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Goldberg

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[54] **MODEL AIRPLANE PROPELLER SPINNER**

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[52] **U.S. Cl.** **416/245**

[51] **Int. Cl.** **B64c 11/14**

[58] **Field of Search** 416/245

[56] **References Cited**

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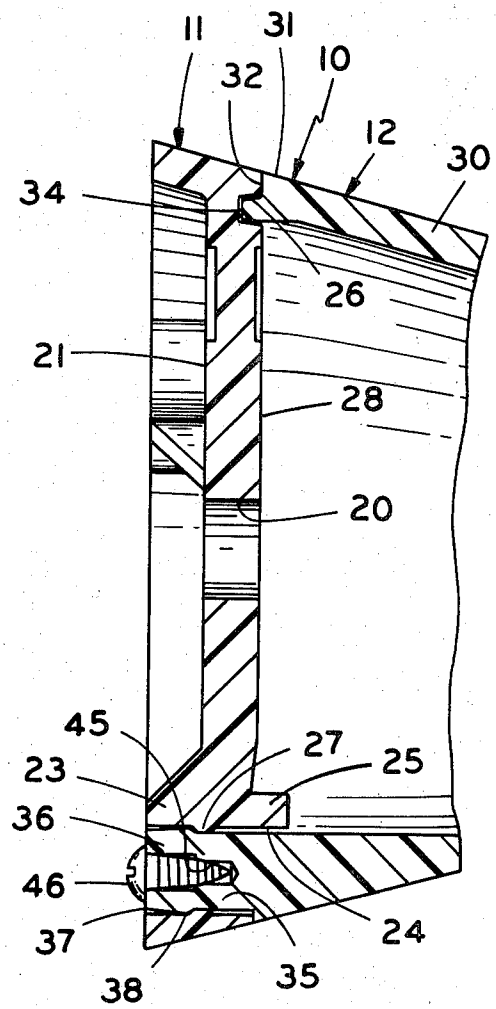
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Attorney, Agent, or Firm—Evan D. Roberts

[57] **ABSTRACT**

A model airplane spinner to be mounted with a propeller on the propeller shaft and thrust plate of an engine by a propeller retainer and providing a base plate mountable on the propeller to receive the propeller, retained on the propeller shaft, with a hollow dome adapted to be positioned on the front of the base plate to enclose the center of the propeller therein with releasable means for securing the dome in position.

