

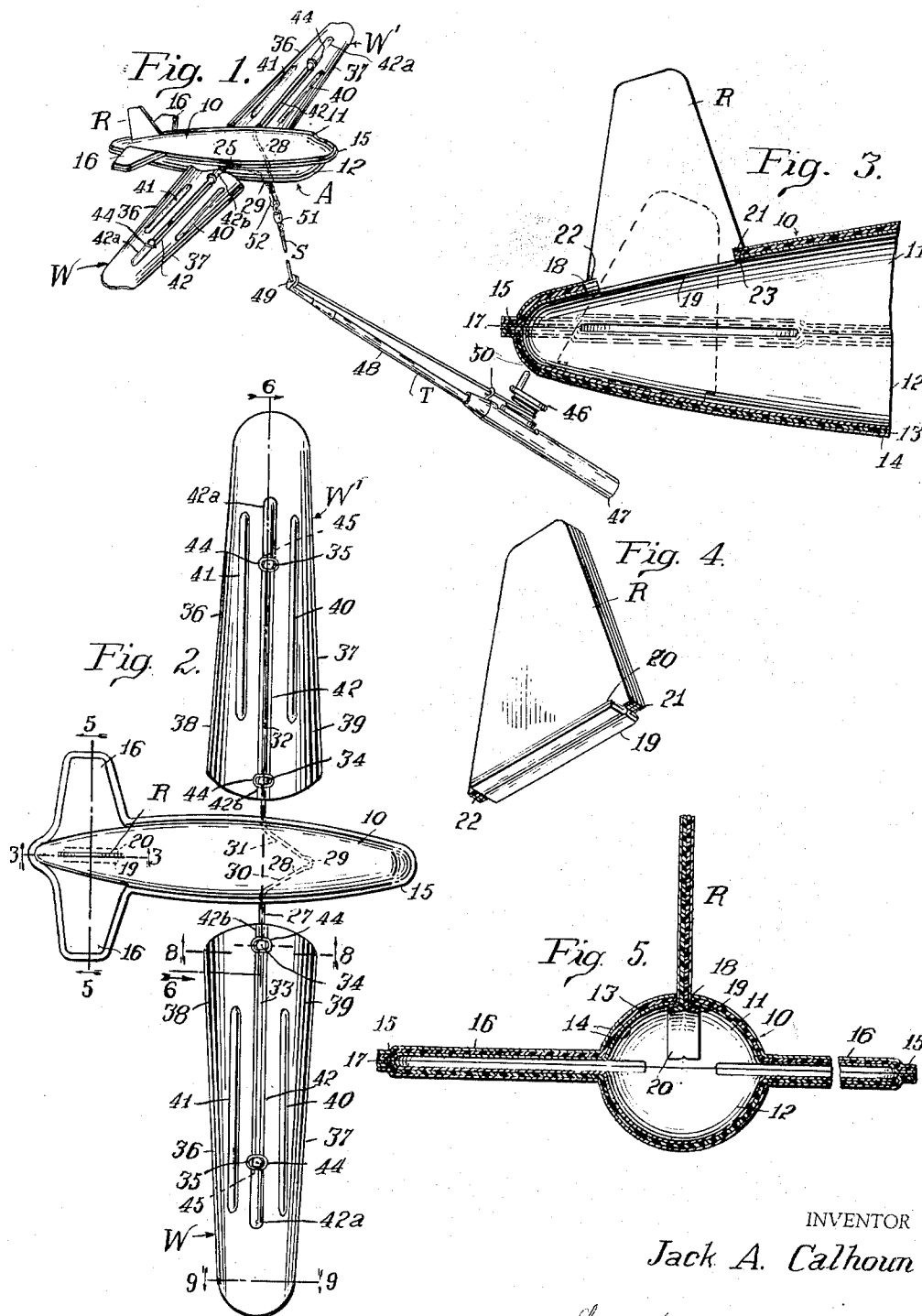
April 22, 1952

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TETHERED TOY AIRPLANE

2,593,979

Filed Jan. 11, 1952

2 SHEETS—SHEET 1



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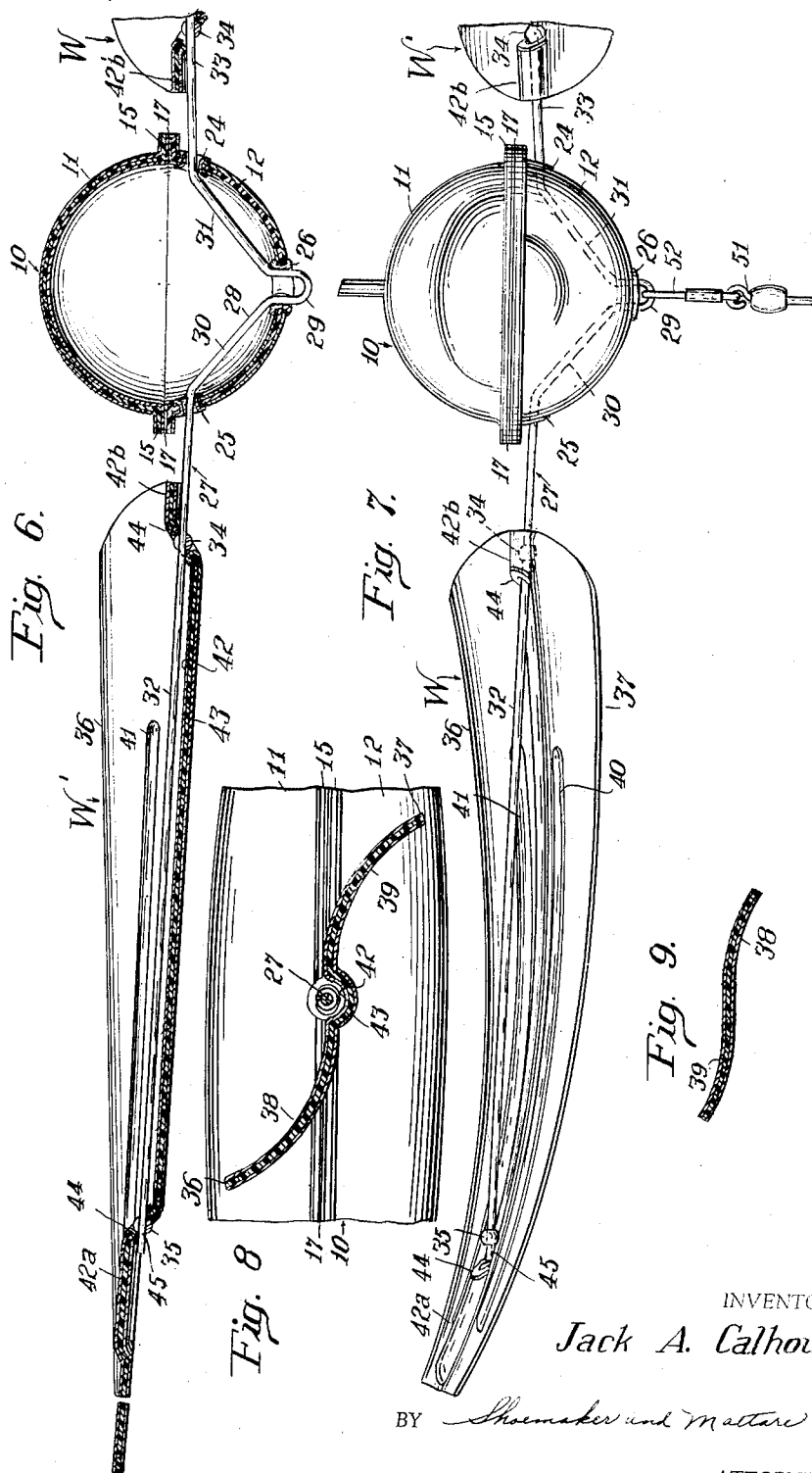
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UNITED STATES PATENT OFFICE

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TETHERED TOY AIRPLANE

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13 Claims. (Cl. 46—77)

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This invention relates to toy airplanes.

