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 [21] Appl. No. **872,037**  
 [22] Filed **Oct. 29, 1969**  
 [45] Patented **Jan. 11, 1972**  
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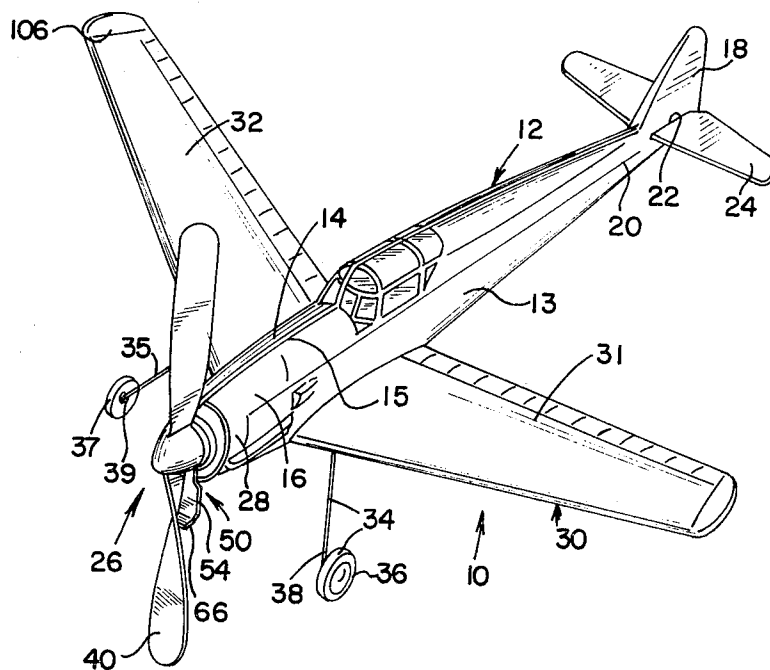
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[54] **MODEL AIRPLANE**  
**14 Claims, 7 Drawing Figs.**

[52] U.S. Cl. .... **46/76,**  
**46/78, 46/191**  
 [51] Int. Cl. .... **A63h 27/00**  
 [50] Field of Search. .... **46/76, 78,**  
**79**

[56] **References Cited**  
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**ABSTRACT:** The model airplane is of the type formed of a thin sheet of plastic material. A propeller assembly including an engine-noise-simulating member is mounted at the forward end of the airplane. The propeller assembly is connected to a rubber band which is secured within the fuselage of the airplane and extends from the forward end thereof. The noise-simulating member is releasably mounted on the propeller assembly and includes a portion which extends into the path of rotary movement of the propeller to engage the propeller for simulating an engine noise when the propeller is rotating. Each wing of the airplane has a box-shaped strengthening spar secured to the underside thereof. Each spar has sidewalls and a bottom wall which tapers inwardly of the associated wing toward the tip of the wing. The bottom wall of each strengthening spar has a landing-gear-mounting portion for releasably holding a landing gear strut to the strengthening spar.





## MODEL AIRPLANE

The present invention relates to improvements in a model airplane of the type which is formed of a thin lightweight plastic sheet material which is vacuum-drawn into suitable dies. The left and right halves of the fuselage including the vertical stabilizer, the elevator which fits in a slot at the rear end of the fuselage, and the left and right wings which are secured to the fuselage are formed in this manner. Preferably, the wings are formed together as a one-piece wing structure having a central portion which is secured to the underside of the fuselage.

According to the teachings of the present invention a box-shaped strengthening spar, made of a thicker material than the wings is secured to the underside of each wing. Also, the propeller assembly for the airplane includes a detachable noise-simulating member mounted thereon between the propeller and the fuselage and is adapted to engage the propeller to simulate an engine noise when the propeller is rotating.

A general object of the present invention is the provision of a model airplane in which a strengthening spar is secured to the underside of each wing of the airplane for strengthening each wing both chordwise and spanwise.

Another object of the present invention is to provide wing-strengthening spars which prevent wing flutter during slight of the model airplane.

Another object of the present invention is the provision of a model airplane having a strengthening spar secured to the underside of each wing of the airplane and wherein each spar permits releasable mounting of landing gear struts on the spars at positions which closely approximate the actual positioning of landing gear struts on a true scale model of the aircraft from which the model airplane is copied.

Another object of the present invention is the provision of a model airplane having a strengthening spar secured to the underside of each wing of the airplane and wherein each spar has a formation for releasably mounting a landing gear strut at a position spaced a sufficient distance from the center line of the fuselage so that the landing gear struts are spaced from one another a sufficient distance to provide a wide track between each strut thereby providing the model airplane with good ground stability.

