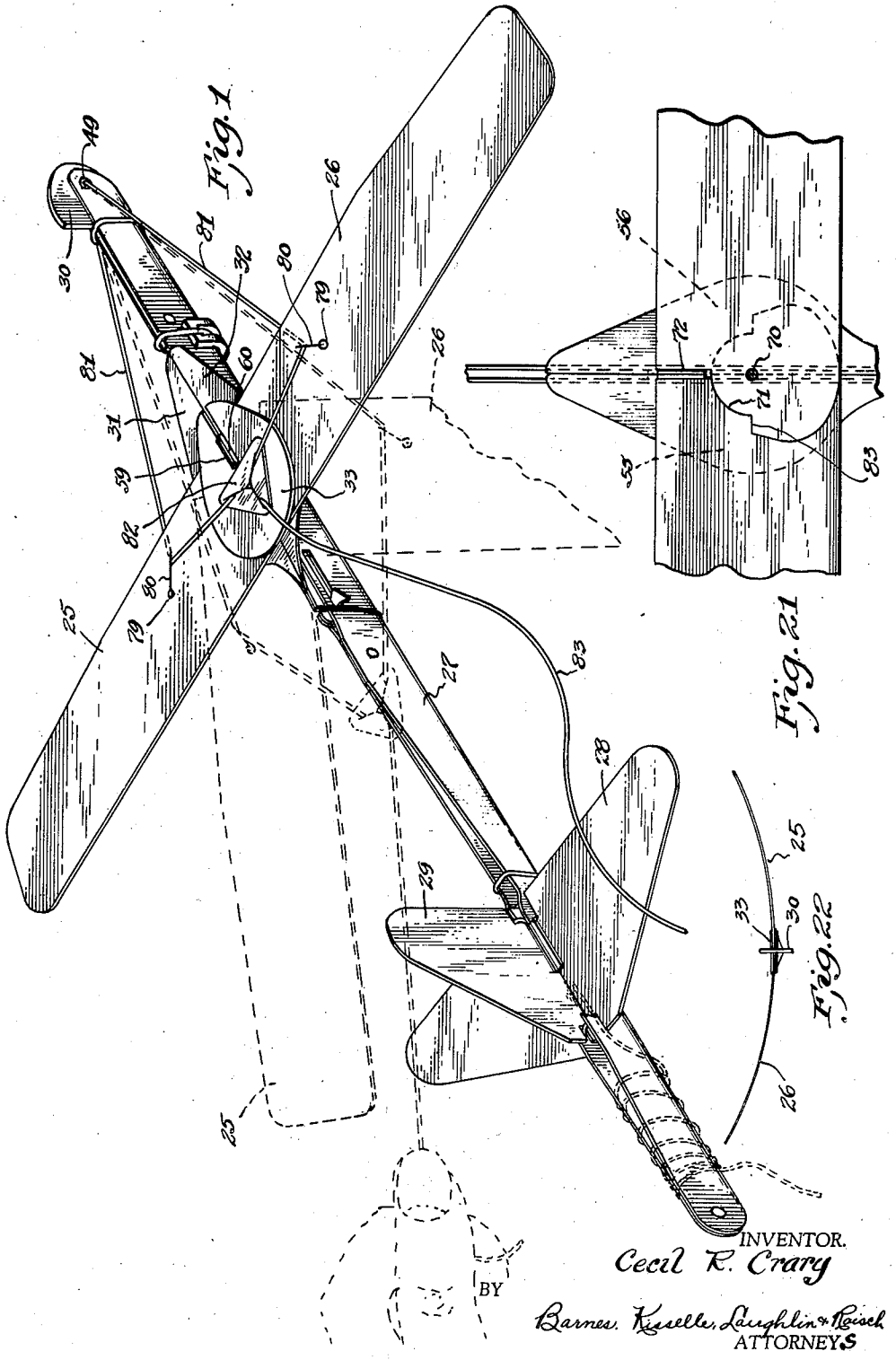
Dec. 29, 1942. C. R. CRARY 2,306,866

TOY AIRPLANE

