Nov. 13, 1956 N. G. BAST 2,770,072

TOY AIRPLANE CONSTRUCTION

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Fig. 3

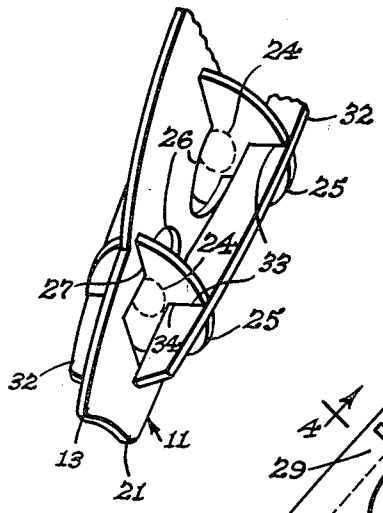


Fig. 1

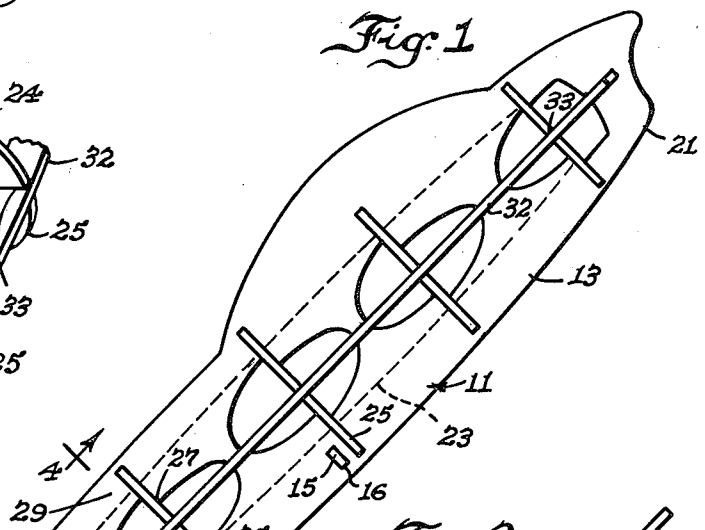


Fig. 2

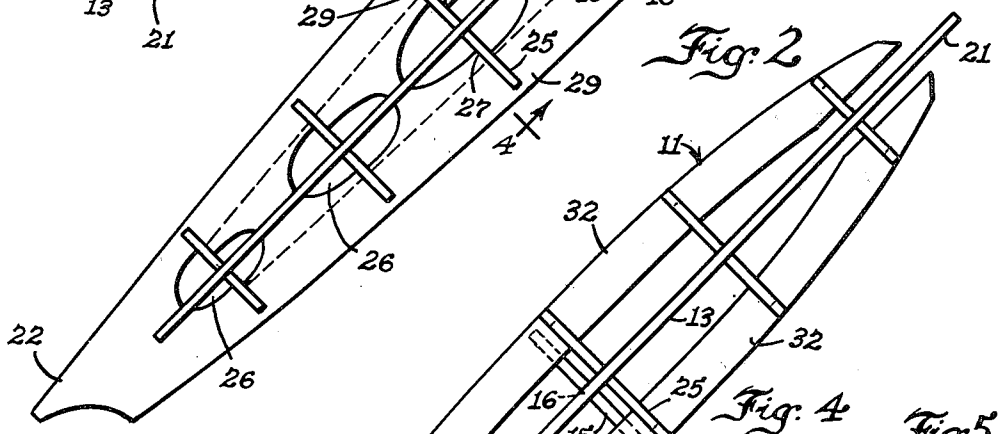


Fig. 4

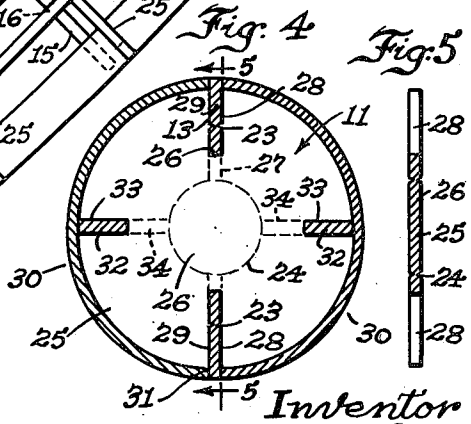
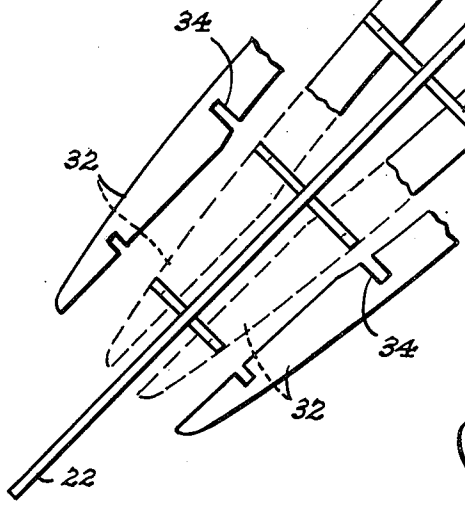


Fig. 5



Inventor
Nathan G. Bast

Andrew F. Wintercorn
Atty.

