

(12) **UK Patent Application** (19) **GB** (11) **2470603** (13) **A**

(43) Date of A Publication

**01.12.2010**

(21) Application No: **0909273.5**  
(22) Date of Filing: **29.05.2009**

(51) INT CL:  
**B64C 3/56** (2006.01) **B64C 3/26** (2006.01)  
**B64C 31/032** (2006.01)

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(56) Documents Cited:  
**FR 002897837 A1** **FR 002806351 A1**  
**FR 002723718 A1** **US 4116407 A**

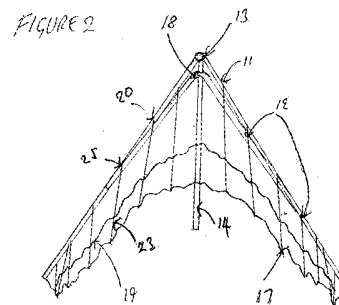
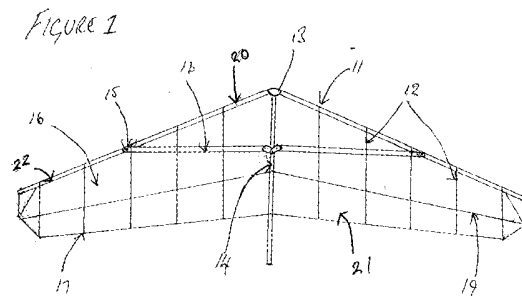
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(58) Field of Search:  
INT CL **B64C**  
Other: **WPI, EPODOC**

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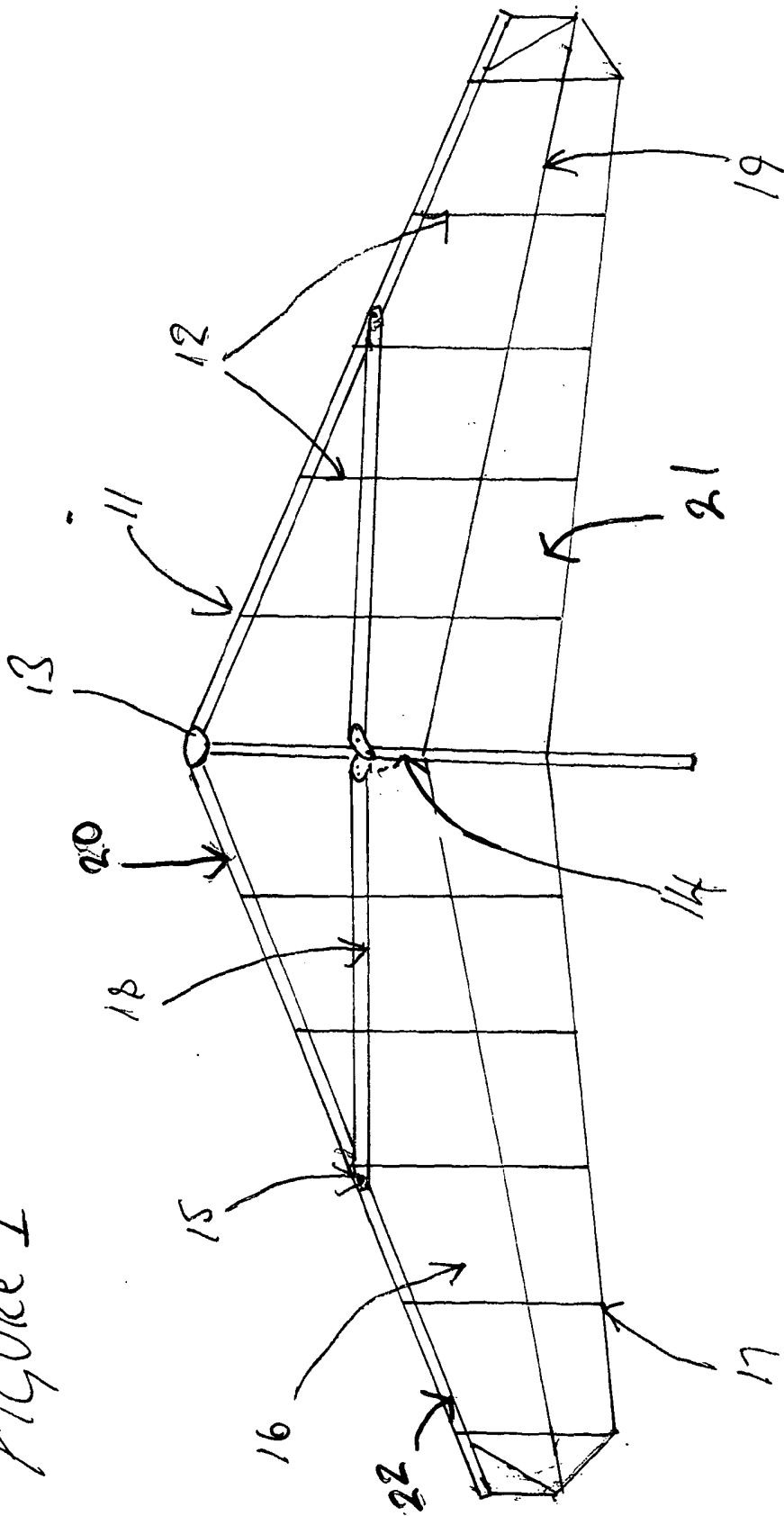
(54) Title of the Invention: **A quick rigging system for flexwing aircraft**  
Abstract Title: **Batten or rib arrangement for folding wing**