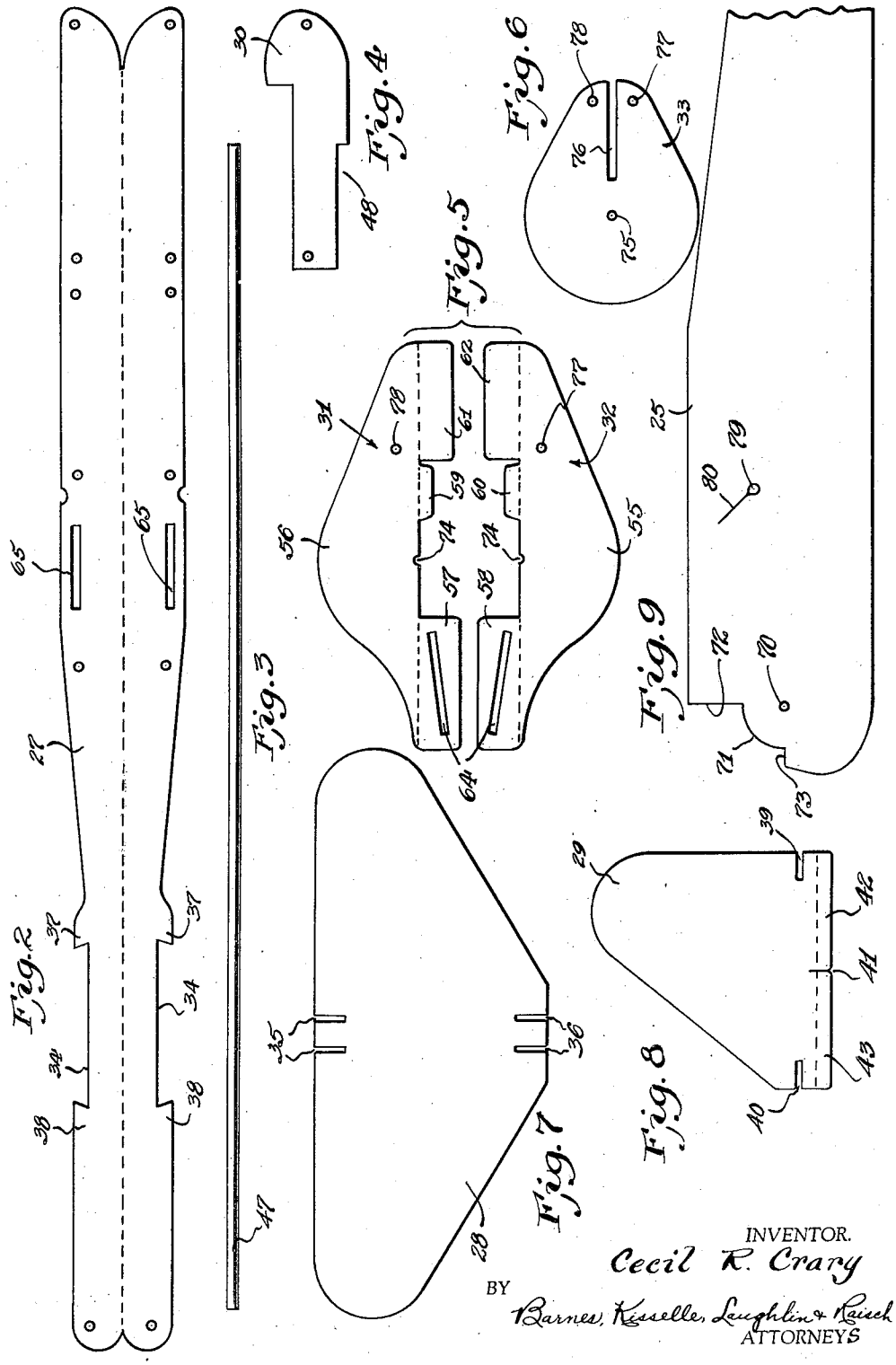
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TOY AIRPLANE

