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TOY AIRPLANE

Filed Oct. 23, 1958

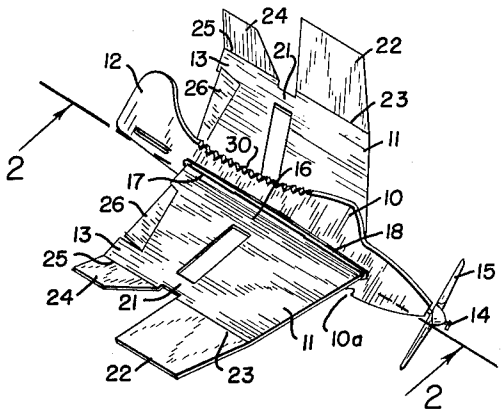

Fig. 1

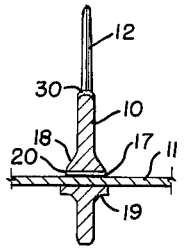

Fig. 3

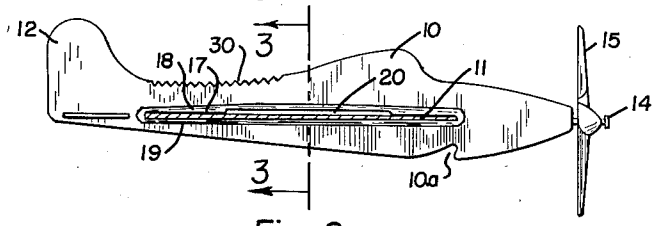

Fig. 2

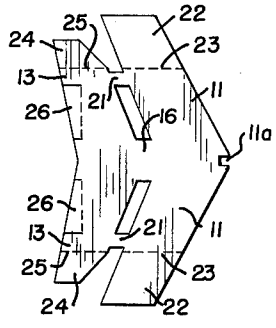

Fig. 4

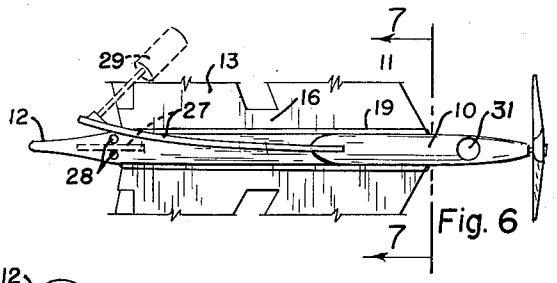

Fig. 6

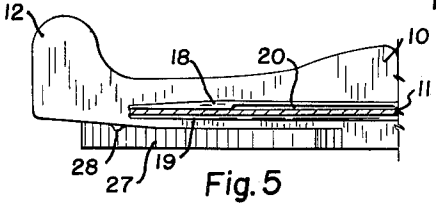

Fig. 5

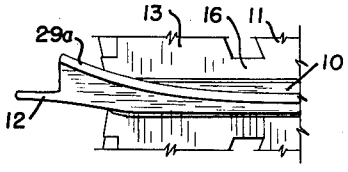

Fig. 8

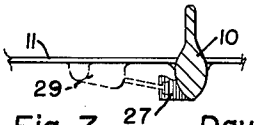

Fig. 7

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TOY AIRPLANE

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This invention relates primarily to airborne toys and more particularly to toy airplanes and gliders, a primary object of the invention being to provide a novel and improved toy airplane of enhanced appearance, simplified construction and versatile performance.

Another object of the invention is to provide a toy airplane having an improved and simplified wing and tail construction which is easily adjusted and balanced to permit a smooth balanced flight of the toy along a selected course.

Another object of the invention is to provide a novel and improved toy airplane which is especially adapted to be catapulted as from a sling to perform diverse maneuvers and for a gliding flight of a considerable distance.

A very important object of the invention is to provide in a toy airplane an improved and simplified interconnected wing and tail construction which permits the use of thin flat sheets of moderately rigid plastic material in its fabrication.

Another object of the invention is to provide in a novel and improved toy airplane, a simplified wing, body and tail construction which is adapted to be fabricated by easy and quick interconnection of the component elements.