The toy airplane has embodied therewith novel rotatable wing construction whereby the plane is maintained in flight. The airplane is preferably tethered by suitable flexible string or the like, which string is associated with a reel that is mounted on and carried by a tethering stick. This tethering stick is in the form of a miniature fishing rod and reel but modified so as to adapt it for use in connection with the winding and unreeling of the string or the like from the reel so as to allow the tethered airplane to soar at different altitudes.

The airplane is fabricated from a particular plastic, which plastic has embodied thereon a silver coating and the overall appearance of the airplane preferably simulates actual flying ships but, of course, may take various forms as regards design, appearance, etc.

One of the features of the plane is the unique construction and mounting of the rotatable wings, there being a wing at each side of the optionally shaped and size fuselage or body. The unusual levitation of the plane results partially from its design and partially from the material from which it is fabricated.

It is desirable in the fabrication of toy airplanes to provide such a plane that will be light in weight and yet rugged and durable so as to withstand an indefinite practical use and yet which will embody demountable wings for purposes of shipment and ready assembly, and the present plane meets such conditions.

It is also desirable in toy airplanes to provide structure that results in known aerodynamic principles so that the plane will be sustained in its flight for an indefinite period of time and the construction of the present toy airplane and its aerodynamic principles are such that unusual and unexpected flight endurance and performance manipulation results therefrom.

With the foregoing in mind, it is therefore an object of the present invention to provide a toy airplane that is so designed and constructed that it will be sustained in flight for an indefinite period of time and is durable and capable of long usage.

Another object of the invention is to provide a toy airplane which embodies therewith a fuselage or body or its equivalent and with a pair of unique rotatable wings, one on either side of the body, fuselage or its equivalent.

Another object of the invention is to provide the combination of a unique rotatable winged toy airplane and a connection or an attach-

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ment of a string or the like thereto and which string is carried on a reel of a tethering stick, the stick being adapted to be held in the hand of the user and the reel enabling the string to be payed out and taken in from and on the reel respectively so as to limit the soaring height of the plane in the air.

Another object of the invention is to provide a toy airplane that is fabricated from a particular silver-coated, plastic, light-weight material, and which material is capable of being stamped, pressed or molded into the component cooperative elements comprising the overall toy airplane and including unique rotatable wing structures which are uniquely rotatably mounted and held from longitudinal movement on a supporting strut or the like. The invention embodies usage of cooperating bearing means on the wings and strut for demountably rotatably supporting the flexible wings on the strut.

Another object of the invention is to provide the aforesaid unique wing structures of extremely light-weight material, these wing structures being so inherently reinforced that they will maintain their shape and perform their function when rotatably mounted on a strut or the like throughout a long period of time.

With the above and other objects in view, the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, proportions, and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

Fig. 1 is a perspective view of the toy airplane as it will appear in flight and showing the tethering stick carrying the reel thereon and with the string about the reel and the end of the string attached to the airplane;

Fig. 2 is a top plan view of the toy airplane;

Fig. 3 is a vertical sectional view on line 3—3 of Fig. 2 showing the vertical stabilizer in its operative position in full lines and in inoperative telescoped position in dotted lines;

Fig. 4 is a perspective view of the vertical stabilizer;

Fig. 5 is a view taken on the lines 5—5 of Fig. 2 looking in the direction of the arrows;

Fig. 6 is a partial transverse view taken substantially on the irregular line 6—6 of Fig. 2

and showing the rotatable wing structure in operative position;

Fig. 7 is a partial end front elevational view similar to Fig. 6 but showing the flexing or bending of one of the wing elements to either remove the same from its supporting strut or to detachably connect the same thereto;

Fig. 8 is a sectional view taken along the lines 8-8 of Fig. 2 looking in the direction of the arrows; and

Fig. 9 is a sectional view taken along the lines 9-9 of Fig. 2 looking in the direction of the arrows.

