April 25, 1950 P. K. GUILLOW 2,505,541

MODEL AIRPLANE STRUCTURE

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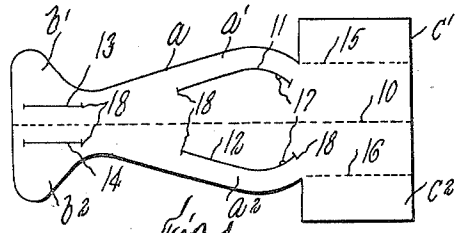


Fig. 1.

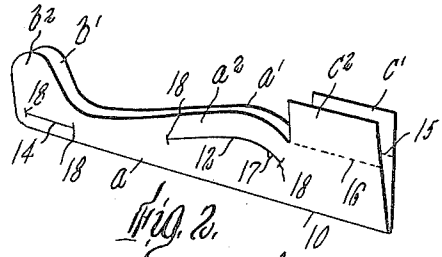


Fig. 2.

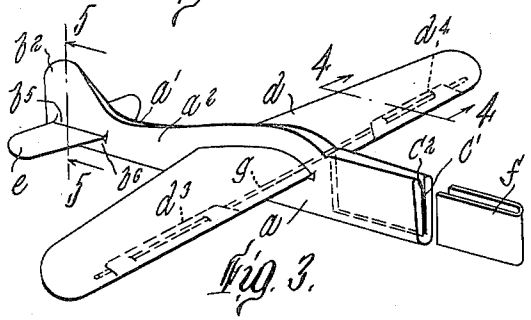


Fig. 3.

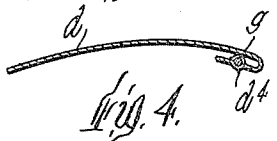


Fig. 4.

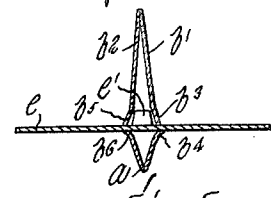


Fig. 5.

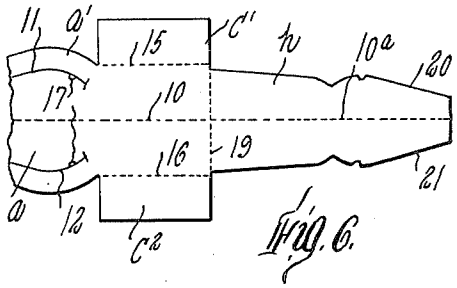


Fig. 6.

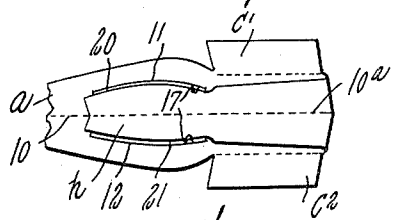


Fig. 7.

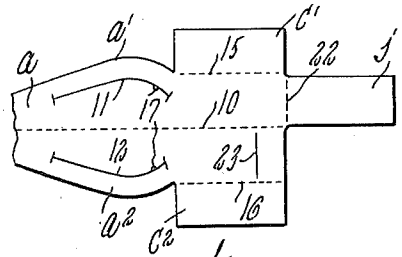


Fig. 8.

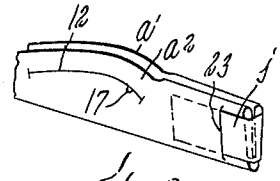


Fig. 9.

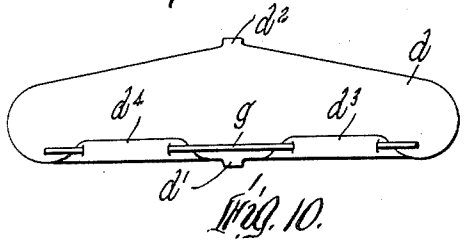


Fig. 10.

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MODEL AIRPLANE STRUCTURE

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2 Claims. (Cl. 46—79)

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The present invention relates to model aerogliders and other aeroplanes such as may be made by assemblages of pieces of stiff paper and are capable, when thrown into the air by hand or with the aid of a catapult, or propelled by self-contained power equipment, of traveling in a path determined by the dispositions of the wings and guide vanes until their momentum or stored power is exhausted. Devices in which this invention is embodied are useful, not only for the entertainment of the possessors, but also for giving elementary instruction and experience in the principles of aeronautics. They are furnished to the users in disassembled flat condition containing two or more separate pieces adapted to be easily put together in shape for flying. More particularly the invention is related to that disclosed in my application Serial No. 472,863, filed January 19, 1943, entitled "Model airplane glider" on which Letters Patent No. 2,351,504 were issued June 13, 1944, and has the same general objects as those set forth in said patent; i. e. to combine provisions for facile assemblage of body and wing elements with means for giving the wing element an exactly predetermined curvature or camber; to provide means for correctly locating the wings with respect to the body in assemblage and preventing accidental shift; and to make a more rugged structure than that of many of the paper models heretofore commercialized. Further objects additional to those above expressed are to improve and strengthen the nose construction, to furnish integral locking means at the nose whereby the balancing weight may be secured without the use of applied adhesive strips or the like, to improve the wing and tail constructions, and to make other improvements which appear in the following specification.

