April 27, 1954 C. GOLDBERG 2,676,431

MODEL AIRPLANE KIT

Filed May 4, 1951

3 Sheets-Sheet 1

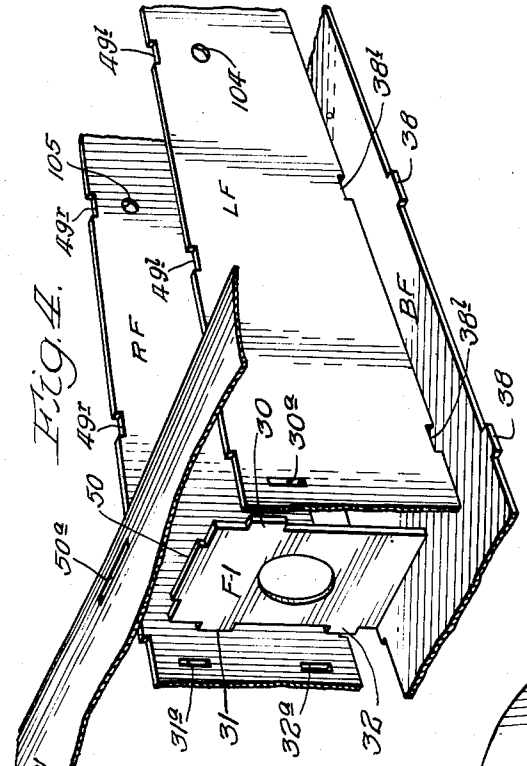



Fig. 4.

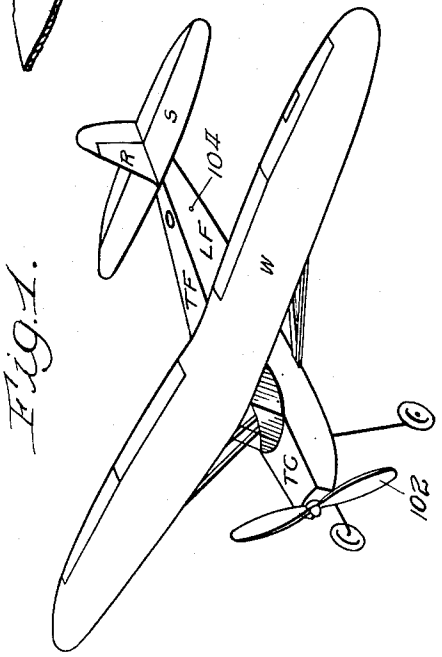



Fig. 1.

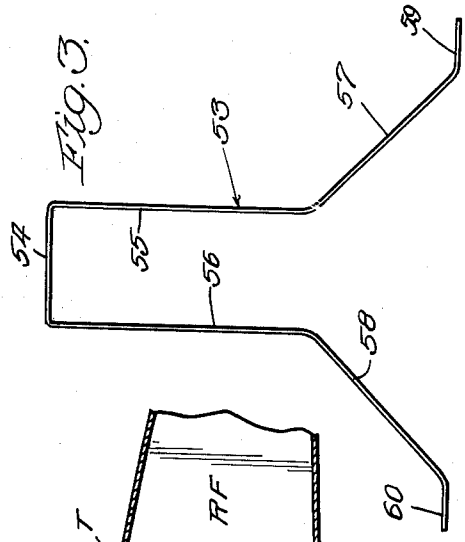



Fig. 3.

