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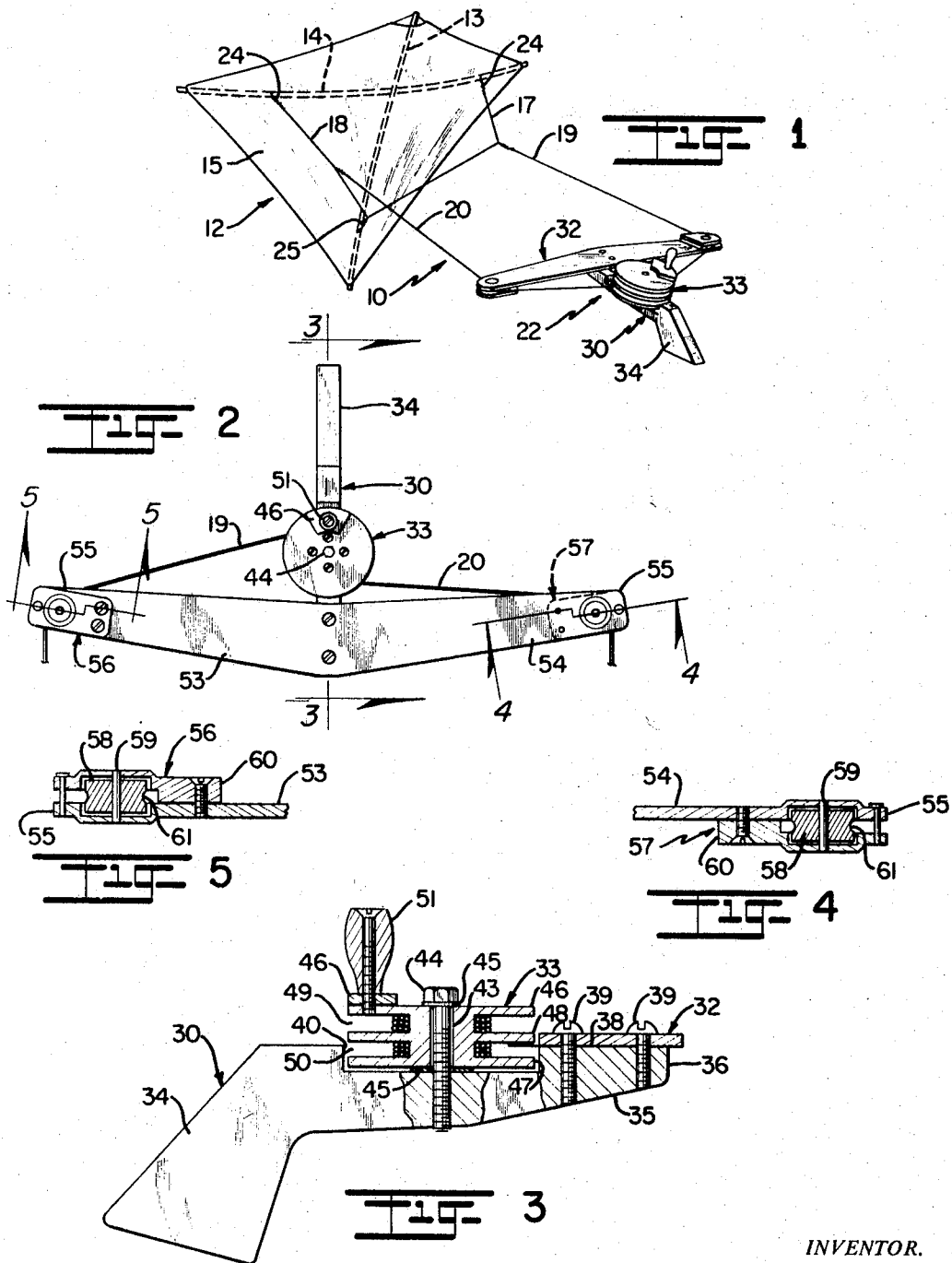
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KITE CONTROL ASSEMBLY