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Fig. 6

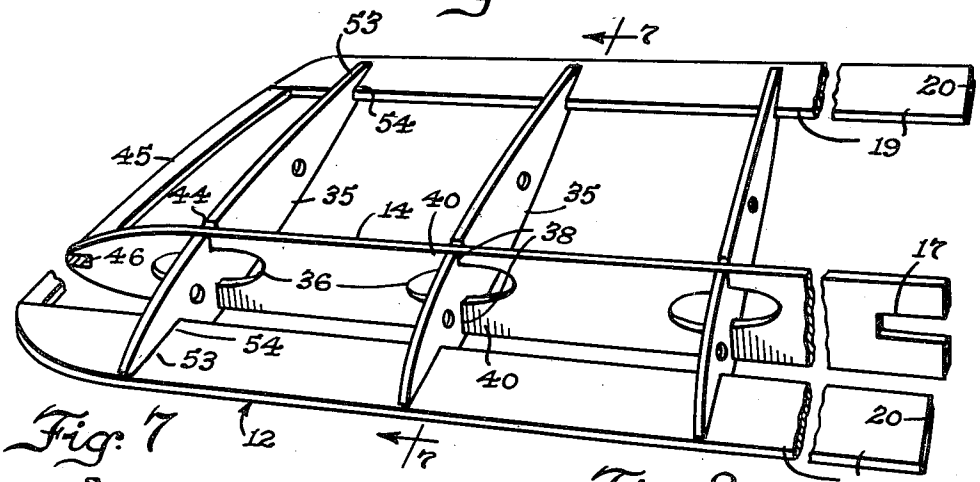


Fig. 7

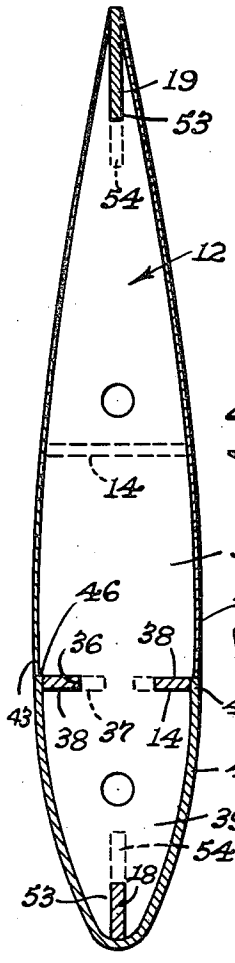


Fig. 8

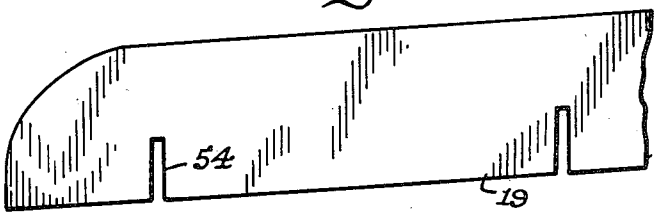


Fig. 10

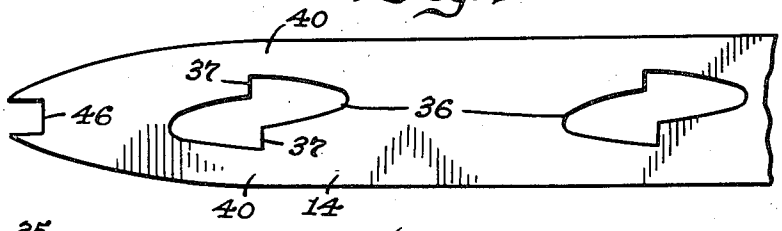
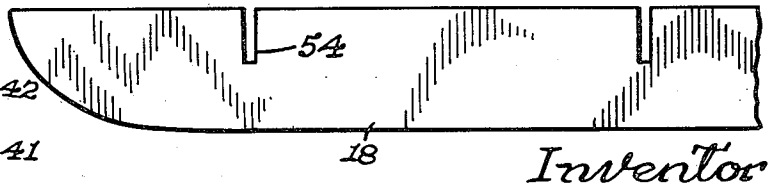


Fig. 9



Inventor
Nathan G. Bast

Andrew F. Winterson
Atty

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TOY AIRPLANE CONSTRUCTION

Nathan G. Bast, Rockford, Ill., assignor to Nils F. Testor, Rockford, Ill.

Application February 27, 1952, Serial No. 273,681

4 Claims. (Cl. 46—17)

This application is a continuation-in-part of my co-pending application Serial No. 189,929, filed October 30, 1950 and now abandoned.

This invention relates to toy or "model" airplanes, and has for its principal object the provision of a new and improved skeleton frame construction for the fuselage and wing, or wings.

Model airplanes are sold commercially in large volumes in kit form, each kit containing all of the necessary component parts for the plane, together with instructions as to the mode of assembly. However, it is only the simpler types of planes that are really adapted for merchandising that way. The more complicated forms involve parts the assembling of which calls for skill too far above the average to appeal to younger children, and, as a result, the planes assembled from such kits are mediocre and have a tendency to discourage rather than encourage the child to follow the hobby further. My invention, therefore, provides a model airplane, the parts for which may be produced economically in large quantities for sale in kit form and are of such a simplified design and adapted to be so readily assembled that the skeleton frames for the fuselage and wing, or wings, can be assembled very accurately by any child of average skill, to produce a model plane of nice appearance, closely resembling the sleekness of large commercially-built planes, and at the same time of such rugged construction that it can be flown without likelihood of serious damage when subjected to the usual shocks and jars.

