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Curtis

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[54] **KITE CONTROLLER**

[76] Inventor: **Malcolm Rex Curtis,** 3224 Timmons Lane, No. 157, Houston, Tex. 77027

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[52] **U.S. Cl.** ..... **244/155 A**

[51] **Int. Cl.** **B64c 31/06**

[58] **Field of Search** ..... 244/155 A, 155 R; 242/96, 99, 85, 118.41

[56] **References Cited**

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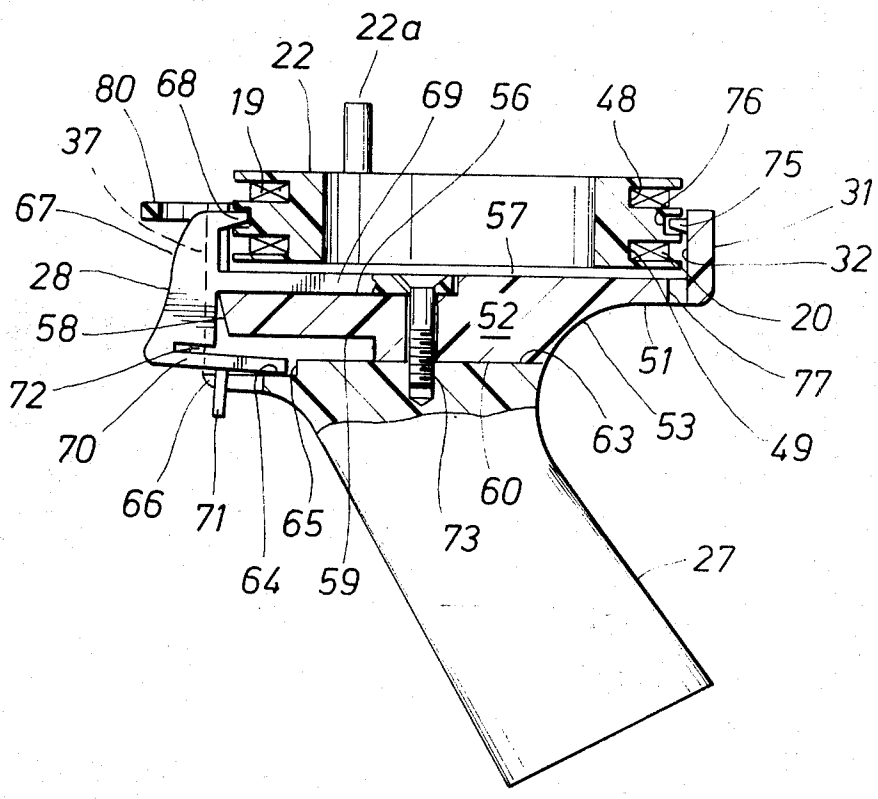
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3,355,129	11/1967	Kinsey	244/155 A
3,289,968	12/1966	Wilson	244/155 A UX
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Primary Examiner—Duane A. Reger
Assistant Examiner—Paul E. Sauberer
Attorney—Fidler & Bard

[57] **ABSTRACT**

A dual line flight controller is disclosed and consists of a hand manipulatable support carrying a dual line spool or reel mounted for rotation about a vertical axis for paying out and for reeling in control lines. Spaced-apart guide members on the support receive individual control lines which are separately spooled on the single reel. A trigger-operated brake is provided to positively control spooling of the control lines and also functions to retain the spool within the support. Disconnect means are provided to selectively release the spool from the support.