(57) A flexwing 11, for a microlight or hang-glider, comprises a frame 13 and a sail 21 that together form a wing structure. The frame 13 is made up of two leading edge tubes 22, two cross-tubes 18 and a keel tube. These tubes are pivotally connected such that they can fold parallel to the keel tube. The sail material is fitted around the frame and is held in an aerofoil shape by means of a plurality of battens or ribs 12. The battens are slidably attached to the leading edge tubes such that when the wing is folded the battens can remain parallel to the keel tube.



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FIGURE 1



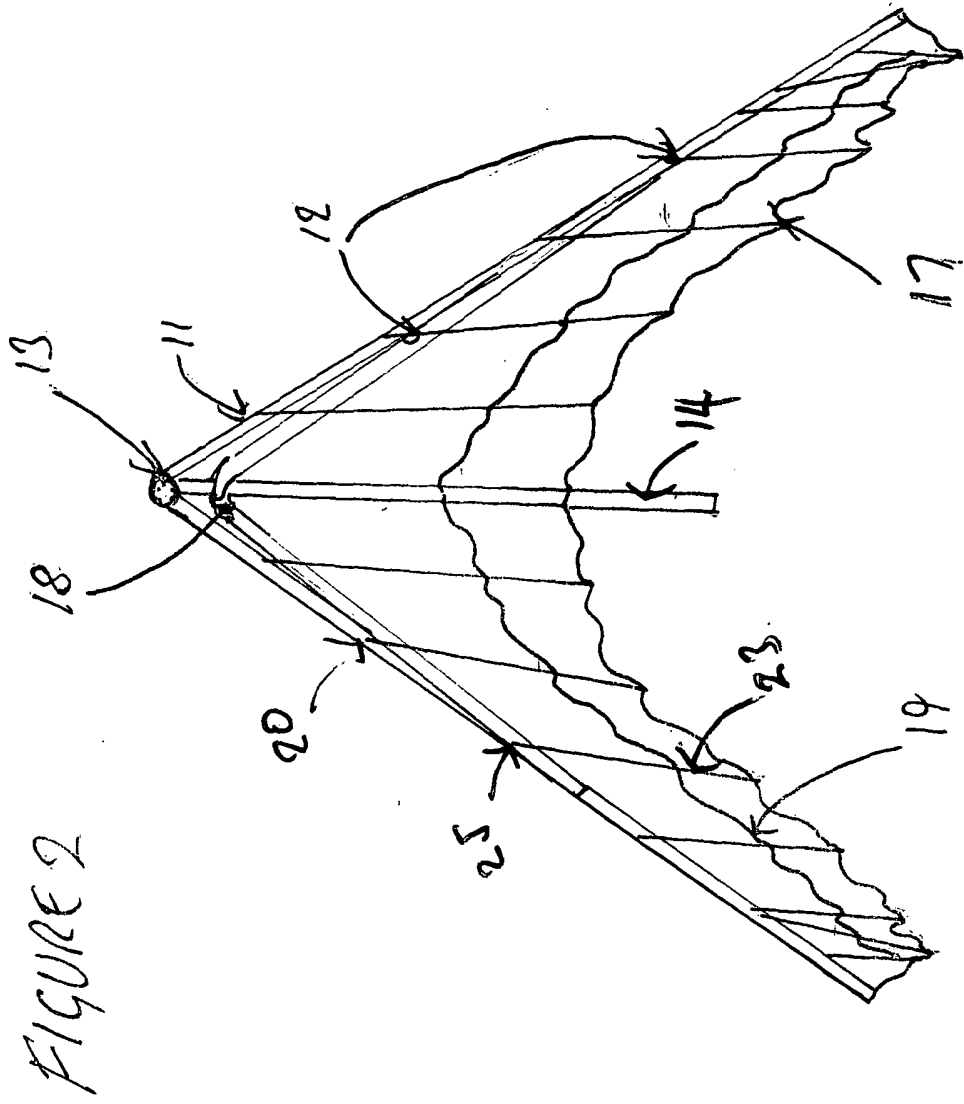


FIGURE 3

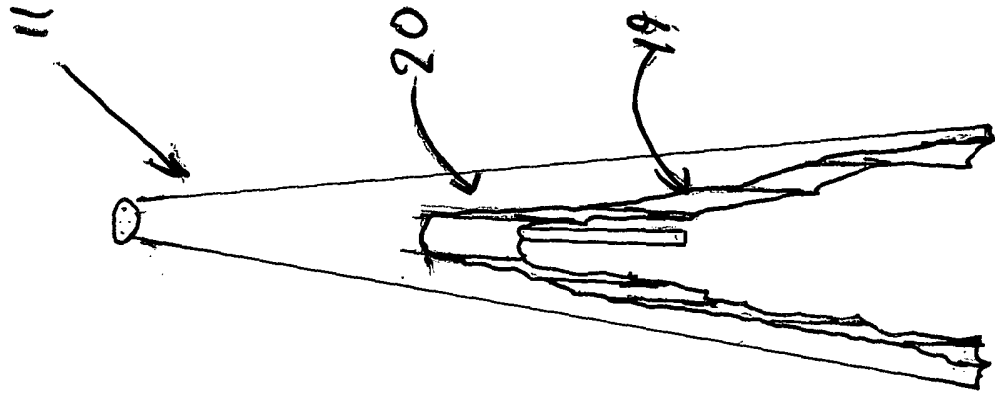


FIGURE 4

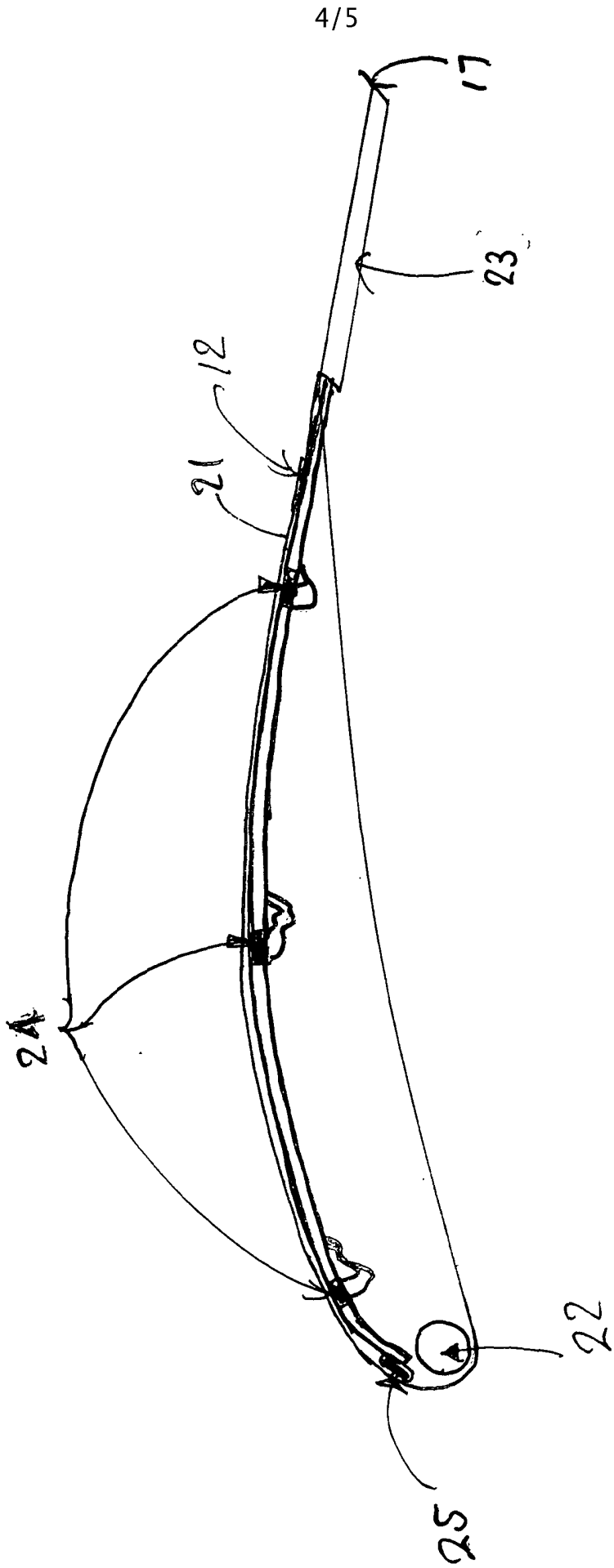
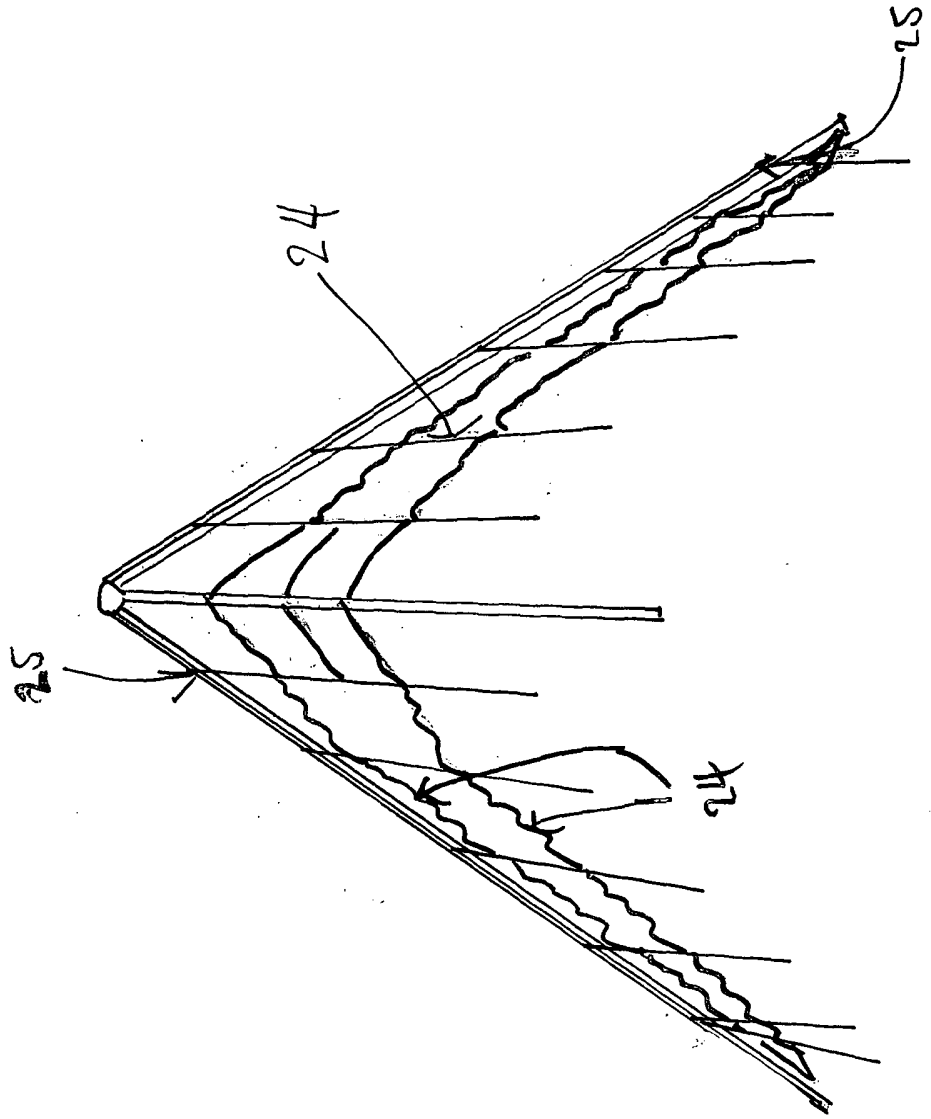