Filed Jan. 20, 1940 4 Sheets-Sheet 2




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TOY AIRPLANE

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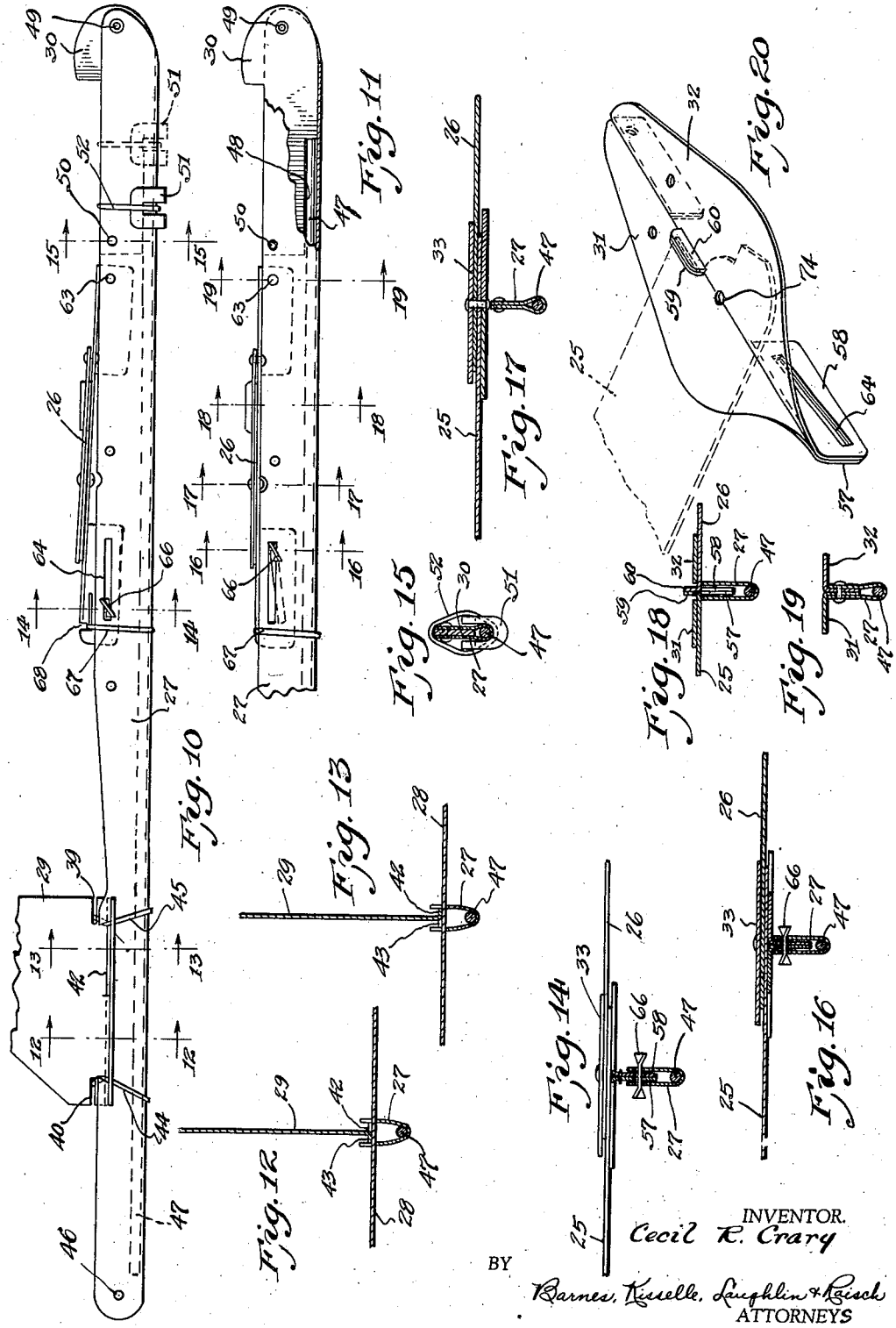