Another object of the invention is to provide in a toy airplane an improved arrangement of airfoil and vane structures which enhance the stability of the toy airplane in flight and which tend to cause the toy airplane to turn into the wind in flight whenever the wind direction suddenly shifts or the flight velocity is reduced to a critical minimum velocity for stability.

Yet another object of the invention is to provide a novel and improved arrangement of airfoil and vane structures which enhance the stability of a toy airplane and which, also, are aerodynamically feasible for use with prototype planes in commercial use.

Another object of this invention is to provide in a toy airplane a novel static electric motor for rotating the propeller from electro-static friction generated on the fuselage of the airplane.

Other objects of the invention are to provide a novel and improved plastic toy airplane of a simplified construction which is neat-appearing, easily-manufactured and is a low-cost, rugged and durable unit.

With the foregoing and other objects in view, all of which more fully hereinafter appear, my invention comprises certain novel and improved constructions, combinations and arrangements of parts and elements as hereinafter described, defined in the appended claims and illustrated in preferred embodiment in the accompanying drawing in which:

FIGURE 1 is a perspective view of my toy airplane constructed in accordance with the principles of the invention.

FIGURE 2 is a longitudinal sectional elevation view of the toy airplane as taken from the indicated line 2—2 at FIG. 1.

FIGURE 3 is a fragmentary sectional detail view, as taken from the indicated line 3—3 at FIG. 2, but on an enlarged scale with wingtip portions being broken away to conserve space and with the thickness of the respective elements being slightly exaggerated for better illustration of the structure thereof.

FIGURE 4 is a plan view of the combined wing and tail elements for a toy airplane interconnected in accordance with the principles of the invention, all as illustrated at FIG. 1, but on a reduced scale.

FIGURE 5 is a longitudinal sectional elevation view of the rear portion of a toy airplane, similar to the illustration at FIG. 2, but showing an alternate construction thereof.

FIGURE 6 is a bottom view of the FIG. 5 illustration, but with wingtip portions being broken away to conserve space and with broken lines indicating, symbolically, an actuating mechanism which may be used in conjunction with the invention.

FIGURE 7 is a fragmentary sectional detail as viewed from the indicated line 7—7 at FIG. 6.

FIGURE 8 is a bottom view similar to FIG. 6, but illustrating another alternate form of construction thereof.

There is a real and definite need for an improved toy airplane constructed along such lines, with sheet plastic wings and an injection-molded body, combining these materials to give the toy a realistic appearance and also good aerodynamic properties so that the toy will glide, stunt and soar through the air in a realistic manner. With such and other considerations in view, the present invention was conceived and developed and comprises in essence, a plastic toy airplane formed in a novel, ingenious manner which takes full advantage of the available types of materials to obtain a compact, neat unit which may be produced at low unit cost. Moreover, in developing such a unit, certain discoveries were made which enhance the aerodynamic properties of an airplane to provide for improved gliding qualities and stability. It is recognized that such improved constructions might also be used in actual prototype airplanes, since the action of a properly balanced toy airplane can well be a model of a prototype and both model and prototype will perform according to well known recognized laws of physical similitude.

Referring more particularly to the drawing, the toy airplane is of a simple design incorporating therein all of the ordinary elements of a common airplane, a longitudinally disposed body **10**, transversely outstanding wings **11**, a vertical tail rudder fin **12** and horizontal tail fins **13**. The unit illustrated is analogous to certain types of monoplanes having backswept wings with the wings being comparatively close to the tail fins **13**. However, this arrangement is merely a duplication or simulation of one of several designs of modern high speed airplanes and the invention, as hereinafter described, is also applicable to airplanes having different wing and tail arrangements from that shown.

The body **10** is preferably formed by injection molding of thermo-plastic material and may include details molded in its surface to delineate features of a regular airplane, but since such details are of a decorative nature they are not herein shown. A nock **10***a* is included at the underside of the body to hold it in a sling for catapulting. The body also includes a pin **14** at its front which carries a propeller **15** that will rotate on the pin in a realistic manner when the toy is sailing.

