United States Patent

[11] **3,582,025**

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[54] WINGED ROTARY KITE

7 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **244/154**
[51] **Int. Cl.** **B64c 31/06**
[50] **Field of Search** 244/154, 153, 155; 46/47, 51, 53, 74, 75

[56] **References Cited**

UNITED STATES PATENTS

2,472,290	6/1949	Fernstrum	244/154
2,675,199	4/1954	Aylor	244/154
3,022,967	2/1962	Romeo	244/154

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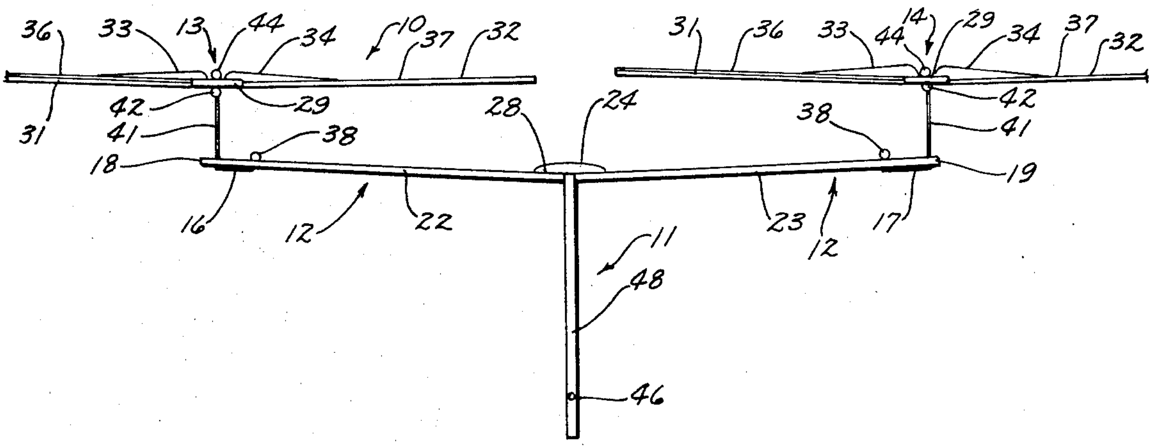
ABSTRACT: This invention relates to a winged rotary kite which has its lift power generated by wind driven rotors and is adaptable for use under normal conditions without the need for a tail, the kite comprising a finlike body to provide directional stability; a member attached to the body for connecting a flexible towline thereto; a wing mounted on and bisected by the body; a pair of axles connected to the distal ends of the wing and extending upwardly therefrom; and a rotor rotatably mounted on each axle, each rotor being spaced a distance above the wing, whereby the rotor as it passes over the wing is maintained in turbulent air rather than in direct airflow thus obtaining less drag on the rotor as it passes over the wing, as compared to the drag on the rotor when it is not over the wing, and by this arrangement causing the turbulent air to be dispersed inwardly from below each rotor toward the fuselage where it is then dumped rewardly, enabling the kite to maintain pitch and vertical stability.



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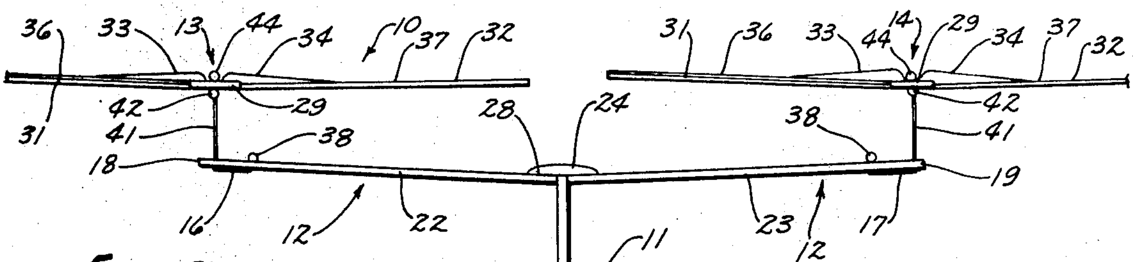