The invention will be more readily understood by referring to the drawings in detail wherein like reference numerals or characters in the several views all designate the same component parts.

The toy airplane as a whole is designated at A, the tethering stick T and the flexible medium or string S. Specifically, the toy airplane comprises an elongated fuselage or body 10 which is generally torpedo or cigar shape. This body or fuselage is fabricated from two substantially similarly-shaped hollow sections, the upper section being denoted at 11 and the lower section at 12. This body or fuselage is preferably constructed from extruded polystyrene, this material being on the market under the trade name of "Polyflex." The said material has inherent flexible characteristics but no resiliency and is capable of being readily molded or otherwise formed into various shapes such as the shape of the fuselage or body of the present toy airplane. The material from which the body or fuselage is made is denoted at 13 whereas 14 is a silver coating preferably only on the outer surface of this material but, if desired, such coating may be on the inner and outer surfaces. The complementary upper and lower sections or halves of the fuselage or body of the airplane are each provided with a similarly formed, outwardly extending flange 15, which flange completely surrounds the entire body and the horizontal stabilizers 16, which stabilizers are integral with the respective upper and lower portions or sections of the body or fuselage.

A preferably solvent type of adhesive 17 is disposed between the opposed flanges of the two sections of the body or fuselage and, of course, where such an adhesive is used to secure these flanges together, the inner opposed surfaces thereof will be free of the silver or other coating so that a very tenacious adhesion of the two sections is effected.

The aft upper section 11 of the fuselage has a slit or elongated opening 18 therein and it is within the walls defining this said opening that the vertical stabilizer or rudder R is positioned and held. This stabilizer R is preferably formed from two thicknesses of the material from which the fuselage or body is formed and these thicknesses may be effected by turning over one piece of the material on itself and suitably adhesively or otherwise securing the same into contacting relationship and providing the outwardly extending flaps 19, 20 at the lower edge of the stabilizer and the ends of which flaps terminate inwardly of the extreme lower outer edges of the stabilizer and thus provide inset shoulder portions 21 and 22 at either end thereof. As seen in Figs. 3 and 4, this stabilizer R is adapted to have the shoulder 21 thereof overlap an upper portion 23 of the front end of the slit 18 and is thus, with the flaps

19 and 20, held in the full line operating position as shown in Fig. 3. For shipment purposes, however, the stabilizer R is merely depressed or telescoped within the aft portion of the fuselage as indicated by the dotted line position of the same in Fig. 3. The tolerances of the width of the slit 18 and the thickness of the stabilizer R are such that there will be good frictional engagement between the same to also aid in maintaining the stabilizer R either projected outwardly or telescoped as shown in Fig. 3.

The fuselage or body has diametrically oppositely disposed eyelets, preferably brass eyelets 24 and 25 therein (see Fig. 6). The position of the eyelets is preferably slightly forwardly of the exact mid point of the fuselage or body of the airplane. Forwardly of the said eyelets and in the bottom section or portion 12 of the fuselage or body, there is a grommet 26 having an opening therein.

A strut support denoted generally at 27, which may be made of any suitable material but is preferably a high carbon wire known as piano or music wire, has its mid section 28 of substantially V-shape and a bight portion 29 at the ends of downwardly and forwardly extending legs 30 and 31 constitutes the connection of the V-shaped portion of the strut with the legs 30 and 31. This bight portion 29 which is at an obtuse angles with respect to legs 30 and 31 extends outwardly through the grommet 26 and serves as a means to attach the end of the string thereto as is hereinafter more fully set forth.