In the skeleton frames for the fuselage and wing, or wings, the longitudinal or main frame member, in accordance with my invention, is provided with a plurality of spaced holes of oblong form, which receive the slotted cross-members of the frame when entered in positions substantially at right angles to their final assembled position, the cross-members being adapted to be turned in the holes to their assembled positions in which the slots in the cross-members receive the longitudinal member, shoulders being provided on diametrically opposite sides of the narrow middle portion of each hole to limit turning when the cross-members arrive at the final assembled positions. Hence, only a dab of cement is required at each joint to make the cross-members rigid with the longitudinal member. The holes in the longitudinal member are graduated in size to conform with the graduation in size of the cross-members, so that there can be no guesswork and no danger, therefore, of error, because only one cross-member can be used in any given station. The fact that the holes in the longitudinal member are within the width thereof instead of being cut-outs from one edge accounts for the greatly increased strength and rigidity of the structure, the holes, moreover, being desirable from the standpoint of further lightening the structure without weakening it.

The fuselage frame, in accordance with my invention, is greatly strengthened by the assembling with a close fit in substantially radial slots in the outer edges of the cross-members of longéron tie strips after all of the cross-

members have been assembled in the main frame member in the novel manner mentioned above. These strips have slots provided therein in longitudinally spaced parallel relationship in the inner edges thereof to receive with a close fit the cross-members and thereby hold the latter against turning out of their final assembled positions and tie them in a fixed spaced parallel relationship, so as to true up and further strengthen and rigidify the structure as a whole. Here again, a little cement applied at each joint at the time of assembly will insure keeping them all tight. Preformed outer wall sections made of molded balsa or corkwood sheet material are adapted to be applied over the outer edges of the tie strips and cemented in place along their longitudinal edges to the opposite sides of the longitudinal or main frame member at the top and bottom thereof to complete the fuselage.