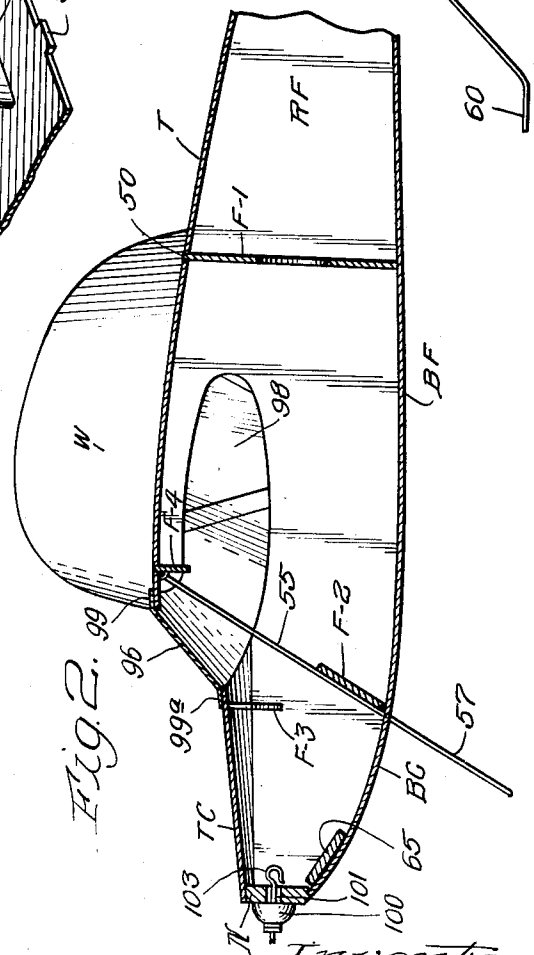



Fig. 2.