Fig. 10

Fig. 11

Fig. 12

Fig. 13

Fig. 14

Fig. 15

Fig. 16

Fig. 17

Fig. 18

Fig. 19

Fig. 20

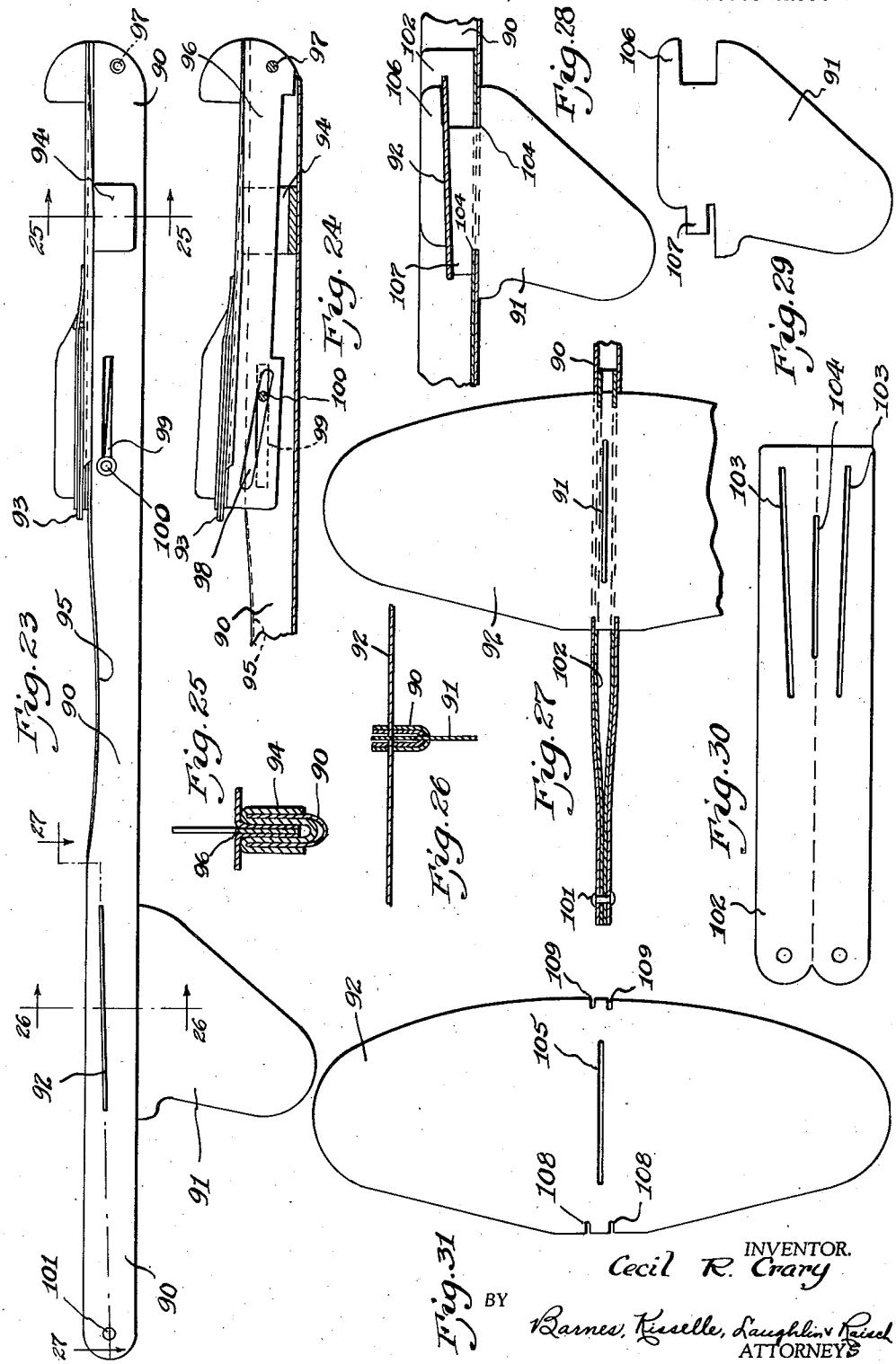
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# UNITED STATES PATENT OFFICE

2,306,866

## TOY AIRPLANE

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Application January 20, 1940, Serial No. 314,751

13 Claims. (Cl. 46—80)

This invention relates to a toy airplane.

It is an object of the present invention to provide a toy airplane which may be projected high in the air and which will sail down to earth by reason of the force of gravity. The invention contemplates an airplane which has the wing members so mounted that they may be folded close to the body of the airplane while the unit is being projected skyward. The timing means is arranged to hold the wings in this position for a predetermined time after which they will be automatically moved to the normal wing position to permit the airplane to glide.

An object of the invention is to provide an airplane which has a novel wing support for flexible wings so that a proper dihedral angle will be assumed by the wings depending on the weight of the airplane and the velocity with respect to the wind.

Another object of the invention is to provide an airplane structure in which the angle of the wings with respect to the longitudinal axis of the body may be adjusted to suit the operator.

A further feature of the invention has to do with a novel connecting member and resilient ties acting on the wings and arranged to permit an easy folding of the wings to the body in conjunction with a timing member. The invention also contemplates a novel adjustment for the center of gravity of the body and a novel reinforced design for the body whereby it may be made of a stiff, waterproof sheet material.

Other objects and features of the invention having to do particularly with details of design of certain of the parts of the toy airplane which facilitate assembly and construction and having to do with the operation of the device, will be brought out in more detail in the following description and claims.

In the drawings:

Fig. 1 is a perspective view of the assembled device showing the flight position, the dotted lines being presented to show the wings moving toward folded position.