The leg portions 30 and 31, see Fig. 6, are actually disposed within the body or fuselage of the plane and, in the lower section or half 12 thereof. The strut or wing-supporting member 27 has oppositely outwardly-extending arms 32 and 33, which arms are of substantially the same length and serve as the actual rotatable supporting means for the wing structures later described. These arms are identical and, at spaced points, they have fixedly mounted thereon suitable sphere-like or rounded bearings 34 and 35. This whole strut including the arms 32 and 33 is, of course, substantially rigid but yet the same can be manually flexed. As both of the arms 32 and 33 are identical and have the same bearings 34 and 35 thereon, it is believed description of one is sufficient.

The pair of wings denoted generally at W and W', which are left and right wings when the plane is viewed from the front, are also similarly formed and a description of one and its association and cooperation with the said bearings 34 and 35, it is believed, will be sufficient. Each of the wings tapers inwardly from the body or fuselage of the ship gradually outwardly to the tips thereof as will be noted from the trailing and leading edges 36 and 37 in Fig. 2. In cross section, the shape of the wings throughout their lengths is substantially in the form of an S and diminishes in length from the large end thereof to the tip end, which means that an imaginary transverse view drawn through the wings would show similarly and oppositely longitudinally extending concavo convex formations which tend to result in the substantial S-shape cross section of the wing. The opposite concavo convex, longitudinally extending portions of the wings are denoted at 38 and 39, see Figs. 8 and 9. These wings, of course, are preferably fabricated from the same material as the fuselage or body of the airplane, namely

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the polystyrene material which is silver coated on both sides or faces thereof.

There are similarly formed, spaced, longitudinally extending reinforcing ribs 40 and 41 that are stamped in each of the wings. These ribs present oppositely disposed raised and depressed formations on both faces of the wings. In other words, one of the ribs will constitute an embossure or raised portion on one side while its opposite side will be a longitudinal depression but the ribs and the depressions are reversed on opposite faces or sides of each of the wings. Additionally, each of the wings has a longitudinally disposed depression or recess 42, which depression or recess is intermediate of the reinforcing ribs 40 and 41 and spaced therefrom. This recess 42, of course, results in a reinforcing rib 43 on the opposite face of the wing. At each end of the said recess 42, an eyelet 44 which is preferably brass, is positioned. It will be noted that each of these eyelets is canted or angularly disposed relative to the longitudinally extending recess 42 at each end of the same, see Fig. 6. Reinforcing ribs 42a and 42b form continuations of the depression 42 at opposite ends thereof.

The positioning and spacing of the rounded bearings 34 and 35 from each other, that are fixedly carried on the arms 32 and 33 of the strut, is such that when the wing W or W' is mounted on the strut, the same will be uniquely disposed in the openings of the eyelets 44 that are at the ends of the longitudinally extending depression or recess 42 formed by the rib 43. As will be seen from Fig. 6, the lower portion of these bearings 34, 35 will each engage behind a complementary lower inclined portion of the eyelet and thus the wing is detachably connected to the strut member and the rounded bearings and the eyelets serve as ideal cooperative means to allow for free and unimpeded rotation of the wing about the bearings and, of course, the arm 32 of the strut member as well as to maintain the wings on the strut.

It is a simple matter to attach or detach the wing W or W' from the arm 32 of the strut member. In Fig. 7, the wing W is in a flexed or bent condition and it will be noted that the extreme or free end 45 of the arm 32 of the strut member is disposed directly in the opening in the brass eyelet 44 whereas the adjacent rounded bearing 35 is outwardly of that opening and the other bearing 34 has passed through and beyond the opening in the adjacent eyelet 44. In this positioning of the arm of the strut member and the flexed or bent condition of the wing, it can either be readily removed from the arm of the strut member or by moving the wing to the right as seen in Fig. 7, the rounded bearing 34 will seat itself in the inclined or canted eyelet 44 in the wing and, simultaneously therewith, the extreme end portion 45 of the strut member will pass through the opening in the eyelet 44 and dispose the bearing 35 adjacent thereto within that opening in the eyelet with portions of the strut adjacent the bearings disposed in the depression created by the formation of ribs 42a and 42b and, as such, the cooperative and component elements will be in the association and relation with each other as shown in Fig. 6 of the drawings. It is clear that the bearings 34, 35 and the eyelets 44 at either end of the recess 42 actually serve a dual function, namely as a means for the wing to rotate thereabout and to detachably secure the wing to the arm of the strut member. It has been described hereinbefore that lower portions

