A toy glider with pivotally mounted wings movable from an extended, flight position to an overlapped, swept back, launch position is provided with axially movable weighted means for retaining the wings in the swept back position during launching against tension normally urging the wings toward the extended position and automatically releasing the wings to the extended position as the launched glider reaches a maximum altitude and noses down to begin its descent.

The axially movable weighted means comprises an elongated rod suspended beneath the glider fuselage registering with means on the fuselage for limiting its back and forth movement, and having a concentrated weight attached thereto in general alignment with the extended wings. The amount and positioning of such concentrated weight influences the angle and range of the descent glide and means may be provided as by employing an axially adjustable weight for permitting the user to adjust and vary the flight characteristics of the glider.
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GLIDER WITH AUTOMATICALLY RELEASING FOLDABLE WINGS

BACKGROUND OF THE INVENTION

This invention relates to a toy glider with pivotally mounted wings movable from an extended flight position to an overlapped, swept back, launch position and which is provided with axially movable weighted means for retaining the wings in the swept back position against tensional means normally urging the wings toward the extended position and automatically releasing the wings to the extended position as the launched glider reaches a maximum altitude and noses down to begin its descent.

The axially movable weighted means comprises an elongated rod suspended beneath the glider fuselage registering with means on the fuselage for limiting its back and forth movement and having a concentrated weight attached thereto in general alignment with the extended wings. In addition to providing longitudinal forward movement of the rod as the launched glider noses downwardly, thereby releasing the wings to the extended position, the amount and positioning of the concentrated weight in the forward position thereof influences the angle and range of the descent glide; and means is preferably provided, as by employing an axially adjustable weight, for permitting the user to adjust and vary the flight characteristics of the glider.

In its simplest form the glider comprises an elongated lightweight fuselage having a tail assembly at one end and an enlarged nose assembly at the other, the nose assembly suitably being an elongated body of tapered and streamlined configuration having an enlarged portion adjacent the fuselage which is somewhat wider and several times higher than the fuselage proper. At the juncture of the fuselage and nose section there is a planar surface perpendicularly oriented with respect to the fuselage and extending downwardly therefrom; and the nose section includes laterally extending fins of generally triangular swept back contour having trailing edges in alignment with said planar surface and providing extended wing stops on the nose section.

Other transverse extensions at the juncture of said fuselage and nose section and rearwardly of said planar surface provide pivot mountings for the wings with the plane of one wing being sufficiently above the plane of the other to permit free overlap of the wings in their folded, swept back position.

The elongated weighted rod is suitably mounted at its forward end in a forwardly extending recess in said planar surface and at its rear end by hanger means extending downwardly from the fuselage and aligned with a downwardly extending stop member restricting longitudinal movement of the rod.

The outer trailing edges or corners of the wings carry offset loops positioned so as to be engaged by said rod in its rearwardly extended position for retaining the wings in the folded position; and the forward movement of the rod under the influence of said weight as the launched glider noses downwardly disengages such loops thereby freeing the wings for movement to the extended, flight position.

Movement of the wings to the flight position is effected by resilient means extending from points on the leading edges of the wings outwardly of the pivot mountings thereof to a point in the nose section forwardly of and preferably above said pivot mountings. The positioning of said point in the nose section and the mounting of the resilient means on the wing edges is such that the resilient means, as extended when moving the wings to the folded position, approaches but does not reach the pivot mountings of the wings. Thus, the tension in the resilient means exert an effective force for extending the wings while exerting little transverse force at the point of engagement of said wing tip loops with the movable retaining rod.

The glider can be simply launched by hand from a suitably elevated position or can be projected to a desired height with elastic or other propelling means and portions of the nose end or tail section can be specially fashioned to appropriately cooperate with such launch assist means.

In more elaborate models of the glider means could be provided for jet or rocket assisted launching without departing from the basic wing retaining and release mechanism of the invention since, regardless of the altitude attained, the wings are automatically released to flight position as the nosing over of the glider to begin its descent carries the weighted rod to its forward position. It is quite desirable, however, in more elaborate models that the mounting of the concentrated weight on the rod be such as to permit longitudinal adjustment of the weight center. This type of adjustment together with care in contouring of the wings and streamlining of the nose and tail assemblies can provide continuing interest as the toy glider then becomes an instrument of learning and experimentation in the characteristics of flight.

The invention will be more fully understood from consideration of the following description having reference to the accompanying drawings in which preferred adaptations of the invention have been illustrated with the various parts thereof identified by suitable reference characters in each of the views and in which:

FIG. 1 is a perspective view of the glider in extended wing position;

FIG. 2 is an enlarged and longitudinally shortened side elevation view of the glider with the wings in extended position;

FIG. 3 is a fragmentary sectional view taken substantially on the broken line 3,5 of FIG. 2;

FIG. 4 is a top view of the glider with the wings in the folded position;

FIG. 5 is a fragmentary view of a portion of the structure shown in FIG. 4 as seen from below; and

FIG. 6 is a fragmentary view of the weighted rod shown in FIGS. 1 and 2 illustrating details of a modified form of construction.