Fig. 2 is a plan view of the blank which is used to fasten the body of the airplane.

Fig. 3 shows the reinforcing rod used in the body.

Fig. 4 shows the novel nose of the body.

Fig. 5 illustrates the blank form of the lower wing supporting members.

Fig. 6 is a cut-out of the top wing supporting member.

Fig. 7 illustrates in detail the shape of the tail wings.

Fig. 8 shows the rudder.

Fig. 9 shows the inner portion of a wing.

Fig. 10 illustrates a side elevation of the assembled device.

Fig. 11 is a similar view of a portion of the side elevation showing the adjustment for the wing angles.

Figs. 12, 13, 14 and 15 are vertical transverse sections taken on the respective lines of Fig. 10.

Figs. 16, 17, 18 and 19 are vertical transverse sections taken on the respective lines of Fig. 11.

Figs. 20 and 21 show details of the wing supporting device.

Fig. 22 is a front view of the device illustrating the manner in which the wings may assume a proper dihedral angle depending on the wind resistance.

Fig. 23 is a side elevation of a modified type of airplane body.

Fig. 24 is a partial view of Fig. 23 showing some parts in different relative positions.

Figs. 25, 26 and 27 are sections taken on the lines 25—25, 26—26 and 27—27 respectively, of Fig. 23.

Figs. 28 through 31, inclusive, are details of the modified form of the invention illustrated in Fig. 23.

Referring to Fig. 1, left and right hand wings 25 and 26 are supported on a body 27 at the front portion thereof. A tail wing 28 is supported transversely of the body and a rudder 29 extends vertically upward from the tail wing, these parts being positioned at the rear portion of the body. A nose 30 extends to the forward end of the body and the wing supporting means comprise right and left hand parts 31 and 32 and a top disc 33.

A preferred shape for the body 27 is illustrated by the blank shown in Fig. 2. It will be noted that this blank has opposed notches 34 which receive the tail wing member 28 and the tail wing member is provided with forward notches 35 and rear notches 36 adapted to receive, respectively, the shoulders 37 and 38 formed at the ends of the notches 34. The body member 27 is, of course, bent upon itself at the centerline to form a channel member, as shown in Fig. 1, so that the notches 34 will each be on the upper surface of the body. The rudder 29 is formed with a forward notch 39 and a rear notch 40 and the lower edge of the rudder is split at 41 and parts 42 and 43 at each side of the split are arranged to be bent in opposite directions to a position at right angles to the rudder. The parts 42 and 43 then rest on the tail wing member 28 (see Figs. 12 and 13). To hold the parts 28 and 29 in position on the

body, rubber bands 44 and 45 are used. These rubber bands pass around the body and into the slots 35 and 36 of the tail wing and the slots 39 and 40 on the rudder, thereby holding the parts solidly in position.

Referring now to the remainder of the body, it will be seen that the rear end of the body is riveted at 46 to close the channel member. Extending forwardly from this closed portion and in the lower portion of the channel is a reinforcing rod 47. This rod is preferably a light bamboo piece and the forward end of the rod is received by a recess 48 in the lower edge of the nose portion 30. The nose portion 30 is riveted at each end to the body as shown at 49 and 50. On the forward end of the body is a small channel shaped weight 51 adjustably supported on that part of the body enclosing the nose by a rubber band 52.

Referring now to the wing supporting construction, the blank members 31 and 32, illustrated in Fig. 5, are shaped respectively to have portions 55 and 56 which will extend from the body when the parts are in position (see Fig. 21). These members 31 and 32 also have, respectively, tab portions 57 and 58, 59 and 60, and 61 and 62. As viewed in Fig. 5, the tab portions 57 and 58 and 61 and 62 are to be bent downwardly at right angles to the main portions 31 and 32. The tab portions 59 and 60 are to be bent upwardly at right angles. The respective tabs of the parts are then placed together in parallel relationship and the downwardly extending tabs are inserted in the channel of the body 27. The front tabs 61 and 62 are pivotally connected to the body by a rivet 63. The rear tabs 57 and 58 are each provided with a slot 64. These slots coincide when the slots are placed together to form a cam groove. The body 27 is also provided with slots 65 which are parallel to the axis of the body and when the wing supporting members 31 and 32 are mounted in the body, a cam member 66 may be passed through the slots 64 and 65 and fixed therein by turning the ends. The cam 66, however, is free to slide in the slots. Since the slot 64 is placed at an angle in the tabs 57 and 58, shifting of the cam-like member 66 will pivot the two wing supporting members 31 and 32 on the rivet 63. The purpose of this is to change the angle of the wings with respect to the axis of the body. A rubber band 67 is passed around the body and through a small notch 68 formed in the members 31 and 32 so that there will be a tension on the camming member 66 to prevent its sliding from any adjusted position. A top wing supporting disc 33, shown in Fig. 6, is intended to be placed over the horizontal portions 55 and 56 of the lower wing supporting members, as shown in Fig. 1. If more body rigidity is desired, the front tabs 61 and 62 may be extended to the nose of the body and there pivoted.

