The specification discloses in the preferred embodiment, a model airplane comprising a fuselage formed by a forward frame member and twin spaced booms extending rearward therefrom. A first annular wing is coupled to the forward frame member and a second annular wing having a larger diameter, is coupled to the rear ends of the twin booms. A model airplane engine powered by combustible fuel for driving a pusher propeller is located between the twin booms and coupled to the junction of the booms with the forward frame member. A pitch trim vane is located forward of the engine and is adapted to be adjusted to different angular positions relative to the plane of the twin booms for controlling the pitch of the airplane while in flight. In one embodiment, there is provided means for adjustably supporting the first annular wing to allow its axis to be adjusted to different angular positions relative to a plane perpendicular to the plane of the twin booms for turning purposes.

8 Claims, 12 Drawing Figures
This invention relates to an annular wing model airplane which may employ a fuel engine for power flights and which is simple, lightweight, difficult to "crack-up" but easy to repair.

Model airplanes employing the conventional planar type wings have a relatively steep angle of descent and high rate of speed in landing which increases their fatality rate. Moreover, many of these planes require a time consuming effort for construction, particularly those powered by small engines. Thus, these planes have disadvantages in that construction and repair is difficult and crack-ups are common.

It is an object of the present invention to provide a model airplane which is lightweight, simple to construct and repair but hard to crack-up and moreover, has a relatively flat angle of descent and slow rate of speed in landing thereby minimizing the fatality rate.

In the preferred embodiment, the model airplane comprises a fuselage formed by a forward frame member and twin spaced booms extending rearward therefrom. A first annular wing is coupled to the forward frame member and a second annular wing is coupled to the rear ends of the twin booms. In addition, a model airplane engine powered by combustible fuel for driving a propeller is located between the twin booms and coupled to the junction of the booms with the forward frame member. The first annular wing has a diameter smaller than that of the second annular wing and the propeller is mounted to force air forward toward the first annular wing.

In one aspect, vane means is located forward of the engine and adapted to be adjusted to different angular positions relative to the plane of the twin booms for controlling the pitch of the airplane while in flight. In another aspect, there is provided means for adjustably supporting the first annular wing to allow its axis to be adjusted to different angular position relative to a plane perpendicular to the plane of the twin booms.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates the preferred embodiment of the model airplane of the present invention;

FIG. 2 is a cross-sectional view illustrating one manner of mounting an annular wing to the fuselage;

FIG. 3 is a cross-sectional view of FIG. 2 taken along the lines 3—3 thereof;

FIG. 4 is a side view of another embodiment of a model airplane employing annular wings;

FIG. 5 is a plan view of the model airplane of FIG. 4;

FIG. 6 is a front view of the model airplane of FIGS. 4 and 5;

FIG. 7 is a side view of a glider employing annular wings;

FIG. 8 is a plan view of the glider of FIG. 7;

FIG. 9 is a front view of a glider of FIGS. 7 and 8;

FIG. 10 is a kite employing annular wings;

FIG. 11 is a plan view of the kite of FIG. 10; and

FIG. 12 is a front view of the kite of FIGS. 10 and 11.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIG. 1, the model airplane of the preferred embodiment comprises a fuselage 21 formed by a forward frame member or spar 23 and having twin spaced booms 25 and 27 extending rearward from the forward frame 23. Booms 25 and 27 are coupled to the frame 23 by way of angled frame members 29 and 31. An annular wing 33 is coupled to the forward frame member 23 while a second annular wing 35, having a diameter larger than that of 33 is coupled to the rear ends of booms 25 and 27. Annular wings are well known to those skilled in the aircraft art and the presentation of the concept and theory by which they provide lift is not thought to be necessary. The direction of flight, however, is toward the smaller annular wing, whereby this annular wing will be located at the forward end of the airplane. A small gasoline powered model airplane engine 37 is located between the twin booms and connected to the junction of the booms with the forward frame member 23. The engine drives a pusher propeller 39 which forces air toward the larger annular wing 35 for powering the model airplane.

