Aug. 1, 1933. R. M. GUILLOW 1,920,746

AIRPLANE TOY

Filed Jan. 23, 1932

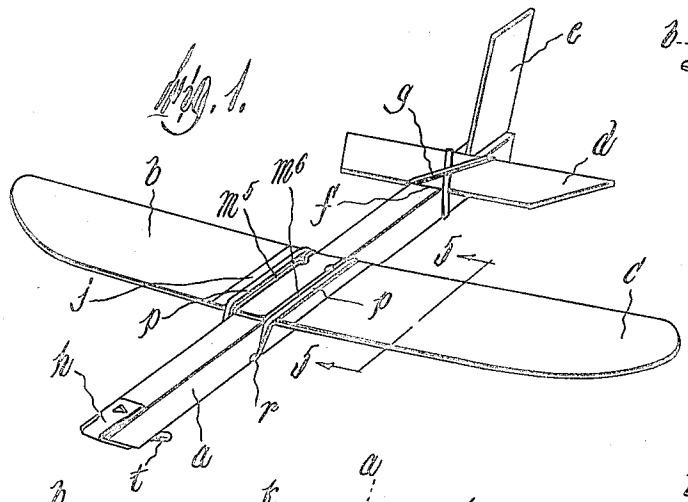


Fig. 1.

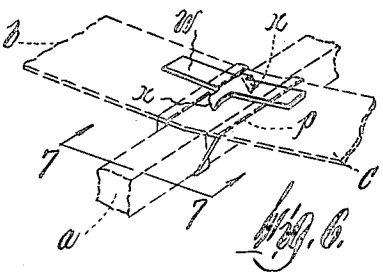


Fig. 6.

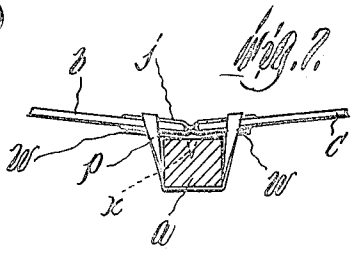


Fig. 7.

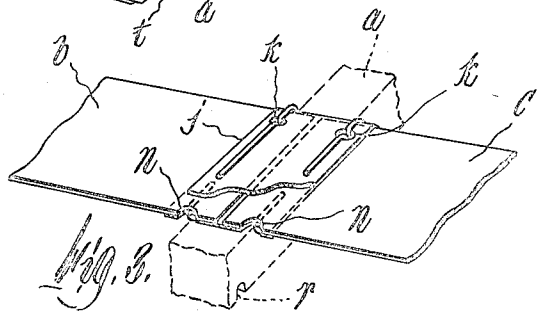


Fig. 3.

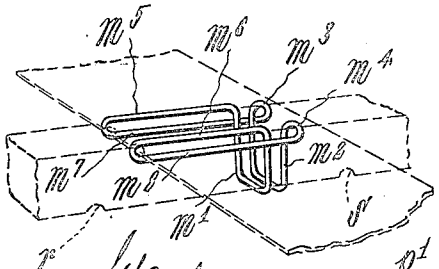


Fig. 4.

Fig. 2.

Fig. 5.

Inventor

Roscoe M. Guillow

by Wright, Brown, Quinby & Shay

Attys.

Patented Aug. 1, 1933 1,920,746

UNITED STATES PATENT OFFICE

1,920,746

AIRPLANE TOY

Roscoe M. Guillow, Wakefield, Mass.

Application January 23, 1932. Serial No. 583,330

9 Claims. (Cl. 46—50)

This invention relates to toy airplanes, particularly those of the glider type, and has for its object to facilitate the launching of the plane by means of a catapult, so that it may be thrown to a considerable height in the air before commencing its gliding flight. For this purpose the wings are so made and attached to the body that they may be folded and tipped backward in order to cause a minimum of air resistance and of deviation from a straight line when the plane is thrown upward forcibly by a catapult or other throwing means. The invention consists in the novel characteristics hereinafter described with reference to the drawing.