Filed July 13, 1966

2 Sheets-Sheet 1



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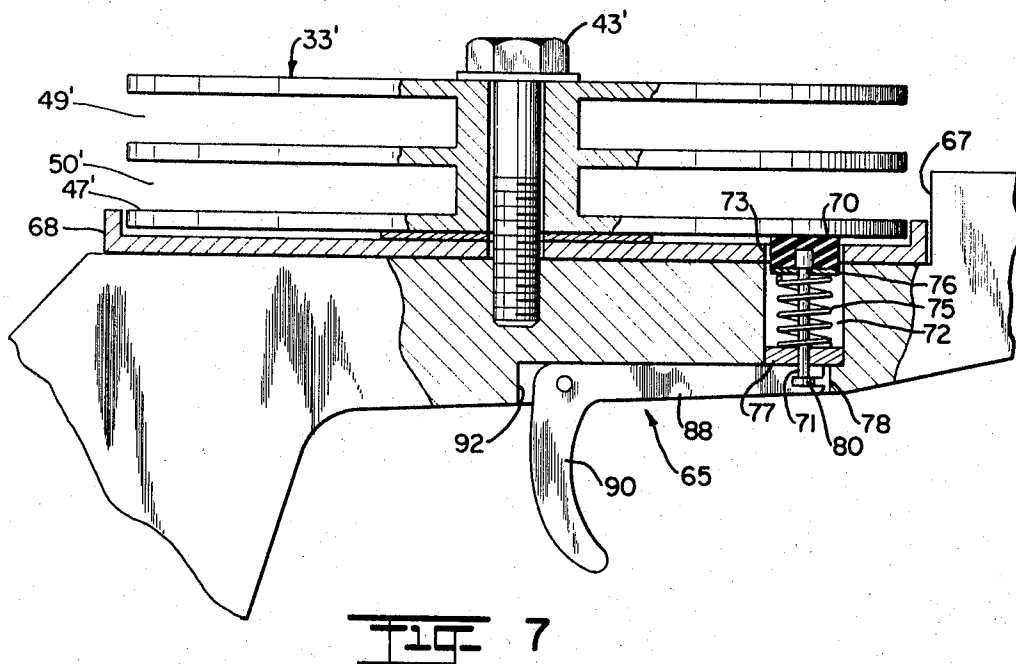
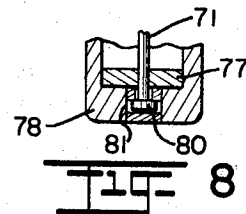
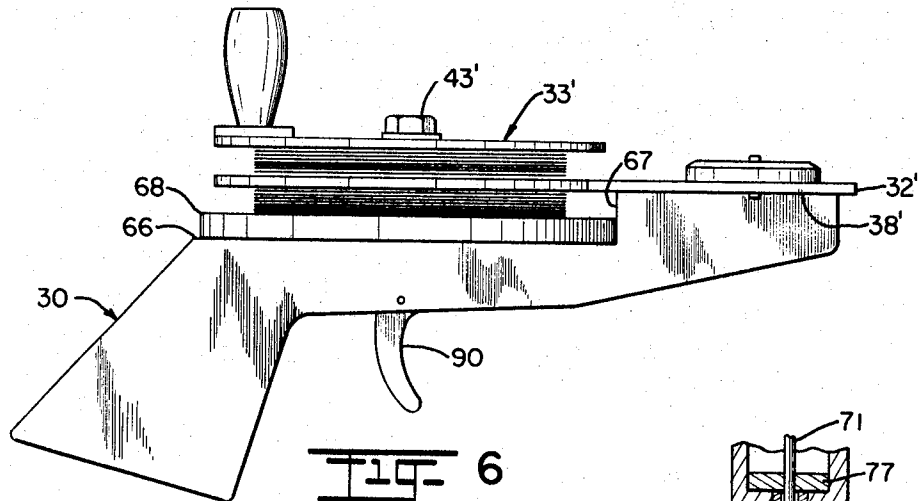
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KITE CONTROL ASSEMBLY

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2 Sheets-Sheet 2



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**KITE CONTROL ASSEMBLY**  
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## ABSTRACT OF THE DISCLOSURE

A kite reel and bridle assembly consists in the combination of a handle support portion for a spool which is mounted for rotation on a vertical axis on the support together with a laterally extending guide member mounted forwardly of the spool and having spaced apart guide portions aligned with upper and lower grooves in the spool, the grooves each having a control line directed outwardly through one of the respective guide portions for connection to the kite. A brake control is contained within the support beneath the spool to afford a positive means of control over the control lines at all times.