A control surface comprising a pitch trim vane 41 hinged to a fixed plate 43 is located forward of the engine and rearward of the wing 33. The plate 43 is connected to a base member (not shown) which in turn is connected to the top of the frame 23. Thus, plate 43 is located at a level above the top of the frame 23 whereby the vane 41 may be moved upward or downward to control the pitch of the plane while in flight. The manner in which the vane 41 is hinged to the plate 43 is conventional and description is not thought to be necessary. The hinging arrangement, however, is identified by reference numeral 47 and allows the vane 41 to remain fixed at a given angle once adjusted. By moving the vane or flap 41 downward, the plane will climb at a steeper angle and glide at a flatter angle. The reverse occurs if the vane is moved upward. From experience, it is found desirable to adjust the vane 41 in a position whereby the plane will climb at a steeper angle and glide at a flatter angle. The engine is located at the center of gravity of the airplane which has advantages since the engine is heaviest component of the airplane and in fact its weight is almost as much as the remainder of the airplane. Thus, by locating the engine at the center of gravity of the airplane, it will be balanced and hence eliminates problems of balance which would occur if the engine were located in the front or back.

Preferably, the wings 33 and 35 are secured to the fuselage with rubber bands thereby allowing the wings 33 and 35 to be adjusted to different positions along the length of the frame member 23 and along the length of the booms 25 and 27 respectively. With such adjustments, the manner of flight of the plane may be adjusted as desired. For example, if the front wing 33 is moved away from the center of gravity and the point of thrust of the engine, the plane will climb at a steeper angle. If the wing 33 is moved closer to the motor or engine 37, the plane will climb at a flatter angle. Moreover, by tying or lacing the wings to the fuselage with rubber bands, damage will be minimized in the event of crack-up. In this respect, by use of the rubber bands, if the plane hits the ground with a hard impact, the chances are increased that the wings will separate from the fuselage rather than be broken.

In the embodiment disclosed, the wing 35 is laced to the twin booms 25 and 27 by way of rubber bands 51 and 53. Although not shown, notches may be provided in the bottoms of the booms 25 and 27 for receiving the rubber bands thereby allowing the wing 35 to be more securely held in the position desired. In one embodiment, the wing 33 may be laced to a platform by way
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of a rubber band which in turn is slidably secured to the front frame 23. Referring to FIGS. 2 and 3, a platform is illustrated at 61 and has secured to opposite ends, a pair of guide members 63 and a pair of guide members 65 which are spaced apart an amount to receive the frame member 23 with a tight friction fit. Although not shown, the wing 33 may be tied or laced to the platform 61 with a rubber band. With this arrangement, the platform 61 may be slid to different positions along the frame member 23 to position the wing 33 at a desired location.

In the embodiment disclosed in FIGS. 2 and 3, the wing 33 is secured to the platform 61 by way of a bolt 71 which defines a pivot axis about which the wing 33 may be adjusted or rotated to different angular positions. The bolt 71 is positioned such that it extends vertically when the flat plane of the craft (as defined by the booms 25 and 27) is horizontal. Moreover, the pivot axis defined by the bolt 71 coincides with a diameter of the wing 33. By rotating the wing 33 about the bolt 71, its central axis will be adjusted to different angular positions (relative to a plane perpendicular to the plane of the twin booms 25 and 27) whereby the airplane may be adjusted to fly in a straight line or to turn while in flight. Although a rudder may be employed for turning purposes, a very large rudder would be required since the opposite vertical portions of the arc formed by wings 33 and 35 present large surfaces which act also as a rudder to maintain the flight of the plane straight as long as the central axis of the wings 33 and 35 are parallel with the length of the plane. Hence a very large turning rudder would be required to overcome the effect of the opposite vertical arc portions of the wings 33 and 35. Thus, turning is facilitated by adjusting the angular position of one of the annular wings, preferably wing 33 since it is mounted to a single spar or frame member.