Another object of the present invention is the provision of a model airplane having a strengthening spar which is secured to the underside of each wing of the airplane and which permits a landing gear strut to be releasably mounted thereon.

Another object of the present invention is the provision of a model airplane in which an engine-noise-simulating member is detachably mounted on a propeller assembly of the airplane at a position between the propeller of the assembly and the fuselage of the airplane.

Another object of the present invention is the provision of a model airplane in which a very low cost engine noise simulator is detachably mounted between the propeller assembly and the fuselage of the airplane.

Still another object of the present invention is the provision of a model airplane having an engine-noise-simulating member which will provide maximum noise with minimum power loss.

These and other objects and advantages of the present invention, and the manner of their attainment, will become more apparent from the following description of the preferred embodiments of the invention taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective view of the model airplane of the present invention;

FIG. 2 is a fragmentary exploded perspective view of the propeller assembly of the model airplane shown in FIG. 1;

FIG. 3 is a bottom plan view of the right wing;

FIG. 4 is a sectional view of the right wing taken along line 4—4 of FIG. 3;

FIG. 5 is a sectional view of the right wing taken along line 5—5 of FIG. 3;

FIG. 6 is a sectional view of the strengthening spar of the right wing taken along line 6—6 of FIG. 3; and,

FIG. 7 is a sectional view, similar to FIG. 6, of a modified strengthening spar.

Referring now to the drawings in greater detail, the model airplane of the present invention is generally indicated at 10 in FIG. 1. The airplane 10 has a fuselage 12 which is formed from left and right fuselage sections 13 and 14. The sections 13, 14 are joined together along the edge thereof, as indicated by the edge 15 on the simulated cowl portion 16 of the fuselage. In this way, the vertical stabilizer 18 is formed integral with the fuselage. The rearward end 20 of the fuselage 12 has a slot 22 therein for receiving a horizontal stabilizer 24 and a propeller assembly 26 is attached to the forward end 28 of the fuselage 12. A one-piece wing structure 30 including left and right wings 31 and 32 is secured to the underside of the fuselage 12. As will be described more fully in connection with the description of FIG. 3, 4 and 6, left and right landing gear struts 34 and 35 are releasably secured to the underside of the wings 31 and 32. A wheel 36, 37 is secured to the lower end 38, 39 of each of the struts 34 and 35.

As best shown in FIG. 2, the propeller assembly 26 includes a propeller 40 which is connected by a hook member 42 to a resilient windable mechanism 44 which, in the illustrated embodiment, is a rubber band. The rubber band 44 is secured within the fuselage at the rearward end 20 thereof.

The propeller assembly 26 also includes a spacer hub 46 mounted on a shaft portion 48 of the hook member 42 and a key-shaped engine-noise-simulating member 50 which has a ring portion 52 releasably received on a cylindrical portion 53 of the spacer hub 46 and a shank portion 54 extending radially outwardly from the cylindrical portion 53. It will be understood that the noise-simulating member 50 can be removed from the propeller assembly 26 merely by unhooking the rubber band 44 from the hook member 42 and slipping the member 50 off of the spacer hub 46. Also, the spacer hub 46 has a boss portion 55 which holds the member 50 against the forward end 28 of the fuselage 12 when the rubber band 44 is wound and in tension.

The forward end 28 of the fuselage 12 has a circular recessed portion 56 defined by a rim or coaming 58. This circular recessed portion 56 has a circular opening 60 therein through which the rubber band 44 extends into the interior of the fuselage 12 and in which the cylindrical portion 53 of the spacer hub 46 is received when the rubber band 44 is wound and in tension. The ring portion 52 of the noise-simulating member is adapted to be received against the recessed portion 56 and confined in that position by the coaming 58 and the spacer hub 46 on which the ring portion 52 is received. To hold the member 50 against rotation, the coaming 58 has a slot or guideway 62 formed therein for receiving and holding the shank portion 54 of the member 50 when the member 50 is held against the recessed portion 56. To better locate the shank portion 54 in the guideway 62 the shank portion is provided with a reduced-in-width portion 63 which is received in the guideway 62.

