May 16, 1939. A. P. O'HARE 2,158,377

GLIDER

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Fig. 1.

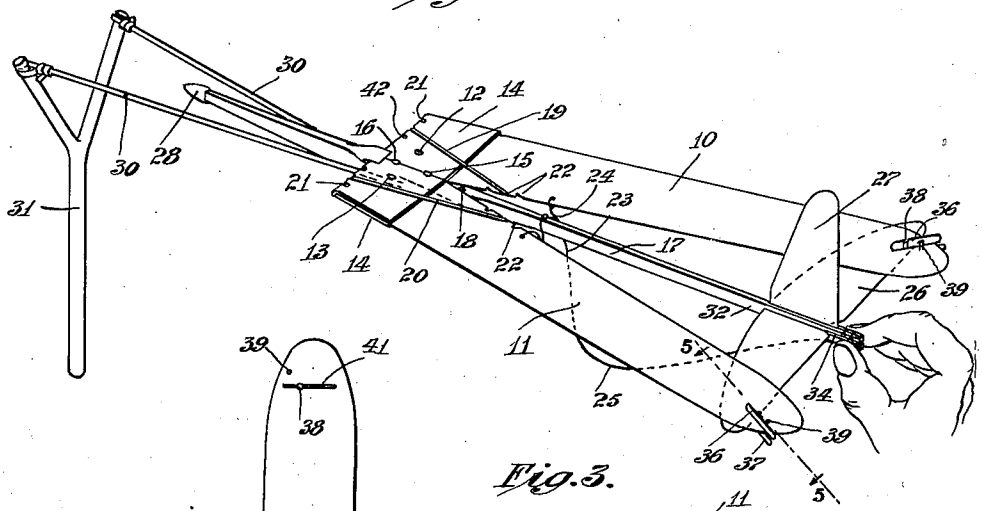


Fig. 3.

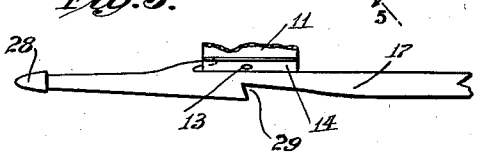


Fig. 2.

Fig. 4.

Fig. 6.

Fig. 5.

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GLIDER

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5 Claims. (Cl. 46—80)

This invention relates to gliders, especially those known as toy aeroplanes, which are adapted to be launched and capable of soaring for a while. An object is to provide a glider with wings which may be folded to offer decreased air resistance during launching, and which will open automatically in flight, but not immediately after launching. Another object is to provide such a device with delay action means for opening the wings only after the glider has been launched and has had an opportunity to gain altitude under the launching force, with the wings folded. A further object is to render such delay action means inoperative until just before the glider reaches its greatest height.

A number of suggestions have been made for toy aeroplanes whereby the wings may be folded during launching to offer less wind resistance. The difficulty with these suggestions has been that the wings open immediately after launching, thereby cutting down the height to which the glider might otherwise ascend if the wings had remained folded. According to this invention, the wings are maintained in folded position after launching and not opened to offer increased resistance to upward travel of the glider until sometime later when the glider is nearer to the peak of its upward movement, whereby greater altitude may be gained and therefore greater soaring time and distance.

Referring to the drawing:

Fig. 1 is a prospective of one embodiment of this invention ready for launching.

Fig. 2 shows the glider on Fig. 1 with the wings open.

Fig. 3 is a detail of the notch in which the elastic band may engage for launching.

Fig. 4 is a detail of the rear end of the body portion of the glider.

Fig. 5 is a section on the line 5—5 of Fig. 1.

Fig. 6 is a section on a line 6—6 of Fig. 2.

