

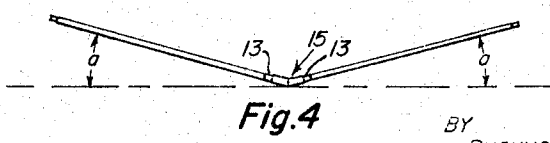
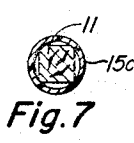
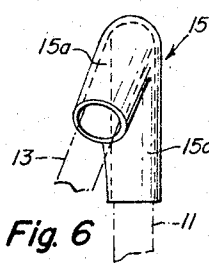
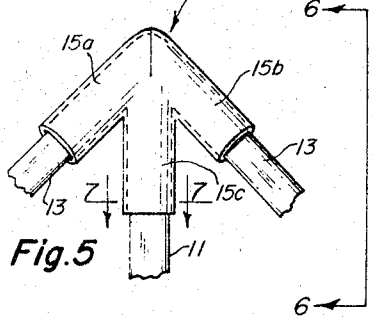
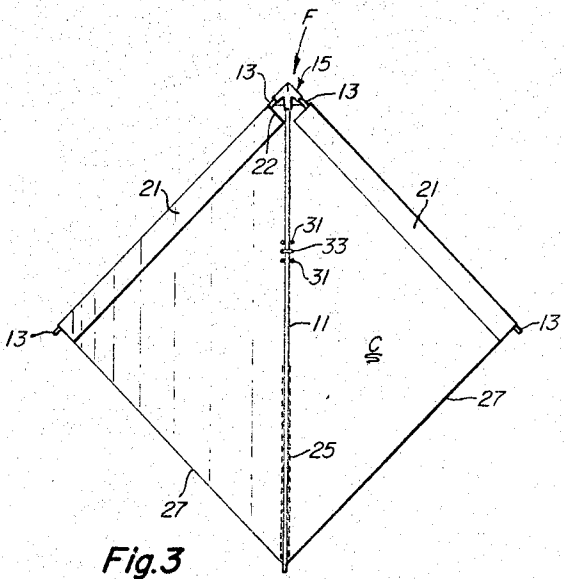
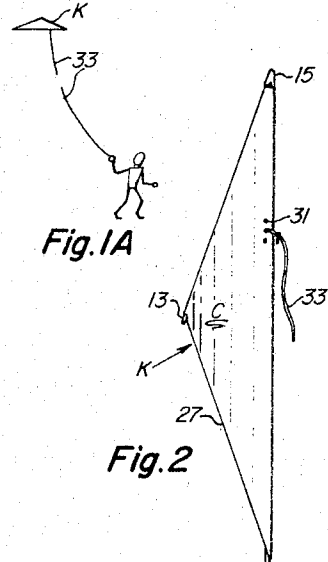
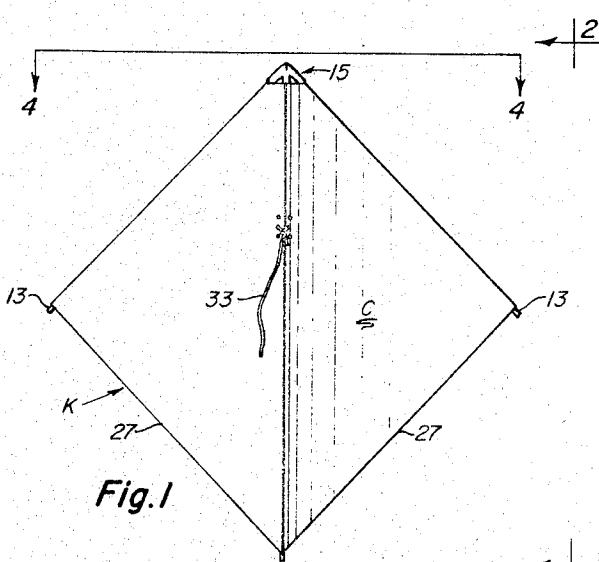
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3,276,730

TAILLESS KITE

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3,276,730  
**TAILLESS KITE**  
 Charles H. Cleveland, Bend, Oreg.  
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 6 Claims. (Cl. 244-153)

This invention relates to kites and particularly to a tailless kite. Tailless kites, per se, are not new. The box kite is a tailless kite and is relatively stable in flight, but it is complex and expensive. The ordinary diamond shaped kite can be flown without a tail although it is quite unstable unless certain critical conditions are met.