14 Claims, 6 Drawing Figures



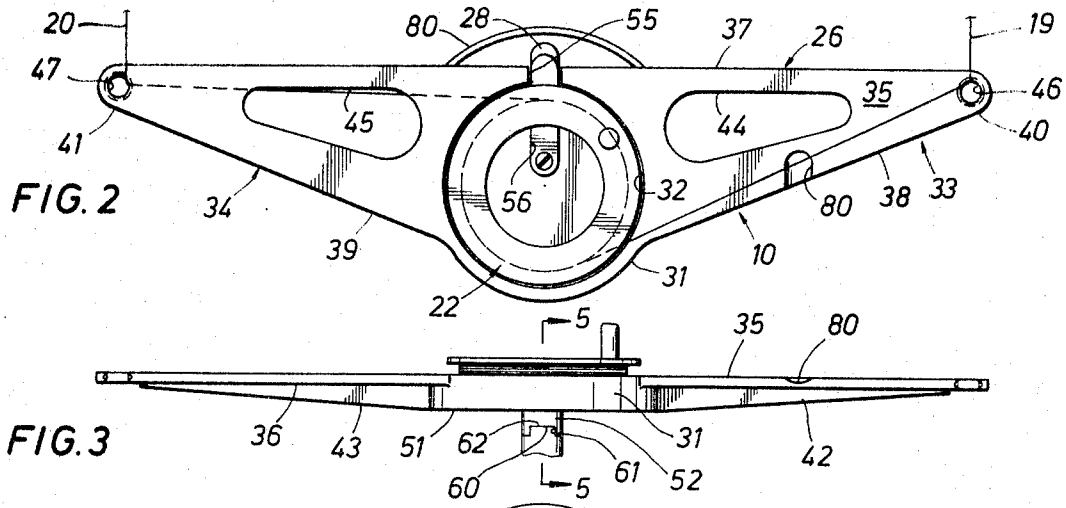


FIG. 2

FIG. 3

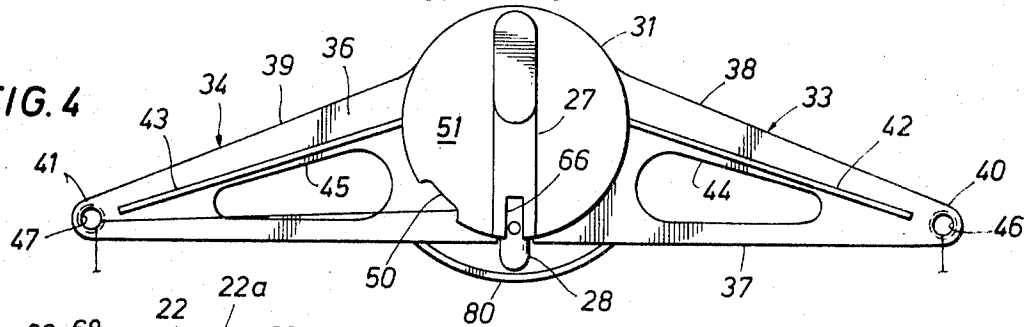


FIG. 4

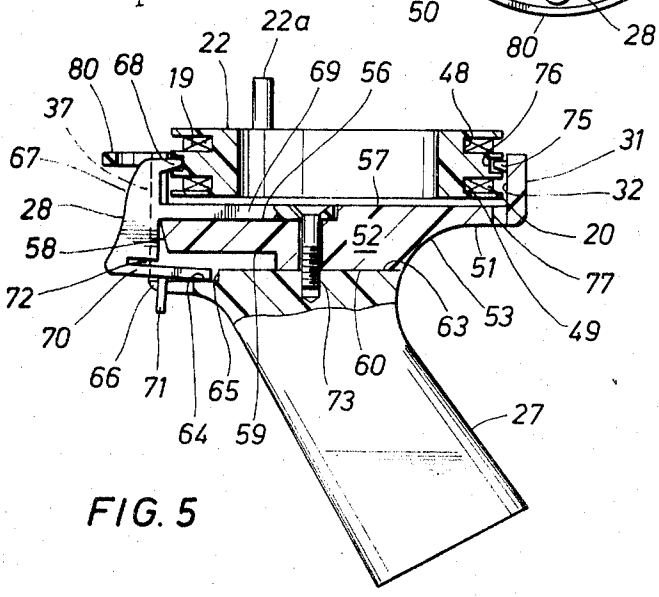


FIG. 5

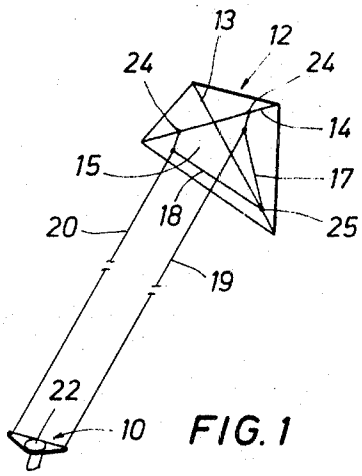


FIG. 1

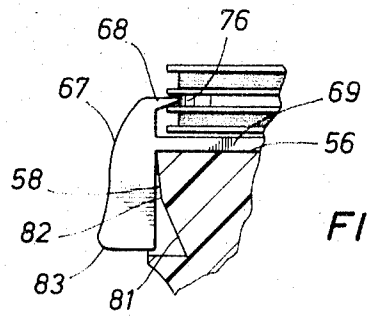


FIG. 6

M. Rex Curtis
INVENTOR

BY FIDLER & BARD

ATTORNEYS

KITE CONTROLLER

This invention relates to a controller for light-weight, airborne devices, such as kites, model airplanes and the like and, more particularly, relates to a hand-manipulatable controller which includes a control reel and twin control lines for flying and maneuvering a kite.