Fig. 1

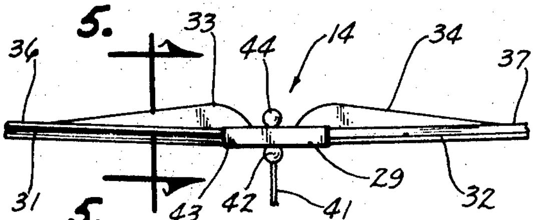

Fig. 4

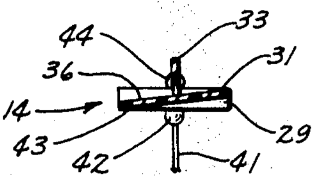

Fig. 5

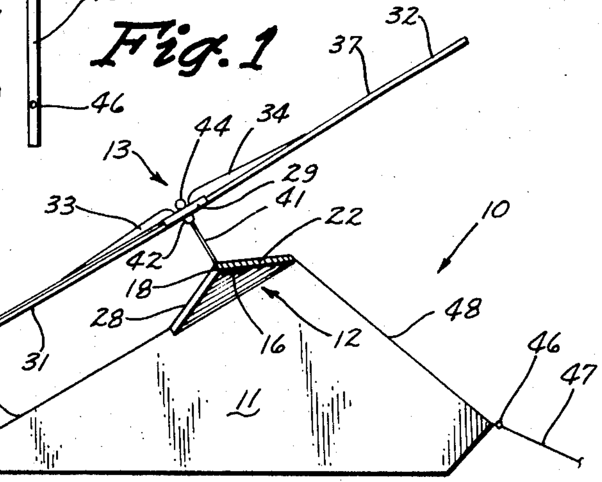

Fig. 3

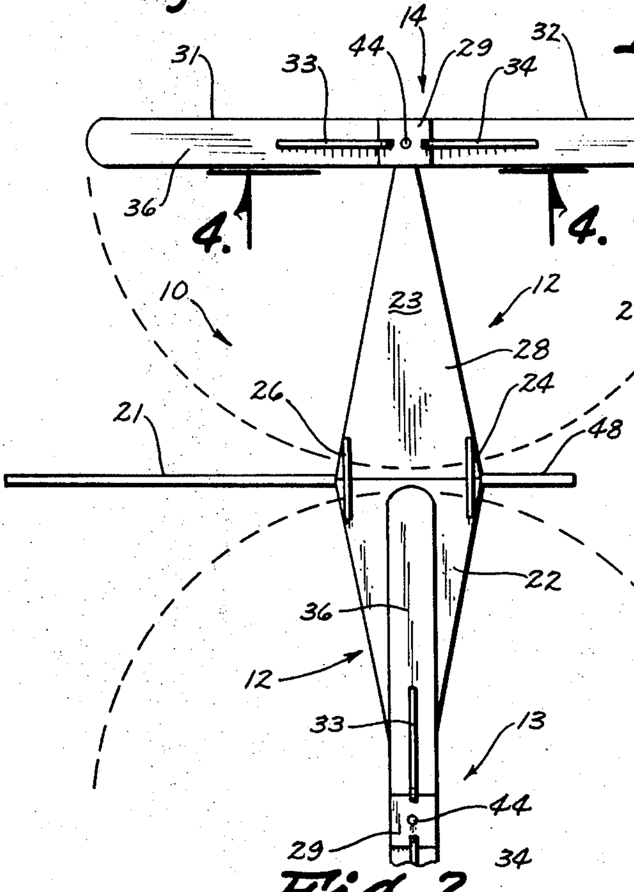

Fig. 2

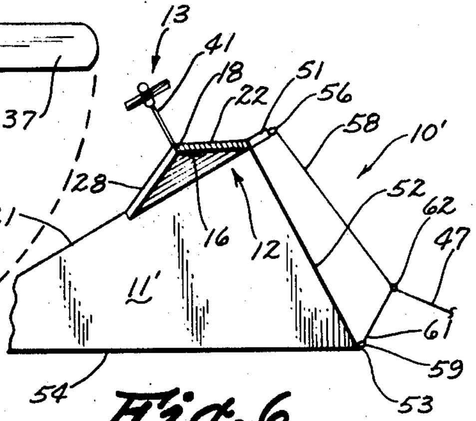

Fig. 6

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WINGED ROTARY KITE

BACKGROUND OF THE INVENTION

This invention relates generally to kites and particularly to kites of the rotor propelled variety.

Various types of rotor propelled kites are known and are exemplified in U.S. Pat. Nos. 2,472,290, 2,675,199, and 2,987,280. Generally, all of the prior art structures have in common an elongated fuselage, a crossmember attached to the fuselage, a pair of rotors rotatably mounted directly to the extended ends of the crossmembers, and a tail unit connected to the fuselage to provide vertical and horizontal stabilization of the kit.

The rotary kite of this invention obviates the need for a tail unit by raising the rotors above the wing so as to place the rotors in the turbulent air formed above the wing to thereby effect a higher drag on the outside and front of the dish formed above the wing by each of the rotors to provide vertical and pitch stability for the kite.

SUMMARY OF THE INVENTION

This invention relates to a tailless winged, rotor propelled kite comprising an elongated, thin, flat fuselage; a wing mounted on and bisected by the fuselage; a pair of rotors having a hub; a pair of upwardly extending members connected to the outer ends of the wing to rotatably mount the rotors with the hub of each rotor spaced above and in noncontacting relation to the wing; and a member connected to the fuselage for attaching a towline thereto.

