April 26, 1966 F. V. CUNNINGHAM 3,248,075

KITES

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FIG. 1

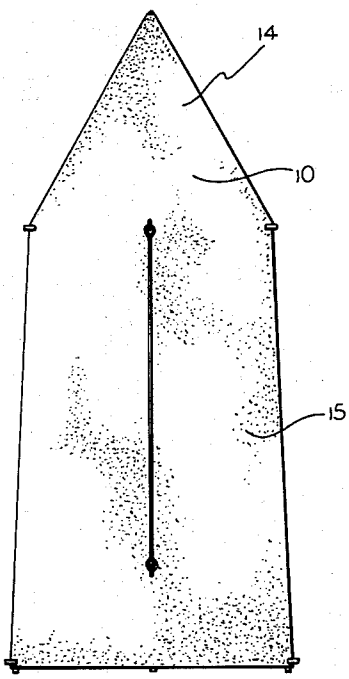
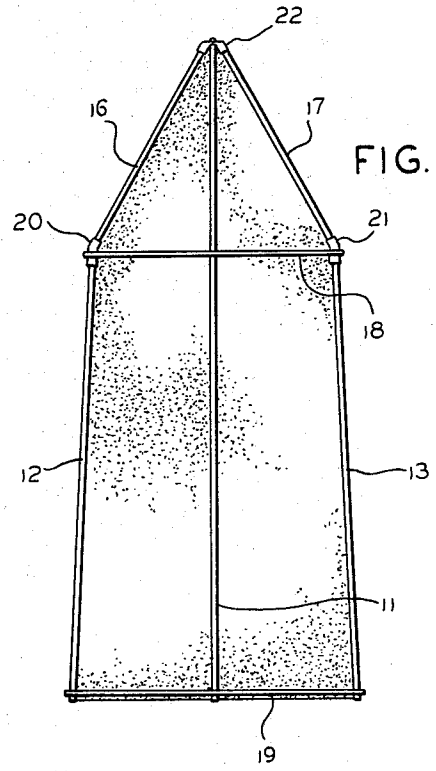


