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2,524,500

KITE

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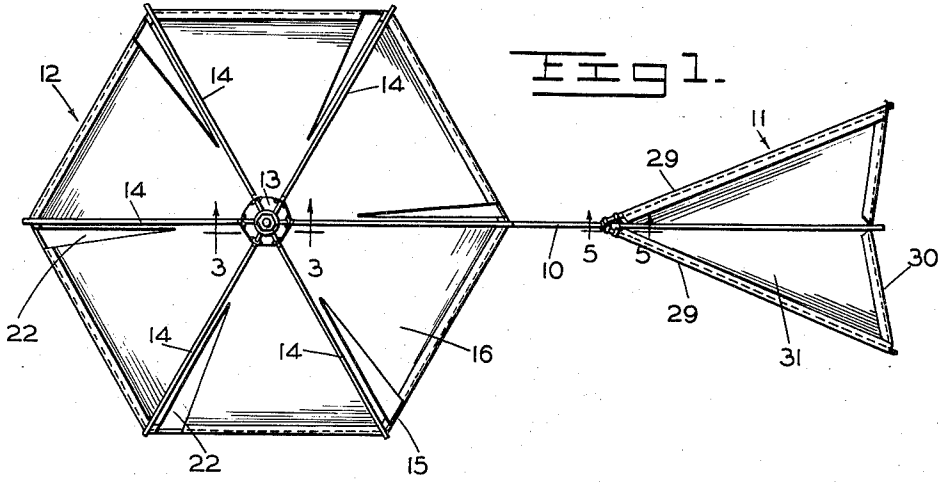


Fig 2.

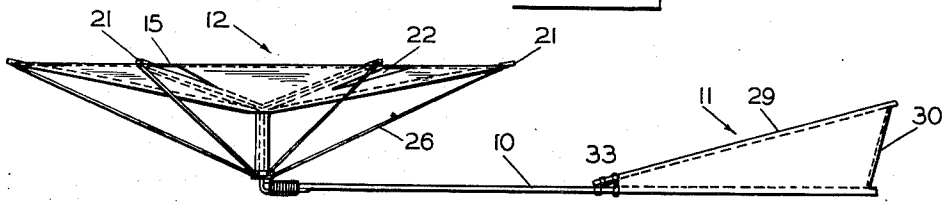


Fig 4.

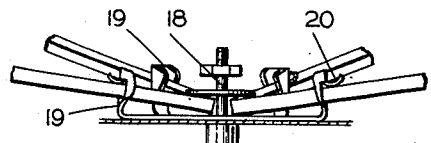
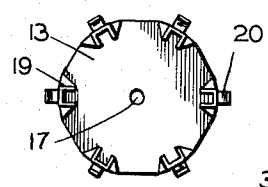


Fig 3.

Fig 6.

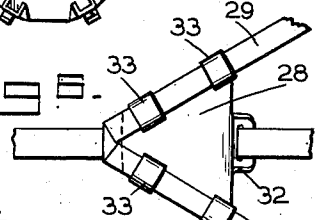
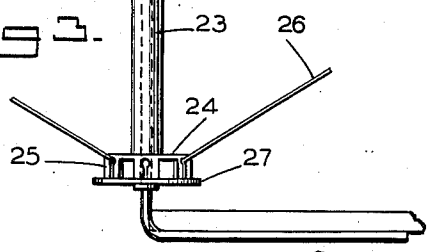
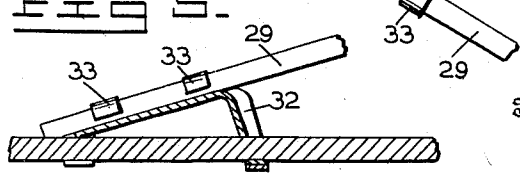


Fig 5.



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KITE

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3 Claims. (Cl. 244-153)

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This invention relates to kites and more particularly to kites which utilize a rotary airfoil as the main lifting element.