In the embodiment of FIGS. 2 and 3, the arrangement for mounting the wing 33 for angular movement about bolt 71 comprises two rubber or soft plastic washers 73 and 75 located on opposite sides of the bottom of the wing 33, a washer 77 and a nut 79 mounted around the end of the bolt 71 and threaded thereto on the underside of the platform 61. The platform 61 is elevated above the frame member 23 by filler members 67 and 69 attached to the platform 69 between the spaced guide members 63 and 65. In operation, the wing 33 may be adjusted to the desired angle and then preset to that angle by threading the bolts 71 into the nut 79 to apply a desired amount of tension between the wing 33 and the platform 61.

In another embodiment, in-flight adjustment of the angular position of the wing 33 may be carried out by attaching a bell crank 81 to the front or the bottom end of the wing 33 and tying one end of a cord to the bell crank and the other end to the arm of the timer employed to shut off the fuel to the engine. The timer is conventional and comprises an arm which may be cocked in one direction and then rotated back in the opposite direction by a spring set mechanism. A soft fuel hose extends from the fuel tank through a ring and then to the engine. As the arm is rotated from its cocked position, it will reach a position where it will clamp against the soft fuel hose and hence will shut off the fuel to the engine, thereby stopping the engine. The other end of the cord or string may be attached to this arm. In this embodiment, the tension applied between the wing 33 and the platform 61 by the bolt 71 and nut 79 will be adjusted to allow the timer spring and its arm to rotate the wing 33. Thus, as the arm is rotated from its cocked position by the timer spring, it will pull the cord and hence will rotate the wing 33 about the bolt 71 during flight. With this arrangement, the wing 33 may be originally preset to a turning position and then pulled to a straight position as the engine turns off or it may be originally preset to cause the plane to fly straight in free flight and then to rotate to a turning position as the fuel is cut off thereby allowing the plane to circle in its glide down after engine turnoff.

Thus, it can now be understood that the model airplane of the present invention is simple to construct and repair, is lightweight, and moreover due to the annular wings, it will descend at a relatively flat angle and at a low rate of speed thereby minimizing the fatality rate. Moreover, the plane is relatively strong and hence will not break as easily as the conventional model airplane. By providing the engine and the control surfaces and control arrangement disclosed, the plane may be readily operated as a free flight plane. In operation of the plane of FIG. 1, the engine may be started and the plane then held and thrown forward to make it airborne. Although not shown, wheels may be provided, if desired.

In one embodiment, the frame members 23, 25, 27, 29, and 31 are made of balsa wood while the wings 33 and 35 also are made of thin balsa wood strips which are bent to the circular shaped illustrated. The balsa wood employed for the wings may have a thickness of one-sixteenth of an inch. Wing 33 has a diameter of 8 inches while wing 35 has a diameter of 13 inches. The length of each wing along its axis is 6 inches. Booms 25 and 27 have a length of about 14 inches while the fuselage portion, including angular members 29 and 31 and front frame member 23 from the front of the plane backward to the front portions of the booms 25 and 27 is about 14 inches. The triangular shaped tab 83 is provided to counter balance the effect of the torque of the engine. The engine employed may be a Cox TD .049 engine which is a standard free flight model airplane engine.

Referring now to FIGS. 4 and 6, there is illustrated a model airplane having two annular wings 93 and 95 mounted to a fuselage 97 and powered by a small gasoline engine 99 and propeller 101 attached to the front of the airplane. The embodiments of FIGS. 4-6 may be a radio controlled airplane with the radio control equipment located in the body or fuselage. In this embodiment, the radio control equipment will counter balance the weight of the engine and hence the airplane may be more readily balanced if the engine is located in the front of the plane. Pitch control surfaces 103 and roll control surfaces 105 are also illustrated for controlling the pitch of the plane and also the roll or banking of the plane while in flight. Although now shown, a rudder also may be employed and which may for example, be located within the rear annular wing 95 to facilitate turning.