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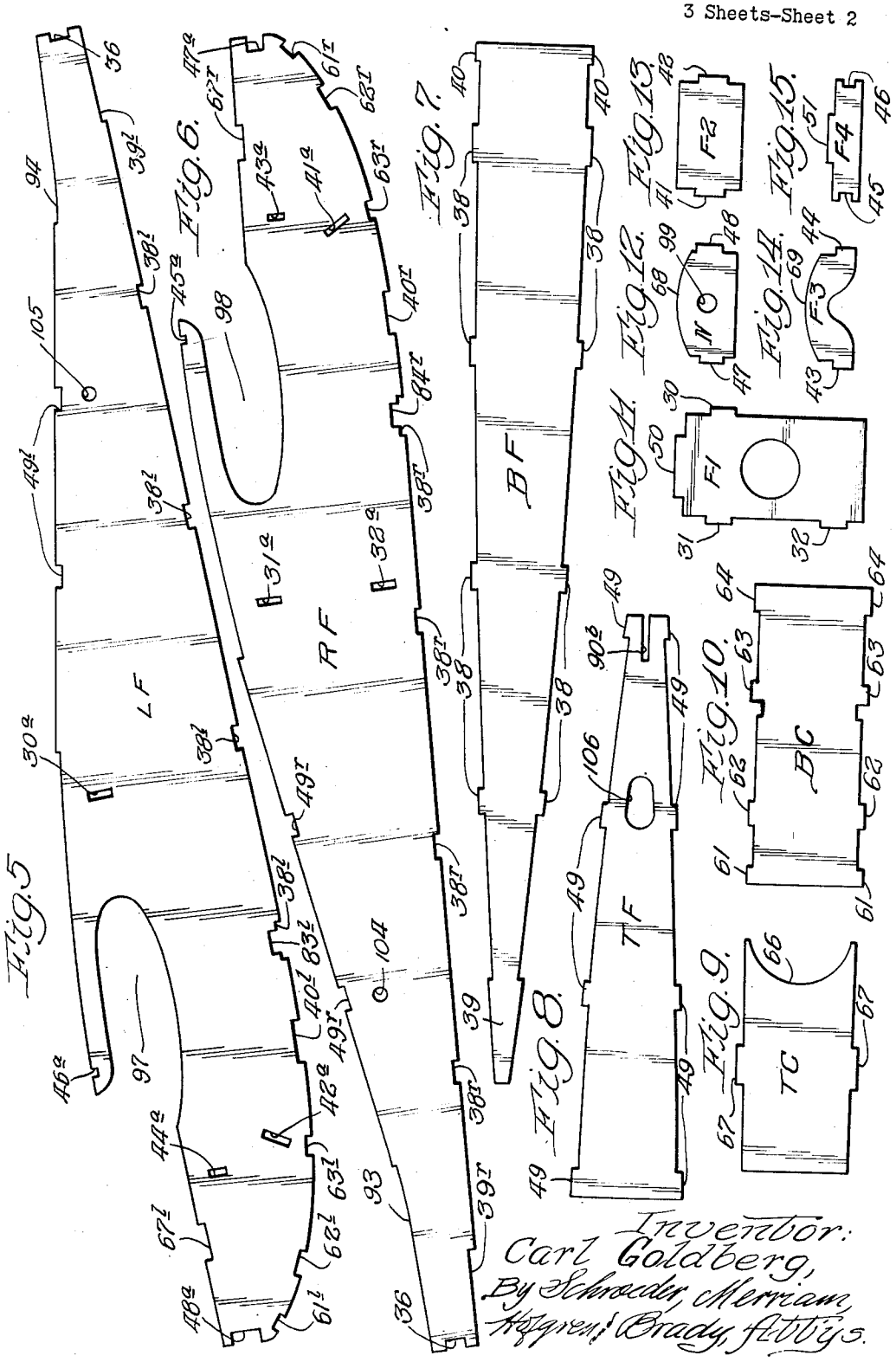
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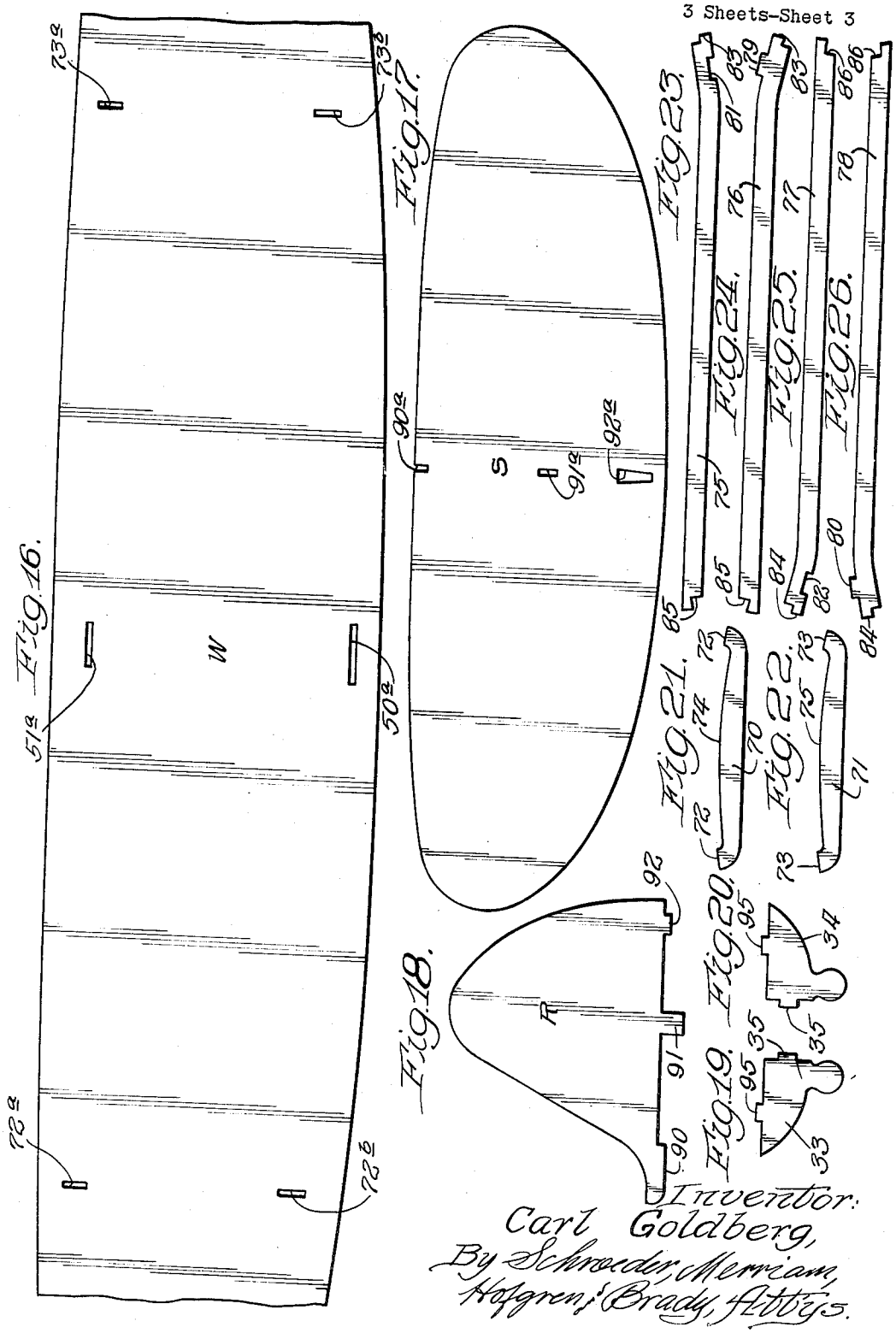
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MODEL AIRPLANE KIT

