Nov. 5, 1968 F. T. SADA 3,409,255

KITE CONTROL APPARATUS

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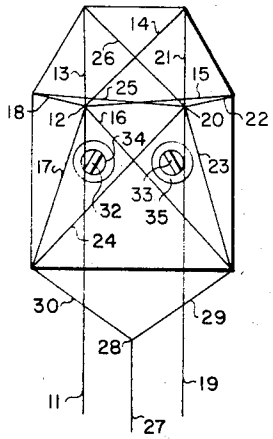

FIG 1

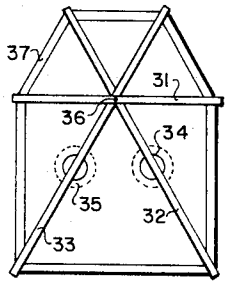

FIG 2

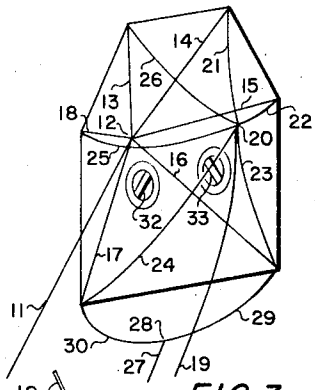

FIG 3

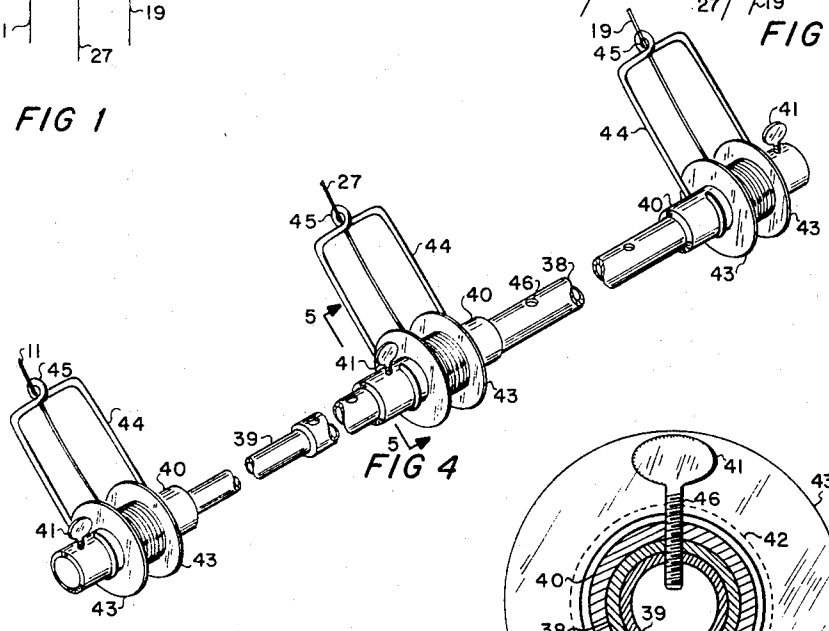

FIG 4

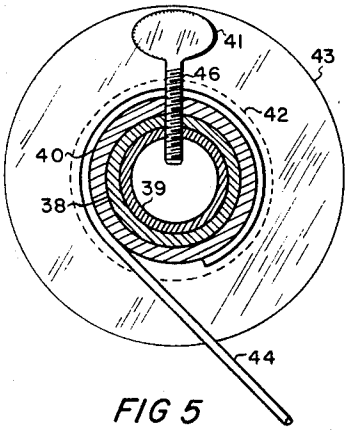

FIG 5

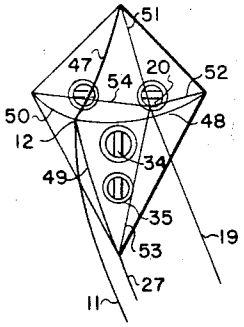

FIG 6

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KITE CONTROL APPARATUS

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ABSTRACT OF THE DISCLOSURE

A kite control apparatus comprising: a multi-cornered kite including multiple apertures in its covering material, a right and a left control bridle each comprising multiple lines from the center of said bridle to each corner of the said kite, an altitude control bridle attached to the kite, a telescoping central rod including right, left and altitude reels wound with control lines, wherein the lines from each reel are attached to their corresponding control bridles.

This invention relates to kite control apparatus and more particularly to a bridle arrangement attached to selected portions of a kite and control means selectively attached to the bridle arrangement.

Heretofore it has been the general practice to attach a single control line to a point approximately at the center of lift of a kite. Additionally, some advanced designs provided multiple bridles which control the attitude and altitude of the said kite to a limited extent. These prior art control means have generally been constructed in triangular or diamond-shaped configuration including multiple control arms with a reel system located in the approximate center of the multiple control arms; obviously, it is extremely difficult to maneuver and control a kite by such prior art teachings.

The simplified kite control apparatus of the subject invention includes all control components on a single axis whereby the reeling and flying control motions are accomplished from a single hand position, in a natural attitude.

An object of the subject invention is the provision of means for controlling the flight of a kite, said means mounted on a single axis.