In the drawing,—

Fig. 1 is a perspective view of a toy airplane embodying this invention, in its condition for gliding flight;

Fig. 2 is a perspective view showing the wings folded and tipped back preparatory to launching of the plane into the air;

Fig. 3 is a fragmentary perspective view showing the nature of the hinge between the wings, and the means for connecting the wings in a tiltable manner to the body;

Fig. 4 is a perspective view showing in a diagrammatic way the nature of my preferred connecting means between the body and wings, such connecting means being shown in full lines and the adjacent parts of the body and wings in broken lines;

Fig. 5 is a sectional view and fragmentary side elevation taken on line 5—5 of Fig. 1;

Fig. 6 is a fragmentary sectional view showing a modified form of the invention including positive means for maintaining a desired dihedral angle between the wings in gliding flight;

Fig. 7 is a cross section and partial end elevation taken on line 7—7 of Fig. 6.

Describing now in complete detail the embodiment of the invention here illustrated, but without intending thereby to limit the scope of my invention and protection to less than their true scope;—the main parts of the airplane comprise a body *a*, wings *b*, *c*, stabilizing vane *d*, and guide vane *e*. These parts are all made of light material, preferably balsa wood; the body being a square bar or stick of the wood, and the wings and vanes being sheets cut as thin as possible, for lightness of weight, while having adequate strength.

The guide vane *e* is set upright in a kerf cut in the tail end of the body piece, and secured there by glue. When the plane is in the normal position of gliding flight this vane is in a vertical plane but its front and rear edges are inclined to the length of the body. The stabilizing vane is set across the top of the body, just forward of the vane *e* in a substantially horizontal plane when the airplane is in its normal position of flight. Its forward edge is located by a shoulder *f* cut in the top side of the body piece, and the surface of the body directly in rear of this shoulder is made with a slight upward and rearward inclination to give a desired pitch to the vane with respect to the wings, such as has been found desirable in practice. It is simply, but adequately, secured to the body by an elastic rubber band *g*, the loops of which pass under the body in front and in rear of the vane, and the intermediate stretches of which cross one another in passing over the top surface of the vane.

The forward end of the body is beveled to reduce air resistance and provide a factor of stability and guidance, and the acute angle between its upper side and forward end is protected by a metal shield *h*, preferably a paper clip of well known type having spurs which are struck inward near the ends and are embedded in the wood of the body.

The wings *b* and *c* are made as the right and left members of a pair of otherwise duplicate pieces. Their butt ends are connected together by a hinge consisting of a piece of gummed tape *j* wrapped around them crosswise in position to cover the gap between their adjacent butt ends, enough of a gap being left between these ends to provide flexibility permitting the wings to be brought together side by side, substantially as shown in Fig. 2. The connected wings are laid across the top side of the body with the hinge axis in the median longitudinal line of such top surface, at the location between the front and rear ends of the body which is known by experience to be the correct location for stable gliding flight.

The wings so located are made fast to the body by a connection which permits the wings to turn about their hinge axis with respect to one another and also to tilt backward about their rear edge, or the rear end of their hinge axis, with respect to the body. The connection preferred for this purpose, because it has all the desired qualities of flexibility, resilience and elasticity, and is inexpensive and easy to apply, is a simple elastic rubber band of the familiar type used in offices, etc., to surround papers; the same sort of article as the band *g* previously described. In applying the wing-connecting band, its end loops are passed upwardly, from underneath through