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3 Sheets-Sheet 3




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# UNITED STATES PATENT OFFICE

2,676,431

## MODEL AIRPLANE KIT

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1 Claim. (Cl. 46—17)

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This invention relates to a model kit and more particularly to a model kit having a number of preformed parts which are to be assembled together to complete the model.

One of the features of this invention is the provision of a model kit including a number of preformed parts having interengaging means to engage with complementary interengaging means provided on other preformed parts so that parts which are to be attached together may be correctly oriented by bringing the interengaging means into registry. A further feature of the invention is to produce a model kit which includes a number of similar right- and left-hand or otherwise reversible parts and to provide each of such parts with dissimilar interengaging means for engaging an intervening part not only correctly to orient the parts for attachment to the intervening part, but also to prevent reversal of the parts.

A particularly important phase of the interengagement of the parts is the interlocking of the fuselage parts, with top and bottom fuselage parts interlocking at their edges with right and left hand sides of the fuselage. This provides a "self-correcting" fuselage structure which ensures a properly formed fuselage and which obviates not only bending or curvature of the entire fuselage to one side or the other, but also twisting thereof, despite the initial condition of the parts. Even though one or a number of the parts as provided in the kit in die-cut form are twisted or warped to any extent, the mashing of the interengaging means overcomes any initial warping or differences in strength of the sections and ensures a straight and properly formed fuselage.

A further feature of the invention is the provision of a model airplane kit which includes a preformed wing and to provide such a kit with preformed ribs each having a cambered surface so that the wing surface is properly cambered by attaching the ribs thereto. Another feature of the invention is the provision of a model airplane kit of the type described in the preceding sentence with preformed struts to be attached to the fuselage section of the airplane and to the ribs, correctly to determine the dihedral of the wings and to control warp thereof.

Another feature of the invention is the provision in a model airplane kit of preformed parts including fuselage side panels and a wing and to provide each of the side panels with interengaging means which are dissimilar from each other, with the interengaging means on

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each panel adapted to be registered with complementary interengaging means on an intervening part to prevent reversal of the side panels and to form a fuselage section, and to provide the wing with dissimilar interengaging means so that the wing is attachable only in one position to the fuselage section.

Still a further feature of the invention is the provision of wing struts and interengaging arrangements locating the inner end of the preformed struts relative to the side of the fuselage and their outer ends relative to the wing in such manner as to control the warp of the wing. Any undesired warp initially present after the wing is removed from the kit will be corrected by this construction; and any desired "warp" of one or both wings, as to counteract the propeller torque or otherwise improve flight characteristics will be automatically ensured.