This is a continuation-in-part of application Ser. No. 514,965, filed Dec. 20, 1965, now abandoned.

This invention relates to a novel and improved control assembly for lightweight airborne devices, such as, kites, model airplanes and the like, and more particularly relates to a control reel and twin bridle assembly for flying and maneuvering a kite where the assembly is characterized by affording improved maneuvering capabilities, especially in controlling the kite about its roll axis.

The present invention is best exemplified by describing its use with a kite of the type having mutually perpendicular cross frame members for supporting a skin, such as, a lightweight paper covering. Typically, one longitudinal frame member is disposed at the roll axis, a transverse frame member is bowed and located somewhat above the pitch axis, and the yaw axis is mutually perpendicular to the cross members. Broadly it is known to utilize a reel assembly having double control lines connected at spaced points on a kite of the character described and where the control lines can be individually or simultaneously reeled in and out for maneuvering, launching or landing of the kite. However, the present invention is directed to an improved, simplified form of twin bridle attachment for adjusting the pitch as well as for controlling turning, lateral motion or side slipping of the kite.

Accordingly, it is an object of the present invention to provide for a novel and improved control assembly in the form of a reel having double control lines and a twin bridle arrangement which together afford a simple yet effective means of control for lightweight airborne devices, such as, for instance, kites or model airplanes in flight.

It is another object of the present invention to provide a twin bridle attachment which in combination with a double control line enables close control in steering and maneuvering an airborne device especially in a lateral direction.

It is a further object of the present invention to provide a reel with widely spaced double control lines in which the reel has an improved spool and guide frame to prevent binding or tangling of the lines and to effect closer control in flying the kite; and further wherein the lines may be individually or simultaneously reeled in or payed out for the purpose of maneuvering as well as launching or landing a kite or other airborne device.

It is a further object of the present invention to provide a novel and improved braking device adapted to be incorporated in a reel of the character described which

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will facilitate braking and close sensitive control over the reel lines in a simplified, dependable manner.

It is still a further object of the present invention to provide a kite reel and bridle assembly for controlling a kite of the type having mutually perpendicular cross members and a lightweight skin or covering and wherein the control assembly is of simplified construction, economical to manufacture, assemble and install while requiring a minimum number of parts and affording greater stability and ease of control in use.

In accordance with the present invention there has been devised a control assembly for lightweight airborne devices, primarily kites, and the assembly being broadly characterized by having a reel providing a common support for a spool, which is mounted for rotation on a vertical axis on the support, together with a laterally extending guide member having spaced apart guide portions aligned with upper and lower grooves on the spool, and the grooves each having a control line directed outwardly through one of the guide portions for connection to the airborne device. In a modified form of reel in accordance with the present invention a brake control is contained within the support for selective engagement with the spool to afford an automatic, positive means of control over the control lines at all times. Most desirably, the airborne device takes the form of a kite having mutually perpendicular longitudinal and transverse cross frame members; and a twin bridle serves as a means of connection between the control lines and the kite to more effectively control maneuvering of the kite, particularly about its roll axis.

The above the other objects, advantages and features of the present invention will become more readily appreciated and understood from a consideration of the following detailed description of a preferred form of the present invention when taken together with the accompanying drawings, in which:

FIGURE 1 is a somewhat perspective view of a preferred form of kite assembly in use and in attached relation to a kite.

FIGURE 2 is a top plan view of a preferred form of reel.

FIGURE 3 is a sectional view taken on lines 3—3 of FIGURE 2.

FIGURE 4 is a section view taken about line 4—4 of FIGURE 2; and

FIGURE 5 is a section view taken on line 5—5 of FIGURE 2.

FIGURE 6 is an enlarged elevational view of a modified form of a reel.