The inner end of each of the wings is shaped as shown in Figs. 9 and 21 so that the wing may be pivoted at a point indicated by reference numeral 70. A portion of the wing adjacent this pivot point is formed on a radius from the point, as shown at 71. At each end of this radius are shoulders 72 and 73. In mounting the wings a pivot rivet is passed through a hole 74 (Fig. 20) formed by semi-circular openings in the edge of members 31 and 32. This rivet also passes through the points 70 in wings 25 and 26 and then through a hole 75 in the disc 33. The disc 33 is also provided with a slot 76 through which project the tabs 59 and 60 of the lower wing supporting members 31 and 32. The disc 33 is also fastened to members 31 and 32 at points indicated by reference numerals 77 and 78. With the wings thus mounted it will be seen that they may be pivoted about the point 70 from a position transverse of the body 27 to a position where they lie substantially parallel with the body. Each of the wings is provided with an aperture 79 off from which extends a slit 80.

A strip of rubber 81 is passed through an aperture in rivet 49 and each end, after being inserted through aperture 49 and through respective wings 25 and 26, is slipped into the slit 80 so that it will be held securely in place. The ends of the rubber strip 81 are then secured in a triangular piece 82 (Fig. 1) which has a central aperture and three slits extending radially therefrom. The ends of the strip 81 are passed through this central aperture and then drawn into the slits to be held in place. A second rubber strip 83 has one end fastened in the third slit of the piece 82. Thus the portions of rubber strip 81 which lie between the wings and the nose may be given any tension desired by simply shifting the band in the slits 80. When this strip is given a tension it will be seen that the wings 25 and 26 will be maintained in their open position, shown in Fig. 1. In this position the shoulders 72 of the wings will bear against the tabs 59 and 60 extending upwardly from the wing supporting means 31 and 32. This will limit the forward movement of the wings.

When the toy airplane is to be projected skyward, the strip 83 is drawn toward the tail of the airplane. This will draw the connecting piece 82 back and eventually will move the wings 25 and 26 back. These wings are shown about half way back by the dotted lines in Fig. 1. This pivotal movement of the wings is limited by the shoulders 73 contacting the tabs 59 and 60. When the wings are once drawn back they may be held in this position by fastening the drawing strip 83. This strip 83 is also intended to be a timing device and to function as such, it is wound around the tail end of the body behind the tail wings and the loose end is held by the thumb and forefinger. The airplane may then be projected skyward, either by throwing or by the use of a shooting device such as a rubber band mounted on the end of a handle. This shooting band may be positioned behind the upright portion of the nose 30. After the folded airplane is projected upward the end of the strip 83 will be released and will gradually unwind from the tail until the tension thereon is released. This will permit the strip 81 to draw the wings 25 and 26 into flying position. At this time, however, due to the velocity of the airplane, the wings will assume a dihedral angle, as shown for example in Fig. 22. The wings are preferably formed of a flexible waterproof pressed paper and are given semi-rigid support by the members 31, 32 and 33. This support will tend to move the wings down into the transverse position while the wind resistance will tend to hold the wings bent upwardly in a dihedral angle. An equilibrium will be reached so that the plane may glide downwardly; as the velocity decreases the dihedral angle will decrease.

It will be seen that in case the angle of the wings with the axis of the body is to be changed, this may be done by simply shifting the camming member 66 in the slots 64 so that the wing sup-

porting members 31 and 32 will be shifted. Adjustment of the center of gravity of the plane may be made by shifting the weight of the wing fore or aft on the body. The parts of the airplane including the wings, body, tail wings, and rudder are preferably formed of a waterproof pressed paper or other fibrous material. The rod 47, as previously mentioned, is preferably formed of bamboo or rod and affords a very light reinforcing member for the body. If desired, this rod may be eliminated and the body reinforced longitudinally by embossing or flanges.