The use of the present invention may best be exemplified by describing its use with a kite of the type having perpendicular cross-frame members for supporting a skin or light-weight paper covering. Typically, the longitudinal frame member of such a kite is disposed at the roll axis, and the transverse frame member is bowed and located somewhat above the pitch axis. The yaw axis is mutually perpendicular to the cross-members. This type of kite and dual or double control line control by means of a reel assembly has heretofore been disclosed in U. S. Pat. No. 3,355,129. In this type of system, the control lines can be simultaneously reeled in and out and for maneuvering, launching or landing of the kite. While the fundamental concepts of dual control line assemblies are illustrated and claimed in U.S. Pat. No. 3,355,129, the present invention is directed to an improved controller.

The present invention is directed to a controller for light-weight airborne devices and includes a common support, a handle, a dual line spool mounted for rotation about a vertical axis on the support, and a trigger brake control for controlling and releasing the spool relative to the support. The spool has upper and lower line receiving grooves and control lines respectively issue from the grooves outwardly through guide portions at opposite ends of the support member for connection to an airborne device. The spool is mounted in a recess in the support and is edge-supported by a projection on the support and the trigger brake control for rotation relative to the support. The edge support arrangement permits the spool to be mounted for rotation without requiring any center support and, therefore, problems due to backlash or snagging of lines with a center support are completely eliminated. The trigger brake control includes a resiliently constructed trigger, and means are provided for extended movement of the trigger to permit release of the spool from the support.

The novel features of the present invention are set forth with particularity in the appended claims. The invention, together with further objects and advantages thereof, may be best understood by way of the following description of exemplary apparatus and methods employing the principles of the invention as illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view of a kite assembly in use and attached to the controller system of the present invention;

FIG. 2 is a top plan view of a preferred form of the control system of the present invention;

FIG. 3 is a front view of the control system of the present invention;

FIG. 4 is a bottom plan view of the control system of the present invention;

FIG. 5 is a view in cross-section taken along line 5—5 of FIG. 2; and

FIG. 6 is an alternative trigger mechanism construction.

Referring now to FIG. 1, a controller is designated at 10 for use in controlling from the ground a conventional from of airborne device, here represented by a kite 12. The kite typically has perpendicular cross-frame members 13 and 14 and opposite ends of the frame members serve to support an outer skin or covering 15. The longitudinal frame member 13 is positioned along and effectively defines the roll axis of the kite, whereas the transverse frame member 14 is bowed or arcuate and is located just above the pitch axis. Again, the yaw axis of the kite extends normally through the point of intersection of cross-members 13 and 14. Generally, the cross-members are suitably made of wood or plastic of limited flexibility, and the covering is composed of light-weight cloth or paper. The form of kite is given more as background for the present invention and is not to be considered as limiting use of the present invention, although the controller 10 is especially effective with this form of kite.

Bridle lines 17 and 18, and control lines 19 and 20 for each respective bridle, couple the kite 12 to a common reel or spool 22 on the controller 10. Referring to the bridle arrangement, it will be seen that the bridle lines 17 and 18 have upper forward ends 24 secured in a spaced-apart relationship to the transverse cross-member 14, the points of connection for the bridle being relatively near to the opposed outer ends of the cross-member 14 and away from the midsection. The bridle lines incline downwardly and inwardly from the ends 24 toward one another and terminate in lower rearward ends 25, which are secured together at the point adjacent to the lower end of the longer cross-member 13. In practice, it will be evident that the ends 25 of the bridle line may be entwined and interconnected to one another as shown for attachment to the cross-member 13, and the pitch may be readily adjusted by varying the point of connection of the ends 25 in relation to the lower or trailing end of the kite. To maneuver the kite, the control lines 19 and 20 extend from opposite sides of the reel 22 for connection to one of the bridle lines 17 and 18, the points of connection at the apex of the bridle lines also establishing the pitch attitude of the kite in flight.

As shown in more detail in FIGS. 2–5, the controller 10 includes a support member or frame 26, a reel 22, a handle 27 and a trigger 28 which are preferably constructed from plastic. The frame 26 is triangularly shaped and has a central body portion 31 with a cylindrically shaped recess 32 to receive the reel 22. A handle in the form of a pistol grip is affixed to the bottom of central portion 31, while the trigger 28 is mounted forwardly of the handle and in contact with the reel 22 for controlling its action. The assembly is basically comprised of four component parts; that is, the frame, the reel, and handle and the trigger.