The glider has wings 10 and 11 pivoted respectively about the headed pins 12 and 13 passing through the wings and also through upper and lower portions of the wing holding means 14, which in turn may be secured by pins 15 and 16 to the body portion 17 of the glider. In order that the holding means 14 may be adjusted forwardly or rearwardly, the body 17 is provided with a number of additional holes 18 for receiving the pins 15 and 16 in the location desired for the best longitudinal position of the wings with respect to the body portion 17. A string or resilient band, such as a rubber band, 19 and 20, engage one of several notches 21 in the forward edge of the wing holding means 14, and also engage a notch 22 in the rear edge of the wing. A strand 23, or thread, is attached to each of the wings as illustrated, forming a loop and passing through an eye 24, attached to the body portion 17 and extending slightly above, as illustrated in Figs. 1 and 2. Another strand 25 is slideably attached to the loop 23, and extends rearwardly, preferably through one or more guiding eyelets not shown, attached to the rear body portion. On pulling the strand 25, loop 23 and the wings are pulled rearwardly until the wings are in the position illustrated in Fig. 1 when their adjacent edges abut one another near their pivots.

The after portion of the glider is provided with the usual stabilizers 26, and the vertical or rudder portion 27, neither of which is made adjustable. The nose, or forward end of the body, may be provided with a soft rubber portion 28, or may be suitably and adjustably weighted. Beneath the wing holding means is provided a notch 29, into which the rubber band 30 may be engaged, the band 30 being attached to a fork and stick 31. The rear portion of the body 32 is provided with grooves or roughened portions 33 to assist in holding the rear end of the body in an operator's hand, as illustrated in Fig. 1, during the launching. The other hand of the operator holds the forked stick 31, and on separating the hands the glider is launched under the impetus of the rubber band 30. The hand of the operator holding the rear portion of the body may or may not hold the strand 25 for the purpose of keeping the wings retracted.

The stabilizer portion of the tail 26 preferably fits in a horizontal slot 34, shown in Fig. 4, while the rudder portion 27 fits in a vertical slot 35. These parts may be inserted after purchase and shipment and held in place by friction.

Small fins 36 and 37 are pivotally mounted at 38 adjacent to the tip of each wing, as shown in Figs. 1 and 5. A small pin 39 extending through the wing serves as an abutment to keep the fins 36 and 37 from moving in a counterclockwise direction during and after launching.

These fins, when in position shown in Fig. 1, offer sufficient air resistance to oppose the opening of the wings until the glider is near the peak of its upward travel. When the upward travel becomes slowed, the wind resistance offered by these fins 36 and 37 is not sufficient to overcome the pull of the rubber bands 19 and 20, with the result these bands cause the wings to open, swinging from the position shown in Fig. 1 to that

shown in Fig. 2. As the wings are opened under the stress of these bands 19 and 20, they engage the forward or closed side of the wing holding means 14 with a slight impact. The end 40 of each fin 36 and 37, is preferably slightly weighted so that as the wing comes into this open position, the slight impact just referred to is sufficient to cause the weighted ends to be swung in a clockwise direction about the fin pivot 38 and away from the abutment pin 39. As soon as this occurs the fins 36 and 37 are then free to turn about their pivot as a weather vane, to the position 41 shown in Fig. 2, when substantially no resistance is offered by these fins.

By adjusting the position of the bands 19 and 20 at each end, these bands may be moved close to or away from the pivots 12 and 13 so as to adjust the effective lever arm through which the initial force for opening the wings is applied.

When the forward edge of each band 19 and 20 is placed in the notch 42, then when the wings are retracted or folded, the rubber band will be so close to its pivot pin as to offer only a comparatively weak force tending to open the wings. This comparatively weak force is easily opposed by the wind resistance offered by the fins 36 and 37 in their position shown in Fig. 1.

Another embodiment of this invention contemplates these fins 36 and 37 being fixed to the wings substantially in the position shown in Fig. 1, the fins being non-adjustable and offering a little more air resistance after the wings are open, though not a serious amount.

In each of these embodiments, the wing holding means is shaped to give the wings the desired incidence and dihedral inclination. The wings and the body portion of the glider, as well as stabilizers and rudder, may all be made of balsa wood, which is comparatively light.

Adjustment of the wings forward or back, with respect to the body portion, enables the desired distribution of weight and lifting effect to be obtained longitudinally of the body of the glider. Some similar effect is obtained by adjustment of the weighted end 28, if desired. The strand 25 may extend well in rear of the stabilizers or may be short enough so as to extend only adjustment to the rear end when the wings are folded.

The band 30 engaging the notch 29, functions in much the same manner as the sling shot. With a different shape wing holding means, it may be possible to use one instead of two rubber bands for opening the wings. In either event, the resilient band of rubber or other material should be so mounted as to be close to the wing pivot or pivots and exert only a small moment of force tending to open the wings, this moment increasing as the wings open.