The principles of the invention are herein explained with reference to models or designs of powerless gliders, but this fact is not to be construed as a limitation of the invention to model gliders only, for some of these principles are applicable to powered model aeroplanes as well. That is, I intend and desire to protect all structures and uses in which the principles referred to may be embodied or to which they may be applied.

Some of the manifold embodiments of the invention are illustrated in the accompanying drawings, in which

Figure 1 is a plan view of the paper blank from which the body portion of one of such embodiments is made.

Figure 2 is a perspective view of the aeroplane body fashioned from the blank shown in Figure 1.

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Figure 3 is a perspective view of the assembled aeroplane glider, complete except for the insertion of the balancing weight in the nose, such weight being shown in line with the body and separated therefrom.

Figure 4 is a detail sectional view of one wing, taken on the line 4—4 of Figure 3.

Figure 5 is a sectional view taken on line 5—5 of Figure 3, showing the rudder and stabilizer vane assemblage at the tail end of the aeroplane.

Figure 6 is a plan view of the forward end of the body blank similar to Figure 1 but including an interior wing supporting element integrally united with the body.

Figure 7 is a plan view of the blank shown in Figure 6 with the extension which forms the wing support folded back on the body and the blank partially bent along its longitudinal median line.

Figure 8 is a plan view of the forward part of a body blank like that shown in Figure 1 except that it has an additional nose lock.

Figure 9 is a perspective view of the same body blank folded into its operative condition with the nose lock in position to perform its locking function.

Figure 10 is an under plan view of a wing adapted to be combined with any of the forms of body shown in other figures.

Like reference characters designate the same parts in all of the figures.

The model aeroplane shown in Figures 1 to 5 inclusive consists of four parts; a body or fuselage, a wing member constituting the two wings of a monoplane, a stabilizer vane, and a balancing weight at the nose end. The body is made from a blank *a* of stiff paper or other suitable tough, stiff, flexible and light weight sheet material. It is creased or scored along its median line 10 so that it may be folded into V shape substantially as shown in Figure 2. The panels *a'* and *a2* of the blank at opposite sides of the center line 10 are alike and their outer bounding edges are symmetrical. Cuts 11 and 12 are made in said panels equally distant from the median line and symmetrically located with respect thereto. These cuts are substantially as long as the width at mid length of the wing member which is provided for assemblage with the body, or slightly longer in a measure sufficient to enable the wing member to be passed through them without injury. Their forward ends are located at the distance from the forward end of the blank equal to that prescribed for the location of the leading edge of the wing. They are curved with the curvature prescribed for the camber of the wing

needed for the effective flight of the assembled model.

In approaching the rear end of the blank, the bounding edges converge to substantially less width than than portion in which the slots 11 and 12 are located, while near the tail end they are widely and abruptly divergent, forming rudder vanes *b'* and *b2*. Cuts 13 and 14 are made through the material between the rudder vanes and the median line 10, and at equal distances from the latter, to receive a stabilizer vane.

At each side of the forward end of the blank are lateral extension panels *c'* and *c2*. Folding lines 15 and 16 are made parallel to the median line 10 at locations somewhat nearer to the outer limits of the panels *c'* and *c2* than to the median line, by creasing, scoring or perforating the blank.

In forming the blank thus described into the body of an aeroplane model, the blank is folded along the median line 10 until the side portions are nearly parallel, as shown in Figure 2, and the lateral extension panels *c'* and *c2* are folded inward as shown in Figure 3. If preferred said panels can be folded over the body of the blank on lines 15 and 16 before the blank is folded on line 10. A wing unit *d* is passed through the cuts 11 and 12, which are then located side by side, and a stabilizer vane *e* is passed through the cuts 13 and 14, which also are located side by side. A balancing weight *f*, which may be strip of heavy cardboard or paper of a width somewhat less than the distance between the median line 10 and the bending lines 15 and 16, or a flattened roll of paper, or a number of sheets superimposed, is bent into the form of a narrow U, and its legs are passed into the channels formed by the inwardly bent extension panels and the side panels of the blank. This weight and these panels cooperate to form a nose lock which holds the side panels of the body close together, prevents them from spreading apart, and protects their forward edges against danger of crushing and tearing when the model aeroplane falls to the ground or strikes an obstruction while in flight.