Another object is to provide hand-held control means for raising or lowering a kite, including means for controlling the flying attitudes and altitude of the said kite.

Another object is to provide an improved bridle arrangement for a kite, which bridle arrangement is particularly adapted for use in combination with a single axis flight control means.

Other objects and features of the invention will become apparent to those skilled in the art as the disclosure is made in the following detailed description of preferred embodiments of the invention as illustrated in the accompanying sheet of drawing in which:

FIG. 1 is a front elevational view of the kite in a stable, down-wind attitude.

FIG. 2 is a rear elevational view of FIG. 1.

FIG. 3 is a perspective view of the embodiment of FIG. 1 maneuvering to the left.

FIG. 4 is an enlarged, isometric view, partly broken away, of the control rod reel assembly which is attached to selected bridle members of the kite.

FIG. 5 is an enlarged, vertical sectional view of the control rod reel assembly taken substantially on the line 5—5 of FIG. 4 looking in the direction of the arrows.

FIG. 6 is a front elevational view of a diamond-shaped kite maneuvering to the right.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIGS. 1 and 3

a pentagonal kite of substantial conventional construction wtih a plurality of bridles attached to selected portions of the said kite.

FIG. 1 illustrates the control lines and bridle with the kite in a stable down-wind attitude. The kite and control means are rigged for flight by attaching the left control line **11** to the center of the left control bridle **12**. The left control bridle comprises line extending from its center to each corner of the kite starting at the 12 o'clock position continuing clockwise they are designated as **13, 14, 15, 16, 17, 18**. The right control line **19** is attached to the center of the right control bridle **20**. The right control bridle comprises lines extending to each corner of the kite also utilizing the same system of numbering they are designated as **21, 22, 23, 24, 25, 26**. The altitude control line **27** is attached to the center of the altitude control bridle **28**.

Referring now to FIGS. 1 and 3 of the drawings lines **29, 30** extend from the center of the altitude control bridle to the two lower corners of the kite.

FIG. 2 illustrates a preferred embodiment of the invention illustrating some of the detail of construction of a hexagonal kite from the rear. The kite frame comprises one diagonal stiffening member **31** and two overlapping members **32, 33**. They may be secured in their center by either riveting **36** stapling or tying. The outer perimeters of the kite are connected with twine (not shown) and the covering material is folded over to the rear and secured by glue or other means of attaching **37**.

The kite chosen for illustration in FIGS. 1, 2, and 3 is hexagonal in configuration. The kite illustrated in FIG. 6 is diamond shaped. Other shapes may be used incorporating the same bridle principle without departing from the spirit or scope of this invention. A six cornered star-shaped kite has been found to be particularly adapted to the bridling and control methods disclosed in this application.

The kites utilized in the invention are of conventional construction except for the bridle arrangement and the apertures in the covering material. The usual stiffening members are employed which extend diagonally from corner to corner. Two of these members are visible at **32** and **33** FIG. 1. It is also pertinent to note that improved flying qualities have been obtained by constructing the kites to be flown with two holes as illustrated at **34**. The holes reduce the air pressure on the kite and tend to prevent the breaking of the stiffening members in a high wind. It is necessary to reinforce the covering material around the edge of the holes to prevent tearing **35**.

The kite at FIG. 1 is illustrated in a stable flying position with all control bridles in a tensioned condition. In this attitude the kite will fly directly down-wind from the operator and will remain in a relatively stable flying position provided the control rod is held in a fixed position parallel to the front of the kite.

Referring to FIG. 4 which is an isometric view of the control rod and reel assembly illustrating in some detail many features of its construction which are partially illustrated in more detail in the sectional view FIG. 5. The control rod is constructed of a hollow tubular member which is preferably of some light nonconducting material such as plastic. Telescopingly mounted into control rod **38** is the extension rod **39**. Each of the reels are constructed around a hollow axle **40** which slides over a control rod section to which it may be secured by a thumb screw **41**. Mounted around each axle is a spindle **42** to which is attached two parallel thread retaining discs **43** and movably mounted around said axles are line guide bails **44** each having an aperture **45** through which the control lines pass.

FIG. 6 illustrates one of many possible modified forms

of the invention. A diamond shaped kite is disclosed in a to the right flying attitude. The control lines are attached in a manner heretofore described. The control lines for the to the left control bridle are fewer in number and are designated as **47**, **48**, **49**, **50** whereas the control lines for the to the right control bridle are designated as **51**, **52**, **53**, **54** a different arrangement of holes are shown in the covering of the diamond shaped kite which have proved to be quite effective in preventing the breaking of the stiffening members and also aid in stabilizing the kite. In the diamond shaped kite the altitude control line may be attached directly to the kite with no additional bridle strings required.