The body form is preferably narrow with the vertical tail fin **12** included in the molding, but the wings **11** and horizontal tail fins **13** are formed as a unitary member of a thin plastic sheet material and are joined together by a central longitudinally-disposed flat connecting strip **16** and other connecting strips, hereinafter described. In order to accommodate and hold this combined wing-tail unit **13**, a longitudinal slot **17** extends through the body and this slot is reinforced by outstanding upper flanges **18** and lower flanges **19**. The width of the slot **17** is such that the wing-tail unit will fit tightly in place, but the center portion of the slot is widened as at **20** to permit the wing-tail unit to be easily threaded into the slot when the toy is being assembled. A notch **11***a* is formed at

the center of the front edge of the wing which is adapted to lock the wing-tail unit in place in the slot **17**.

The thin plastic sheet forming the wings **11** and horizontal tail fins **13** may be of a polystyrene or mylar film or similar material. Such sheet materials are tough and strong, but are flexible. However, it was discovered that a certain amount of flexiblity is not objectional if an interrelated aerodynamic stability is maintained between the wings and the horizontal tail fins. In order to accomplish this desirable condition, the outer sections of the wings and tail fins are interconnected by longitudinally disposed strips **21** at the approximate outer third points of each wing. With such structure, flexure of a wing **11** as from the weight of the toy, is accompanied by like flexure of the horizontal tail fin **13**.

To complete the unit, the tip **22** of each wing **11** is turned upwardly as at the fold line **23** any desired amount to provide for lift and stability, and the tip **24** of each tail fin **13** is similarly turned upwardly as at a fold line **25** for like reasons. In addition, tail elevators **26** may be formed in the flat surface of the tail and ailerons, not shown, may be formed in the wings if desired.

This unitary member forming the wings **11** and tail fins **13** may be easily stamped out of a block of plastic sheet with a properly shaped die, to the desired form as illustrated at FIG. 4, wherein the broken lines indicate the fold lines **23** and **25** and the fold lines at the tail elevators **26**. Such structure, being easily made, reduces the cost of the toy.

In tests it was noted that whenever this toy airplane would reach its critical minimum speed for sustaining flight, it would lose its stability and fall or spin out as does a full size airplane. However, it was further discovered that if an off-setting vane **27** were longitudinally disposed underneath the body of the toy plane as in the manner illustrated at FIGS. 5 through 8, the toy plane would naturally tend to turn into and face the wind whenever the wind was not against the direction of flight. In so turning into the wind, its relatively increased velocity would be such as to permit the toy to make an easy, flat or pancake landing and minimize danger of the toy from being damaged by an erratic landing. As shown in FIGS. 5–8, inclusive, the body **10** actually may be referred to as as first or upper longitudinal strip. A second longitudinally extending strip is the offsetting vane **27** which can occupy a normal position in which it is substantially coplanar with the body **10** or can be flexed to the right or left of such normal position substantially in the manner shown in FIG. 6.

The action of the offset vane **27**, which is substantially the same effect as curving the body, is not fully understood, but it produces a far more stable flight at slow velocities without seeming to affect the normal flight at higher velocities. This vane **27** may be offset from the axis of the body **10** to either side thereof and work equally well.

In the illustration at FIGS. 5 to 7, the vane is held in offset position by knobs **28** at the underside of the plane body or as an alternative, the offset can be held to any position by a positive control as indicated by the broken lines **29** at FIGS. 5 and 7. As in the illustration at FIG. 8, the offset can also be made permanent with the vane **29***a* being affixed to the underside of the body.

It is to be noted that the action of such toy planes having longitudinally disposed offsetting vanes, will favorably stabilize the flight of the toys as hereinbefore set forth, and that the toy airplanes will act much the same as the prototype planes when they are in flight. Therefore, it is apparent that this structure disclosed will be useful in stabilizing the flight of prototype airplanes whenever they are in flight and are ready to land, for then they often approach a critical minimum velocity and a number of serious accidents have occurred at such time.