It has heretofore been suggested that the provision of an animated feature in the construction of a kite adds to the interest and amusement involved in flying the kite. In this connection, rotary airfoils have been utilized and provided with slots arranged in the surface of the covering material in order to induce rapid rotation of the airfoil while it is sustaining the kite. The slots in the covering material function to allow the flexible covering material to set back to a greater degree adjacent to the slots than at remoter points in response to the impinging air and thus cause the covering material to form a series of inclined planes which produce resultant forces which at the same time lift and rotate the airfoil. However, kites heretofore constructed in accordance with such suggested designs have exhibited instability in flight and, for the most part, complete failure of the animated feature. These shortcomings are believed to be attributable to the flat profile of the rotary airfoil and the failure to appreciate that oblong slots provided in the covering material cannot perform their intended function in gusty, turbulent air since the flexible covering material, necessarily utilized, is constantly agitated and the slots do not function to consistently present a planing surface to the impinging air. The resultant force which tends to impart rotary movement to the airfoil is thus not steadily applied and the animated feature fails to perform. Such kites are also characterized by a tendency to tumble and dump the supporting air-stream.

The present invention proposes to overcome the above specified objections to kites utilizing rotary airfoils as the principal lifting element by providing a design which is distinguished for its stability in flight and for the efficient performance of the animated rotary lifting element. These advantages are accomplished, in general, by forming the sectional rotary airfoil with a conical profile and by providing in the covering material of the airfoil a series of triangular slots or openings. The triangular slots positively result in forming the surface of the airfoil into a series of planing surfaces acting continuously to produce a resultant force which imparts rotary movement to the airfoil at all times when the impinging air-stream is sufficient to lift the kite.

Further advantages of the invention will be apparent from the following detailed description

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made with reference to the accompanying drawings.

In the drawings:

Figure 1 is a plan view of a kite constructed in accordance with the present invention;

Figure 2 is a side view of the kite shown in Figure 1;

Figure 3 is a section through the rotary airfoil supporting assembly taken along lines 3-3 of Figure 1;

Figure 4 is a diagrammatic view of the hub used to support the ribs of the airfoil;

Figure 5 is a sectional view through the tail assembly along the lines 5-5 of Figure 1;

Figure 6 is a plan view of the tail plate showing the manner in which the tail is supported on the stabilizer.

In general, a kite constructed according to the instant invention comprises a stabilizer 10, a tail assembly 11 and a rotary airfoil 12. The airfoil and the tail are supported on either end of the stabilizer. The customary yoke for connection of the retaining string may also be attached at either end of the stabilizer.

Referring to Figures 1 and 2 it is seen that the airfoil is formed in a generally conical shape and comprises a hub plate 13, ribs 14, peripheral binding 15, and the covering material 16.

The hub plate 13 is provided with a central aperture 17 adapted to receive the supporting pin 18 which serves as the axis about which the airfoil rotates when the kite is in flight. The hub is provided with up-turned extensions 19 which have punched out tabs 20. The punched out portions form openings into which the radially extending ribs 14 are received. The tabs 20 are pressed down against the ribs 14 thus locking them in spaced relationship. The extensions 19 are turned up from the hub 13 at an angle which will result in positioning the lower side of the punched out opening above the plane of the hub so that the ribs will define a generally conical form when inserted into the openings. In the accompanying drawings the airfoil is illustrated as consisting of six rib members; it is understood, however, that no limitation is intended in this respect and that the number of ribs used in construction of the airfoil may be varied.

The outward ends of the ribs 14 are provided with slots 21 which receive the peripheral binding 15, which may be a string or fine wire. A flexible covering material is secured to the underside of the conical form defined by the upwardly extending radial ribs 14 and the peripheral bind-

ing 15. Elongated triangular slots 22 are formed in the covering material, one adjacent each rib, in order to positively form the covering material into a series of planes which develop components of force when the kite is air-borne which will impart a rotary motion to the airfoil. The triangular slots are disposed with one side lying parallel to the ribs and the wider ends or bases thereof being formed adjacent the peripheral binding. It has been found that this type of construction is necessary in order to ensure that a series of planing surfaces will be formed and continuously maintained by the action of the supporting airstream during the flight of the kite. The conical form of the airfoil constructed in the manner described gives the kite unusual stability and balance when it is air-borne.