In another embodiment not shown, a model airplane having a single elongated beam forming the fuselage may be constructed with one annular wing located in the front and the other located in the rear, both of which will be attached to the same side of the fuselage beam. In this embodiment, the model airplane engine and propeller may be attached and hung from the fuse-
lage beam by suitable structure. In this embodiment, the engine also will be located at the center of gravity of the aircraft. This embodiment also may employ a pitch control vane similar to that illustrated in FIG. 1. In this embodiment and in the embodiment of FIGS. 4-6, the propeller is not of the pusher type but will force the air rearward in the conventional manner.

Referring to the glider of FIGS. 7-9, the fuselage is formed by a single beam 121 having a smaller annular wing 123 attached to the front end and a larger annular wing 125 attached to the rear end. Also provided is a pitch trim vane 127 hinged to a fixed plate 129 which is attached to the beam 121 by way of a member 131. The vane 127 may be adjusted to control the pitch of the plane. In addition, there is provided a rudder 133 comprising a vertical vane 135 hinged to a fixed, but vertical plate 137 for controlling turning of the airplane. Hooks 139 are provided to which the loop of a string may be attached for pulling the plane upward and then for detachment purposes to allow the plane to glide down in flight.

The kite of FIGS. 10-12, also employs a single beam 141 to which are attached at opposite ends a smaller annular wing 143 and a larger annular wing 145. A lower plate 147 is attached to the bottom end of the beam 141 for stabilizing purpose purposes. A kite string may be attached through the apertures 149 formed through the triangular plate 147 near its apex.

1 claim:

1. A model airplane comprising:
a fuselage formed by a forward frame member and twin spaced booms coupled to said forward frame member and extending rearward therefrom,
a first annular wing coupled to said forward frame member,
a second annular wing coupled to the rear ends of said twin booms, and
a model airplane engine, powered by combustible fuel, coupled to the junction of said booms with said forward frame member and extending rearward for driving a propeller, said engine and propeller being located between said first and second annular wings and spaced longitudinally therefrom.

2. The model airplane of claim 1 wherein:
said first annular wing has a diameter smaller than that of said second annular wing, vane means located forward of said engine and adapted to be adjusted to different angular positions relative to the plane of said twin booms for controlling the pitch of the airplane while in flight, said propeller is a pusher propeller mounted to force air rearward toward said second annular wing.

3. A model airplane comprising:
a fuselage formed by a forward frame member and twin spaced booms extending rearward therefrom, a first annular wing coupled to said forward frame member,
a second annular wing coupled to the rear ends of said twin booms, and
a model airplane engine, powered by combustible fuel, for driving a propeller, said engine being located between said twin booms and coupled to the junction of said booms with said forward frame member, and
means for adjustably supporting said first annular wing to allow it to be adjusted to different angular positions to locate its axis at different angular positions relative to a plane longitudinally of the fuselage and perpendicular to the plane of said twin booms.

4. The model airplane of claim 2 comprising:
means for adjustably supporting said first annular wing to allow it to be adjusted to different angular positions relative to a plane longitudinally of the fuselage and perpendicular to the plane of said twin booms.

5. A model airplane comprising:
frame means forming an elongated fuselage with top and bottom sides, first annular wing coupled to one end of said frame member on one said side thereof, a second annular wing coupled to the other end of said frame member on said same side, and
means for adjustably supporting one of said annular wings for adjustment to different angular positions about a line that coincides with a diameter of said one annular wing and which extends through said fuselage between said top and bottom sides thereof.

6. The model airplane of claim 5 comprising:
a propeller, and
means coupled to said fuselage for rotating said propeller for providing thrust for driving said model airplane.

7. A model airplane comprising:
a fuselage formed by a forward frames member and twin spaced booms extending rearward therefrom, a first annular wing coupled to said forward frame member, a second annular wing coupled to the rear ends of said twin booms, and
means for adjustably supporting said first annular wing to allow it to be adjusted to different angular positions to locate its axis at different angular positions relative to a plane longitudinally of the fuselage and perpendicular to the plane of said twin booms.

8. The model airplane of claim 7 comprising:
a propeller, and
means coupled to said fuselage for rotating said propeller for providing thrust for driving said model airplane.

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