holes k, k, in the wings near their rear edges, so that both side portions of the band pass under and around the body and occupy a notch l in its under side. The loops are then stretched out and passed over the ends of the respective wings, one over each, and released. The band then has a position and arrangement substantially as shown in a diagrammatic way in Fig. 4, having two bights m', m^2, embracing the body, eyes m^3 and m^4, each surrounding the edge part of one wing back of the hole k, lengths m^5 and m^6 passing over the top of the wings and around their forward edges, and connecting lengths m^7 and m^8 passing under the wings to connection with the eyes m^3 and m^4; these parts being all integral members of an endless band. The holes k, k are spaced with a distance between centers approximately equal to the width of the body and are symmetrically located with respect to the wing hinge. Notches n, n are similarly located and spaced in the forward edges of the wings to receive the forward loops of the band. The connection so made permits perfect freedom of the wings to be tilted backward whether before or after folding together about their own hinge axis. These movements of the wing apply tensile and bending stresses to the bights m' and m^2 of the band, without causing any considerable rubbing motion of any part of the band against any part of the wings or body, such as would tend to tear and break the band. Durability of the band is thus assured.

The band selected for the purpose just described preferably has such length and strength that it will hold the wings to the body without looseness. While its members m' and m^2 have some tendency to hold the wings in the horizontal position, due to their tension and to the fact that this tension is applied to the edges of the holes k forward of the rear edges of the wings, they are not relied upon to hold the wings in horizontal position and to return them to that position after they have been folded and tilted back. This latter service is performed by a tension member or spring, preferably formed by a third elastic rubber band p, the end loops of which are located in notches r and s in the under side of the body forward and aft of the wings, and the central connecting parts of which pass over the wings and are located by the notches n, n. The band p is of such length that when applied in the manner described it exerts tension holding the wings to the body in gliding flight, and when the wings are folded and tilted back, the parts p', p^2 leading from the body to the forward edge of the wings are put under increased tension. The normal procedure in thus placing the wings is first to fold them together, and then tilt them back. Thus the parts of the band p overlying the wings are pinched and prevented from sliding, so that the increased tension caused by tilting back the wings is applied virtually wholly to the parts p', p^2.

In flying the toy with the aid of a launching device, the wings are folded and tilted back on either side of the guide vane e, and are grasped by the thumb and forefinger of the user's hand, so placed as to grip the guide vane between the wings. A hook t projecting from the under side near the forward end of the body is placed in the bight of an elastic band u, the ends of which are fastened to a rod or fork in the user's other hand. Preferably the hook is made as a wooden peg set into a hole in the body and projecting with a rearward inclination. The user draws his hands apart, stretching the band of the catapult while aiming it upward. Upon releasing his grip on the wings, the catapult shoots the plane through the air so rapidly that the reaction of the air holds the wings still in approximately the same position until the propulsive force has largely spent itself. Then the spring elements p', p^2 restore the wings to normal position, that shown in Fig. 1, and the plane proceeds to glide to the ground, more or less slowly and with more or less variations of movement and traveling through a greater or less distance, depending on the direction and force of the air currents.

The particular mode herein described of hinging the wings to one another and to the body, and the manner in which the force of the spring elements is applied, causes the wings, in unfolding, to present a positive or salient angle of incidence to the air in the direction of movement; thereby tending to produce gliding action the instant the wings start to unfold. By virtue of the folding capacity of the wings, the force of the catapult is effective to propel the plane to a great height and distance, without serious deviation from the original direction, due to the diminished wind resistance of the folded wings and the fact that in their folded back position they tend to guide the article in a straight path rather than to deflect it. Experience has shown that the plane can thus be thrown to a relatively great height before beginning its gliding descent, and that in gliding it executes a variety of movements, such as loops, spirals, dives, horizontal flight, upward movements, circlings, etc. according to the air conditions, of a character most interesting to the beholder. In some conditions it will fly a long distance in the same general direction before coming to earth.

With the use of a tension band p of the right length and strength, the air reaction in one direction and the weight of the body in the opposite direction will combine to hold the wings at a dihedral angle of slightly less than 180° with their tips raised, a condition favorable to stability. I have devised, however, for optional use, a mechanical aid to maintenance of a desired dihedral angle whatever may be the strength of the band. A device for this purpose is shown in Figs. 6 and 7, and consists of a strip or plate w of sheet metal stiff enough to give support to the wings, and provided with attaching prongs x on either side of its middle line, which are embedded in the top side of the body on the median line thereof beneath the wings. The ends of this plate or support extend laterally under the two stretches of the band p and are bent up at the prescribed angle.