FIG. 2



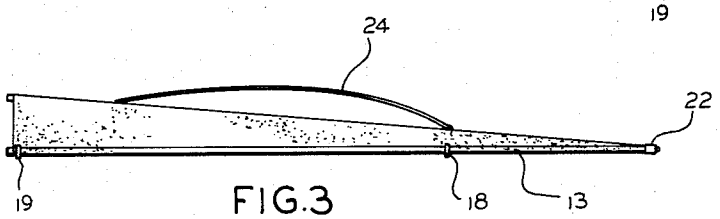


FIG. 3

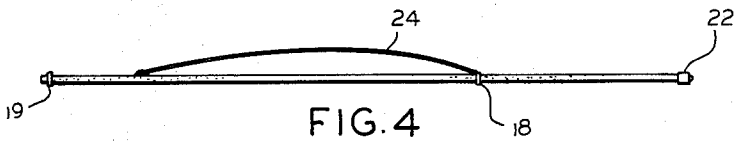


FIG. 4

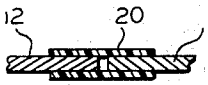


FIG. 5

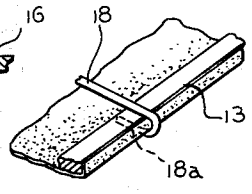


FIG. 6

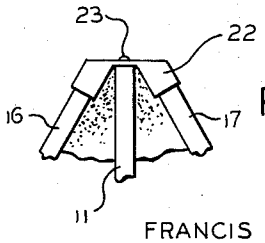


FIG. 7

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FIG.12

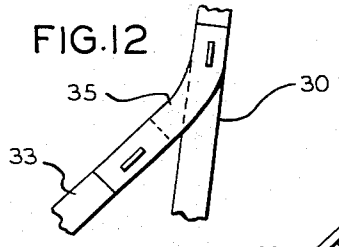


FIG.9

FIG.11

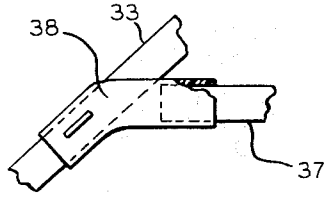


FIG.13

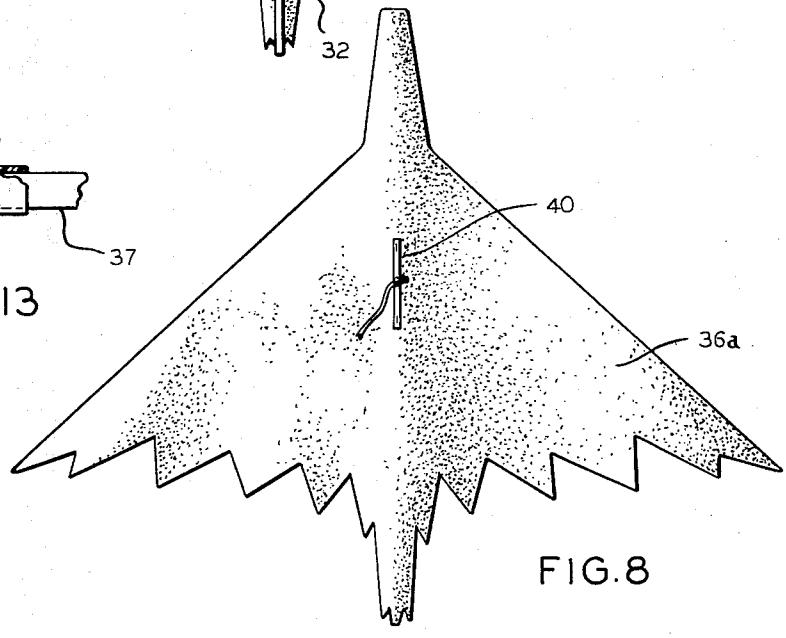


FIG.8

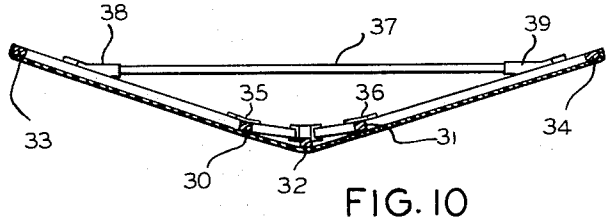


FIG. 10

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United States Patent Office 3,248,075 Patented Apr. 26, 1966

3,248,075

KITES

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Filed Feb. 25, 1963, Ser. No. 260,693
7 Claims. (Cl. 244—153)

This invention is directed to kites and is particularly concerned with improvements which enhance manufacture, shipping, and customer assembly thereof and which improve the gliding and diving flight characteristics of kites.

Most kites are so constructed that their bulk and fragile nature in an assembled flying condition requires expensive shipping and packaging techniques. For this reason kites are oftentimes packaged, shipped and sold to the customer in an unassembled condition. Most kites are also characterized by relatively fragile frame constructions which are easily damaged by impact forces. The nature of the frame constructions, which are determinative of the overall shape of kites, do not permit shipment in a flat assembled condition. The present invention aims to overcome these deficiencies of prior constructions by so constructing a kite body that although it has a shallow V-shaped cross section in the flying condition, it may be shipped and packaged in an assembled, flat condition. The user need only attach the customary manipulating line. The same features which enable shipment in the flat condition also enhance the diving and gliding flight characteristics of the kite. In addition, in one form of the invention, the kite may be easily folded with the sheet material rolled around stiffening members for shipment. Furthermore, the kite is so constructed that it is more impact resistant than previous kites. These and other purposes will become more apparent in the course of the ensuing specification and claims when taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a front view of a typical kite constructed in accordance with the principles of the present invention;

FIGURE 2 is a rear view of the kite illustrated in FIGURE 1;

FIGURE 3 is a side view of the kite illustrated in FIGURES 1 and 2;

FIGURE 4 is a view similar to FIGURE 3 but illustrating another condition of the kite illustrated in FIGURE 3;

FIGURE 5 is an enlarged sectional view of a portion of the kite illustrated in FIGURES 1 through 4 and particularly illustrating a connection between stiffening members in the kite;

FIGURE 6 is an enlarged perspective view of a portion of the kite illustrated in FIGURES 1 through 4 and particularly illustrating a detail of assembly;

FIGURE 7 is an enlarged plan view of a portion of the kite illustrated in FIGURES 1 through 4 and illustrating another connecting joint between stiffening elements of the assembly;

FIGURE 8 is a front view illustrating a modified form of the inventoin;

FIGURE 9 is a rear view of the kite shown in FIGURE 8;

FIGURE 10 is a sectional illustration of the kite illustrated in FIGURE 8 and particularly illustrating the dihedral of the kite;

FIGURE 11 is a detail view of one fastening subassembly used in the invention;

FIGURE 12 is a detail view of another fastening subassembly used in the invention; and

FIGURE 13 is a detail view of another fastening subassembly used in the invention.