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of the rounded bearings 34 and 35 actually engage the inclined or canted lower portions of each of the eyelets 44 and thus serve to maintain the wing on the strut member and permit it to rotate thereon. However, the wing may be removed or placed on the strut member by simply flexing it between its ends and more or less placing in alignment the eyelets 44 so that the bearings can either be removed from their position in the eyelets or placed therein.

The material from which the fuselage or body and also the wings are formed is preferably of a thickness of .065 to .075 inch and is coated as hereinbefore mentioned with silver and, additionally, a protective coating, not shown, applied to the silver coating in order to prevent oxidation or discoloration thereof. This protective coating may be in the form of a rubberized transparent solution. The arms 32 and 33 of the strut are preferably slightly upwardly inclined, see Fig. 6. Colors other than silver may obviously be used.

Without limiting the invention to precise materials and weights, dimensions, etc., it has been found that a toy airplane constructed in accordance with the disclosure of this invention and from the materials mentioned herein can and did obtain the height of some 2300 feet and the wings at all times were substantially rigid and constantly rotating, of course, to maintain the soaring heights of the plane and to attain levitation. In this plane that was built and tested, the same measured about 23 inches from wing tip to wing tip and the fuselage or body of the plane was approximately 10 inches in length and its greatest diameter was about 2 inches. The wings tapered at their major portion adjacent the body or fuselage from 3 inches down to about 1 1/2 inches at their tips. The overall weight of the plane was less than one ounce. The type of material that was used and mentioned herein is springy in nature so that if the fuselage is dented it will immediately spring back into proper condition and this also applies to the wings of the plane.

The use of the airplane is very simple and while I prefer to use the tethering stick or rod T, it may be dispensed with and the string or ball of string held in the hand of the user. This tethering stick includes a reel 46 upon which the string S is wound, a handle 47 and a reduced portion 48 and an eye 49 at the end thereof with also an eye 50 adjacent the reel through which eyes the string extends and there is a conventional swiveled connection 51 which is in turn connected with a conventional detachable hook 52 and this hook 52 is engaged about the bight portion 29 of the strut member that projects beyond the bottom of the plane, see Figs. 6 and 7, so that the end of the string or cord S may be connected with the plane. A toy airplane constructed in accordance with this invention has been tested at wind currents of 35 M. P. H. and has stood up very well and maintained its flight. Depending upon the wind currents, of course, will determine how the plane will soar or move in the air and thus, of course, if the wind currents are gentle, the plane will ride in the substantially same horizontal position but if the plane is caught in cross currents or air pockets, it will accordingly dive and rise similarly to a conventional commercial flying ship.

It is believed important that reference be had to Fig. 2 wherein it will be noted that the legs 30 and 31 of the mid portion of the strut member

not only are V-shaped but they are inclined downwardly and forwardly and thus the obtusely disposed bight portion 29 of these legs which connects them together projects outwardly through the grommet 26 at a point that is disposed closer to the nose or forward point of the plane rather than the aft portion thereof and serves to rigidize the fuselage and hold the strut in a fixed relationship therewith. This is important because it has been found that by so positioning the attachment of the string to the bight portion 29, the plane will in most instances be in proper balance and ride the air currents in a substantially horizontally disposed position.