11 Claims, 7 Drawing Figures



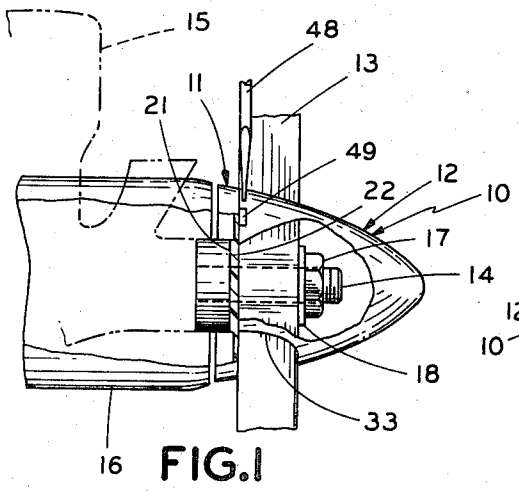


FIG.1

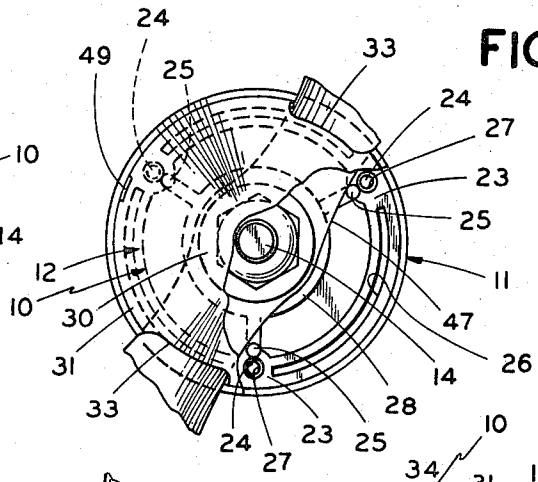


FIG.2

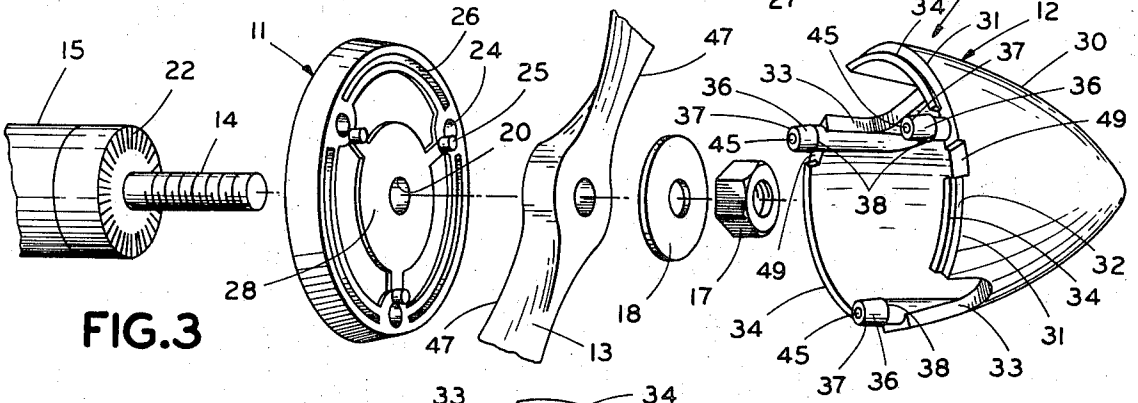


FIG.3

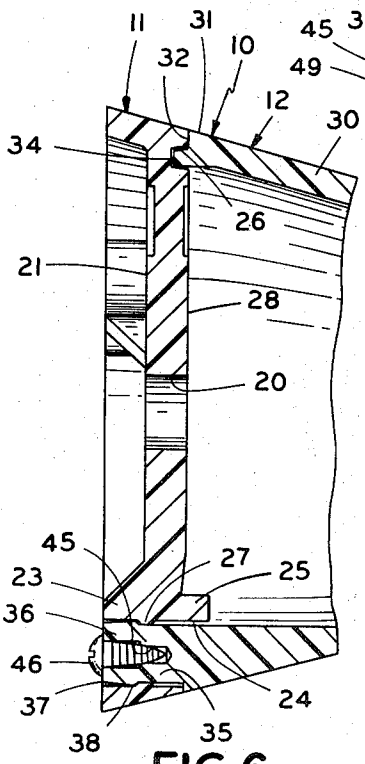


FIG.6

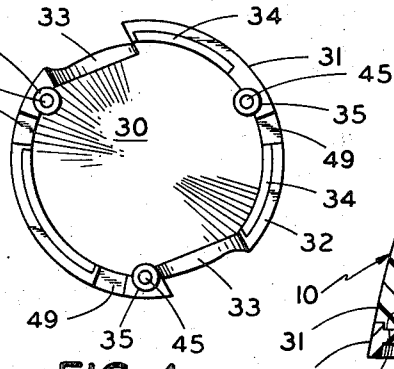


FIG.4

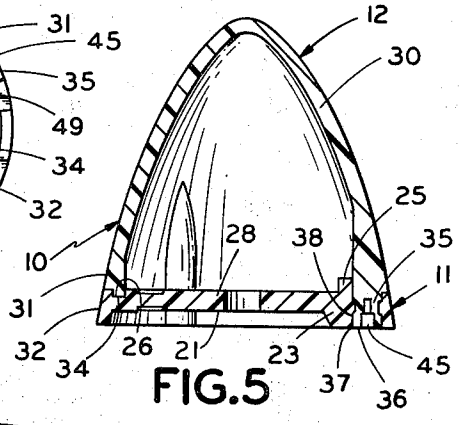


FIG.5

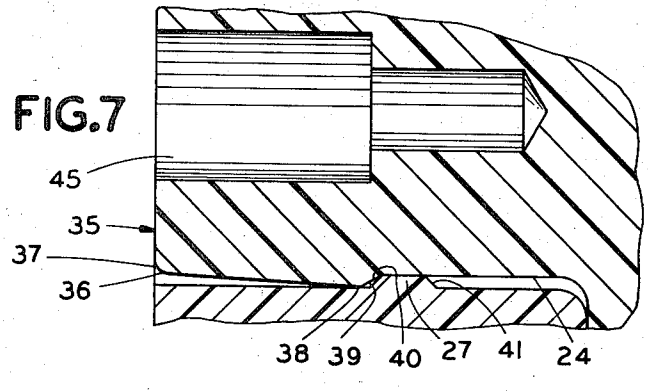


FIG.7

MODEL AIRPLANE PROPELLER SPINNER

SUMMARY OF THE INVENTION

This invention relates to a model airplane propeller spinner which may be molded or otherwise formed from plastic, or other suitable material, in two pieces adapted to cooperate to releasably enclose the center of the propeller. In particular, the propeller spinner of this invention is provided with a circular laminar base plate having an axial passage whereby the base plate may be positioned over the engine propeller shaft and against a drive thrust plate of the engine.

The base plate is adapted to receive a propeller similarly mounted on the engine propeller shaft, whereby when the propeller is tightened on the propeller shaft, the base plate will be in driving engagement with the engine thrust plate at the rear of the base plate and will be drivingly secured to the propeller at the front of the base plate. An axially symmetrical and hollow dome has a radially relieved base portion adapted to receive the propeller radially therethrough when the dome is positioned over the propeller and against the base plate.

The dome is provided with a radial base surface portion which is adapted to complementally engage the front of the base plate to position the dome coaxially on the base plate to enclose the propeller shaft and propeller center within the dome to provide a highly aerodynamic enclosure of these members when the dome is secured to the base plate. A releasable structural securing means is provided between the dome and the base plate for releasably securing the dome thereto, whereby the dome may be released and removed from the base plate to allow the propeller to be separately manipulated or replaced.

It is a general object of this invention to provide a model airplane spinner which is adequate, appropriate, safe, and acceptable to the sophisticated modelers of today for their racing, sport, and general aviation flying. In furtherance of the general object of this invention, it is a specific object to provide a spinner which is as simple and as economically constructed as possible, and yet which is, among other things, strong enough to withstand the severe dynamics of 15,000 to 20,000 revolutions per minute, and air speeds in excess of 150 miles per hour.

Thus, it is a further object of this invention to provide a spinner which is highly aerodynamic with the highest degree of accuracy and security, of assembly and use, with respect to the propeller and engine propeller shaft. Further, in view of a need for simplicity and ready usage, it is an object of this invention to provide a spinner which is readily attachable to the aircraft, readily opened for access and release, and readily and reliably closed or resecured to allow the operator of the aircraft to install, replace, or otherwise manipulate the spinner and propeller with safety and reliability.

Also, inasmuch as model airplane spinners are generally subjected to very severe and wearing usage, even by the most careful operator, it is another object of this invention to provide a spinner wherein the dependability and wear characteristics may be respectively maintained and compensated for to maintain accuracy, safety, and reliability. Still another object of this invention is to provide a spinner which provides an ultimate assemblage which is highly aerodynamic.