With particular reference now to the drawings, wherein like elements are designated by like characters throughout, and in the first instance to FIGURE 1, the numeral **10** generally designates a sheet of suitable kite fabric which may be of paper, paperlike material, or thin plastic film all as is known to the art. The sheet fabric **10** has an outline and configuration of the overall kite.

The flexible fabric **10** is fixed to a stiffening frame which is defined by a longitudinal stiffening member **11** and side stiffening members **12** and **13**. The kite defined by the fabric and stiffening members may have a form such that the top portion thereof has a generally inverted V-shaped (in a front view) and while the lower portion **15** may have various shapes, wherein members **12** and **13** may be divergent, parallel, or convergent to suit desired appearance.

The top portion of the kite may have its characteristic inverted V-shaped form defined by stiffening members **16** and **17** which are connected to the side stiffening members at the upper portion of the kite. The stiffening members **11**, **12**, **13**, **16** and **17** may be comprised of elongated, relative narrow plastic tubes or strips of wood, as are depicted in the drawing, and which are flexibly joined together.

The flexible sheet fabric **10** which defines the general outline and configuration of the kite may be fixed to the strips **11**, **12**, **13**, **16** and **17** through suitable and conventional means such as adhesives or light staples.

In accordance with the principles of the invention, the side strips **12** and **13** are held in the spaced apart relation by transverse braces illustrated in the drawings as stay wires **18** and **19** which span the width of the kite body and are affixed thereto.

The side strips or stiffening means for the kite body may be joined together through use of tubes **20** and **21** as is illustrated in detail in FIGURE 5. In FIGURE 5, for example, the abutting ends of the strips **12** and **16** are shown inserted into the bore of the flexible tube **20**, which may be conveniently formed of a plastic material which is somewhat yieldable or resilient. The uppermost strips **16** and **17** may be joined together and to the medial longitudinally extending reinforcing strip **11**, as is particularly illustrated in FIGURE 7. In FIGURE 7, for example, a tube **22** of a resilient plastic similar to the tubes **20** and **21** receives the ends of the strips **16** and **17** at the apex thereof and is bent as is seen in FIGURE 7. The adjoining end of the strip **11** may be fixed to the tube **22** through use of a small nail, rivet or the like, **23** which is driven through the tube **22** and into the end of the strip **11**.

The reinforcing rods **18** and **19** may be fixed to the side strips **12** and **13** simply by bending the ends of the wires over or around the strips **12** and **13** so as to effect a clamping engagement therewith. In FIGURE 6, for example, the end portion **18***a* of the rod **18** is shown bent over the strip **13**.

The sheet fabric **10**, which spans the framework defined by the several supporting strips, has a width greater than the width of the framework defined by the strips **16**, **17** and **12** and **13**. The actual width of the sheet fabric at the bottom of the kite may, for example, be 25% greater than the dimensions between the lower portions of the strips **12** and **13**. Thus the sheet material defining the overall outline of the kite body may assume a configuration of generally V-shaped cross section as appears in FIGURE 3 with the cross section diminishing from the bottom of the kite to the top thereof as appears in FIGURE 3. Since the joint at the apex of the top portion serves as a pivot due to the resilient nature of the tube **22**, the medial strip **11** may be moved into a flat, substantially coplanar disposition with the side strips, as is illustrated in FIGURE 4, or when pulled outwardly the

kite body has a bridged or somewhat V-shaped cross section to provide proper flight characteristics.

By virtue of the flexibility of the medial stiffening member **11** with respect to the side frame members which are held in the spaced apart relation illustrated in the drawings, the kite is easily shipped in an entirely flat condition. The kite is fully assembled nonetheless and the kite is ready for flying upon removal from the package and attachment of the usual line to the bridle **24** or simply by direct attachment to the medial strip as illustrated in FIGURE 8.

Under customary flying conditions, the kite will have the generally V-shaped cross section illustrated in FIGURE 3. If the user desires to put the kite through maneuvers, such as diving, releasing of the tethering line will allow the medial stiffening member **11** to flex backwards into the somewhat coplanar disposition illustrated in FIGURE 4, all of which causes the kite to nosedive at great speeds. On the other hand, by pulling on the tethering line, the kite again assumes its cross sectional configuration illustrated in FIGURE 3, whereupon the wind forces cause the kite to again ascend.

The flat disposition of the kite, as illustrated in FIGURE 4 is particularly advantageous in terms of launching the kite through any suitable launching means. In this regard the kite may be held in the more or less flat condition and shot upwards by some mechanical means.