Another feature of the invention is the provision of a model kit of the type previously described herein, wherein the interengaging means comprise a tongue on one part receivable in a slot on the other part so that the interengaging means serves not only correctly to orient the parts but also forms a part of the securing means for attaching the parts together.

Other and further features of the invention will be apparent from the following disclosure and drawings, in which:

Fig. 1 is a perspective view of a model airplane embodying the invention;

Fig. 2 is a vertical longitudinal section through the forward portion of the fuselage;

Fig. 3 is an elevational view of the landing gear wire;

Fig. 4 is an exploded perspective view showing the manner in which the parts are fitted together; and

Figs. 5 to 26, inclusive, are views showing the preformed parts which are to be secured together to form the model airplane.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail one specific embodiment, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

For the purposes of exemplary disclosure, the invention is shown as embodied in a model airplane kit although it will be apparent to those

skilled in the art that the features may be embodied in other kits for making models of devices other than airplanes.

Referring now to Figs. 5 to 26 inclusive, the model airplane comprises a number of preformed parts shown in those figures. Preferably, the parts are stamped from thin sheet balsa so that substantially no cutting or forming of the parts is required of the builder of the model. The parts include a right and left-hand fuselage side panel designated RF and LF respectively, a bottom fuselage section BF, a top fuselage section TF, a top cowl section TC, a bottom cowl section BC, a wing W, a rudder R and a stabilizer S. A number of formers F1 and F4, inclusive, are provided correctly to space the fuselage parts from each other and to brace and otherwise strengthen the construction. It will be noted that the sections just referred to are provided with a number of slots and tongues which form the interengaging means for purposes which will hereinafter become apparent. Where parts are apt to be inverted, reversed end for end or right for left, the interengaging means are dissimilar in nature. The dissimilarity in the interengaging means may take several forms. Thus, the dissimilarity may be in the number of engaging means or in their relative position or in their shape. In each case, where similar parts are formed with dissimilar interengaging means, the part to which they are to be attached is formed with interengaging means which are complementary to the dissimilar engaging means and thus parts cannot be misaligned or reversed.

It is believed that the invention is best described by describing the steps in assembling the parts together to complete the model.

To assemble the kit the first step is to apply cement to the two long sides of the former F1. It will be noted that the former is provided with a single tongue 30 on one side and with two tongues 31 and 32 on its opposite side. The tongues 30 to 32, inclusive, form the interengaging means on the former which are adapted to be inserted into complementary slots 30*a*, 31*a* and 32*a*, respectively, in the side panels. It will be noted that the right and left-hand fuselage side panels, RF and LF, are substantially identical, however, the panel RF is provided with two slots 31*a* and 32*a* while the panel LF is provided with but one such slot. Thus the parts can only be fitted to the former in the correct right and left-hand relationship.

When this step has been completed, the two sections 33 and 34 (Figs. 19 and 20) which are similarly formed in the shape of the tail wheel and the end fuselage section are cemented together to provide a double construction for the tail wheel. It will be noted that each of the tail wheel portions is provided with a tongue 35 which, when the parts 33 and 34 are cemented together, form a single tongue to be inserted in the notches 36 formed at the end of the fuselage panels RF and LF. Little need for dissimilar interengaging means is required here inasmuch as the top and bottom of the fuselage are clear and the tail wheel is, of course, on the bottom.

When the cement has dried on the parts just described, the fuselage panels are slightly spread apart and the bottom fuselage panel BF is slipped into place. It will be noted that the bottom fuselage is provided with interengaging means in the form of a plurality of tongues all of which have been designated 38 which are receivable in slots 38*r* on the bottom of the right-hand fuselage section RF and 38*l* on the lefthand fuselage section LF. The first three of the tongues 38 are equally spaced from each other, but the fourth is positioned closer to its preceding tongue and is also wider. This dissimilarity in the interengaging means provided on the section BF, and the complementary dissimilarity found in the slots 38*r* and 38*l*, prevents its being inserted in reversed position. The rear end of the bottom panel BF is provided with an arrow shaped tongue 39 which fits into a complementary shaped groove 39*r*, 39*l* formed on the sections RF and LF, respectively. The forward end of the section BF is provided with a pair of smaller tongues 40 which are received in the rear portion of the slots 40*r* and 40*l*, respectively. The tongues 40 fill up only the rear portion of the slots 40*r*, 40*l* for reasons which will hereinafter become apparent.