Other advantages and novel aspects of the invention will become apparent upon examination of the following detail description, in conjunction with the accompanying drawings wherein:

FIG. **1** is a partial view of the nose of a model airplane illustrating the two-piece, base plate and dome, model airplane propeller spinner of this invention mounted on the engine of a model airplane;

FIG. **2** is a front axial view of the spinner of this invention looking to the left in FIG. **1** and with the dome portion partially broken away at the lower right thereof showing the propeller and spinner elements in position;

FIG. **3** is an expanded perspective view of the spinner of this invention, with the dome rotated laterally to better show the structure thereof and illustrating assemblage position of the elements thereof with respect to the propeller and the engine propeller shaft;

FIG. **4** is an axial rear view of the dome of the spinner of this invention with the base plate removed therefrom;

FIG. **5** is a sectional view taken radially through the axis of the spinner of this invention showing the assembled relationship of the dome and base plate thereof;

FIG. **6** is a partial enlargement of the sectional view of FIG. **5** showing the general details of the dome, pins, back plate retaining passage portions, and compensating structural details; and

FIG. **7** is a greatly enlarged partial sectional view of the interreacting deformable interlocking surface portions of the dome pin and base plate passage ridges.

A model airplane propeller spinner generally represented by the numeral **10**, or portions thereof, is shown in FIGS. **1–7** for the purpose of illustrating and describing the spinner of this invention. Spinner **10** is generally provided with a base plate **11** and a nose or dome portion **12** adapted to fit securely against the front of the base plate **11** to provide a smooth aerodynamic enclosure for a propeller **13** mounted on a propeller shaft **14** of a model airplane engine **15** secured in a model airplane **16**. A nut **17** threadable on shaft **14**, and a washer **18** positionable thereon are illustrated as typical propeller retaining means, which also retain the spinner **10** to the engine shaft **14**.

Base plate **11** (FIGS. **2, 3, 5,** and **6**) is a laminar structure with an axial opening **20** therethrough adapted to allow base plate **11** to be mounted on propeller shaft **14** with a rear central portion **21** in engagement with a driving thrust plate **22** keyed to propeller shaft **14** of engine **15**. Three passage portions **23** are provided in base plate **11**. Portions **23** and generally concentric respective pin retaining passages **24** are centered on a circle concentric with the axis of base plate **11** through opening **20** and are equally angularly spaced apart on that circle.

Propeller locating projections **25** are provided radially inwardly from passages **24**. Axially extending grooves **26** (FIGS. **2, 3, 5,** and **6**) are provided in the front of base plate **11** between passage portions **23** and concentric with the axis of propeller shaft passage **20**. Pin retaining passages **24** are provided with radially inwardly extending retaining ridges **27** which may have either a continuous or intermittent generally annular configuration. A front central portion **28** is provided on the front of base plate **11** around passage **20**.

Dome 12 comprises a generally rounded conical, and axially symmetrical and hollow, front portion 30 having a base perimeter portion 31 with a surface 32 which is radially relieved at 33 to receive propeller 13 radially therethrough. Flanges 34, extending radially from base surface 32, are respectively adapted to complementally engage grooves 26 on the front face of base portion 11.

Three dome positioning and retaining pins 35 are positioned on base portion 31 to extend axially from dome surface 32 in respective registry with the three base plate passages 24 and are adapted to enter base plate pin passages 24. Each pin 35 has tapered and resiliently deformable end portions 36 (FIGS. 3, 6, and 7) of generally conical configuration having a smaller diameter portion 37 adjacent the end of the pin and a larger diameter portion 38 inwardly from the pin end and terminating in a beveled rear surface 39 which is larger than the inner diameter of respective passage ridges 27.

Passage ridges 27 are illustrated as having a front beveled surface 40 and a rear beveled surface 41 (FIG. 7). Each pin end portion 36 is illustrated with the forward or inwardly positioned beveled surface 39 adapted to respectively snap into a position to engage the inclined rear beveled surface 41 of pasaage locking or retaining ridges 27 when pins 35 are respectively inserted a sufficient distance into respective pin passages 24.

Retaining pins 35 may be provided with axial relief passages 45 to reduce the stiffness of pins 35 and to thereby enhance the radial compressibility and deformability thereof. Each pin relief passage 45 may be adapted to retain a plug element such as a self-threading screw 46 whereby when plug or screw 46 is inserted or threaded axially into the relief passages 45, pins 35 will be stiffened and otherwise have the compressibility and deformability thereof reduced. Radially extending grooves are provided in the dome to permit entry of a tool such as a screwdriver to allow for quick disassembly of the dome from the back plate as will hereinafter be described.