In a similar manner, the wing frame is also greatly strengthened by the assembling with a close fit in slots in the outer ends of the cross-members of other tie strips, which also have slots provided therein in longitudinally spaced parallel relationship in the inner edges thereof to receive with a close fit the cross-members to hold the latter against turning out of their final assembled positions so as to tie them in a fixed spaced parallel relationship, so as to true up and strengthen and rigidify the structure as a whole. Cement applied at each joint at the time of assembly insures keeping them all tight. One or more preformed wall sections of molded balsa or corkwood sheet material are applied on the leading edge of the wing over the tie strip and cemented in place along their longitudinal edges to the top and bottom edges of the longitudinal or main frame member to substantially complete the wing.

The strength of the present structure with its interlocking parts, especially when all of the joints are cemented, as described, to keep them tight, is such that an elongated central potrion of the longitudinal or main frame member of the fuselage may be cut out to provide space for a rubber band for propeller drive purposes stretched lengthwise of the frame on its center line between an eye fixed in the tail portion and an eye provided on the rear end of a propeller drive shaft. Center holes may be cut in the cross-members through which the rubber band can be extended. To facilitate construction of such a plane and yet not sacrifice any of the other aforementioned advantages of the present invention, I prefer to have the outlines of the portions that are to be cut out not only marked out but preferably actually partially cut through on the marked outlines, so that a child will have no difficulty completing the job and is not apt to damage or even ruin the toy in the operation of cutting out the marked portions.

The invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a side view of a skeleton frame assembly for the fuselage of a model airplane made in accordance with my invention;

Fig. 2 is a top view of the same skeleton frame assembly with portions of the longérons broken off and shown alongside the fuselage in full lines to better illustrate the construction thereof, the assembled position of these portions being indicated in dotted lines;

Fig. 3 is a perspective view of the front end portion of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 1 on a larger scale, substantially full size, and showing molded balsa outer wall sections applied;

Fig. 5 is a sectional detail on the line 5—5 of Fig. 4 of the cross-member or former member alone;

Fig. 6 is a perspective view of a skeleton frame structure for one of the wings of the model airplane, the same being shown on a larger scale than Figs. 1 and 2, por-

tions of the longitudinally extending members being broken away to permit showing the parts on such a large scale;

Fig. 7 is a cross section on the line 7—7 of Fig. 6 on a still larger scale, substantially full size, and showing a molded balsa covering on the leading edge and also a covering on the rest of the wing;

Figs. 8 and 9 are plan views of end portions of the tie strips shown in Fig. 6 applied to the trailing edge and leading edge, respectively, and

Fig. 10 is a side view of an end portion of the longitudinal frame member or spar shown in Fig. 6;

The same reference numerals are applied to corresponding parts throughout the views.

Referring to the drawings, the reference numeral 11 designates the skeleton frame assembly for the fuselage generally, and 12 designates generally the skeleton frame assembly for one of the two opposed half sections of the wing, it being understood that the two halves of the wing are left and right counterparts and adapted to be assembled on opposite sides of the longitudinal or main frame member 13 which forms the "keel" of the fuselage. Each wing section similarly has a longitudinal or main frame member 14 constituting a "spar," the two opposed spars 14 of the two wing sections being arranged to have abutment with the opposite sides of the keel 13 on the lower portion thereof and to be secured thereto by means of an interconnecting cleat or wing brace 15 that extends with a close fit through a slot 16 provided in the keel 13 and has a close fit at its opposed projecting end portions in slots 17 provided in the inner end portions of the spars 14. Cement is, of course, applied in the slot 16 and slots 17 to anchor the parts securely in the assembled relationship. The inner ends of the strips 18 and 19 on the leading and trailing edges, respectively, of the wing sections are cut off at right angles, as indicated at 20 in Fig. 6 for abutment squarely against the opposite sides of the keel 13 and fastening thereto by cementing or in any other suitable manner.

