. 1 is a side elevation of the forward end of an airplane fuselage illustrating the invention, parts of the engine cowling and the spinner shell being broken away;

Fig. 2 is a side elevation on an enlarged scale in the vicinity of the spinner, the propeller blades and part of the spinner shell being broken away;

Fig. 3 is a section on line 3—3 of Fig. 2;

Fig. 4 is a section on line 4—4 of Fig. 2;

Fig. 5 is a detailed perspective view showing parts of the spinner support; and

Fig. 6 is a detailed view on line 6—6 of Fig. 4.

As herein shown, an engine 10 of the air-cooled, radial type drives a propeller shaft 12 on which is mounted a propeller including a hub 14 and four radially extended blades 16. The engine is enclosed in a cowling comprising an outer cylindrical shell 18 and an inner cylindrical shell 20 surrounding and spaced from the propeller shaft, the shells 18 and 20 forming an annular air intake duct 22 leading to the engine compartment.

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A spinner shell which encloses the propeller hub comprises three sections, a dome-shaped nose section 24, a forward annular section 26 and a rear annular section 28, of gradually varying diameter from the forward extremity of the nose section to the rear extremity of the section 28 which terminates in a diameter equal to the diameter of the forward end of shell 20. The forward annular end of shell 20 and the rear annular end of section 28 of the spinner are provided with inwardly directed webs 30 and 32, respectively, having stiffening flanges on their inturned edges. Sections 26 and 28 of the spinner are also provided with four equally spaced, peripheral, semi-circular cutouts 34 disposed in confronting relation at each blade shank location, each of these cutouts having inturned beaded edges 36 which closely surround the blade shanks 38 but are out of contact therewith.

Section 26 of the spinner shell has an annular band 40 secured, as by riveting or spot welding, to its inner surface which extends beyond the edge of the shell to provide an annular seat for the nose section and terminates in an inturned stiffening flange portion 42. The rear portion of nose section 24 is secured to the annular seat on section 26 by bolts 44 the heads of which are either rounded or are flush with the outer surface of the shell sections. A series of peripherally disposed holes are provided in flange portion 42 in which bolt and washer units 46 are suitably disposed as required to balance the spinner assembly.

It will be noted that the dividing line 48 between the front and rear sections 26 and 28 of the spinner lies in a transverse plane which includes the longitudinal axes of the several propeller blades 16 and that consequently the cutouts 34 in the two sections are semi-circular and are symmetrical with these blade axes. In accordance with this invention improved means are provided within the spinner for suitably connecting the forward and rear sections 26 and 28 and for supporting the spinner in an improved manner in symmetrical position relative to the axis of rotation of the propeller.

As will be apparent from Fig. 4, the propeller hub 14 has four equally spaced, radially directed blade shank receiving barrels 43 terminating in internally threaded ends 50 which heretofore received the threaded end of a nut for compressing a packing washer 52 against an internal packing ring 54 adjacent the end of the barrel. In accordance with this invention the usual nut is replaced by an extension sleeve 56 provided with a reduced externally threaded end which is receivable in the threaded portion 50 of the barrel and is provided with an exposed spanner wrench engaging portion 58 forming a shoulder

59 which abuts the end of the hub barrel and locates the sleeve accurately relative to the propeller axis. If desired, this shoulder may be in the form of a nut threaded on the portion 50 to allow for adjustment of the sleeve relative to the hub barrel. The inner threaded end of sleeve 56 serves in place of the former nut to compress the packing 54. The sleeves 56 extend radially substantially to the inner surface of spinner section 26, terminating just short of the inturned bead 36 at the forward portion of the cutouts. Each of the sleeves 56 is provided adjacent its outer extremity with a pair of spaced annular ribs 60 which have finished confronting faces accurately located relative to the shoulder 59. The grooves formed by the ribs 60 are utilized for accurately positioning the spinner relative to the axis of rotation of the propeller and for supporting the spinner shell against centrifugal forces and against bending moments exerted about the three coordinate axes of the propeller.