As shown, the shank portion 54 extends radially from the axis of rotation of the propeller 40 and has a tip or end portion 66 which is bent to extend toward and into the path of rotation of the propeller 40. It will be understood that when the propeller is turned to wind the rubber band 44, tension will be placed upon the rubber band 44 to draw the boss portion 55 of the hub 46 against the recessed portion 56 of the fuselage 12 with the cylindrical portion 53 of the hub 46 received into the opening 60. In this way, the noise-simulating member 50 will be held firmly in place when the rubber band 44 is wound and in tension.

It will be apparent from FIG. 2 that the noise-simulating member 50 is formed of a sheet of thin material. In one preferred embodiment of the invention, the noise-simulating member is made from a 0.010-inch-thick plastic sheet material, such as a 0.010-inch-thick sheet of a polyvinyl chloride material.

It will be appreciated that depending upon the engine sound desired the engine-noise-simulating member 50 can be made of different materials and have different thicknesses. How-

ever, it is to be noted that a small thickness is desired to minimize loss of power from the contact of the tip 66 and the shank portion 54 with the rotating propeller 40. Also the key shape of the member 50 provides a louder simulated motor noise with minimum power loss, due to the shank portion 54 being drawn into contact with the propeller 40 resulting in a slapping and vibrating action. Another feature of the member 50 is the tapering of the tip 66 which enables the shank portion 54 to be pushed out of contact with the propeller 40 during winding of the rubber band 44, preventing damage to the engine-noise-simulating member 50. Moreover, the member 50 can be easily removed from the propeller assembly 26 merely by unhooking the rubber band 44 from the hook member 42 and then removing the member 50, if engine noise simulation is not desired. This gives a small power increase.

Another important feature of the present invention is the provision of a strengthening spar 70 (FIG. 3) secured to the underside of each of the wings 31 and 32. Since each wing is a mirror image of the other wing, only the spar 70 secured to the underside 71 of the right wing 32 will be described in detail with reference to FIGS. 3-6. As shown in FIGS. 3 and 4 the strengthening spar 70 is in the form of an elongated shallow box which has a bottom wall 72 and sidewalls 74. The box-shaped spar 70 is open at the top and is secured to the underside 71 of the wing 32 along the top edges of the sidewalls 74. Preferably, the box-shaped spar 70 has a rim portion 76 which extends from the top edges of the walls 74 to facilitate securing of the spar 70 to the underside 71 of the right wing 32 with a suitable adhesive.

As shown in FIG. 4, the longer portion of the box-shaped spar 70 extends spanwise of the wing and the shorter portion extends chordwise of the wing. In this way, the spar 70 strengthens the wing chordwise and spanwise.

As shown in FIG. 3, if desired, the rim portion 76 can have two locating niches 78 and 79 which are adapted to mate with two locating projections 80 and 81 formed in the wing 32. The locating niches 78 and 79 and the locating projections 80 and 81 defined spar-locating means for properly and accurately positioning and locating the spar 70 on the underside 71 of the right wing 32. It will be understood that a similar spar, not shown, can be properly located on the underside of the left wing 31 in like manner.

As shown in FIG. 3, the bottom wall 72 includes a landing-gear-mounting portion, generally indicated at 82, for releasably mounting the upper end portion 84 of the landing gear strut 35. To provide a firm mounting of the landing gear strut 35, the upper end 84 of the wire strut 35 is U-shaped having two leg portions 86 and 87 and a bight portion 88. As shown in FIG. 3, the landing-gear-mounting portion 82 is formed by pressing out and cutting out portions of the bottom wall 72. In this regard, it will be understood that the spar 70 can be formed with the landing-gear-mounting portion in one operation from a sheet of semirigid material by a conventional sheet-forming apparatus.

The landing-gear-mounting portion 82 is designed to firmly hold the U-shaped end portion 84 of the wire strut 35 against side-to-side movement, fore-and-aft movement, and in-and-out movement. In other words, the landing-gear-mounting portion 82 releasably and firmly holds the landing gear strut 35 against three-dimensional movement. For this purpose, and as best shown in FIGS. 3 and 6, the landing-gear-mounting portion 82 includes a guide projection 90, a holder strip portion 92, a keeper projection 94, and a stop projection 96, all of which extend from the bottom wall 72.