In cementing the bottom section BF to the bottom of the right and left-hand fuselage sections RF and LF, cement may be applied in each of the slots mentioned and then the side panels BF and LF spread apart so that the panel BF may be inserted therebetween with the tongues inserted in each of the slots. When the cement has hardened, which with model glue is a matter of seconds, not only are the side panels firmly secured together but the proper curvature is formed in the fuselage section. In addition, the parts are correctly oriented with respect to each other because of the fact that they can be secured together only when the slots and tongues are correctly positioned.

The formers F2, F3 and F4 are next secured in position. For this purpose, glue may be applied to the sides of the former F2 which includes the tongues 41 and 42 and then the tongue inserted in the slots 41*a* and 42*a*, respectively. It will be noted that the tongues 41 and 42 are longer than the tongues 30, 31 or 32 so that mispositioning of the former F2 cannot be achieved. It will also be noted that the slots 41*a* and 42*a* are slanted, the purpose of which will hereinafter be described.

Glue is then applied to the sides of the former F3 which includes the tongues 43 and 44 and the tongues are inserted in the slots 43*a* and 44*a*, respectively, in the sections RF and LF.

The former F4 is provided along its edges with U-shaped notches 45 and 46, the upper legs of which fit in the notches 45*a* and 46*a*, respectively, in the side panels. The lower legs of the notch extend beneath the portion of the fuselage side panels carrying the notches 45*a* and 46*a*.

The nosepiece N is provided with two tongues 47 and 48 on opposite sides thereof with the tongues being dissimilarly positioned. Thus it will be noted that the tongue 48 is higher than the tongue 47. Furthermore, the nosepiece N is considerably thicker than the formers inasmuch as it must take the thrust of the rubber motor used to drive the airplane. The edges of the nosepiece are cemented and the tongues 47 and 48 inserted in the notches 47*a* and 48*a*, respectively, formed in the front portion of the fuselage side panel sections. It will be noted that the notch or slot 47*a* is deeper than the slot 48*a*. Thus the nosepiece, when seated, is slightly tilted to the right with respect to the fore-and-aft line of the aircraft. This is done in order to offset the torque when the rubber motor is unwinding, the torque tending to pull the airplane to the left. By slightly tilting the propeller to the right, the torque effect which tends

to tilt the airplane to the left, thereby causing it to slip to the left and thus turn to the left, is offset inasmuch as the offset of the propeller tends to turn the airplane to the right resulting in a straight path.

The top fuselage section TF is provided with a number of tongues all of which have been designated as 49, the middle two of which are to be seated in the slots 49*r* and 49*l*, respectively, of the side panels RF and LF while the right and left-hand tongues 49 seat in cutout portions (for the wing and stabilizer respectively) formed in the tops of the side panels. Again it will be noted that the spacing between the tongues 49 is not uniform and thus again the panel can be inserted only in proper position.

It will be noted that the former F1 is provided with a relatively wide tongue 50 at its top while the former F4 has a narrow tongue 51 similarly positioned. The wing W is provided with complementary portions for engaging the tongues 50 and 51, namely the slots 50*a* and 51*a*. Thus when the wing, which is the next part to be assembled, is placed on the fuselage, its leading and trailing edges cannot be reversed. The narrow slot 51*a* is adjacent the leading edge of the wing while the broad slot 50*a* is adjacent the trailing edge and hence correct alignment of the wing is assured and also its alignment with respect to the fuselage is assured inasmuch as the wing can be positioned only when properly oriented.