It is an object of this invention to provide an improved rotor propelled kite.

It is another object of this invention to provide a rotor propelled kite which is operable under normal conditions without the need for a tail element.

It is yet another object of this invention to provide a finlike fuselage adapted to provide directional stability for the kite.

It is still another object of this invention to provide a rotary propelled kite having an inherent construction capable of maintaining the kite at a optimum angle of attack.

It is a further object of this invention to provide a towline connection to a kite wherein an easy and quick adjustment can be made to compensate for variations in wind velocity.

It is still a further object of this invention to provide a rotor propelled kite which is simple to use, economical to manufacture, and rugged in construction.

These objects and other features and advantages of the rotored propelled kite of this invention will become readily apparent upon reference to the following description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of the kite of this invention;

FIG. 2 is a plan view of the kite;

FIG. 3 is a side elevational view showing the kite in its normal angle of attack;

FIG. 4 is a fragmentary side view of a rotor as taken along the line 4—4 of FIG. 2;

FIG. 5 is a fragmentary side elevational view as taken along the line 5—5 of FIG. 4; and

FIG. 6 is a fragmentary side elevational view of a modification of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and particularly to FIG. 1, the rotor propelled kite of this invention is indicated generally by the numeral **10**. The kite **10** generally includes a fuselage **11**, a wing **12** mounted on the fuselage **11** and bisected thereby, and a pair of rotors **13** and **14** rotatably mounted above the wing **12** by a pair of members **16** and **17** extending upwardly from the wing **12** adjacent the outer ends **18** and **19** thereof.

The fuselage **11** (FIGS. 1 and 3) is an elongated finlike body formed by a thin, flat, lightweight material. In side view (FIG. 3), the fuselage **11** has a substantially triangular shape.

The wing **12** (FIGS. 1 and 2) is attached to the fuselage **11** adjacent the top edge **21** thereof and is shaped with a positive dihedral angle of about 5° to about 20° between the bisected wing portions **22** and **23** thereof. The wing **12** is provided with a pair of elongated braces **24** and **26** extending transversely of the fuselage **11**, which braces **24** and **26** are secured to the top side **28** of the wing **12**.

The rotors **13** and **14** (FIG. 1) are disposed above the wing **12** and are identical, therefore only one rotor **14** will be fully described. The rotor **14** includes a hub **29** having an aperture (not shown) centrally formed therein for rotatably mounting the rotor **14** to the mounting member **17** as hereinafter described.

A plurality of blades of **31** and **32** (FIGS. 4 and 5), each having a slight fixed pitch, are rigidly connected to the hub **29** and radially extend therefrom. The blades **31** and **32** may be secured to the hub **29** with a slightly negative angle of incidence, for example less than 10° and with a positive dihedral angle of less than 20°. However, the angle of incidence is important only under low wind conditions since when the wind is of normal velocity, the air drag on the rotor **14** will tend to arch the blades **31** and **32** upwardly. To retard the arching, a plurality of elongated support members **33** and **34** are provided. Each support member **33** and **34** extends radially from the hub **29** to approximately one-third the length of the blades **32** and **33** respectively, and attaches, as with glue, to the top surfaces **36** and **37** of the blades **31** and **32** respectively.

The blades **31** and **32** (FIGS. 1 and 2) are of a length slightly less than the wing portions **22** and **23**, such that when mounted, as hereinafter described, the rotating blades **31** and **32** of the rotors **13** and **14** do not travel an intersecting path (dotted lines, FIG. 2).

The rotors **13** and **14** (FIG. 1) are mounted above the wing **12** by a pair of identical mounting members **16** and **17** and for purposes of brevity, only one member **17** will be described. The mounting member **17** includes an L-shaped rod extended upwardly through the wing **12** and connected thereto by a conventional bead fastener **38**, embracing one end (not shown) of the member **17**, and abutting the top surface **28** of the wing **12**.

The elongated arm **41** of the L-shaped member **17** projects upwardly from the wing **12** adjacent the outer end **19** thereof to form an axle upon which to mount the rotor **14**. When viewed in front elevation (FIG. 1), the axes of the extended arm or axle **41** extends normal to the wing **12**, and since the wing **12** is mounted at a positive dihedral angle, the axes of the axle **41** of the members **16** and **17** are inclined upwardly to converge on the vertical plane passing through the fuselage **11**.

To mount the rotor **14** (FIGS. 1 and 4) to the axle **41**, a spherical bead **42** or the like is provided. The bead **42** is snuggly secured to the axle at a predetermined height above the top surface **28** of the wing **12**. Stated another way, the rotor **14** is spaced above the wing **12** by the bead **42** approximately one-fourth the length of the wing end **19** from the fuselage **11**.