As shown, the end portion 84 is received over the guide projection 90, under the holder strip portion 92 and over the keeper projection 94. It will be noted that the sides 97 and 98 of the guide projection 90 define guide channels for the leg portions 86 and 87 and the keeper projection 94 has a curved side 99 defining a curved guide channel for the bight portion 88 of the end portion 84 of the landing gear strut 35. The stop projection 96 limits rearward movement of the bight portion 88 whereas the keeper projection 94 limits forward movement

of the bight portion 88. Also, the keeper projection 94 cooperates with the guide projection 90 and the inclined portions 100 and 101 of the holder strip portion 92 to limit side-to-side movement of the end portion 84. The inclined portions 100 and 101 of the holder strip portion 92 hold the end portion 84 from movement away from the underside 71 of the right wing 32 and cooperate with the holder strip portion 92 to prevent rocking movement of the end portion 84.

A modified mounting of a modified landing gear strut is shown in FIG. 7. In this embodiment, a spar 70' is formed without a keeper portion. Also, the end portion 84' of the modified strut is longer than the end portion 84, shown in FIG. 6, so that a bight portion 88' of the end portion 84' can be bent to extend upwardly along a portion of the rear sidewall 74' of the spar 70' and an end 87a of the leg 87' of the end portion 84' can be bent to extend upwardly along the front sidewall 74' as shown. The end 87a forms a front stop and the bight portion 88' forms a rear stop. These stops provide a more positive locking-in-place of the modified landing gear strut and prevent easy or accidental disassembly of the strut from the spar 70'.

It will be understood that the box-shaped spar 70 is made of a semirigid, semiflexible sheet material such as a plastic sheet material. In one embodiment of the invention, the spar 70 is made from a polyvinyl chloride material, similar to the material from which one preferred form of the member 50 is made. With this construction, the projections 90, 94 and 96 and holder strip portion 92 can be moved or distorted slightly when inserting the U-shaped end portion 84 of the wire landing gear strut 35, and, after the end portion 84 is properly located, the projections 90, 94 and 96 and the portion 92 will snap back into their normal positions. In this way, the slight flexibility of the material from which the spar 70 is made facilitates easy mounting and dismounting of the landing gear strut 35 on the spar 70 so that the model airplane 10 can be readily flown with or without the landing gear struts 34 and 35.

As best shown in FIG. 4, a central portion 102 of the one-piece wing structure 30 has a rib 103 on the underside thereof which extends chordwise across the central portion 102 and separates the left wing 32 from the right wing 31. The rib 103 appears as a slot on the upper surface of the wing structure 30 so that the rib 103 can be received over a rib 104 formed on the underside of the fuselage 12 and secured to the underside area 105 of the fuselage 12 by a suitable adhesive. In this way, yaw movement of the wings 31 and 32 relative to the fuselage 12 is prevented.

It will be noted that the strengthening spar 70 extends along the underside 71 of the wing 32 to a point adjacent the rib 103 which point is also underneath the fuselage 12 so that the strengthening spar secured to the wing 32 will extend from the area 105 of the fuselage 12 which is secured to the wing 32. In this way, a rigid connection is provided between the wing 32 and the fuselage 12, and in a similar manner, between the wing 31 and the fuselage 12. Also, to reduce drag, the bottom wall 72 is tapered inwardly toward the underside 71 of the wing 32 in a direction toward the tip 106 of the wing 32.

With each spar 70 constructed as described and secured to the undersides of the wings 31 and 32 in the manner described, wing flutter of the wings 32 and 31 (which are made of a very thin sheet material) is reduced, if not altogether eliminated. Moreover, the use of the box-shaped spars 70 to impart sufficient stiffness and strength to each wing allows the use of a minimum thickness sheet material for the one-piece wing structure 30 resulting in a weight and cost saving for the model airplane.

I claim:

1. In a model airplane comprising a fuselage having a forward end and a rearward end, a propeller assembly including a propeller and a spacer hub situated at the forward end of said fuselage, propeller-driving means secured to said fuselage and detachably connected to said propeller, the improvement comprising engine-noise-simulating means situated between

said forward end of said fuselage and said propeller, said noise-simulating means being key shaped and having a ring portion which is detachably received on said spacer hub and a shank portion which extends radially outwardly from said ring portion, said forward end of said fuselage having a guideway for receiving said shank portion to prevent rotation of same, and said shank portion having a bent end portion, said end portion and said shank portion extending into the path of rotary movement of said propeller to engage the same for simulating an engine noise when said propeller is rotating in normal flight direction.

2. The airplane as defined in claim 1 wherein said noise-simulating means is made from a thin semirigid sheet material.

3. The airplane as defined in claim 1 wherein said noise-simulating means is made of polyvinyl chloride.

4. The airplane as defined in claim 1 wherein said bent end portion is tapered to enable said propeller to force said shank portion out of the path of movement of said propeller during reverse rotation of said propeller.