While the fuselage or body of the plane is shown as torpedo or cigar shape, it is understood that the same may be in the form of an elongated flat body or disc. As a matter of fact, the wings when rotatably mounted on the strut structure will function to cause the airplane to act as a flying wing in the absence of utilizing any body or fuselage structure whatsoever.

The arms or extensions 32 of the strut member, or that portion of these arms that is disposed in the longitudinally extending groove or recess 42, serve with the ribs 40 and 41 to additionally reinforce and strengthen the wings W and W'. Thus, each wing structure is rigidized when the same is associated with the extensions 32 of the strut 27.

I claim:

1. A toy airplane comprising a hollow body, a continuous substantially rigid wing strut supporting member extending laterally beyond opposite sides of the body, a wing mounted on and carried by each of the said extensions of the strut member, and cooperable engaging bearing means between each of the extensions of the strut member and the wing supported thereon for allowing rotation of the wing relative to the strut member and for maintaining each wing on each of the said extensions, the strut member having an integral downwardly and forwardly extending substantially V-shaped midsection thereof which is disposed within the hollow body of the plane and the said V-shaped portion of the strut member having its bight portion projecting through an opening in the bottom of the body of the plane, said projecting bight portion serving as a means to attach a flexible tethering string thereto.

2. A toy airplane comprising a body, substantially rigid wing strut supporting member extending laterally beyond opposite sides of the body, a wing mounted on and carried by each of the said extensions of the strut member, and spaced cooperable engaging bearing means between each of the extensions of the strut member and the wing supported thereon for allowing rotation of the wing relative to the strut member and for maintaining each wing on each of the said extensions, wherein at least one of the cooperable bearing means comprises a fixed rounded bearing on the strut extension and an eyelet inclinedly disposed and affixed to the wing and in which eyelet the rounded bearing is detachably mounted.

3. A toy airplane comprising an elongated substantially rigid wing supporting strut member, an elongated wing spacedly rotatably mounted on the opposite end portions of the strut member, said opposite end portions being joined by an intermediate portion, individual cooperable bearing means carried by a portion of the strut member at its opposite end portions and portions of

the wings mounted on such end portions, said bearing means rotatably supporting each of the wings relative to the strut end portions upon which they are mounted and detachably maintaining each wing on the said end portions, and wherein the cooperable bearing means comprises a spherical rounded member fixedly carried by and on each end portion of the strut, and an inclinedly disposed eyelet fixedly positioned in and carried by each wing with the rounded bearing disposed in the said eyelet so that a lower portion of the rounded bearing abuts the lower inclined portion of the eyelet and allows rotation of each wing relative to the end portions of the strut and to maintain the wing in its rotational association with the projecting end portions of the strut.

4. A lightweight toy airplane fabricated from a silver-coated plastic material comprising a hollow body and a laterally extending rotatable wing mounted on each side of the body, a substantially rigid elongated wing supporting wire strut member including a lateral extension at each side of the body, which extensions serve as a rotatable mounting for the wing at each side of the body, the said strut member having a midsection of substantially V-shape and positioned to extend downwardly from and forwardly of the lateral extensions, and said V-shaped portion of the strut including a bight portion which serves as an attachment for a flexible means for tethering the plane.

5. A lightweight toy airplane fabricated from a silver-coated plastic material comprising a hollow body and a laterally extending rotatable wing mounted on each side of the body, a substantially rigid elongated wing supporting wire strut member including a lateral extension at each side of the body, which extensions serve as a rotatable mounting for the wing at each side of the body, the said strut member having a midsection of substantially V-shape and positioned to extend downwardly from and forwardly of the lateral extensions, and said V-shaped portion of the strut including a bight portion which serves as an attachment for a flexible means for tethering the plane, and wherein each wing is similarly formed and is substantially S-shaped in cross section and has its edges tapering gradually inwardly to the tip of the wing, the wing having longitudinally extending, spaced reinforcing ribs thereon between which ribs there is a longitudinally extending recess, an inclinedly disposed eyelet at each end of the said recess, the said lateral extensions of the strut member each having a spaced pair of rounded bearings thereon and the spacing of which bearings coincides with the positioning of the eyelets at the end of the said recess so that the bearings are disposed in the respective eyelets of each wing and the portion of the extensions between each of the bearings lies in the said recess and with the said ribs reinforces and strengthens each wing and allows for the rotation of each wing relative to the lateral extensions of the strut and serving to detachably maintain the wings in their rotative relationship with the lateral extensions of the strut member.