The landing gear is in the form of a resilient wire bent generally in the shape of a U as illustrated in Fig. 3. Thus the landing gear 53 is bent as to have a base 54, a pair of legs 55 and 56 extending from the base, the legs being bent outwardly intermediate their ends to form the outwardly extending portions 57 and 58 which in turn are bent at their ends to form the wheel axles 59 and 60. As shown in Fig. 2, the landing gear is inserted in the interior of the fuselage and the base 54 is cemented to the underside of the wing and front side of the former F4. Correct positioning of the landing gear is assured by bringing it downwardly from the base into contact with the slanting former F2 to which it is also cemented. The portions 57 and 58 of the landing gear are thus positioned to extend outwardly beneath the fuselage.

The cowl bottom BC is illustrated in Fig. 10 and includes the flat panel shown provided with oppositely facing tongues 61, 62, 63 and 64. It is to be attached to the bottom portion of the fuselage section so far completed with the tongues 61, 62 and 63 inserted in the slots 61*r*, 61*l*, 62*r*, 62*l*, 63*r* and 63*l*. The tongue 64 is seated in the notches or slots 40*r* and 40*l* so as to abut the forward end of the bottom fuselage section BF.

At this stage of the construction a steel weight 65 may be cemented in the nose of the airplane on the section BC as shown in Fig. 2. This provides the proper balancing weight for the craft in flight.

The top cowl section TC is provided with an arcuate portion 66 adjacent its rear end with a pair of oppositely facing tongues 67 which are received in the notches or slots 67*r* and 67*l*, respectively, in the fuselage sections. Cement is applied along the two side edges and the front edge of the section TC, and it is bent around the top curved portions 68 and 69, respectively, of the nose section N in order to give the proper curvature to the cowl. The section TC is held in place until the cement is hardened, which, as previously stated, is a comparatively short period of time.



As illustrated in Figs. 21 and 22, the kit may include a pair of ribs 70 and 71 each provided at its ends with tongues 72 and 73, respectively, and with cambered upper surfaces 74 and 75. The wing W is provided with two pairs of slots 72*a* and 72*b* and 73*a* and 73*b* to receive the tongues 72 and 73, respectively. Cement is applied along the upper surface of the ribs 70 and 71 and then the tongues are inserted in the slots and the wing held in contact with the entire upper surface of the rib. This produces the proper camber in the wing to insure lift to the airfoil section.

The kit also includes two pairs of struts, the first pair including precut struts 75 and 76 and the second pair having the struts 77 and 78. It will be noted that the struts 76 and 78 include a tongue 79 and 80, respectively, which is to be inserted in the grooves 81 and 82 formed in the other strut of the pair. When the pairs of struts are cemented together, there is formed a pair of V-shaped struts, each having a single tongue 83 and 84 at the inner end. The tongues 83 and 84 are to be inserted into the bottom portions of the notches 83*l* and 84*r*, respectively formed in the left and right-hand fuselage sections correctly to position the struts. The outer ends of the struts are provided with notches 85 and 86 which are secured to the ends of the ribs. The precutting and prealignment of the struts assures that when they are inserted in position with the tongues at their inner ends in the slots 83*l* and 84*r* of the fuselage sections and with their outer ends encompassing the ends of the ribs, the proper dihedral angle and warp of the wing are ensured. As will be readily apparent, the preformed length of the struts and the slots determining their point of location in the side of the fuselage and their outer end attachment to the rib and thus to the wing determine not only the dihedral angle but also the angle of incidence or warp of the wing. Changing the relative length of the front or back struts (as by changing the actual length of the strut in its design, its point of attachment to the side of the fuselage fore and aft, and the distance of one of the ribbed slots 72 or 73 from the central wing slots 50*a* and 51*a*) enables a predetermined warp of the wing to be achieved. Not only does this correct any undesired warp which may be present in the wing before assembly of the plane, but it also enables desired warpage to be designed into the wing, so that there may be a deliberate "wash-in" to the left wing and "wash-out' 'to the right wing, if desired, to offset propellor torque.