As illustrated in the drawing, particularly in FIGS. 1, 2 and 4, the improved glider 10 of the invention comprises an elongated fuselage 11 having a tail assembly 12 at one end thereof and an elongated streamlined nose section 13 at the other end thereof. The fuselage 11 has been shown of simple rectangular cross section as the minimum structure to appropriately space and position the tail assembly 12 and nose section 13 but it is to be understood that the fuselage can, if desired, be contoured to provide a more realistic airplane profile as viewed during flight. The central portion 13a of the nose section is enlarged to about twice the width and several times the height as the fuselage shown as clearly seen in FIGS. 2 and 3 of the drawing and is provided in the juncture of the nose section and fuselage 11 with
a transversely extending wing mount 14, 14a to which wings 15, 15a are secured by pivot forming means 16, 16a. In small models the pivot means can comprise simple plastic rods with capped ends though it is understood that in more elaborate models any suitable pivot forming means can be employed.

As seen in FIG. 3, wing mounting 14a has a downward offset with respect to wing mount 14 sufficiently to offset the wings 15, 15a vertically to permit their free swinging movement from the extended flight position shown in FIGS. 1 and 2 to the swept back, launch position shown in FIG. 4.

In alignment with the front edge of the wing mount 14, 14a, it will be seen in FIGS. 2 and 3 that the nose section 13 has planar surface 17 which is essentially perpendicular to the axis of the fuselage 11. The nose section 13 is also provided at opposite sides thereof and in alignment with each of the wings, with essentially triangular fins 18, 18a having swept back leading edges 19, 19a and trailing edges 20, 20a which are in common alignment with each other and with the planar surface 17. The fins 18, 18a extend somewhat beyond the wing mounts 14, 14a as clearly seen in FIG. 4 of the drawing and function as wing stops aiding in alignment of the wings when in extended, flight position.

The fins 18, 18a, which preferably have rounded leading edges 19, 19a and, as shown in FIG. 3 of the drawing, may be slightly staggered to align with the wings 15, 15a to produce a maximum of streamlining effect. It is to be understood, however, that if desired, the fins 18, 18a can be made slightly thicker and arranged at transverse alignment so that wing 15 will engage the upper portion of fin 18 and wing 15a will engage the lower portion of fin 18a.

The leading edges 21, 21a are provided outwardly of the pivots 16, 16a with anchor means 22, 22a receiving ends of resiliently extendible elongated strand members 23, 23a which extend to opposed sides of the nose section 13 at a point 24 which is located forwardly of and above the wing mount 14, 14a. For ease of assembly and balancing of tensions in the strands 23, 23a, the mounting point 24 can suitably comprise a passage through the nose section as seen in FIG. 3 slidably receiving a connecting strand portion 23b of a unitary resilient strand.

The strands 23, 23a or the unitary strand 23b can in simpler models constitute a rubber or other elastic strand of appropriate resilience although it is to be understood that in more elaborate models other longitudinally extendible means such as coil springs or the like might be employed to provide the appropriate tensions for moving the wings, when released, from the swept back position shown in FIG. 4 to the extended flight position during flight. In order to accomplish this, the location of the nose mounting 24 and the wing mounts 22, 22a must be such that the extended strands 23, 23a or 23b, when the wings are in the folded position shown in FIG. 4, are disposed outwardly of the pivots 15, 15a; and when apparent when discussing the release mechanism, varying this distance, as by moving the mounts 22, 22a closer to or further from the wing edges can influence the freedom of operation of the release mechanism.

The trailing edges of the wings 15, 15a at the portions thereof adjacent the fuselage are shown as having cutouts 32, 32a. These facilitate the folding and prevent protrusion of the inner corners 33, 33a beyond the leading edge 21a, 21 respectively of the opposed wing when in the folded position shown in FIG. 4.

The key to the unique operation of the improved glider resides in the unique mechanism for restraining the wings in the folded position and automatically releasing the same when a launched glider has reached the top of a climb and nosed down to begin a descent. This mechanism comprises an elongated rod 25 having a weight 26 fixedly secured thereto at a position in general alignment with the wings as shown in FIGS. 1 and 2 and having its forward end slidable engaging a deep recess 27 in planar surface 17 and its rear end supported from the fuselage 11 by a bracket 28 to align the rear end 25a of the rod with a downwardly extending stop member 29 closely spaced from the bracket 28. As will be seen in FIGS. 1 and 2 this suspends the rod 25 and weight 26 below the wings and fuselage for longitudinal movement along an axis substantially parallel to the axis of the fuselage. The length of the rod 25 is so related to the depth of the recess 27 and the location of the stop 29 that the rod has very limited movement between a rearward position when the end 25 is in engagement with the stop 29 and a forwardly position when the end 25 is spaced from the stop 29 but still engaged by the bracket 28.