It is a main object of the present invention to provide a kite of simple and inexpensive construction and which requires no tail or even a bridle and yet is quite stable and does not require critical adjustments.

A more specific object of the invention is to provide a tailless kite having a simple frame and a simple covering wherein the frame so holds the covering in a predetermined contour and the covering is of such shape as to attain predetermined stable aerodynamic characteristics of the kite.

A further object of the invention is to provide a kite as just described in which the covering can be of square form so as to result in a minimum of expense in forming kite coverings from rolls of paper.

Various other objects of the invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

FIG. 1 is a face-on view of my kite;

FIG. 1A shows my kite in its flying position;

FIG. 2 is a view of my kite taken in the direction of the arrows 2-2 of FIG. 1;

FIG. 3 is a rear view of my kite;

FIG. 4 is a front end view of my kite taken in the direction of the arrows 4-4 of FIG. 1;

FIG. 5 is an enlarged fragmentary view of the nose portion of the frame of my kite taken from the rear thereof;

FIG. 6 is a side view of the nose portion shown in FIG. 5 taken in the direction of the arrows 6-6 of FIG. 5, and showing the kite sticks in phantom lines; and

FIG. 7 is a section taken along line 7-7 of FIG. 5.

Referring to the drawings, my kite K comprises a frame F (FIG. 3) of generally elongated arrowhead form when viewed from the face of the kite. The frame includes a straight main body or fuselage stick 11 and a pair of straight auxiliary or lateral wing sticks (or spars) 13, which sticks are held by a nosepiece connector 15 so that they converge symmetrically towards the connector.

The connector shown is of hollow one piece tubular form, which is preferably molded of plastic, and it has a pair of leg portions 15a and 15b and a central shank portion 15c. The sticks are shown as being of square cross section with rounded corners and fit snugly with a compressed frictional fit (FIG. 7) within the leg and shank portion of the connector, which are of circular cross section.

While it is evident from FIG. 5 that the connector itself is of generally arrowhead shape when the kite is viewed face-on, it is evident from FIGS. 2, 4 and 6 that the axes of the legs of the connector are not in the same plane as the axes of the shank of the connector. In fact, the axes of the legs of the connector lie in a common plane which obliquely intersects the axes of the shank portion 15c of the connector.

It is evident from FIGS. 4 and 6 that the inclination of the axes of the legs of the connector to a symmetrically

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located plane containing the axis of the shank portion of the connector, when considered from the front end of the kite, provides a positive dihedral angle  $a$ .

Secured to the frame F is a square flexible covering C with a diagonal line of the square coinciding with the fuselage stick 11 and with two marginal portions 21 folded over the wing sticks 13 and secured to the body of the covering C. In order to provide clearance for the connector 15, the upper corner of the covering C, as the parts are shown in FIG. 3, is removed.

The body portion of the covering C is secured to the lower portion of the body stick 11, as the parts are shown in FIG. 3, by an adhesive material 25. The edges of the kite at 27 may be left plain or may be folded over and adhesively secured to the body portion of the covering C. In any event the final shape of the covering will be square. There is no necessity for connecting string between the free ends of the wing sticks 13 and the lower end of the body stick 11.

A plurality of pairs of holes 31 are provided in the body portion of the covering C in straddling relation to the body stick 11, such holes being located forwardly or above the line through the ends of the wing sticks, as the parts are shown in FIG. 3. A string 33 is shown passing through the central pair of holes 31 and secured around the body stick 11. As evident from FIGS. 1-3, no bridle is required for the kite. Instead of providing holes, a manufacturer could print hole locations on the covering to indicate where the string 33 is to be fastened.

The extra pairs of holes are for different flying purposes. If the wind is of moderate velocity, the string 33 is fastened as shown in FIGS. 1-3. If the wind is of greater than moderate velocity, the upper pair of holes as the parts are shown in FIGS. 1-3 are utilized, whereas if the wind velocity is less than moderate, the lower pair of holes are utilized.