The wing *d* is cut from a sheet of stiff and resilient paper or other material of the character indicated in the description of the body blank. When made from paper, a thickness in the order of from seven to ten thousandths of an inch is adequate for the purpose. It may be reinforced at or near its leading edge to give it greater stiffness in that part and assist in holding the leading edge in a straight line. When thus reinforced, the paper of which it is made may be thinner than that which would be needed in the absence of reinforcement. The structure of the wing shown in Figures 3 and 4 is additionally shown in under plan view in Figure 10. It has tabs *d'* and *a2* projecting from the leading and trailing edges respectively at the middle portions of such edges. Their purpose is to project between the side panels of the body and to hold the latter at a sufficient distance apart to provide a stable support for the wing. Also flanges *d3* and *d4* are formed integral with the forward edge portion of the blank (or there may be only one flange or more than two). These flanges are folded back and under along the line of the leading edge, and they are perforated at points spaced apart along a line substantially parallel to the leading line to receive a stiffening rod *g* (which may be a length of reed or other light and strong material), which is passed through them from either side alternately. Notches 17 are made in the body at the inner sides of the cuts 11 and 12 respectively to receive and accommodate this rod. The reinforcing rod is an optional feature. It is of greater value and importance in planes having a wide wing spread than in planes with short or stubby wings.

The stabilizer vane is made of like material to the wings and is cut out with dimensions appropriate to the other dimensions of the plane according to known principles. It is assembled with the body by being passed through the cuts 13 and 14, and it is preferably provided with tabs at the mid length of its leading and trailing edges, similar to the tabs *a'* and *d2* of the wing, one of which is shown upturned at *e'* in Figure 5 between the panels which form the rudder.

It will be noted that cuts 11, 12, 13 and 14 are intersected at their extremities by short cross cuts 18. As here shown, the cross cuts extend to both sides of the longitudinal cuts, but they may be located at one side only, either side, provided that the cross cuts at both ends of any longitudinal cut are located at the same side thereof. The cross cuts enable the material of the body adjacent to the longitudinal cut to be displaced laterally to accommodate the thickness of the wing and stabilizer vane. The longitudinal cuts which receive these members are merely incisions through the body blank made without removal of any of the material, while the wing and vane have definite thickness. The displacement of the material permitted by the cross cuts compensates for the thickness of the wing and stabilizer without causing the body panels to take a warped formation. The displaced margins of the cuts also bear on the wing and vane with clutching effect; and those at the rear end cause the rudder panels *b'* and *b2* to be inclined toward each other and substantially to meet at their upper extremities. These effects are illustrated by Figure 5 where the portions of the body blank above and below the cut 13 which are bent outward between the cross cuts are designated *b3* and *b4*, while the corresponding portions above and below the cut 14 are designated *b5* and *b6*. Similar formations occur adjacent to the wing *d*. In being passed through the body cuts, the wing, and likewise the stabilizer vane, passes through one panel of the body member from the outside inward, and through the other panel from the inner side outward. The tendency in passing through the first panel is to displace margins of the cut inward, and this displacement can be reversed by the operator by the use of a narrow instrument. But in passing through the other side panel the material adjacent to the cut is displaced outwardly in the desired manner.

A modification of the body structure is shown in Figures 6 and 7. The body blank here shown is exactly like that shown in Figure 1 with one exception; that it is provided with an integral forward extension *h* connected with the forward end of the body portion on a creased or scored folding line 19, and is itself creased or scored along a line 19*a* in the extension of the line 10. The lateral outlines 20 and 21 of the extension, at and inward from its extremity, are the reversed counterparts of the cuts 11 and 12 and are located at the same distance from the folding line 19 as those cuts, and at distances from the median line 19*a* approximately equal to the distances of the cuts from the median line 10; the arrangement being such that when the extension is folded back on the body, and the body is then folded on the median line, the edges 20 and 21 register with the cuts 11 and 12 respec-

tively and constitute an additional support for the wing member.

Figure 8 illustrates a nose locking element for supplementing the lock previously described as constituted by the inwardly turned panels *c'* and *c2* and the weight *f*. The additional locking element is a tongue *j* extending forwardly between the median line **10** and the folding line **15**, joining the side panel *a'* on a line **22**. After folding inward of the panels *c'* and *c2*, folding of the body on the line **10**, and insertion of the weight *f*, the tongue *j* is passed around the nose of the body outside of the weight and tucked into a slit **23** in the panel *a2*, as shown in Figure 9. This latter figure omits the weight *f* in order to show the lock more clearly; but it is to be understood that the weight ordinarily is inserted as previously described before the tongue is interlocked with the panel.

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

1. A model aeroplane comprising a body member of paper material or the like, composed of symmetrical panels integrally joined together on a hinge line and in folded condition with the panels side by side, each of said panels having a lateral extension panel, and said extension panels being folded inward forming channels which open inward from the forward end of the body, a balancing weight of narrow U form of which the legs are confined in said channels, forming with the in-folded panels a lock which

prevents spreading apart of the main panels of the body, and a wing member extending through the body.

2. A model aeroplane as set forth in claim 1, in which one of the body panels has a forwardly extending tongue at its forward end, which tongue is bent around the nose of the body outside of the balancing weight and is passed through a cut in the opposite body panel.

PAUL K. GUILLOW.

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