The trailing corner 30, 30a of the wings carry looped extensions 31, 31a engageable by the rod end 25a when in its rearward position and disengaged by the rod end 25a when in its forward position as clearly seen in FIG. 5 of the drawing. It will be noted in this connection that the force vector imparted to the wings transversely of the rod 25 is relatively small due to the alignment of the extended strand 23, 23a or 23b close to but outwardly of the pivots 16, 16a. Thus, the engagement of the looped extensions 31, 31a with the rod end 25a should have little restraining effect on longitudinal movement of the rod 25. If it should be found that there is an objectionable restraining effect, this can be eliminated by adjusting and/or relocating the wing mounts 22, 22a or the nose mount 24 so that in the folded wing position the strand 23, 23a or 23b comes closer to the pivots 16, 16a.

Although not clearly apparent from the shortened illustration in FIG. 2, it will be seen in FIG. 1 that the location of the weight 26 is sufficiently forward in the assemblage to assure that the glider will nose down as it has completed the launch portion of its flight. Furthermore, by being aligned with the extended wings, the properly located weight 25 provides a concentration of weight which can enhance the flight characteristics of the glider.

In mass production of toy gliders in accordance with the invention, it may be possible to hold sufficiently close tolerances with respect to structures limiting movement of the rod 25 and the size and location of the weight 26 to insure good flight characteristics. It will be realized, however, that any deviation from such tolerance could impair the flight characteristics and it is, therefore, considered preferable to provide means for the user to make adjustments in the location of the weight 26 longitudinally of the rod 25. This can be accomplished in various ways and one means has been illustrated in FIG. 6 as comprising a two-part weight 26 in which an elongated, externally threaded part 26a is fixedly secured to the rod 25 and preferably provided with an enlarged head 26b at one end thereof. An internally threaded and weighted collar 26c is then mounted
on the externally threaded part 26a so that rotation of
the part 26c moves the weighted collar 26c longitudi-

nally with respect to the rod 25.

In this modification both the inner part 26a and the
collar 26c can constitute weighted material so that to-
gether they provide the weight concentration desired
on the rod 25. Alternatively, however, the inner part
26a could be formed of lightweight plastic material so
that the weighted collar 26c constitutes the primary
weight carried by the rod 25.

It will be recognized that one using a glider equipped
with a weight 25 having adjustable features as above
described can note the flight characteristics of the
 glider and adjust the location of the collar 26c appro-
 priately to improve the flight characteristics. Thus, for
example, if the glide is too steep the collar 26c should
be rotated to move it toward the tail of the glider; and
if the glider tends to stall in flight, the collar 26c should
be rotated to move it slightly toward the nose of the
 glider. By thus carefully adjusting the location of the
collar 26c, it will be possible for the user to extend the
range of flight and even achieve a certain amount of
soaring in flight if prevailing temperature and wind
conditions are appropriate.

While in the particular glider shown in the drawing
the wings are located below the fuselage and the elon-
gated weighted rod for restraining and releasing the
wings is disposed below the wings in axial alignment
with the fuselage, it will be understood that in adapting
the principles of the invention to more elaborate glider
models, and particularly models intended to provide a
more realistic fuselage profile, changes can be made in
the orientation of the above-mentioned parts. Thus, for
example, in simulating a high winged monoplane the
wings could be mounted above the fuselage; or in simu-
lating a low winged monoplane the wings could be
dropped to a position lower than shown in FIG. 2. In
the latter event the weighted rod could well be oriented
above the plane of the wings or even above the fuse-
lage. In the event that simulation of airplane profile in-
cluded the use of an enlarged, hollow fuselage, the
weighted rod could be arranged within such hollow fu-
sselage. In such event there should, of course, be ap-
propriate access through the fuselage in the vicinity of
a weight 26 of the type shown in FIG. 6 to facilitate axial
adjustment of the weighted collar 26c.

Various changes and modifications in the improved
 glider and wing control mechanism as herein described
may occur to those skilled in the art, and to the extent
that such changes and modifications are embraced by
the appended claims, it is to be understood that they
constitute part of the present invention.