It is understood that the airfoil here disclosed may be adapted to variant designs, for instance, two or more such airfoils may be used on a single kite by supporting a crosspiece on the stabilizer and mounting rotary airfoils at either end thereof.

The stabilizer 10 is of sufficient length and mass to counterbalance the portion of the airfoil which extends forwardly of the supporting pin 18. It has been found that satisfactory balance is obtained when the length of the stabilizer is made approximately one and one-half times the diameter of the airfoil when similar dimensioned material is used in the construction of both the stabilizer and the radial ribs. The supporting pin 18 is secured to the forward end of the stabilizer at right angles to the longitudinal axis of the stabilizer. A standoff sleeve 23 is interposed between the airfoil 12 and the friction ring 24 which ring is provided with slotted extensions 25 which are turned downwardly at right angles to the plane of the ring. The slots formed in the extensions are adapted to receive strengthening stays 26 which are secured at their other ends to the tips of the upwardly extending ribs 14. A friction washer 27 is positioned on the supporting pin to form a bearing surface for the extensions 25. The airfoil assembly may thereupon be positioned on the supporting pin which serves as its axis of rotation. This construction reinforces the lifting element of the kite and at the same time provides a bearing support which minimizes resistance to its rotary movement.

Referring to Figures 5 and 6 it will be seen that the tail consists of a tail plate 28 positioned on the rearward portion of the stabilizer, the ribs 29, the line 30 and the covering material 31. The tail plate is formed with a flanged portion 32 which is provided with an opening which permits it to be slipped into position on the stabilizer. The tail piece may be then locked into position by crimping the walls of the opening against the stabilizer. The extensions 33 are adapted to be crimped around the ribs 29 and to maintain the ribs in a rearwardly diverging relationship

and at an upward angle from the horizontal plane of the stabilizer. The line 30 is secured in slots provided in the ends of the ribs 29 and the stabilizer 10 and defines with the ribs and stabilizer two similar triangular areas disposed at an obtuse angle to one another. The covering material is secured by attachment to the ribs and a binding line.

The tail formed in the described manner adds to the air-borne stability of the kite which results from the conical form of the rotary airfoil. Both kite supporting elements are, therefore, characterized by a resistance to tumbling and to dumping the supporting air-stream.

The retaining string may be attached to the stabilizer at a selected point of balance or to a yoke which is strung between the ends of the stabilizer.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. An air foil comprising a hub, a plurality of ribs fixed in said hub at equi-distance and at equi-angles above the horizontal, a stay line fixed to the free ends of said ribs and a flexible material covering the area defined between said hub and said stay line, said material being provided with a series of radially extending triangular slots, one adjacent each rib, the wider ends of said slots extending to said stay line.

2. A kite comprising a cone-like rotary airfoil, a stabilizer, and a tail, said tail supported on one end of said stabilizer and the said rotary airfoil supported at the other end thereof, said foil being provided with a series of radially extending triangular elongated slots having their base ends adjacent the periphery of said foil and said tail comprising two similar upwardly disposed triangular airfoils mounted adjacently on said stabilizer and at an obtuse angle to one another.

3. A kite comprising a cone-like rotary airfoil, a stabilizer, and a tail, said tail supported on one end of said stabilizer and the said rotary airfoil supported at the other end thereof, said foil comprising a hub, a plurality of ribs fixed in said hub at equi-distance and at equi-angles above the horizontal, a stay-line, fixed to the free ends of said ribs and a flexible material covering the area defined between said hub and said stay-line, said material being provided with a series of radially extending triangular elongated slots, one adjacent each rib, the wider end of said slots extending through said stay-line.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
966,143	Van Wie	Aug. 2, 1910
2,074,327	DeCourcy	Mar. 23, 1937