6. A toy airplane as defined in and by claim 4, wherein the body of the plane has an elongated slot in the aft upper portion thereof, a vertical stabilizer telescopically received within the walls of the slot formation whereby the stabilizer may be positioned in either of two positions, one being extended for service and the other being substan-

tially completely retracted within the hollow body for packing.

7. A toy airplane as defined in and by claim 4, wherein the body of the plane is comprised of two substantially similarly formed upper and lower sections with a flange continuously about each section and including horizontally disposed stabilizers at the aft end of the body, and means for permanently joining the complemental flanges of the two sections of the body and the horizontal stabilizers together.

8. In combination, a toy airplane and a tethering stick carrying a flexible extensible string means thereon to tether the said plane, the plane comprising a hollow body and a rotatable wing extending laterally beyond each side of said body, strut means for supporting each of said wings, the strut means having a V-shaped midsection thereof carried by the body and a lateral extension thereof on each side of the body and on which extension each of the wings is rotatably mounted, means for attaching the free end of the string to the bight portion of the midsection of the strut member, and reel means carried by the tethering stick whereby the string may be wound upon or unwound from the reel to determine and control the height of the plane in the air.

9. The combination of the airplane and tethering stick and extensible string means as defined in and by claim 8, wherein the body is elongated and the midsection of the strut means is disposed within the hollow body, the mid-section having a bight portion extending outwardly beyond the bottom portion of the body, said extending bight portion serving as a means to attach the free end of the string thereto.

10. A toy airplane fabricated from a silver coated plastic material comprising a hollow body and a laterally extending rotatable wing mounted on each side of the body, a substantially rigid elongated wing supporting wire strut member including a lateral extension at each side of the body, said extensions providing rotatable mountings for the wing at each side of the body, said strut member having a mid-section of substantially V-shape positioned to extend downwardly from and forwardly of the lateral extensions, said body having an eyelet disposed downwardly and forwardly of the lateral extensions, and said V-shaped portion of the strut including a bight portion obtusely disposed relative to the legs of

the mid-section, said bight portion projecting outwardly through said eyelet so that tethering means for the plane can be attached thereto.

11. A toy airplane comprising an elongated substantially rigid wing supporting strut member, a flexible elongated wing rotatably mounted on the opposite end portions of the strut member, said opposite end portions being joined by an intermediate portion, and cooperable bearing means respectively carried by opposite end portions of the strut member and portions of the wings mounted on said end portions, said bearing means being of such construction as to rotatably support each of the wings relative to the strut end portions and maintain each wing from displacement longitudinally of said strut member except when said wings are flexed intermediately of their ends whereupon said cooperable bearing means on the strut member and wings are disengaged from each other and said wings can be detached from said struts.

12. A toy airplane as defined in and by claim 11, wherein said intermediate portion of the strut member is of substantially V-shape, and said V-shaped portion of the strut including a bight portion which serves as an attachment for a flexible means for tethering the plane.

13. A toy airplane as defined in and by claim 12, and additionally including a hollow body having an eyelet in the bottom of the body disposed downwardly and forwardly of the opposite end portions of the strut member, and said V-shaped intermediate portion of the strut member being disposed within said hollow body and having its bight portion extending outwardly through said eyelet to provide a means for attachment of flexible means for tethering the plane.

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