The delay action means for retarding opening of the wings until the glider is near the summit of its upward movement, is a noteworthy feature of this invention because it keeps the wings folded where they offer less wind resistance than when open and therefore enables the glider to attain a greater upward movement than would be the case if the wings were open immediately after launching. This delay action means, involving the fins 36 and 37, will be understood to be responsive to the upward speed of the glider, or in other words responsive to wind resistance or air pressure. When it is desired to have the wings open earlier in the upward flight, the rubber bands 19 and 20 have their forward ends placed in one of the outer notches 21, which is not so close to the pivot pin as is the notch 42. When a separate pivot is provided for each wing, the wing opening means 19 and 20 may be adjusted in a simpler way than when only one pivot is used for both wings.

The pivots 19 and 20 are preferably split at the lower ends so as to be easily spread apart somewhat after the manner of a cotter pin, yet easy for amateurs to assemble, it being contemplated to ship or box the wings and other parts of the glider illustrated detached or knocked down from the assembled position as shown in Figs. 1 and 2. In such case the device may be readily assembled by the youthful amateur without recourse to tools or other difficulty in assembling.

I claim:

1. A toy aeroplane or glider comprising a body, a wing holder transverse to the body, spaced pivots on the holder, a wing secured to each pivot and adapted to extend at an angle to the body and also be folded rearwardly, resilient means cooperating with each wing and holder for opening the wings and holding them open and located close to the wing pivot when the wing is folded whereby the force of said resilient means is applied to the wing at a short distance from the pivot when each of the wings is folded and increases as the wing unfolds and an auxiliary surface at an angle to the wing surface and of a size not substantially more than sufficient to offer wind resistance enough during and shortly after launching to overcome the force of said resilient means tending to open the wings, said resilient means opening the wings when the windage on said auxiliary surface is reduced adjacent the top of the glider's flight.

2. A toy aeroplane or glider comprising a body, a wing holder transverse to the body, spaced pivots on the holder, a wing secured to each pivot and adapted to extend at an angle to the body and also be folded rearwardly, resilient means cooperating with each wing and holder for opening the wings and holding them open and located close to the wing pivot when the wing is folded whereby the force of said resilient means is applied to the wing at a short distance from the pivot when each of the wings is folded and increases as the wing unfolds and an auxiliary surface at an angle to the wing surface and of a size not substantially more than sufficient to offer wind resistance enough during and shortly after launching to overcome the force of said resilient means tending to open the wings, a pivoted mounting for said auxiliary surface, an abutment against which said surface is retained while the wings are folded, and means for moving said surface to clear said abutment when the wings are in operative position.

3. A glider comprising a body, wings pivoted thereto and adapted to be folded rearwardly, resilient means cooperating with said wings and body and tending to move the wings to an open position, a fin attached to each wing and capable of offering sufficient wind resistance after launching and with the wings folded to overcome the tendency of said resilient means to open the wings until the glider is near the top of its flight.

4. A glider comprising a body, wings pivoted thereto and adapted to be folded rearwardly, resilient means cooperating with said wings and body and tending to move the wings to an open position, a fin attached to each wing and capable of offering sufficient wind resistance after launching and with the wings folded to overcome the tendency of said resilient means to open the wings until the glider is near the top of its flight, and then allow the wings to open, each fin being

pivoted to the wing near the outer end thereof, an abutment against which each wing engages on opening with a snap capable of rotating its fin to a position where the same may offer reduced wind resistance.

5. A glider comprising a body, wings pivoted thereto and adapted to be folded rearwardly, resilient means cooperating with said wings and body and tending to move the wings to an open position, a fin attached to each wing and capable of offering sufficient wind resistance after launching and with the wings folded to overcome the tendency of said resilient means to open the wings until the glider is near the top of its flight, and then allow the wings to open, each fin being pivoted to the wing near the outer end thereof, an abutment against which each wing engages on opening with a snap capable of rotating its fin to a position where the same may offer reduced wind resistance and an abutment against which each fin is held for offering wind resistance during upward flight and while the wings are folded, said snap of the wings against said first abutments swinging the fins away from said second abutments.

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