In Figs. 23 through 31 is illustrated a preferred embodiment of the invention. Referring to Fig. 23, the body of the airplane is shown at 90, a rudder at 91, a tail wing at 92, a main wing at 93, and a weight at 94. The body 90 is a channel reinforced at its mid-section by a flared portion 95 at each side. Referring first to the nose of the plane, this is formed by the body 90 and also by a wing supporting member 96 which is pivoted at 97 to the front end of the body. The wing supporting member extends back from the nose within the body channel and is provided with transverse members for supporting the wings as described in connection with the embodiment shown in Fig. 1. A slot 98 in the wing supporting member cooperates with a slot 99 in the body and a cam 100 for adjusting the level or angle of the wings. The weight 94 is formed with a double channel cross section, as shown in Fig. 25, so that when the wing supporting member 96 is fitted into the central channel of the weight and the sides of the body 90 are fitted into the side channels of the weight, the weight will be locked between the two members so that there is no chance of it being lost. It will thus be seen that the nose portion and the weight have been provided without the use of rubber bands for holding the same together.

Similarly, a novel tail construction has been provided in the embodiment of Fig. 23 so that the tail wing 92 and the rudder 91 may all be locked in place by the use of a single rivet 101. The rear portion of the body 90 is provided with side slots to receive the tail wing 92. A reinforcing member 102, which consists of a channel adapted to fit within the rear portion of the body channel, is also provided with similar side slots to receive the tail wing. These latter slots are shown at 103 in Fig. 30. The bottoms of the body channel 90 and of the reinforcement member 102 are also provided with slots 104, and similarly, the tail wing 92 is provided with a slot 105. These slots in the bottoms of the channels and also in the tail wing are provided to receive the rudder 91 which has a novel shape. The rudder is shown in Figs. 28 and 29. The right upper corner is cut away except for a tab 106 and at the left upper corner, the rudder is cut away except for a tab 107. After the tail wing 92 has been put in position by passing it through the slots in the body 90 and the slots 103 in the reinforcing member 102, the rudder may then be placed in position. This is done by passing the upper portion up through the slots 104 in the bottom of the body 90 and the reinforcement member 102 so that the upper right hand corner of the rudder is positioned in such a way that the tab 106 is above the tail wing 92. The rudder may then be shifted rearwardly so that the tab portion 107 hooks into the channel of the body 90 and the reinforcement member 102. The rear edge of the tail wing 92 is provided with spaced notches 108 which are adapted to receive portions of the side wall of the body 90 to hold the wing rigidly in position at its rear edge. The front edge of the tail wing is provided with notches 109 which are to receive the front edges of the slots 103 in the reinforcement member 102. After the reinforcement member is drawn back into the position shown in Fig. 27, it is then riveted in place and the entire tail assembly is locked in position.

What I claim is:

1. A toy device comprising a longitudinally extending body portion, tail means on said body portion, wing means movably fastened on said body portion, said wing means being shiftable from a position directly adjacent said body to a position transverse thereof, means for adjusting the plane of said wing means with respect to the longitudinal axis of said body and means for maintaining said wing means in said first position for a predetermined length of time while said toy is projected skyward.

2. A toy device comprising a longitudinally extending body portion, tail means on said body portion, wing means movably fastened on said body portion, said wing means being shiftable from a position directly adjacent said body to a position transverse thereof, means for adjusting the plane of said wing means with respect to the longitudinal axis of said body, means for affording support to said wing means a predetermined distance from said body, and means for maintaining said wing means in said first position for a predetermined length of time while said toy is projected skyward.

3. A toy device comprising a longitudinally extending body portion, tail means on said body portion, wing means adapted to be fastened on said body, means for movably mounting said wing means on said body comprising a fastening plate and means for pivoting the inner ends of said wings to said plate, means for mounting said plate pivotally at one end on said body, and means for adjustably locking said plate at the other end to said body whereby the angle of the plane of said plate means and of the wings supported therein may be adjusted with respect to the longitudinal axis of said body portion.

4. In a toy device resembling an airplane, a longitudinally extending body portion, tail means on said body portion, wing means to be fastened to said body, and wing supporting means comprising identical angle members having like portions fastened to said body and each having a portion projecting outwardly from said body, means for pivotally fastening said wing means to said projecting portions, and means on each of said members for limiting the pivotal movement of said wing means in one direction, said wing means being adapted to be folded to said body to permit projecting of said toy rapidly skyward.