In operation, the model airplane propeller spinner 10 of this invention is utilized on the model airplane engine 15, with a previously selected propeller 13, by first placing base plate 11 axially on propeller shaft 14 with rear surface 21 thereof in engagement with engine driving thrust plate 22. Selected propeller 13 is similarly inserted on propeller shaft 14 with the central rear surface thereof in flush engagement with front surface 28 of base plate 11 and with one back trailing edge 47 of propeller 13 in locating engagement with one of the locating or positioning projections 25 of base plate 11, such as the projection 25 in upper right of FIG. 2, for example. Propeller retaining member 17 is threaded on propeller shaft 14, against a washer 18 to prevent damage to propeller 13, and when sufficiently tightened thereof, will appropriately secure propeller 13 to base plate 11 on propeller shaft 14 and against propeller drive thrust plate 22 to drivingly retain propeller 13 and base plate 11 on propeller shaft 14.

Dome member 30 is thereafter generally positioned with relieved portions 33 thereof in aligned relationship with the blades of propeller 13 and is positioned over propeller 13 with positioning and retaining pins 35 in axial registry with base plate retaining passages 24. Dome 30 is then forced axially toward base plate 11 to insert pins 35 respectively in base plate passages 24 with pin end portions 36 deformably and frictionally urged through the opening of narrower ridges 27 to a point with the pin end portions 36 just beyond ridges 27 and with pin inward beveled surfaces 39 expandably snapped into respective 360 degree engagement with ridge rear surfaces 41 (FIGS. 5–7).

This multiple 360 degree snap engagement provides a large and definitive scope of retentive force which is generated by resilient deformative action without reliance on weaker pivoting or flexing action. This action holds dome radial face portion 32 and flanges 34 securely in complemental engagement with the front radial face of base plate 11 and grooves 26 respectively, to accurately and coaxially position and secure dome 30 on base plate 11, and to enclose the center of propeller 13 and propeller retainer 17 within the hollow of dome 30 (FIG. 1). Also, the 360 degree deformative resilient retention provided by the three pins 35 and pin passages 24 creates an extremely large retentive force with respect to the radial space used and thereby allows the retaining structures to avoid the propeller while providing the required retention.

Also, the three-point pin retention which is made possible in a spinner by the structure of the spinner 10 of this invention provides a single plane of retention for reliability and precision.

After extended periods of severe wear between dome pin ends 36 and base plate passage ridges 27, resulting from an excessive number of assembly and disassembly operations of dome 30 with respect to base plate 11, the retentive effect of pin end portions may be reduced. If for this, or any reason, the pin and passage retentive force is reduced or otherwise not sufficient for any given use of spinner 10, metal plugs or screws 46 may be respectively driven or threaded into pin relief passages 45. Pins 35 will be stiffened, the radial compressibility and deformability thereof will be reduced, and the resistance to axial passage past passage ridges 27 will be increased, thereby compensating for the reduction in retentive action between pins 35 and retaining passages 24.

To disassemble dome 30 from base plate 11, a screwdriver 48 may be inserted in one of three radial slots 49 in dome radial face portion 32, whereby extended insertion of the taper of the screwdriver 48 or a twisting action thereof will cause at least the adjacent pin 35, if not two or all three pins 35, to snap out of the retained position (FIGS. 5–7) in pin passages 24. Dome 30 will thereby be removed from base plate 11 and propeller retainer 17 is accessible for allowing removal thereof to permit manipulation of, or replacement of, propeller 13.

It is to be understood that the invention is not to be limited to the specific constructions and arrangements shown and described, as it will be understood to those skilled in the art that certain changes may be made without departing from the principles of the invention.