Once the bead **42** (FIGS. 4 and 5) is appropriately spaced and secured to the axle **42**, the rotor **14** is mounted on the axle **42** through the aperture (not shown) formed in the hub **29**, with the bottom surfaces **43** of the hub **29** resting upon the bead **42**. The rotor is then secured by a second conventional bead fastener **44** at the extended end (not shown) of the axle **41**.

A connection member **46** (FIGS. 1 and 3) provided to attach the kite **10** to a flexible tow line **47**. The connection member is formed of a screw-eye or the like and is securely connected to the leading edge **48** of the fuselage **11**.

In operation, the kite **10** is launched by the operator running toward the oncoming wind and pulling the towline **47** attached to the kite **10** with him, at the same time paying out the towline **47** as the kite **10** rises. With the parts arranged and positioned as hereinbefore described, the kite **10** substantially assumes a position best illustrated in FIG. **3** with the wing **12** tilted upward, thereby giving the rotors **13** and **14** a high angle of attack of approximately 45° to 60° relatively to the horizontal direction of the wind. As the wind strikes the rotors 13 and **14**, they commence to rotate rapidly causing a circular area or "dish" to form (dotted lines, FIG. **2**) which tends to prevent the flow of air upwardly and through the "dish." To accomplish a higher lift on the outside of the "dish" as compared to the lift on the inside thereof nearest the fuselage **11**, the rotors are spaced above the wing as described hereinbefore, and whereby the wing in effect blanks out a portion of the "dish" from below as best illustrated in FIG. **2**. This location of the rotors places them in turbulent air rather than in direct wind flow thereby maintaining a higher drag on the outer and front areas of the "dish" of each rotor, and causing the air to dump inwardly of the "dishes" at the fuselage **11**, thereby obtaining vertical and pitch stability normally obtained on other kites and the like by tail surfaces.

A modification of the present invention is illustrated in FIG. **6**, with like numerals indicating like parts. The modified kite **10'** includes a modified fuselage **11'** having an extension member **51** coextensive with the top edge **21** of the fuselage **11'** and extending axially forward therefrom, and a straight leading edge **52**. The leading edge **52** connects to the top edge **21** immediately forward of the wing **12** and extends therefrom to connect to the forwardmost end **53** of the bottom edge **34** of the fuselage **11'**.

The extension member **51** is provided with an eyelet **56** or the like for connecting one end **57** of a flexible chord **58** to the fuselage **11'**. A second eyelet **59**, similar to eyelet **56**, is secured to the leading edge **52** of the fuselage **11'** adjacent the end **53** of the bottom edge **54** thereof for connecting the opposite end **61** of t the chord **58** to the fuselage **11'**. The chord **58** may be of any suitable length, but it has been found that a length at least 1 inch longer then the distance between the eyelets **56** and **59** is most satisfactory.

The towline **47** is attached to the chord **58** by a slip knot **62**, or the like, such that the towline **47** may be selectively moved along the chord **58** between the eyelets **56** and **59** to compensate for various wind velocities and maintain the kite **10'** at the optimum angle of attack. Thus, it has been found that when wind velocities are high, the optimum angle of attack is best maintained by connecting the towline **47** to the lower portion of the chord **58**, while a low or normal wind velocity would require a towline **47** attachment approximately midway between the chord ends **57** and **61**. In all other respects, the arrangement and operation of the modified kite **10'** is similar to the kite **10** hereinbefore described and hence requiring no reiteration.

Although a preferred embodiment and a modification of the winged rotor kite of this invention has been hereinbefore fully described, it is to be remembered that various alterations and modifications can be made thereto without departing from the invention as defined in the appended claims.

I claim:

1. A winged rotor kite comprising:
   a tailless fuselage comprising an elongated, thin, flat member;
   a wing mounted on and bisected by said fuselage;
   a pair of rotors, each rotor including a hub;
   means for mounting a rotor at each outer end of said wing, said hub of each rotor spaced above and in noncontacting relation to said wing; and
   means connected to said fuselage for attaching a towline thereto.

2. A winged rotor kite as defined in claim **1**, wherein said fuselage has a substantially triangular shape.

3. A winged rotor kite as defined in claim **2** wherein said wing has s slightly positive dihedral angle.

4. A winged rotor kite as defined in claim **3** wherein each of said rotors include a plurality of blades, each of said blades having a slight pitch.

5. A winged rotor kite as defined in claim **4** wherein said blades connect to said hub to form a slightly positive dihedral angle.

6. A winged rotor kite as defined in claim **4** wherein said rotor mounting means include a pair of elongated axles extended normal to said wing and secured thereto, and axes of said axles extending convergingly upward.

7. A winged rotor kite as defined in claim **1** wherein said towline connecting means includes a flexible member.