It is a known fact that upon trying to make a three-point landing or a smooth, flat landing of a prototype plane a suddent shift of wind direction may cause the wings of the plane to momentarily lose their lifting power or to cause one wing to lift in excessive degree with a tendency to overturn the plane at a critical moment. These things are beyond the power of the pilot to obviate with conventional controls and an automatic device which will cure the condition and avoid a chance of injury to the pilot and damage to the plane is desirable.

As a supplementary feature the toy airplane includes a novel static-electric motor for rotating the propeller **15** from static friction. This is accomplished by the employment of motivating means along the fuselage as at a serrated edge **30**, the movement of a rod, comb or the like on these serrations will produce an action that causes the propeller to rotate. When employed in combination with the other features of this improved toy airplane, the adaptability and versatility of the toy is thereby enhanced.

Another feature of the toy plane is illustrated at FIG. 6 and is in the form of a cavity **31** at the lower edge of the front of the body of the plane. This cavity is at a desirable location to hold ballast to weight down the front of the toy airplane to balance it in flight and especially for balancing the toy should the propeller **15** be accidentally broken. A suitable ballast material is easily obtained clay, which is sufficiently heavy for the purpose. However, other material such as lead foil may also be used.

While I have described my invention in considerable detail, it is obvious that others skilled in the art can devise and build alternate and equivalent structures which are within the spirit and scope of my invention; hence, it is to be understood that my protection will be limited, not by the constructions illustrated and described, but only by the proper scope of the appended claims.

I claim:

1. An airplane comprising a fuselage having a forward end and a rearward end, wings attached to the fuselage adjacent the forward end thereof, said wings projecting laterally on opposite sides of the fuselage, a tail-element attached to the fuselage rearwardly of and in substantially the same plane as each of the wings, the leading edge of each such tail-element being spaced rearwardly from the trailing edge of the wing behind which it is located, a first longitudinally extending strip integral with the fuselage, said strip extending lengthwise along the fuselage from the forward to the rearward end thereof, and a second longitudinal strip hingedly connected at its forward end to the first longitudinal strip and extending rearwardly beneath the first longitudinal strip in edge-to-edge relationship therewith, said second longitudinal strip being separate from the first strip along its rear portion so as to be capable of being flexed laterally with respect to the first longitudinal strip.

2. An airplane comprising a fuselage having a forward end and a rearward end, wings attached to the fuselage adjacent the forward end thereof, said wings projecting laterally on opposite sides of the fuselage, a tail-element attached to the fuselage rearwardly of and in substantially the same plane as each of the wings, the leading edge of each such tail-element being spaced rearwardly from the trailing edge of the wing behind which it is located, a first longitudinally extending strip integral with the fuselage, said strip extending lengthwise along the fuselage from the forward to the rearward end thereof, and a second longitudinal strip hingedly connected at its forward end to the first longitudinal strip and extending rearwardly beneath the first longitudinal strip in edge-to-edge relationship therewith, said second longitudinal strip having a terminal portion at its rear end, which terminal portion is located rearwardly of the trailing edge of the tail-elements and is separated from the first longitudinal strip so as to be capable of being flexed into a laterally deflected position with respect to the first longitudinal strip.

3. An airplane comprising a fuselage having a forward end and a rearward end, wings attached to the fuselage adjacent the forward end thereof, said wings projecting laterally on opposite sides of the fuselage, a tail-element attached to the fuselage rearwardly of and in substantially the same plane as each of the wings, the leading edge of each such tail-element being spaced rearwardly from the trailing edge of the wing behind which it is located, a longitudinally extending connector member rigidly attached at its forward end to each wing in outwardly spaced relation to the fuselage, said member further being rigidly attached at its rear end to the tail-element located at the rear thereof so as to interconnect the wing and tail-element so as to form a laterally extending closed-end gap between each such wing and tail-element, a first longitudinally extending strip integral with the fuselage, said strip extending lengthwise along the fuselage from the forward to the rearward end thereof, and a second longitudinal strip hingedly connected at its forward end to the first longitudinal strip and extending rearwardly

beneath the first longitudinal strip in edge-to-edge relationship therewith, said second longitudinal strip being separate from the first strip along its rear portion so as to be capable of being flexed laterally with respect to the first longitudinal strip.

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