Frame 26 is an integral one-piece unit constructed preferably of plastic having a high impact characteristic. For example, high density polyethylene, polystyrene or polyvinylchloride are suitable materials. High impact characteristics are desirable to avoid shattering or breaking in the event of mishandling of the controller.

The frame 26 has a central, cylindrically shaped body portion 31 and integrally attached, triangularly formed side extensions 33 and 34. The side extensions 33 and 34 have generally parallel upper and lower flat surfaces 35 and 36 and define a common front side surface 37 and rearward side surfaces 38 and 39 tapering from the central body portion 31 to rounded apexes 40 and 41.

Integral with the bottom surface **36** and body portion **31** are perpendicular, triangularly shaped supporting ribs **42** and **43**. The ribs **42** and **43** are generally aligned parallel to the rearward surfaces **38** and **39** and provide structural support or stiffness for the side extensions **33** and **34**. Ribs **42** and **43** preferably have a thickness which is 0.6 or less than the thickness of extensions **33** and **34**. With dimensions for the ribs larger than 0.6 of the side extensions, it has been found that reflection or imprint impressions are formed in the upper surfaces. Each extension **33** and **34** has an oblong, somewhat triangularly shaped opening **44, 45** which is provided for the purpose of lightening the weight and providing hand grip portions.

In the apexes **40** and **41** of each extension, an opening **46** and **47** is provided which should have a smooth surface to eliminate abrasion of the control lines. It is contemplated that a metal or glass eyelet (shown in dashed line) be incorporated in the molded plastic, as this will provide a smooth surface for a control line.

The reel **22** has upper and lower annular grooves **48** and **49** which respectively receive control lines **19** and **20**. The arrangement is such that upper groove **48** will be disposed above the upper surface **35** of extension **33**, and the lower groove **49** is disposed below the lower surface **36** of extension **34**. Thus, upper line **19** can pass over upper surface of extension and through the eyelet **46**. The central body portion **31** is provided with an elongated opening **50** extending between the bottom surface **51** of central body portion **31** to the lower surface **36** so that the bottom line **20** can pass below the lower surface **36** of extension **34** through the eyelet **47**. The lines are wound with the same hand, i.e., left hand, so that clockwise rotation of the reel **22** simultaneously winds the line while counterclockwise rotation of the reel simultaneously pays out the line. To rotate the reel **22**, it is provided with and upstanding control knob **22***a*.

The central body portion **31** of the support frame **26** has a depending stub portion **52** which has its lengthwise dimension transverse to the forward side surface **37**. The rearward surface **53** of the stub portion is curved to complement a curved portion of the handle **27**. The handle, when attached, is disposed at an acute angle with respect to the central portion **31** so as to extend between a point below the trigger **28** to a point disposed below the rearward end of the central body portion **31**.

The forward end of the stub portion **52** and the central body portion **31** have an access opening **55** (see FIGS. **2** and **5**). Coextensive with the opening **55** in the central portion **31** is a rectangularly shaped recess **56** in the bottom surface **57** of recess **32**. Coextensive with the opening **55** in the forward part of the stub portion **52** below the recess **56** is a rearward and downwardly extending tapered section **58**. Below the tapered section **58** is an elongated recess **59** in the bottom surface **60** of the stub portion **52**. The bottom surface **60** of the stub portion **52** also has a lengthwise extending groove **61** (see FIG. **3**) which receives a mating tongue **62** on the handle **27**. The upper surface **63** of the handle **27** has a forward recessed portion **64** forming a shoulder **65** and a U-shaped slot **66** which extends into said recessed portion. When coupled to the stub portion **52**, the handle **27** and stub portion thus define an upper recess and a lower recess.

The trigger **28**, which is composed of plastic, consists of a forward body portion **67** having an upper, inwardly extending brake tab **68**, an intermediate attachment tab **69** and a lower release tab **70**. The release tab **70** has a perpendicularly arranged release button **71** which extends through the U-shaped slot **66**. The tab **70** is resilient or will flex in a direction transverse to the body portion, and the flexing function is enhanced by means of a slot **72** in the body portion **67**. A screw **73** passes through an opening in the intermediate trigger tab **69** and the stub portion **52** and threadedly connects the handle **27** to the support **26**.