5. In a model airplane having a fuselage, left and right wings secured to, and extending from, opposite sides of said fuselage, and each of said wings having a strengthening spar, the improvement comprising each of said spars being in the form of a shallow elongated box having an opening defined by a peripheral edge portion of said box, said peripheral edge portion including a flange which extends substantially around said box and is secured to the underside of one of said wings, each of said wings having at least one locating projection at a predetermined location on said underside thereof, and said flange of each of said box-shaped strengthening spars having at least one concave locating notch which is adapted to mate with said locating projection on said underside of one of said wings to ensure proper positioning of each box-shaped spar on said underside of one of said wings.

6. In a flyable model airplane having a fuselage and left and right wings secured to and extending from opposite sides of said fuselage, said wings being formed from a thin sheet of plastic material, and each of said wings having a strengthening spar, the improvement comprising each of said spars being separately formed in the shape of a shallow elongated box open at the top and having sidewall portions connected to and extending from said bottom wall, and a top edge defined by the upper peripheral edge portions of said sidewall portions, and means for securing said peripheral edge portions of each of said box-shaped strengthening spars to the underside of one of said wings.

7. The model airplane of claim 6 wherein said bottom wall of each of said box-shaped strengthening spars tapers inwardly toward said underside of the wing to which said spar is attached and tapers in a direction toward the tip of said wing to which said spar is attached.

8. The model airplane of claim 6 wherein said bottom wall of each of said box-shaped spars has means thereon for releasably mounting an end portion of a landing gear strut.

9. The model airplane of claim 8 wherein said means for releasably mounting an end portion of a landing gear strut on said bottom wall includes means projecting from said bottom wall for locating said end portion of said landing gear strut in a predetermined location on said bottom wall and for releasably and firmly holding said end portion of said landing gear strut against three-dimensional movement such as side-to-side movement, fore-and-aft movement, and in-and-out movement.

10. The model airplane of claim 8 wherein said means for releasably mounting an end portion of a landing gear strut includes a yieldable holder strip portion which extends from said bottom wall and is adapted to releasably receive said end portion of said landing gear strut thereunder, said holder strip portion serving to hold said strut end portion against said bottom wall.

11. The model airplane of claim 8 wherein said means for releasably mounting an end portion of a landing gear strut includes a keeper projection which extends outwardly from said bottom wall and a stop projection which is spaced from said keeper projection and extends from said bottom wall, said keeper projection and said stop projection being located so as to receive a part of said end portion of said landing gear strut therebetween, said keeper projection preventing movement of said strut end portion in one direction and said stop projection preventing movement of said strut end portion in the opposite direction.

12. The model airplane of claim 10 wherein said means for releasably mounting an end portion of a landing gear strut includes a guide projection which extends outwardly from said bottom wall, said holder strip is disposed adjacent said guide projection, and said guide projection cooperates with said holder strip portion for preventing side-to-side movement of said strut end portion.

13. The model airplane of claim 6 wherein said peripheral edge portions of said sidewall portions of each of said box-shaped spars include flange portions which are secured to said underside of one of said wings.

14. In a model airplane comprising a fuselage having a forward end and a rearward end, a propeller including at least two blades and a hub situated at the forward end of said fuselage, propeller-driving means secured to said fuselage and detachably connected to said propeller, and means for simulating engine noise, and improvement comprising said engine-noise-simulating means being mounted for free rotation on said hub between said propeller blades and said forward end of said fuselage, said forward end of said fuselage having means for engaging said engine-noise-simulating means for preventing rotation of said engine-noise-simulating means when said propeller is rotating, and said engine-noise-simulating means being stiff but resilient and having a deflectable end portion which extends into the path of said propeller during rotation thereof and which is engaged and deflected by said rotating propeller upon each revolution thereof.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,633,306 Dated January 11, 1972

Inventor(s) Lawrence H. Conover

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 25, "slight" should be --flight--.

Column 1, line 60, "these" should be --These--.

Column 2, line 16, "FIG." should be --FIGS.--.

Column 3, line 54, "semirigid" should be --semi-rigid--.

Column 4, line 23, "semirigid" should be --semi-rigid--  
and "semiflexible" should be --semi-flexible--.

Column 5, line 13, "semirigid" should be --semi-rigid--.

Column 6, line 44, "and" should be --the--.

Signed and sealed this 9th day of January 1973.

(SEAL)  
Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

ROBERT GOTTSCHALK  
Commissioner of Patents