To this end, annular clamping collars, generally indicated at 62, are provided about the extension sleeves 56 at each blade shank location. As shown most clearly in Fig. 5, these collars 62 comprise two complementary semi-circular members 64 and 66 having flanges 68 and 70 a pair of which are permanently secured, as by welding, to the adjacent inner surfaces of spinner sections 28 and 26, respectively, around each of the several cutouts. Each of the collar members 64 and 66 has a generally semi-circular key 72 permanently secured to its inner periphery. The keys 72 are rectangular in cross section and closely fit the groove between the ribs 60 so as to accurately locate the collar and accordingly the attached spinner sections radially on the barrel and sleeve extensions. The collar members 64 and 66 are also provided with integral bent ears 74 which extend laterally in planes parallel with the plane of the dividing line 48 between the shell sections 26 and 28.

For the purpose of clamping the fore and aft collar members 64 and 66 about the extension sleeves 56, these members are provided with pairs of spaced parallel lugs 78 and 80 having curved attaching bases 82 which conform to the outer periphery of the annular collar members and are attached thereto by a row of rivets 84 which extend through the base of the collar members and also by a second row of rivets 86 which extend through the base, the collar and the underlying ring, or key, formed by members 72. Clamping bolts 88 extend through the lugs 78 and 80 and clamp the collar members 64, 66 firmly about sleeve extensions 56, it being noted that the key members 72 are slightly less than semi-circular so that there is a space 90 between the adjacent ends thereof in the clamped position of the collars.

The confronting peripheral portions of shell sections 26 and 28 are further reinforced and connected by flanged webs generally indicated at 92 and 94 (Fig. 6) which extend between and are connected with the clamping collars just described. The webs 92 and 94 have like arcuate flanges 96 and 98 which overlie the inner surfaces of the shell portions 26 and 28 and are permanently welded thereto. The inner edges of these web members are provided with rearwardly directed parallel stiffening flanges 99 and 100 as shown more clearly in Fig. 6. The web members 92, 94 extend between the lugs 78 and 80 of the clamping collars and have a filler member 102 therebetween which is of suitable thickness to permit the collars to firmly clamp the sleeves 56 while also clamping the webs 92, 94 between the lugs 78 and 80.

Midway between the blade shanks the flanges 96 and 98 are provided with widened portions 104 to accommodate one leg 106 of an angle clamp, the other leg 108 of which is secured to the web. Bolt 110 extends through the leg 106 and the webs of members 92, 94 to provides additional clamping means midway between the clamping collars.

The flanges 96 and 98 are also provided with offset ends 112 which overlie the flanges 68 and 70 of the clamping collars and are secured thereto by rivets 114. It will thus be evident that the front shell section 26 has permanently secured thereto one half of a clamping collar at each cutout and an intermediate web clamping member between adjacent collar members, while the rear section 28 has the complemental collar member and another parallel web member permanently secured thereto. By means of bolts 88 and 110 the two shell sections 26 and 28 can thus be readily secured together about the intervening hub carried extension sleeves 56.

In order to gain access to the propeller hub it is only necessary to remove the screws 44 and the nose section 24 which permits removal of the propeller and spinner sections 26 and 28 from shaft 12 as a unit, thus giving access to clamping bolts 88 for the several collars and the clamping bolts 110 for the intermediate clamps. In the particular construction illustrated these bolts are inserted from the engine side of the spinner.

It will be evident that as a result of this invention a very simple and effective spinner supporting structure has been provided which is easily assembled and easily removed for purposes of access to the propeller. It will also be evident that a construction has been provided which is particularly adapted to provide the necessary support required for large diameter spinners; and that the construction not only provides a rigid support which accurately locates the spinner relative to the propeller shaft but that it also provides adequate reinforcement around the cutouts for the blade shanks.

While one embodiment of the invention has been shown and described herein it will be evident that various changes in the construction and arrangement of the parts may be made without departing from the scope of the invention as defined by the appended claims.

What it is desired to secure by Letters Patent is:

1. In an airplane propeller assembly, a hub having radially extended blade shank receiving barrels, blades having their shanks extending into said barrels, extension sleeves secured to the free ends of said barrels, said sleeves having clamp locating mean accurately located with respect to the axis of rotation of the propeller, a spinner shell comprising a forward hollow cone section and a rear section forming an aft extension of said cone, said shell sections having complemental cutouts to receive said blade shanks, and means for detachably connecting said shell sections together and supporting the latter on said sleeves including a pair of clamping members at each blade shank location cooperating with the clamp locating means of said sleeves, one member of each pair being connected to a different shell section.