Opposite to the access opening **55** is an inwardly extending projection **75** on the central body portion **31** which is sized to be received in an intermediate, annular braking groove **76** in the reel. A corresponding opening **77** is shown in the body portion **31** below the inwardly extending projection **75**, and this opening is a result of a mold insert which is necessary for forming this internal projection in the recess **32**.

As a further refinement, a small, rigid strap **80** can be included in the frame in front of the trigger guard. The strap **80** is arranged to match with the front side surface **37** and bridges the trigger **28** with sufficient room to permit insertion of the trigger in assembly. The purpose of strap **80** is to avoid any snagging of lines with the trigger.

Before summing up the description and the operation of the controller, there are several points to be made. Reel **22** is constructed from an engineering plastic such as an acetal, polycarbonate or nylon. This is because the reel requires sufficient strength to prevent distortion and thus binding. The fit of reel **22** in recess **32** is preferably such that the reel is free to rotate but not so loose as to oscillate in the recess. This is important since the walls of recess **32** contain the reel and perform the function required by a center post. Trigger **28** is constructed from pure polypropylene or an alloy or co-polymer of polypropylene. This is so that trigger **28** has a "memory," i.e., when displaced from a set position it will, upon release of the force, return to its original set position. The lines **19** and **20** should preferably be mono-filament lines with a 4 to 12 pound test strength.

In assembly, the trigger **28**, support frame **26** and handle **27** (which may be hollow) are assembled with a screw **73** as shown in FIG. **5**. Next, the reel **22** is inserted with the intermediate groove **76** in registry with tab **75**. Button **71** is pushed upwardly while an inwardly directed force is applied to the bottom portion of the trigger body **67**. This action permits the trigger tab **70** to clear shoulder **65** and enter recess **59**, thereby moving the upper trigger tab **68** out of the recess **32** so that the reel can be inserted into the recess. Upon insertion of reel **22**, the pressure on the trigger is relieved and the trigger tab **68** will come into registry with the intermediate groove **76** on the reel. At the same time, the lower trigger tab **70** is displaced to recess **64**. Trigger tab **68** and the housing tab **75** frictionally engage the groove **76** of the reel **22** and normally inhibit rotation of the reel. By selectively applying pressure to the trigger, the amount of friction drag can be controlled. Thus, with an airborne device, the control lines can be payed out under control of the pressure on the trigger.

One of the particular advantages of the present invention is the lack of a center support for reel **22**. Thus, if line **20** should for some reason slip off the lower

groove 49, it will pass between the lower face of the reel and the upper face 57 of the recess 32, and the only effect is to lengthen the distance of line 60 to a kite by one circumference value. This may be readily compensated for by hand releasing a wrap of the upper line 19. To facilitate this operation, an elongated, dish-shaped groove 80 is provided in the upper surface 35 of the frame, and a finger can be used to manipulate the line 19.

In FIG. 6, another trigger embodiment is disclosed. In this embodiment, the trigger operates to control the friction on the reel and, thus, its rotation as heretofore described. However, below the inclined surface 58 is a second surface 81 which is inclined at a sharper angle. The intersection point 82 of surfaces 58 and 81 serves as a fulcrum point so that pressure at the tip 83 of the trigger displaces tab 68 from the groove 76. This is possible because the plastic of tab 69 will permit the tab 69 to stretch sufficiently to permit disengagement.

While particular embodiments of the present invention have been shown and described, it is apparent that changes and modifications may be made without departing from this invention in its broader aspects; and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

What is claimed is

1. A controller for dual lines comprising a frame member having means for guiding control lines, a reel disposed in said frame member, means mounting said reel about its periphery for rotation about its vertical axis, said reel having spaced-apart line grooves, and means for selectively applying a braking force to the periphery of said reel intermediate of said line grooves.

2. The apparatus of claim 1 wherein said mounting means includes a peripheral tongue and groove interconnection.

3. A controller for airborne devices comprising support means having a central body portion and spaced apart line guide means, said central body portion having a cylindrical recess and having a transverse access opening, trigger means received in said access opening, handle means depending from said central body portion, spool means for control lines received in said recess, first peripherally disposed mounting means on said support means, second peripherally disposed mounting means on said spool means and in cooperative engagement with said first mounting means, said first and second mounting means being disposed intermediate of said control lines for mounting said spool means for rotation about its vertical axis, and means on said trigger for frictionally engaging said spool means intermediate of said control lines, said trigger means being selectively movable to vary the frictional force on said spool means.