The construction of the kite is such that it may be used as a sail plane or glider, without the customary tethering line. In this regard the overall shape and configuration of the kite enables the user to sail the kite body much in the manner of a model sail plane or glider.

The construction is relatively shock resistant. In this regard, the use of the flexible joint tubes between the upper and lower side stiffening members allows the top portion **14** of the kite to yield slightly with respect to the bottom portion. The flexible connecting tubes also tend to absorb shock upon impact of the kite with some object, as through collision of the apex of the kite with some object, as might be encountered when the user is putting the kite through a dive. Shock forces are transmitted generally longitudinally through the medial stiffening member **11** and the side stiffening members **12, 13, 16** and **17**. The yieldability of the joints between the stiffening members together, which provides a slight yieldability of the top portion of the kite with respect to the lower portion, enables absorption of such shocks without fracturing the stiffening members.

The principles of construction illustrated and described with respect to the kite of FIGURES 1 through 7 may be embodied in many different kite configurations. One such configuration is a plane inverted V-shape wherein the side stiffening members define the legs of the V. FIGURES 8 9 and 10 illustrate an additional configuration. In FIGURE 8, for example, the kite has a configuration such as to simulate a bird. Longitudinal stiffening means **30** and **31** in the form of wooden strips may diverge from the top to the bottom thereof. An additional longitudinal and medial stiffener in the form of a strip **32** is positioned between the strips **30** and **31**, and need not extend to the apex. Strips **30** and **31** are held together at their apex, and may be held by means of a flexible tube **33***a* (FIGURE 11) similar to tube **22** in FIGURE 7. Side stiffening means, in the form of strips **33** and **34**, extend laterally and may extend downward from strips **30** and **31**. Strips **33** and **34** are flexibly connected to strips **30** and **31** as by means of flexible straps **35** and **36** (FIGURE 12). Suitable flexible fabric **36***a* is fixed to the strips **30, 31, 32, 33** and **34** and overlies the same as is seen in the drawings.

In order to hold the side stiffening members **33** and **34** in spaced relation, a transversely extending stiffening strip **37** is removably attached to strips **33** and **34** as through use of tubes **38** and **39**. The ends of the tubes **38** and **39** as is seen in FIGURE 13 are fixed to the strips **33** and **34**. Strip **37** has a length such that when the opposite ends are inserted into the tubes **38** and **39** the kite body may assume the dihedral illustrated in FIGURE 10, as by flexing of the central stiffening means with respect to the side stiffening means, or it may assume a substantially flat disposition as in storage thereof.

The width of the body fabric is such, in FIGURES 8, 9 and 10 and the length of brace **37** is such that when brace **37** is in place, at least the fabric between strips **30** and **31** may flex between an essentially flat position and the V-shaped position illustrated in FIGURE 10, thus providing the characteristic keel effect when the tethering line pulls the longitudinal strip outwardly. The positioning of strip **32**, as shown in the drawings, together with the looseness of fabric in the flat condition enable strip **32** to move between the flat position and the V-shaped position. In effect, strip **32** moves about connection **33** as a pivot in moving between these positions.

It is preferred to have brace **37** of such a length that the fabric between strips **31** and **34** and the strips **30** and **33** also assumes the V-shaped disposition so that the V-shape is continuous from the outer strips **33** and **34** to the strip **32** as illustrated in FIGURE 10.

Brace **37** may also be fixed to strips **30** and **31**, thereby holding the fabric between strips **31** and **34** and strips **30** and **33** in essentially a flat, coplanar position, while at the same time maintaining the V-shaped keel effect between strips **30** and **31** in the flying position while allowing flexure of this central section to a flat disposition which is essentially coplanar with the other sections in a non-flying position.

The tubes **38** and **39** may be metal or plastic, and formed as shown. More economically, the tubes may be of straight extruded flexible plastic tubing cut into short lengths and stapled or otherwise attached to the outer wing strips. A child may easily bend these from their alignment with strips **33** and **34** into proper alignment for insertion of the strip **37**. This provides a loose fit of brace **37** in the tubes. A hole **40** is cut through the fabric **36***a* to expose stiffening strip **32** for direct attachment of a flying line. Alternately a bridle **24** as shown in FIGURE 3 may be attached to **32** as means for flying cord attachment.

The kite illustrated in FIGURES 8, 9 and 10 may be shipped flat in the fully assembled condition. The kite may also be folded by removing strip **37** and by moving the strips **30** and **31** alongside one another and alongside strip **32** and then folding strips **33** and **34** alongside the central strips. Thus, the kite of FIGURES 8, 9 and 10 may either be shipped in a flat condition or in a folded condition.