The keel 13 is preferably, although not necessarily, cut from a sheet of balsa to the profile shown in Fig. 1. The front end 21 is suitably profiled for connection with an engine mount. The rear end 22 is suitably profiled for connection with a tail assembly or stabilizer. However, as will soon appear, the keel 13 is also adapted to have an elongated central portion thereof, indicated by the dotted lines at 23 in Fig. 1, cut away to provide space in the keel for a rubber band for propeller drive purposes, stretched lengthwise of the fuselage on its center line between an eye fixed in the rear or tail portion and an eye provided on the rear end of a propeller drive shaft suitably mounted in the front or nose portion of the fuselage. In other words, the one construction is designed and adapted to be used in various ways. The outline 23 of the central portion of the keel to be cut away may be merely printed on the opposite sides of the keel as a guide to the purchaser in cutting out this portion, but I prefer, as indicated in Fig. 4, to have the piece 13 actually partially cut through on the dotted outline so that a child will have no difficulty completing the job and is not apt to damage or even ruin the toy in the operation of cutting out the marked portion. For a similar reason, the circular outlines 24 of the central portions of the generally oval-shaped cross-members, bulkhead members or formers 25 are similarly partially cut through, as indicated in Fig. 5, to define circular "knock-out" slugs which the child can either press out or cut out easily to provide holes through which the rubber band for propeller drive purposes can be extended.

Oblong holes 26 are provided in the keel 13 in longitudinally spaced relation, as clearly appears in Fig. 1, each having shoulders 27 provided on diametrically opposite sides of the middle portion to have abutment with the opposite sides of the associated cross-members or formers 25. Six holes 26 are shown in Fig. 1 and six formers 25 assembled therein, the holes 26 being of graduated sizes and the formers being graduated in size to fit the same so that each hole takes only one specific former and no other. That eliminates all guesswork and assures uniformly good results. Each former 25 has diametrically opposed slots 28 provided therein in which the portions of the keel 13 on diametrically opposite sides of the hole 26 in which the former fits will have a close fit when the formers are in their finally assembled positions in the holes, as illustrated in Figs. 1 to 4. The formers are adapted to be entered in the holes with the long dimension of each former coinciding with the long dimension of the associated hole, the formers being entered far enough to bring the slots 28 into register with the plane of the keel 13, whereupon the formers may be turned to the upright assembled positions entering the portions 29 of the keel above and below the holes 26 in the slots 28, the opposed faces of each former abutting the shoulders 27. A little cement can be applied to each shoulder 27 and to each of the portions 29 adjacent these shoulders to fasten the formers rigidly in their finally assembled positions. The fact that the holes 26 are within the width of the keel 13, instead of being in the form of cut-outs from an outer edge, accounts for the strength and rigidity of the structure, the holes 26 moreover serving as lightening holes without weakening the structure. The fuselage would be quite strong if the shell formed by the two molded balsa sections, indicated at 30 in Fig. 4, were applied and cemented to the peripheral edges of the formers 25 and along their longitudinal edges 31 to the opposite sides of the keel 13, without any further reinforcing being added to the frame structure of the fuselage. However, in accordance with my invention, longéron tie strips 32 are assembled with a close fit in substantially radial slots 33 provided in the diametrically opposite sides of the formers 25 in a plane at right angles to the plane of the slots 28, the tie strips 32 moreover having slots 34 provided in their inner edges in longitudinally spaced parallel relationship to receive with a close fit those portions of the formers 25 next to the slots 33, whereby to hold the formers against turning out of their final assembled positions and tie them in a fixed spaced parallel relationship and accordingly true up and further strengthen and rigidify the structure as a whole. Cement applied at each of the joints 33—34 at the time of assembly will insure keeping them all tight. As a matter of fact, it is the addition of these tie strips 32 that actually makes it practical to cut away such a large central portion of the keel 13, as indicated at 23, without danger of too seriously weakening the frame structure. The portion 23 is not cut out until after the whole skeleton frame structure has been assembled and the cement in all of the joints has set so that there is no likelihood of any damage or distortion of the frame due to this cutting out.