FIGURE 7 is a view in more detail, partially in section, of the modified form of reel shown in FIGURE 6; and

FIGURE 8 is a fragmentary view and section of a portion of the brake control mechanism in the modified form.

Referring in more detail to the drawings, there is shown by way of illustrative example in FIGURE 1 a control assembly designated at 10 for use in controlling from the ground a conventional form of airborne device here represented by a kite 12. In accordance with usual practice, the kite has mutually 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 the 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 a lightweight cloth or paper. Here, the form of kite described is

given more as a setting for the present invention and is not to be considered as limiting use of the present invention to this specific form of kite, although the control assembly 10 is especially effective with this form of kite.

In accordance with the present invention, the control assembly 10 is broadly comprised of bridle lines 17 and 18, control lines 19 and 20 for each respective bridle, and a common reel 22 for the control lines 19 and 20. Specifically referring to the twin bridle arrangement, it will be seen that the bridle lines 17 and 18 have upper or forward ends 24 secured in spaced apart relation to the transverse cross member 14, the points of connection for the bridle being relatively near 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 or rearward ends 25 which are secured together at a 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 or 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. Of course sufficient slack or excess length is provided in each of the bridle lines so that they can be drawn outwardly and away from the covering for attachment of the control lines 19 and 20 in spaced relation to the kite surface. In this relation, it will be further apparent that the twin bridle lines are conformable for use in the same manner with other lightweight airborne devices, for example, a model airplane with the ends 24 connected in spaced-apart relation to opposite wing sections and the ends 25 being secured at a common point to the fuselage relatively near the tail section.

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. In turn, and as shown in more detail in FIGURES 2-4, the reel consists essentially of a common support member 30 for an upper cross bar or guide member 32 and a spool 33, and the support member 30 includes a rearwardly inclined, handle portion 34 located directly behind the spool 33. Preferably, the support 30 and handle 34 are integrally formed from a single narrow elongated piece of stock with the undersurface 35 of the support converging forwardly from the handle and terminating in a forward flat end surface 36; also the support has a flat upper surface portion 38 for attachment of the cross bar 32 by means of suitable screws 39, and an upwardly facing, open slot 40 is located behind the surface portion 38 for insertion and mounting of the spool 33.

In general, the spool 33 effectively serves to control simultaneous reeling in or paying out of the double control lines 19 and 20 and is exposed in such a way that the upper control line 19 can be independently wound or unwound upon the spool to vary the relative length between the lines. Further, the relationship between the spool 33 and guide 32 is such that the lines are directed outwardly in widely spaced relation at opposite lateral extremities of the guide member to afford least resistance to outward release of the control lines and to effect closer control in maneuvering the kite. For this purpose, the spool 33 is of generally circular configuration and is provided with a central bore 43 for insertion of a bolt 44 or other suitable shaft extending downwardly through the bore and through the thickness of the support member 30; also washers 45 are positioned at opposite ends of the spool between the head of the bolt and the surface of the support member 30 to permit freedom of rotation of the spool on the bolt. Preferably the spool body is formed with top and bottom flanges 46 and 47 respectively, together with an intermediate flange 48 spaced there be-

tween to define upper and lower grooves 49 and 50 for the control lines 19 and 20, respectively. Most desirably, the lower groove 50 is beneath the upper surface 38 of the support 30 whereas the upper groove is completely exposed so as to permit winding or unwinding of the upper control line 19 independently of the lower line 20. A control knob 51 is positioned on the upper flange 46 for manually rotating the spool. Moreover, as best seen from FIGURE 2, the control lines extend in opposite lateral directions from the spool and are wound in opposite directions within each respective groove so that they will be simultaneously wound or unwound on the spool in response to rotation in either direction.