It is to be understood, as stated at the beginning of this specification, that I claim the benefit of all equivalents to the means and elements hereinbefore described, within the scope of actual novelty of the invention. The parts of the airplane may be made of other materials than the balsa wood before specified, and connected together by other means than those described, provided capacity is preserved for substantially the same character of relative movement between these parts as described, all within the scope of the invention claimed.

What I claim and desire to secure by Letters Patent is:

1. A toy airplane glider comprising a body, wings hinged together and adapted to be folded on a median line and hinged to the body at their

rear edge, whereby said wings may be folded and extended longitudinally of the body, and yieldable means for spreading said wings; the wings in unfolding presenting a positive angle of incidence and thereby tending instantly to produce gliding action.

2. An airplane toy comprising a body, wings flexibly connected to said body adjacent to their rear edge so as to be capable of tilting backward about such edge or a point therein, and being hinged to one another on a median line longitudinal to the body, whereby the wings may be folded back into substantial alinement with the body, and spring means connected to the body and wings arranged to be put under tension when the wings are so disposed and to exert force tending to place and hold the wings in supporting relation to the body; the wings being thereby caused to present a positive angle of coincidence tending to produce gliding action, instantaneously upon starting to unfold.

3. An airplane comprising a body, wings hinged together on a median line perpendicular to the line joining the wing tips, and adapted to be folded on said line into position side by side, said wings having holes adjacent to their rear edge equidistant from the hinge axis and on respectively opposite sides thereof, and a flexible resilient band passing through said holes and around the body and being locked against withdrawal from the holes.

4. An airplane toy as set forth in claim 3 and including a second resilient band engaged with the body at points in front and rear of the wings, having a connecting portion which passes from one of said points to the other across the outer face of the wings.

5. An airplane toy comprising a body, wings hinged to one another on a median line transverse to a line passing from one wing tip to the other, means coupling the wings to the body with provision for tilting movement rearwardly about the rear end of the hinge line, and a spring member engaged with the wings and body, normally holding the wings extended with their hinge line extending lengthwise of the body and adapted to yield so as to permit folding and tilting of the wings rearwardly to a position in which the length dimensions of both wings are substantially parallel to the body and their width dimension is perpendicular to the body; the wings in unfolding having at all times a positive angle of coincidence and tending to produce gliding action instantaneously upon starting to unfold.

6. An airplane toy comprising a body, wings crossing the body and hinged to one another on a median line transverse to their own length and longitudinal to the body, flexible coupling means connecting the wings to the body at points adjacent to their rear edge and to said hinge line, and elastic tension means extending from points on the forward edge of the wings at opposite sides of the hinge line to an adjacent point on the body, adapted to be put under increased tension when the wings are folded together and tilted back, whereby to restore the wings to normal position when released.

7. An airplane toy as set forth in claim 6 in which said tension means is an elastic band passing around the body forward and aft of the wings, and across the outer face of the wings; those portions of the band which pass over the wings being pinched between the wings when the latter are folded together and thereby substantially withheld from sliding on the wings.

8. An airplane toy as set forth in claim 6 in which the coupling means is an endless elastic band having two bights passing under the body, two eyes, each surrounding the rear edge of one wing, two lengths, each passing over the top of one wing to the forward end thereof from one of said bights, and connecting lengths, each passing under one wing from the forward end of one of the before-named lengths to one of the eyes.

9. In an airplane toy having a body and foldable, hingedly connected wings, means for connecting and hinging the wings to the body comprising an endless elastic band passing under the body and upward through separate holes in the wings at either side of the body, and having loops surrounding the wings.

ROSCOE M. GUILLOW.