2. In an airplane propeller assembly, a hub having radially extended barrels, blades having their shanks extending into said barrels, exten-

sion sleeves secured to the free ends of said barrels, said sleeves having peripheral clamp locating grooves adjacent their free ends accurately located with respect to the axis of rotation of the propeller, a spinner shell comprising a forward hollow cone section and an annular section forming an aft extension of said cone, said shell sections having complemental cutouts to receive said blade shanks, and means for connecting said shell sections detachably together including a pair of clamping members at each blade shank location having key portions received in said annular clamp locating grooves, one member of each pair of clamping members being connected to a different shell section, and means for clampings said pairs of members around said sleeves.

3. In an airplane propeller assembly, a hub having radially extended barrels, blades having their shanks extending into said barrels, extension sleeves secured to the free ends of said barrels, said sleeves having annular clamp locating grooves adjacent their free ends accurately located with respect to the axis of rotation of the propeller, a spinner shell comprising a forward hollow cone section and an annular section forming an aft extension of said cone, said shell sections being divided in a plane including the axes of said shanks and having completmental cutouts to receive said shanks, and means for connecting said shell sections detachably together and for supporting the same for rotation with said hub including a pair of clamping members surrounding said sleeves, one member of each pair being connected to a different shell section, said clamping members having arcuate key portions accurately fitting said clamp locating grooves, and fore and aft extending clamping means for connecting said clamping members.

4. In an airplane propeller assembly, a hub having radially extended barrels, blades having their shanks extending into said barrels, extension sleeves secured to the free ends of said barrels, said sleeves having annular clamp locating grooves adjacent their free ends accurately located with respect to the axis of rotation of the propeller, a spinner shell comprising a forward hollow cone section and an annular section forming an aft extension of said cone, said shell sections being divided in a plane including the axes of said shanks and having complemental cutouts to receive said shanks, and means for connecting said shell sections detachably together and for supporting the same for rotation with said hub including a pair of clamping members surrounding each of said sleeves, one member of each pair being connected to a different shell section and each of said members having key means received in said clamp locating grooves, pairs of parallel web members extending between and connected to said clamping members, means for connecting one web member of each pair of web members to a different shell section, and fore and aft clamping means connecting said pairs of clamping members and said pairs of web members.

5. In an airplane propeller assembly, a hub having radially extending barrels, blades having their shanks extending into said barrels, extension sleeves secured to the free ends of said barrels, said sleeves having clamp locating means at their free ends accurately located with respect to the

axis of rotation of the propeller, a spinner shell enclosing said hub, and clamping means carried by said shell and cooperating with the locating means on said sleeves for supporting said spinner.

6. In an airplane propeller assembly, a hub having radially extending barrels, blades having their shanks extending into said barrels, extension sleeves secured to the free ends of said barrels, said sleeves having clamp locating means at their free ends accurately located with respect to the axis of rotation of the propeller, a spinner shell enclosing said hub, said shell having fore and aft sections divided in a transverse plane including the axes of said blade shanks, and clamping means carried by said shell sections and cooperating with the locating means on said sleeves for supporting said spinner and detachably connecting said shell sections together.

7. In an airplane propeller assembly, a hub having radially extending barrels, blades having their shanks extending into said barrels, extension sleeves secured to the free ends of said barrels, said sleeves having clamp locating means at their free ends accurately located with respect to the axis of rotation of the propeller, a spinner shell enclosing said hub, said shell having fore and aft sections divided in a transverse plane including the axes of the blade shanks, clamping means carried by said shell sections and cooperating with the locating means on said sleeves for supporting said spinner and connecting said shell sections detachably together, and a conical nose section detachably secured to the forward periphery of said forward section for permitting access to said shell supporting means.

8. In an airplane propeller assembly, a hub having radially extended barrels, blades having their shanks extending into said barrels, extension sleeves secured to the free ends of said barrels, said sleeves having clamp locating means accurately located with respect to the axis of rotation of the propeller, a spinner shell comprising fore and aft sections divided in a transverse plane including the axes of said blade shanks, said shell having cutouts to receive said blade shanks, and means for detachably connecting said fore and aft sections including pairs of clamping members at the cut outs and also between said cut outs, one member of each pair being connected to a different shell section, and fore and aft extended clamping means for securing said members together, said clamping members at said cut outs having inwardly directed portions which surround the free ends of said sleeves and cooperate with said clamp locating means to position and support said spinner concentric with said propeller axis.

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