I claim:

1. A toy glider comprising an elongated fuselage hav-
ing pivotally mounted wings movable from an ex-
tended, flight position to an overlapped, swept back
launch position, resilient means normally urging said
wings to the extended flight position, an elongated rod
extending parallel to and supported longitudinally of
said fuselage, said rod having a concentrated weight
thereon in substantial alignment with the extended
wings, stop means at forward and rear portions of said
fuselage for providing limited longitudinal movement
of said rod and weight, and loop means at the outer
trailing edges of said wings slidably engageable by said
rod in the rearmost position thereof for supporting said
wings in the swept back, launch position against the ac-
tion of said resilient means.

2. A toy glider as defined in claim 1 wherein the con-
centrated weight on said rod includes means for mov-


ing the weight center thereof longitudinally of said rod.

3. A toy glider as defined in claim 2 wherein said last
named means comprises an externally threaded mem-
ber coaxially mounted on said rod and an internally
threaded, weighted member in coaxial engagement
with said first member to provide longitudinal move-
ment thereof when rotated with respect to said first
member.

4. A toy glider as defined in claim 1 wherein the fold-
able wings are pivotally mounted toward the forward
end of said fuselage, and said forward end includes lat-
erally extending means substantially perpendicular to
the center line of said fuselage forming stop members
aligning said wings in the extended, flight position
thereof.

5. A toy glider as defined in claim 4 wherein the pivot
mounting of said wings comprises parallel pivot axes
and means for positioning the wings with respect to said
axes so that the planes of said wings are sufficiently off-
set to permit free overlap of the wings when moved to
the swept back, launch position.

6. A toy glider as defined in claim 4 wherein said re-
silient means extend from points on the leading edges
of said wings, outwardly spaced from the pivot mount-
ing thereof, to a point forwardly of said pivot mounting
and above the plane of said wings.

7. A toy glider as defined in claim 6 wherein said re-
silient means comprising a longitudinally yieldable
strand member passing through a transverse aperture in
the plane and having ends thereof secured to leading
edges of said wings.

8. A toy glider as defined in claim 7 wherein the loca-
tion of said aperture is such that in the swept back,
launch position of said wings said resilient means, as ex-
tended, lies outwardly of the pivot mountings of said
wings.

9. A toy glider comprising an elongated fuselage hav-
ing a tail assemblage at one end and an enlarged and
elongated nose portion at the other end thereof means
at the juncture of said fuselage and nose portion for
pivotally mounting wings beneath said fuselage for
movement from extended, flight position to a swept
back, launch position, means suspending an elongated
rod beneath said fuselage and wings in alignment with
said fuselage, and in a manner to have limited longitudi-
 nal movement with respect to said fuselage, said rod
carrying a concentrated weight at a point in substantial
alignment with said wings, resilient means extending
from points on the leading edges of said wings out-
wardly of the pivot mounting thereof to a point in said
nose portion forwardly of said pivot mounting for nor-
mally urging said wings to extended, flight position, and
means at the outer trailing edges of said wings engage-
able by said rod in the rearwardly oriented position
thereof for supporting the wings in the swept back,
launch position, said last named means being automati-
cally disengaged to permit extension of the wings to
flight position when said rod is moved by said weight to
a forwardly oriented position.

10. A toy glider as defined in claim 9 wherein said re-
silient means engages said nose section at a point some-
what above the plane of said wings.
11. A toy glider as defined in claim 9 wherein the concentrated weight on said rod includes means for moving the weight center thereof longitudinally of said rod.

12. A toy glider with pivotally mounted wings movable from an extended, flight position to a swept back, launch position, said glider comprising an elongated fuselage terminating at one end in a tail assemblage and at the other end in an enlarged and streamlined nose and wing mounting assemblage, the nose portion of said assemblage having a transverse dimension two or three times greater than said fuselage and including at the rear portion thereof an essentially flat surface extending downwardly from and perpendicularly to said fuselage, laterally extending vanes of generally triangular contour projecting from opposed sides of said nose portion having swept back leading edges and following edges in common alignment with said perpendicularly disposed surface of the nose portion providing wing stops for the extended wing position, other transversely protruding means at opposed sides of said nose portion above and extending rearwardly from said perpendicularly disposed surface thereof, pivotally supporting wings for swinging movement beneath said fuselage, axially aligned means in said nose section and in substantial alignment with said tail assemblage for supporting beneath said wings and parallel to said fuselage an axially moveable lightweight rod having a concentrated weight in substantial alignment with said wings, restraining means on the rear trailing edges of said wings engageable by said rod in the rearwardly oriented position thereof, and resilient means extending from a forward portion of said nose section to points on the leading edges of said wings outwardly spaced from the pivot mounting thereof for urging said wings to the extended, flight position when forward movement of said rod has disengaged said restraining means.

13. A toy glider as defined in claim 12 wherein said resilient means engages said forward portion of the nose section at a point somewhat above the plane of said wings.

14. A toy glider as defined in claim 12 wherein the concentrated weight on said rod includes means for moving the weight center thereof longitudinally of said rod.

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