The wing construction as shown in Figs. 6 to 10 closely resembles the fuselage construction shown in Figs. 1 to 5. The longitudinally extending spar 14 has oblong holes 36 cut therein in longitudinally spaced relation, each of which has shoulders 37 defined on diametrically opposite sides of the middle portion thereof, similarly as the shoulders 27 in holes 26 in keel 13. Ribs or formers 35 have opposed slots 38 provided therein behind the nose portion 39, adapted to receive the portions 40 of the spar on diametrically opposite sides of the narrow middle portion of the holes 36 when the ribs 35 are assembled in the holes 36, as shown in Fig. 6, following the same procedure as in the assembling of the cross-members or formers 25 in the holes 26, the shoulders 37 in this case being cemented to the opposite sides of the ribs 35 and the portions 40 being also preferably cemented in the slots 38 so as to provide a rigid and serviceable wing structure. The holes 36 and the ribs 35 are graduated in size to diminish the size of the wing section toward the tips, and there again it is mani-

fest that with such graduation the ribs, which may, furthermore, be numbered if desired to facilitate assembling, cannot be assembled on the spar in anything but their correct locations, similarly as in the case of the formers **25** in the fuselage construction. While I have shown only a single spar **14** in the wing section it should be evident that two, or even more, could be provided in spaced parallel relationship, all interlocking with the ribs **35** in the manner stated, as indicated by the dotted spar **14** in Fig. 7. A molded balsa covering is provided for the leading-edge of the wing adapted to fit over the nose portions **39** of the ribs **35**, as shown at **41** in Fig. 7, with its trailing edge portions **42** overlapping the upper and lower edges of the spar **14**, to which these edges **42** are preferably cemented. The edges of the nose portions **39** may likewise be cemented to the inside of the cover **41**. Fabric or paper strips running lengthwise of the wing cover the rest of the ribs behind the spar **14** and over the strip **19**, as indicated at **43**, the ribs **35** being preferably widened behind the spar **14** so as to define shoulders **44** to make up for the difference in thickness of the fabric covering **43** as compared with the balsa covering **41** so that the outer surfaces of the coverings **41** and **43** lie substantially flush with one another. At the tip of each wing a rib **45** is provided fitting closely in a slot **46** provided in the outer tapered end portion of the spar **14** and cemented in place. The front and rear ends of the rib **45** lie flush with the ends of the strips **18** and **19** and are cemented thereto. The ends of the balsa and fabric coverings **41** and **43** are cemented to the top and bottom of the rib **45**. The strips **18** and **19**, like the strips **32** previously described, are entered with a close fit in slots **53** provided in the opposite ends of the ribs **35** and they also have slots **54** provided therein in longitudinally spaced parallel relationship receiving the ribs **35** with a close fit, whereby to hold the ribs **35** against turning from their assembled positions and tie the ends of the ribs together in true parallelism and thereby make the wing much stronger, especially when all of the joints **53–54** are properly cemented. A wing constructed as just described is very serviceable and practical, and will easily withstand the jolts to which wings are inevitably subjected in the flying of model airplanes.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. In a toy airplane construction, a skeleton framework comprising a longitudinal frame member having a plurality of longitudinally spaced holes provided therein, each of oblong shape and provided with a pair of shoulders on the diametrically opposite sides of the narrow middle portion in spaced parallel planes, cross-members assembled on and in transverse relation to the longitudinal member, one in each of said holes, each cross-member having one dimension intermediate its ends that is appreciably greater than the width of the narrow middle portion of the associated hole but less than the length dimension of said hole, said cross-member having on that dimension inwardly extending slots provided in diametrically opposite side portions thereof of a width approximately equal to the thickness of the longitudinal member and receiving the same to interlock the members when the cross-member is inserted in the associated hole to a position in which the slots are in coplanar relation to the longitudinal member and is turned to the interlocked position, the cross-member in its terminal assembled position having abutment on its opposite sides with the shoulders while the slots closely receive portions of the longitudinal member adjacent said shoulders outwardly from the hole, the distance between the inner ends of said inwardly extending slots on said cross-members being substantially equal to the width of the narrow middle portion of the holes associated therewith, and a longitudinal tie member entered in inwardly extending slots provided in said cross-members between the diametrically opposed slots, said tie member having longitudinally spaced substantially parallel slots provided in the inner longitudinal edge portion thereof closely receiving said cross-members at the slots therein to prevent turning of said cross-members from assembled position on the longitudinal member while holding the cross-members in fixed parallel relationship.