This invention is placed in operation by unreeling the control lines from the flying reels an equal amount. The right control line is connected to the right control bridle. The center control line is connected to the altitude control bridle. The left hand control line is connected to the left hand control bridle. In the event the control lines are not of equal length when payed out the lines may be adjusted by the loosening of the thumb screw and rotating the reels the desired amount to place the kite in a flying attitude normal to the control rod. Adjustments are usually made by moving the two outer reels. The thumb screw of the center reel is normally utilized to lock the telescoping section in a rigid position by threading the screw through one of the holes **46** in the control rod and either making friction contact with the extension rod or it can be more rigidly secured by screwing through a threaded hole (not shown) in the extension rod.

The kite is now rigged for flight and may be placed in flight in the conventional manner. The preferred method would be to secure the assistance of a second person to hold it in the air down-wind normal to the flying rod and release the kite on the signal of the operator of the control rod. It is however entirely possible to place the kite in the air without the aid of a second person. In a favorable wind the kite can be placed in flight by an operator holding the control rod and kite in a down-wind attitude and allowing the flying lines to unreel as the wind pulls the kite.

As the control rod is held parallel to the ground, a rotation of the rod around the operator to the right tensions the right control bridle causing the kite to move across the sky to the right. This moves the kite into a cross-wind attitude to the operator. A return of the control rod to a normal attitude will move the kite to a down-wind position. The rotation of the control rod around the operator to the left will tension the left control bridle and cause the kite to fly to the left into a cross-wind or up-wind attitude. The return of the control rod to normal returns the kite to a downwind position from the operator.

The bridling of the kite tends to cause the kite to fly in an attitude with the diagonal bracing member parallel to the control rod. A change in the axis of the control rod from the horizontal by partially rotating it along the control rod kite axis combined with a right or left control pressure will result in infinite variations in flying attitude of the kite. For example, a raising of the right control end of the rod with the consequent lowering of the left end will result in the kite climbing to the upper right as right control pressure is applied. Opposite control movements will provide opposite results. A skilled operator can accomplish infinite maneuvers of the kite by varying the position of the control rod in its variations from normal to the kite. This is particularly true if the tension on the altitude bridle is varied in conjunction with variations in positions of the central rod.

Variations in climbing attitude of the kite may be accomplished by tensioning or slackening the line on the center of the control arm. A slackening of the string tends to make the kite climb and a tensioning pulls on the altitude bridle placing the kite in an upright position decreasing the vertical lift causing the kite to fly lower on the horizon. If the kite is placed in a diagonal position in the sky the altitude bridle may be used to control lateral movement of the kite.

Having described the invention and its operation, what I claim is:

1. The combination of a kite and a flying control mechanism comprising a kite, the cover of said kite constructed with a multiplicity of air holes, a first attitude control bridle attached to each corner of said kite, a second attitude control bridle attached to each corner of said kite, an altitude control bridle attached to a selected portion of said kite, a telescoping control rod, a first reel, a second reel, and an altitude control reel mounted on said control rod, a line wound on each reel, said line on said first reel connected to said first attitude control bridle, said line on said second reel connected to said second attitude control bridle, said line on said altitude control reel connected to said altitude control bridle, each reel comprising an axle, a spindle mounted on said axle, a multiplicity of spaced thread retaining discs secured to said axle and spindle, and a screw adjustably securing said axle to said control rod, a line guide bail movably mounted on said axle, said bail having an aperture adapted to receive the said line from the respective control reel.

2. The combination of a kite and flying control mechanism comprising a kite having multiple corners, a multiplicity of attitude control bridles connected to said kite, said bridles comprising a left control bridle comprising lines extending from its center to each corner of said kite, a right control bridle comprising lines extending from its center to each corner of said kite, and an altitude control bridle attached to a selected portion of said kite, a single axis control rod, a multiplicity of control reels axially mounted on said control rod, lines wound on said control reels and connected to said control bridles.

3. The invention of claim **2** wherein the control reels are adjustably mounted on said control rod, and said reels include a line guide means.

4. The invention of claim **2** wherein the single axis control rod is telescopically adustable.

5. The invention of claim **2** wherein the kite construction includes multiple spaced apertures.

6. The combination of a kite and a flying control mechanism comprising:

(a) a kite,
(b) the cover of said kite comprising a multiplicity of air holes,
(c) a left control bridle comprising lines extending from its center to each corner of said kite,
(d) a right control bridle comprising lines extending from its center to each corner of said kite,
(e) an altitude control bridle attached to the bottom of the said kite,
(f) a single axis control rod,
(g) an extension rod telescopingly mounted in said control rod,
(h) a multiplicity of control reels adjustably mounted on said control and extension rod combination, each of said control reels comprising:
  (1) a hollow axle sliding mounted on said control rod,
  (2) a spindle secured over said axle,
  (3) a thread retaining disk mounted over said axle and retained by said spindle,
  (4) line guide bails pivotally mounted on said axle adjacent said disk, and
  (5) a thumb screw adjustably securing said axle to said control rod;
(i) said multiple control reels including,
  (1) a right attitude control reel,
  (2) a left attitude control reel, and
  (3) juxtapositioned between the said right attitude and said left attitude control reel is adjustably mounted on said rod an altitude control reel;
(j) control lines wound on each of said reels and

secured to their respective corresponding said control bridles.

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