An important advantage of my kite is that the covering C may be of square form. If it is, the angular relation of the wing sticks 13 (considered from the face-on view) is slightly less than  $90^\circ$  depending on the magnitude of the dihedral angles. I have found, however, that this angle can be varied (with a consequent change in the shape of the covering) from somewhere around  $90^\circ$  as a minimum, to  $120^\circ$  as a maximum. This of course depends somewhat on the weight of the sticks in relation to the weight of the paper and the size of the kite, but for a normal size kite (say around 30-36 inches as its major dimension) the above limitations will control. These limitations are certainly realistic when using sticks of pine of reasonable size, and wherein the paper is ordinary kite paper in the nature of 25 pound bleached kraft paper.

Referring to FIG. 4, I have found that a dihedral angle of around  $20^\circ$ , plus or minus  $10^\circ$ , is satisfactory in achieving stable flight characteristics.

While my kite may be considered generally of diamond shape, my kite has far superior characteristics from that inherent in the ordinary diamond kite. For instance, in the ordinary diamond kite, the forward flight edges of the kite are not rigidly held in a predetermined angular relation to the remainder of the kite but may flex or flop depending on the differential pressure of the air on the opposite side thereof. In fact, the ordinary diamond (or bow) kite is very unstable unless certain critical adjustments are made. An important advantage of my kite is that it is stable without requiring any critical adjustments.

I am also aware of the so-called flying wing kite of U.S. Patent No. 2,463,135, but this kite requires tails 7 at the ends of the wings and also requires a bridle if it is to be anywhere near reasonably stable. Further, I am aware of the kite disclosed in the Winslow Patent 2,530,-

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641, but the frame of this kite does not positively hold the convex configuration of the body of the kite, and in addition the flight characteristics of the Winslow kite are not anywhere near comparable to those of my kite. In addition, the Winslow kite is not stable even with the 5  
bridle 20, 23 disclosed in the drawings.

While I have used the term "stick" to refer to the elongate frame members 11 and 13, I do not mean to imply that such members must necessarily be made of wood, although at the present time, members of wood will probably be the cheapest form of frame member. 10

Also, while I have shown a kite covering of square form, the covering may be of rectangular and indeed of varying quadrangular shapes. However, it has been a general object of the kite industry for years to produce a simple, stable kite having a square covering. Thus, the 15  
fact that the covering of my kite may be square results in a substantial saving in costs in making the kite since a roll of covering paper can be very readily cut up into square sections, but cannot be cut into other quadrangular shapes except at greater cost. 20

Having described the invention in what is considered to be the preferred embodiment thereof, it is desired that it be understood that the invention is not to be limited other than by the provisions of the following claims. 25

I claim:

1. A tailless kite comprising:

a rigid frame of generally elongate arrowhead form wherein the converging pointed end of said frame is the front end of said frame, 30  
said frame including a shank portion and a pair of symmetrically disposed laterally diverging portions, said laterally diverging portions lying in a common plane, 35  
said plane obliquely intersecting the axis of said shank portion, 35  
said laterally diverging portions also having an angular relation with each other when considered from the front of the frame so that said laterally diverging portions form positive dihedral angles, 40  
said shank portion having a length thereof extending substantially beyond a second plane which is normal to said shank portion and which passes through the rear ends of said pair of portions, wherein the length of said shank portion extending beyond said second plane is at least equal to a major part of the length between said second plane and the converging pointed end of said frame, 45

a flexible covering of quadrilateral form secured to said frame on the convex side thereof including said shank portion of said frame substantially beyond said second plane, with certain margins of said covering secured to said laterally diverging portions and with a diagonal line of said covering coinciding with said shank portion, said frame positively holding said flexible covering to provide a final substantially quadrilateral shape therefor, 50

and means providing for the securement of a string to said shank portion at a place between the front end of said frame and the last mentioned plane. 60

2. A tailless kite comprising:

a rigid frame of generally elongate arrowhead form wherein the converging pointed end of said frame is the front end of said frame, 65  
said frame including a shank portion and a pair of symmetrically disposed laterally extending portions, 65  
a first plane which passes through one laterally extending portion and said shank portion forming an included angle of substantially greater than a right angle but less than  $180^\circ$  with a second plane which passes through the other laterally extending portion and said shank portion so that said laterally extending portions provide positive dihedral angles, 70  
said shank portion having a length thereof extending substantially beyond a third plane which is normal 75

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to said shank portion and which passes through the rear ends of said pair of portions, wherein the length of said shank portion extending beyond said third plane is at least equal to a major part of the length between said third plane and the converging pointed end of said frame,

a flexible covering of quadrilateral form secured to said frame including said shank portion of said frame substantially beyond said third plane with margins of said covering secured to said laterally extending portions and with a diagonal line of said covering coinciding with said shank portion, said frame positively holding said flexible covering to provide a final quadrilateral shape therefor disposed along said first and second planes,

and means providing for the securement of a string to said shank portion at a place between the front end of said frame and the last mentioned plane.