2. In a toy airplane construction, a skeleton framework comprising a longitudinal frame member having a plurality of longitudinally spaced holes provided therein, each of oblong shape and provided with a pair of shoulders on the diametrically opposite sides of the narrow middle portion in spaced parallel planes, cross-members assembled on and in transverse relation to the longitudinal member, one in each of said holes, each cross-member having one dimension intermediate its ends that is appreciably greater than the width of the narrow middle portion of the associated hole but less than the length dimension of said hole, said cross-member having on that dimension inwardly extending slots provided in diametrically opposite side portions thereof of a width approximately equal to the thickness of the longitudinal member and receiving the same to interlock the members when the cross-member is inserted in the associated hole to a position in which the slots are in coplanar relation to the longitudinal member and is turned to the interlocked position, the cross-member in its terminal assembled position having abutment on its opposite sides with the shoulders while the slots closely receive portions of the longitudinal member adjacent said shoulders outwardly from the hole, the distance between the inner ends of said inwardly extending slots on said cross-members being substantially equal to the width of the narrow middle portion of the holes associated therewith, and a pair of longitudinal tie members entered in inwardly extending slots provided in the opposite sides of said cross-members between the diametrically opposed slots, each of said tie members having longitudinally spaced substantially parallel slots provided in the inner longitudinal edge portions thereof closely receiving said cross-members at the slots therein to prevent turning of said cross-members from assembled position on the longitudinal member while holding the cross-members in fixed parallel relationship.

3. In a toy airplane fuselage construction, a skeleton framework comprising a longitudinal frame member having a plurality of longitudinally spaced holes provided therein, each of oblong shape and provided with a pair of shoulders on the diametrically opposite sides of the narrow middle portion in spaced parallel planes, cross-members assembled on and in transverse relation to the longitudinal member, one in each of said holes, each cross-member having one dimension intermediate its ends that is appreciably greater than the width of the narrow middle portion of the associated hole but less than the length dimension of said hole, said cross-member having on that dimension inwardly extending slots provided in diametrically opposite side portions thereof of a width approximately equal to the thickness of the longitudinal member and receiving the same to interlock the members when the cross-member is inserted in the associated hole to a position in which the slots are in coplanar relation to the longitudinal member and is then turned to the interlocked position, the cross-member in its terminal assembled position having abutment on its opposite sides with the shoulders while the slots closely receive portions of the longitudinal member adjacent said shoulders outwardly from the hole, the distance between the inner ends of said inwardly extending slots in said cross-members being substantially equal to the width of the narrow middle portion of the holes associated therewith, and a pair of longitudinal tie members entered in inwardly extending slots provided in the opposite sides of said cross-members between the diametrically opposed slots, each of said tie members having longitudinally spaced substantially parallel slots provided in the inner longitudinal edge portions thereof closely receiv-

ing said cross-members at the slots therein to prevent turning of said cross-members from assembled position on the longitudinal member while holding the cross-members in fixed parallel relationship.

4. In a toy airplane wing construction, a skeleton framework comprising a longitudinal spar having a plurality of longitudinally spaced holes provided therein, each of oblong shape and provided with a pair of shoulders on the diametrically opposite sides of the narrow middle portion in spaced parallel planes, elongated ribs assembled on and in transverse relation to the spar, one in each of said holes, each rib having one dimension intermediate its ends that is appreciably greater than the width of the narrow middle portion of the associated hole but less than the length dimension of said hole, said rib having on that dimension inwardly extending slots provided in diametrically opposite side portions thereof of a width approximately equal to the thickness of the spar and receiving the same to interlock the members when the rib is inserted in the associated hole to a position in which the slots are in coplanar relation to the spar and is turned to the interlocked position, the rib in its terminal assembled position having abutment on its opposite sides with the shoulders while the slots closely receive portions of the longitudinal spar adjacent said shoulders outwardly from the hole, the distance between the inner ends of said inwardly extending slots on said

ribs being substantially equal to the width of the narrow middle portion of the holes associated therewith, and a pair of longitudinal spar members entered in inwardly extending slots provided in the opposite sides of said ribs between the diametrically opposed slots, each of said spar members having longitudinally spaced substantially parallel slots provided in the inner longitudinal edge portions thereof closely receiving said ribs at the slots therein to prevent turning of said ribs from assembled position on the longitudinal member while holding the ribs in fixed parallel relationship.

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