5. In a toy device resembling an airplane, a body portion comprising a fibrous channel member and a reinforcing head member pivoted forwardly of said body, tail means on said body portion, and wing means movably fastened to said head member whereby the wing means may be folded to said body to permit projecting of said toy rapidly skyward and adjustment of the pivotal mounting of said reinforcing head member changes the angle of the wing means with respect to the body portion.

6. In a toy device resembling an airplane, a body portion comprising a fibrous channel member and a reinforcing head member pivoted for-

wardly of said body, tail means on said body portion, transverse extensions on said head member, and wing means movably fastened to and supported by said extensions on said head member whereby the wing means may be folded to said body to permit projecting of said toy rapidly skyward and adjustment of the pivotal mounting of said reinforcing head member changes the angle of the wing means with respect to the body portion.

7. In a toy device resembling an airplane, a body portion comprising a stiffening head member, a reinforcing longitudinal extending rod received at one end in a notch of said head member, and a fibrous channel member bent around said rod and head member to comprise a covering therefor, and part of the body, tail means on said body portion, wing supporting means comprising identical angle members each having a portion received in said channel member and each having a portion projecting outwardly from said channel, means for pivotally fastening said wing means to said projecting portions, and means limiting the pivotal movement of said wing means in one direction, said wing means being adapted to be folded to said body to permit projecting of said toy rapidly skyward.

8. A toy device comprising a longitudinally extending body portion, transversely extending tail means on said body portion, a head portion pivoted on said body, and wing means movably fastened on said head portion, said wing means being shiftable from a position directly adjacent said body to a position transverse of said body whereby said wing means are aligned, and means for maintaining said wing means in said first position for a predetermined length of time while said toy device is being projected into the air, and weight means adjustably supported on said body to control the balance thereof, said weight means comprising a double channel member interlocked with said body and head portions but slidable longitudinally thereof.

9. In a toy device resembling an airplane, a longitudinally extending body portion, tail means at one end thereof, and wing means pivotally fastened at another portion thereof, and means for moving said wing means to a folded position adjacent the body comprising resilient means connected on said wing means at a specified distance from said body, a fastening member provided with diverging slits to receive said resilient means and lock the same in position, and another resilient means received by said fastening member and extending to the rear of said body member and adapted to serve as a draw string and as a timing device for maintaining the wings in folded position for a predetermined length of time.

10. In a toy device resembling an airplane, a longitudinally extending body portion, tail means at one end thereof, and wing means pivotally fastened at another portion thereof, and means for moving said wing means to a folded position adjacent the body comprising resilient means connected on said wing means at a specified distance from said body, a fastening member provided with diverging slits to receive said resilient means and lock the same in position and another resilient means received by said fastening member and extending to the rear of said body member and adapted to serve as a draw string and as a timing device for maintaining the wings in folded position for a predetermined length of time, said wing means being formed of flexible material whereby they will assume a dihedral angle to correspond to wind resistance met thereby.

11. In a toy device resembling an airplane, a body portion comprising a fibrous channel member, means for fastening movable wings at the forward end of said body and a tail construction comprising a reinforcing channel within the rear portion of said body channel, a tail wing arranged to pass through and be supported in registering slots in the walls of said channels, and a rudder provided with corner tabs and received by slots in the bottom of said channels and in said tail wing whereby one of said tabs is locked over said tail wing and the other is locked between said tail wing and the bottom of said channels.

12. In a toy device resembling an airplane, a body portion comprising a fibrous channel member, means for fastening movable wings at the forward end of said body and a tail construction comprising a reinforcing channel within the rear portion of said body channel, a tail wing arranged to pass through and be supported in registering slots in the walls of said channels, and a rudder provided with corner tabs and received by slots in the bottom of said channels and in said tail wing whereby one of said tabs is locked over said tail wing and the other is locked between said tail wing and the bottom of said channels, said reinforcing channel being arranged to be shifted longitudinally of said body to lock said rudder and tail wing in position, and means for holding said reinforcing channel in said shifted position.

13. A toy device comprising a longitudinally extending body portion, tail means on said body portion, a fastening plate, wing means mounted on said plate, means for mounting said plate pivotally at one end on said body and means for adjustably locking said plate at the other end to said body whereby the angle of the plane of said plate and said wing means may be adjusted with respect to the longitudinal axis of said body portion.

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