With this portion of the airplane completed, the rudder R (Fig. 18), which is provided with a forward tongue 90, a long intermediate tongue 91 and a rear tongue 92, is cemented to the stabilizer S with the tongue 90 fitting into the slot 90*a*, the tongue 91 fitting in the slot 91*a* and the tongue 92 fitting into the slot 92*a*. The stabilizer is then cemented to the fuselage side panels and sits in the cutout portions 93 and 94 of the right and left-hand sections respectively with the forward portion of the tongue 90 fitting in the slot 90*b* formed on the top fuselage panel TF. The tongue 92 fills a portion of the slot 92*a*, the balance of that slot being filled by the tongues 95 of the tail wheel sections 33 and 34, it being remembered that the tail wheel sections have been previously cemented together so that the tongue 95 is a single unit. The use of tongue

and groove interengaging means in two or more locations ensures proper alignment of the rudder R, preventing any misalignment with respect to the axis of the fuselage, and providing certainty of "fore and aft" location. Similarly, the interengaging assembly of the horizontal tail surface S provides for a predetermined correct angular relationship between this part and the fuselage.

If desired, a windshield **96**, which may be of a transparent plastic, may be cemented in place. To facilitate forming the windshield, it is provided with an integral tab **99** to be cemented to the leading edge of the wing. A lower marginal edge portion **99***a* is cemented to the cowl section TC and thence the balance of the plastic material is bent around the side of the fuselage to cover the cabin window openings indicated at **97** and **98** and precut in the fuselage side panels.

Wheels may then be slipped onto the axle portions **59** and **60** and a drop of cement applied to the outer ends to hold the wheels in place.

A propeller thrust bearing **100** is then seated in a circular opening **101** in the nosepiece N. A propeller **102** which includes a motor hook **103** is then seated in the bearing and a dowel rod or small peg inserted through two aligned circular openings **104** and **105** in the fuselage side sections. The rear end of the rubber band may be looped around a peg inserted in these openings, the alignment of the rubber band being assisted by the provision of an opening **106** in the top panel TF of the fuselage.

When this work has been completed, the airplane is ready to be flown. It will be noted that throughout the entire description of the steps of assembling the model the various tongues and slots have been referred to constantly. It is believed to be readily apparent that the tongue and slots which form the intergaging means and complementary interengaging means of the model will not only prevent misalignment or reversal of the parts, but also serve correctly and accurately to position each part relative to an adjacent part to which it is to be secured. In many instances the parts may be held together merely by inserting the tongue in the slot and then applying cement to the tongue and slot, the interengaging means serving to hold the parts together as well as to orient them as assembly progresses. Furthermore, the preformed parts serve to produce the proper dihedral angle of the wing and the camber of the wing, the correct alignment of the landing gear and the proper positioning of substantially all of the parts of the craft.

The model so constructed may be assembled very rapidly and with substantially no chances for error and when so assembled produces a sturdy and yet completely accurate scale model.

I claim:

A model airplane kit comprising a plurality of flat precut sheet balsa parts including a unitary wing, a pair of ribs; a pair of struts; and parts to form a fuselage section; at least two slots of unequal length formed in the center section of the wing; two pairs of other slots in the wing with each pair being equidistant from the wingtip in opposite outboard sections of the wing; a pair of tongues each complementary to a different one of the slots in the center section of the wing and formed in the fuselage portion whereby the wing portion may be placed in juxtaposition with the fuselage portion with the tongues inserted in their complementary slots to orient the wing and fuselage sections for attachment to each other; a pair of tongues complementary to the pairs of slots formed in each rib, with said ribs each having a cambered surface to be secured to the underside of the wing with the tongues in each rib inserted in the last mentioned slots to camber the wings and with said struts to be secured to the fuselage section and to the ribs to determine wing dihedral and warp.

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