4. The apparatus of claim 3 wherein said support means, said trigger means and said handle means have coextensively arranged portions and a single fastener means interconnects said support means, said trigger means and said handle means.

5. The apparatus of claim 4 wherein said trigger means is pivotally mounted on said support means and includes said frictionally engaging means located above the pivot location of said trigger means and selectively operable latch means below the pivot location for normally preventing disengagement of said frictionally engaging means from said spool, said latch means being received in a recessed portion of said support means, and means for disabling said latch means for permitting disengagement of said frictionally engaging means from said spool.

6. The apparatus of claim 4 wherein said trigger means is pivotally mounted on said support means and includes said frictionally engaging means located above the pivot location of said trigger means, said support means having a recessed portion below the pivot point and a second pivot location located in said recessed portion whereby said frictionally engaging means is disengageable from said spool when said trigger means is pivoted about said second pivot location.

7. A controller for airborne devices comprising a main support having handle means and spaced-apart line guide means, a spool on said support, said spool having spaced apart grooves, a control line wound in each groove on said spool, said control lines respectively extending from said spool and passing through said guide means, support means disposed intermediate of said grooves for peripherally supporting said spool for rotation about its central axis without a center support, said support means including interrelated tongue and groove means where one of said tongue and groove means extends about the periphery of said spool, and the other of said tongue and groove means includes means for selectively applying a friction force to said spool.

8. The controller of claim 7 wherein said spool has an annular groove means and at least two tongue means interengage with said annular groove means, one of said tongue means being resiliently biased into frictional engagement with said annular groove means.

9. A controller for airborne devices comprising support means having a central body portion and spaced apart line guide means, said central body portion having a cylindrical recess and having a transverse access opening, trigger means received in said access opening, handle means depending from said central body portion, spool means for control lines received in said recess for rotation about its vertical axis, and means on said trigger and said support means having coextensively arranged portions for frictionally engaging said spool, said trigger means being selectively movable to vary the frictional force on said spool, and single fastener means interconnecting said support means, said trigger means and said handle means.

10. A controller for airborne devices comprising support means having a central body portion and spaced apart line guide means, said central body portion having a cylindrical recess and having a transverse access opening, said support means further including thin wall extensions extending transversely from said central body portion to said line guide means, said central body portion being extended below said wall extensions, trigger means received in said access opening, handle means depending from said central body portion, spool means for control lines received in said recess for rotation about its vertical axis, a control line on said spool means disposed above said recess and a control line on said spool means disposed within said recess, said body portion having an opening to said recess thereby permitting the control line within said recess to be disposed below said extensions, and means on said trigger and said support means for frictionally engaging said spool, said trigger means frictionally engaging said spool intermediate of said control lines and being selec-

tively movable to vary the frictional force on said spool.

11. The apparatus of claim **10** wherein said spool means has upper and lower control line grooves and an intermediate groove, a tab member in said recess opposite said trigger means in registry with said intermediate groove and a tab member on said trigger means in registry with said intermediate groove.

12. The apparatus of claim **10** wherein said extensions are triangularly shaped and said line guide means are openings in said extensions.

13. In a control assembly for airborne devices a reel comprising a main support having a handle portion, a cylindrically configured spool received for rotation about a vertical axis in a cylindrical recess in said support, said cylindrical recess having a flat bottom surface, said vertical axis being located forwardly of said handle, said spool being provided with upper and lower control line-receiving grooves thereon, a guide member positioned on said main support forwardly of said spool including oppositely directed, laterally extending arms, a guide portion at the outer terminal end of each arm, a pair of control lines respectively extending in opposite directions from each of the grooves and each control line passing through one of said guide portions for connection to the airborne device, and means on said support for mounting said spool only about its outer periphery for rotation about its vertical axis relative to said support, said mounting means being disposed intermediate of said control line grooves and extending between said spool and the wall of said cylindrical recess whereby a loop of a control line may be added or subtracted from a spool in a stationary position without incurring entanglement in said reel.

14. A controller for airborne devices comprising a main support having handle means and spaced-apart line guide means, a horizontally disposed spool in a cylindrical recess in said support said cylindrical recess having a flat bottom surface, said spool having upper and lower line carrying grooves containing upper and lower control lines which respectively extend through said guide means, and means disposed in a horizontal plane intermediate of said upper and lower line carrying grooves for supporting the outer periphery of said spool for rotation about its central axis without necessity of a center support thereby providing unrestricted upper and lower surfaces on said spool and permitting unlooping of a control line without entanglement.

* * * * *