3. A tailless kite comprising:

a rigid frame of generally elongate arrowhead form, said frame including a central stick and a pair of symmetrically disposed laterally diverging sticks, said laterally diverging sticks lying in a common plane said sticks having an angular relation in said first plane of slightly less than  $90^\circ$ , 30  
said first plane obliquely intersecting the axis of said central stick, 35

said laterally diverging sticks also having an angular relation with each other when considered from the front of the frame so that said laterally diverging sticks form positive dihedral angles, 40

said central stick having a length thereof extending substantially beyond a second plane which is normal to said central stick and which passes through the rear ends of said laterally diverging sticks, wherein the length of said central stick extending beyond said second plane is at least equal to a major part of the length between said first plane and said central stick, 45

and a flexible covering of square form secured to said frame with margins of said covering secured to said laterally diverging sticks and with a diagonal line of said covering coinciding with said central stick including said central stick beyond said second plane, said frame positively holding said flexible covering to maintain a substantially square shape therefor.

4. A tailless kite comprising:

a rigid frame of generally elongate arrowhead form, said frame including a shank portion and a pair of symmetrically disposed laterally extending portions, said laterally extending portions lying in a common plane, 50  
said plane obliquely intersecting the axis of said shank portion, 55

the plane which passes through one laterally extending portion and said shank portion forming an included angle of substantially greater than a right angle but less than  $180^\circ$  with the plane which passes through the other laterally extending portion and said shank portion so that said laterally extending portions provide positive dihedral angles, 60

said shank portion extending substantially beyond a plane which is normal to said shank portion and which passes through the rear ends of said pair of portions, wherein the length of said shank portion extending beyond said last mentioned plane is at least equal to a major part of the length of said shank portion between said last mentioned plane and the juncture between said shank portion and said plane obliquely intersecting the axis of said shank portion, 65

and a flexible covering of quadrilateral form secured to said frame with margins of said covering secured to said laterally extending portions and with a diagonal line of said covering coinciding with at least the major portion of said shank portion, said frame 75

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positively holding said flexible covering to provide a final quadrilateral shape therefor, said covering substantially coinciding with said planes which pass through said laterally extending portions and said shank portion.

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5. A tailless kite comprising:

a rigid frame of generally elongate arrowhead form, said frame including a shank portion and a pair of symmetrically disposed laterally extending portions, said laterally extending portions lying in a common plane and having an angular relation in said common plane of slightly less than 90°,

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said plane obliquely intersecting the axis of said shank portion,

the planes which pass through the laterally extending portions and said shank portion each forming with the horizontal a minor acute angle,

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said shank portion having a length thereof extending substantially beyond a plane which is normal to said shank portion and which passes through the rear ends of said pairs of portions, wherein the length of said shank portion extending beyond said last mentioned plane is at least equal to a major part of the length

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between said last mentioned plane and the intersection of said shank portion with said plane obliquely intersecting the axis of said shank portion,

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a flexible covering of quadrilateral form secured to said frame with margins of said covering secured to said

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laterally extending portions and with a diagonal line of said covering coinciding with said shank portion on either side of said plane which is normal to said shank portion, said frame positively holding said flexible covering to provide a final quadrilateral shape therefor,

and means providing for the securement of a string to said shank portion at a place between the front end of said frame and a plane passing through the free ends of said laterally extending portions and normal to said shank portion.

6. A kite as set forth in claim 1 in which said frame holds said flexible covering in taut, non-billowing relationship and wherein the shank portions and the diverging portions of said frame are so located that the flexible covering needs to be stretched taut to be secured to said shank and diverging portions whereby to cause said covering to be held in taut condition on said frame.

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