The cross bar or guide member 32 is preferably in the form of a relatively thin flat section defining oppositely directed, rearwardly swept arms 53 and 54 extending laterally from the common support member 30. Specifically, the arm sections 53 and 54 terminate in outer ends 55, one end having a lower guide portion 56 and the other end having an upper guide portion 57. Here the wing sections are swept rearwardly such that the ends 55 are aligned to be laterally opposite the spool member 33 and with the guide portions 56 and 57 each aligned in a common plane with one of the grooves 49 or 50 on the spool. Thus the guide portion 56 on the underside of the arm 53 is aligned with the lower groove 50 and the guide portion 57 on the upper surface of the arm 54 is aligned with the upper groove 49. As shown in FIGURES 4 and 5, each of the respective guide portions 56 and 57 consists of a guide roller 58 journaled on a pin 59 in the space formed between an end surface 55 and an outer enclosure 60, and the guide roller being provided with a peripheral groove 61 for the control line. By virtue of the relation between the guide member 32 and spool 33, the control lines 19 and 20 are accordingly aligned for lateral extension through the portions then forwardly for connection to the bridle lines. In this manner, the control lines will extend through the guide section without binding and can be more easily reeled in or out on the spool.

In use, the control lines are passed through the respective guide portions and the end of each line is attached to one of the bridle lines 17 or 18, again the point of attachment to a bridle line being in accordance with the desired pitch or attitude of the kite. Initially, the spool should be free to rotate so that the control lines will be simultaneously paid out from the spool as the kite is carried into the air. At the desired altitude the spool handle or knob 51 may be grasped, or a suitable stop or brake may be attached to selectively hold the reel in position to prevent further release or unwinding of the control lines 19 and 20. Since the kite is in a plane generally normal to that of the guide member 32, turning of the guide member in its own plane, that is, about a generally vertical axis, will cause some limited movement of the kite about its roll axis which in turn will induce side slipping or lateral motion of the kite. Furthermore, through the twin bridle connection, more extreme turning or lateral motion of the kite essentially about its yaw axis can be accomplished by varying the relative lengths of the control lines. In this connection, since the spool is exposed at the top of the reel the relative lengths of the control lines can be varied either for the purpose of maneuvering or to obtain neutral adjustment simply by grasping the upper control line 19 in the section between the spool and guide portion and individually wrapping or unwrapping the control line about the spool without becoming entangled with the lower control line. Similarly, if one control line is either too long or too short this can be compensated for by winding or unwinding the upper control line. Of course, reeling in is accomplished by rotating the entire spool in the direction of winding of the control lines.

In the modified form of invention shown in FIGURES 6 to 8, a reel of the same basic combination and arrangement of elements as shown in FIGURES 1 to 5 is further provided with a brake control mechanism 65. Accordingly, like parts are correspondingly enumerated, and the reel again is formed with a common support member 35 for guide 32' and a spool 33'. The support 30' is again defined by a narrow elongated stock but is modified to include a level, spool-supporting surface portion 66 terminating in a shoulder 67 rearwardly of the upper guide-supporting surface 38'. In place of the open slot 40 shown in the preferred form, a generally cup-shaped stationary retainer 68 defines an upwardly facing, annular recess to receive the lower flange portion 47' of the spool. As before, the spool is mounted for rotation on a suitable shaft, or screw 43' with upper and lower grooves 49' and 50' on the spool for retention of the control lines 19' and 20'.

The brake control mechanism 65 is contained within the body of the support member 30' directly beneath the spool 33' for the purpose of frictionally engaging the bottom surface of the spool either to retard or to completely brake its rotation. Specifically, the brake mechanism is comprised of a brake member in the form of a circular pad 70 suitably composed of a rubber or rubber-like material with a high coefficient of friction at the upper extremity of a vertical stem 70, the stem being supported for movement through a vertical bore 72 in the support member and through an opening 73 in the retainer 68. The brake element 70 is biased to engage the lower flange portion of the spool under the urging of a coiled compression spring 75 disposed in surrounding relation to the stem between a backing plate 76 on one side of the brake and a disc 77 abutting an internal shoulder 78 at the lower end of the bore 72. The lower terminal end 80 of the stem member is retained in a slot 81 at the forward end of a pivotal arm member 88, the latter forming part of a trigger 90 projecting downwardly from pivotal connection within a recess 92 in the undersurface of the support member.