Kites as herein disclosed may be used as gliders or may be flown in customary fashion with or without the diving and gliding characteristics. If it is desired to minimize the diving and gliding characteristics of the kite, weights may be added to the lower half of the kite so that the total weight in the lower half of the kite, which includes the stiffening strip, fabric and transverse stiffeners if they are so located in the lower half, exceeds the weight in the upper half of the kite. Such weights may be metal or plastic forms attached to the medial or the transverse brace or may take the form of short strips of wood similar in cross section to the strips **12, 13, 30** and **31** which are placed symmetrically with respect to the central strip **11** or **32**.

In each form of the invention, the kite is so formed that the kite may either be essentially flat or may be flexed, as when flying or gliding, to provide the shallow V-shaped dihedral or V-shaped keel effect shown in the drawings.

Whereas I have shown and described an operative form of the invention, it should be understood that this showing and description thereof should be taken in an illustrative or diagrammatic sense only. There are many modifications in and to the invention which will fall with-

in the scope and spirit thereof and which will be apparent to those skilled in the art. The scope of the invention should be limited only by the scope of the hereinafter appended claims.

I claim:

1. A kite including a flexible fabric defining the outline of the kite body, said fabric having a top portion of generally inverted V-shape and a lower portion, and rigidifying means fixed to the side portions of said fabric from the top to the bottom thereof, the rigidifying means for the top portion of said body being flexibly connected to the rigidifying means for the lower portion of said body, and a medial reinforcing strip joined to said fabric and to the rigidifying means for said top portion, said strip extending from the top to the bottom of said body, whereby said top portion may bend yieldably with respect to the remainder of said body.

2. An airborne device of the type having sheet material defining a kite body and reinforcing means fixed to said sheet, said means being defined by plural, spaced elongated strips and a transverse strip extending between said other strips and having connections therewith, at least one of said connections including a resilient connecting tube connected to a medial portion of one elongated strip with one end thereof directed in the direction of the length of the strip medial portion and the other extending in a direction inclined thereto while receiving the end of said transverse strip in a removable, resilient, binding frictional arrangement.

3. A kite including sheet material having a configuration to define a body of essentially triangular shape comprised of marginal edges diverging downwardly from an apex, stiffening means extending longitudinally of said body at the medial portion thereof, additional stiffening means spaced outwardly from said first named stiffening means and on both sides thereof and positioned on said marginal edges in downwardly diverging relation relative to each other, said sheet material being fixed to each said stiffening means, means holding said additional stiffening means in said spaced relation, said longitudinal stiffening means being flexibly interconnected with said additional stiffening means so as to allow movement of said longitudinal stiffening means with relation to said additional stiffening means and to and from a first position generally aligned within said additional stiffening means, and a position defining, with said additional stiffening means, a generally V-shaped keel-like cross section of an extent sufficient for flying conditions, said sheet material having sufficient fullness between said stiffening means to allow said movement while said additional stiffening means are in said spaced relation, and means for attaching a manipulating line to said medial stiffening means.

4. The structure of claim 3 wherein said longitudinal stiffening means is flexibly connected to said additional stiffening means solely by said sheet material.

5. The structure of claim 3 wherein said holding means is in the form of a brace extending between and connected to said additional stiffening means.

6. The structure of claim 3 wherein each said stiffening means is an elongated strip and the strips defining said additional stiffening means are positioned in inverted V-shaped relation while having end portions connected together at an apex of said V-shaped relation.

7. A kite including sheet material having a configuration such as to define the sides, top and bottom of a kite body, stiffening means extending longitudinally of said body at the medial portion thereof, additional stiffening means spaced outwardly from said first named stiffening means and on both sides thereof, said sheet material being fixed to each said stiffening means, means holding said additional stiffening means in said spaced relation, said longitudinal stiffening means being flexibly interconnected with said additional stiffening means by said sheet material and by a flexible joint connecting end portions of each said stiffening means so as to allow movement of said longitudinal stiffening means with relation to said additional stiffening means and to and from a first position generally aligned with said additional stiffening means, and a position defining, with said additioal stiffening means, a generally V-shaped keel-like cross section of an extent sufficient for flying conditions, said sheet material having sufficient fullness between said stiffening means to allow said movement while said additional stiffening means are in said spaced relation, and means for attaching a manipulating line to said medial stiffening means.

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