What is claimed is:

1. A model airplane engine propeller spinner to be mounted with a propeller on the propeller shaft and thrust plate of the engine by a propeller retainer such as a propeller nut threadably tightened on the propeller shaft comprising a circular laminar base plate having an axial passage for receiving the engine propeller shaft axially therethrough, said base plate having a central

radial portion adjacent said axial passage with rear and front radial surfaces adapted to complementally engage the front of the thrust plate and the back of the propeller respectively, an axially symmetrical and hollow dome having a base portion which is radially relieved to receive the propeller radially therethrough, said dome having a radial base surface portion adapted to complementally engage the front of said base plate to radially and coaxially position said dome thereon and to enclose the propeller shaft and propeller center within said dome, and means for releasably securing said dome in position on said base plate, whereby said dome may be selectively released and removed from its position on said base plate to allow the propeller retainer to be tightened or loosened on said propeller shaft to respectively retain or loosen said propeller and base plate from said thrust plate to allow the propeller to be separately manipulated.

2. An engine propeller spinner as defined in claim **1** wherein said base plate has means projecting axially from the front thereof to circumferentially position the back of the propeller with respect thereto.

3. An engine propeller spinner as defined by claim **2** with said base plate propeller positioning means being positioned on said base plate to laterally engage the trailing back edge of the engine propeller and to thereby circumferentially position the propeller with respect to the front of said base plate and said dome securing means aligned with said base plate, to align the propeller with the radial reliefs in said dome base portion when the propeller is positioned thereon and affixed thereto to allow said dome to be secured to said base plate.

4. An engine propeller spinner as defined in claim **1** wherein said means for releasably securing said dome comprises three passage portions in said base plate having respective passages formed axially therein and equally radially and angularly spaced about the base plate axis, and three pins extending axially from said dome base portion and adapted to be in respective registry with said three base plate passages to engage said base plate within the passages of said passage portions to retain said dome in position on said base plate.

5. An engine propeller spinner as defined in claim **4** wherein said base plate propeller positioning means comprises projections respectively positioned adjacent said pin passages in said base plate and adapted to engage the rear edge of the propeller to circumferentially position the propeller axially adjacent said pin passages when the propeller is mounted on said base plate front surface and propeller shaft, and said dome radial propeller reliefs are correspondingly positioned adjacent said dome pins to accommodate the propeller when said dome is positioned and retained on said base plate.

6. An engine propeller spinner as defined in claim **4** wherein said passage portions comprise separate axial passages having radially inwardly extending and resiliently deformable ridges, and said dome pins have tapered and resiliently deformable end portions having a small diameter adjacent the pin end and a larger diameter portion inward from said pin end and larger than the inner diameter of said passage ridges, whereby said pins will be respectively snapped into and retained in said passages by axial interference between said ridges and respective large diameter pin portions when the pin end portions are inserted axially through and beyond said passage ridges in said passage.

7. An engine propeller spinner as defined in claim **6** wherein said dome pins have an axial relief passage opening in the ends thereof and extending inwardly beyond said respective ridges thereof for allowing radially inward deformation of said pin end portions and radially outward deformation of said passage ridges to facilitate resiliently deformative passage of said pins in said base plate passage portions.

8. An engine propeller spinner as defined in claim **7** wherein said pin relief passages are adapted to receive and retain a plug in engagement with the sides of said pin passages, and a plug is provided for insertion into said pin passages to selectively reduce the radially inward deformability of said dome pins, as otherwise provided by said pin relief passages, to selectively increase the retentive force of said relief pins with respect to said passage portions.

9. An engine propeller spinner as defined in claim **8** wherein said plug comprises a tapered screw whereby said screw will selectively reduce the radial inward deformability of said pins, and thereby increase the pin retentive force, according to the extent to which said screw is threaded axially into said pin relief passages.

10. An engine propeller spinner as defined in claim **4** wherein a radial slot is provided in said dome base surface portion to allow ready entry of a tool whereby said dome can be urged away from engagement with said base plate against the retentive action between said axial dome pins and said axial base plate passages to release said dome from said base plate.

11. An engine propeller spinner as defined in claim **1** wherein said dome base surface portion includes an axially extending flange adjacent the periphery thereof, and said base plate is provided with a recess for complementally receiving said dome flange when said dome is positioned thereon whereby outward radial movement of the rear portion of said dome with respect to said base plate is prevented.

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