Normally, the brake member 70 will frictionally engage the spool member to prevent its rotation under tension of the spring 75. The trigger is located directly in front of the handle 34' so that when the handle is grasped, the trigger can be readily depressed by the finger to partially or completely release the brake from engagement with the spool in order to permit winding or unwinding of the control lines. The location of the trigger and braking mechanism enables close sensitive control either to impose a drag or to rapidly release the spool for rotation when so desired. When the trigger is released, the brake will automatically engage the spool to prevent accidental rotation of the spool, and for example when the reel is not in use will lock the spool against rotation and prevent entangling or snarling of the control lines.

From the foregoing, it will be appreciated that an improved form of control assembly has been devised especially for use in controlling kites of the type described, but again can be utilized as well with other airborne devices. The reel assembly in either form of invention permits convenient grasping, maneuvering and control of the kite with one hand and in a simplified manner permits reeling in and paying out of the control lines with minimum resistance; moreover, the relative lengths of the control lines are easily controlled simply by varying the length of the upper control line. Furthermore, the twin bridle affords close control especially about the roll axis while permitting some pitch adjustment according to wind resistance through the points of connection of the bridle and control lines. At the same time, the widely spaced relation between the guide portions as well as their disposition in aligned relation with the spool grooves provides for closer means of control of the kite in maneuvering with least resistance or binding of the control lines in passing through the guide portions.

While a preferred embodiment of invention has been

set forth and described herein it is to be understood that various modifications and changes may be made therein. For example, the cross frame members and reel may be moulded or otherwise constructed of various different materials; also, different suitable means of connection or attachment between the components of the reel may be employed. Accordingly, the above and other such modifications may be resorted to without departing from the spirit and scope of the present invention.

What is claimed is:

1. A control assembly for airborne devices comprising a reel including a main support having a handle portion, a spool mounted for rotation about a vertical axis on said support 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 including oppositely directed, laterally extending arms, a guide portion at the outer terminal end of each arm being aligned in a plane common to one of the control line-receiving grooves on said spool, and a pair of control lines extending in opposite directions from the grooves and passing through an aligned guide portion for connection in spaced relation to the airborne device.

2. A control assembly according to claim 1, further including a twin bridle defined by a pair of bridle lines, said bridle lines having ends connected in spaced apart relation forwardly of the airborne device and converging rearwardly for connection at a common point rearwardly of the airborne device, and one of said control lines being connected to a bridle line.

3. A control assembly according to claim 1, said guide member being positioned on said support forwardly of said spool and said arms trailing rearwardly and terminating in lateral spaced relation to said spool.

4. A control assembly according to claim 1, said spool being positioned in an open slot on the upper surface of said support with the upper control line-receiving groove being exposed to permit winding and unwinding of the upper control line independently of the lower control line.

5. A control assembly according to claim 4, said guide member being positioned forwardly of said spool for lateral extension of said arms in a plane intermediately between the upper and lower grooves, one of said guide portions being positioned on the upper surface of one of said arms in a plane common to the upper groove and the other of said guide portions being disposed on the lower surface of the other of said arms in a plane common to the lower groove, and said handle portion inclining downwardly and rearwardly behind said spool.

6. In a control assembly for airborne devices a reel comprising a main support having a handle portion, a spool mounted for rotation about a vertical axis on said support forwardly of said handle, said spool being provided with at least one control line-receiving groove 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, and a pair of control lines extending in opposite directions from the groove and each control line passing through one of said guide portions for connection to the airborne device.

7. In a control assembly for airborne devices according to claim 6, said reel further including a brake control mechanism mounted on said support beneath said spool, said brake control mechanism including a brake member, bias means normally urging said brake member into frictional engagement with said spool to prevent its rotation, and release means associated with said biasing means for selectively releasing said brake member from engagement with said spool.

8. In a control assembly for airborne devices according to claim 6, further including a brake control mechanism comprising a brake member slidable in a vertical bore beneath said spool in offset relation to the spool axis, a

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spring member in the bore normally urging said brake member in a direction to engage said spool, and a pivotal support arm including a trigger operatively connected to said brake member whereupon manually depressing said trigger said support arm will overcome the biasing of said spring to release said brake member from engagement with said spool.

9. In a control assembly for airborne devices according to claim 6, said support having a generally cup-shaped retainer providing an annular recess for disposition of said spool therein, and a braking device including a brake member movable through an opening in said retainer for releasable engagement with said spool.

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