FIGURE 5



# A quick rigging system for flexwing aircraft

This invention relates to a quick rigging system for flexwing type hang gliders or microlight wings.

Flexwing microlights and hang gliders are very popular, but have several disadvantages. Perhaps the biggest disadvantage is the time it takes to (5)assemble or rig the wing. All the battens must be placed in their individual pockets. This task can take many minutes and limits the appeal of flexwing aircraft. Many people decide against purchasing these flexwings because of the assembly time. These battens are placed into the wing in batten pockets which are sewn into the fabric of the sailcloth. It is (10)not possible to fold the wing unless these battens are first removed. Flexwings or hang gliders are derived from rogallo wings but have since developed. Floating cross tube, multi battens and double surface are fairly standard improvements on the original design.

It is the purpose of this invention to allow these ribs or battens to slide (15)and hinge along the leading edge so that they may run generally parallel with the leading edge in order to allow easier folding of the flexwing microlight or hang glider. It is because the battens or ribs are fixed to the sail in a generally parallel pattern that the flexwing is unable to fold in.

(20)It is a purpose of this invention to release the ribs or battens from the confines of the batten pockets allowing them to lie generally parallel with the leading edge of the wing.

The battens are allowed to lie generally parallel by being attached to a track by means of sliders allowing the leading edge of the batten to slide (25)up and down to facilitate rigging and de-rigging.

From one aspect the invention consists of an internal batten bridle system that ensures the correct positioning in its fully rigged state.

From another aspect the invention consists of a rail or guide along the leading edge, which ensure the correct positioning of the battens or ribs (30)during flight.

From a further aspect the invention consists of a sliding mechanism that allows the battens or ribs to rotate generally parallel with the leading edge and slide up while still being fixed at the trailing edge of the wing.

From a still further aspect the invention allows the ribs or battens to move (35)from their in flight position to a position which allows the wing to fold in.

From a still further aspect the invention allows the battens or ribs to be

released from their flight position and allow the leading edge of the battens to move towards the centre or nose of the wing along the leading edge of the wing.

From a still further aspect the invention consists of a linkage of ropes and (5) pulleys enabling remote operation of the movement of the ribs or battens.

From a still further aspect the invention may allow the operator of the wing the possibility of opening and closing the wing while remaining in the normal operating position of the aircraft.

(10) From a still further aspect the invention consists of a bridle system ensuring the correct position of the ribs or battens when the wing is in a flight ready state.

The invention may be performed in various ways and a specific embodiment will now be described, by way of examples, with reference (15) to the accompanying drawings, in which:

Figure 1 is a diagrammatic cross section plan view of the flexwing or hang glider in a flight ready state.

Figure 2 is a diagrammatic cross section plan view of the flexwing or hang glider in a part folded state showing the movement of the various (20) components.

Figure 3 is a diagrammatic plan view of the flexwing or hang glider in a near fully folded state.

Figure 4 is a diagrammatic cross section side view of the flexwing showing the bridle system and leading edge batten track

(25) Figure 5 is a diagrammatic plan view of the flexwing in a partially closed state showing a bridle and track system without the main sail.

Best seen in Figure 1, the flexwing 11 consists of an airframe 13 and a sail 21 which together forms an integral structure capable of flight.

Best seen in Figure 1, the two leading edge tubes 22 are spread apart by (30) the cross tubes 18 and the sail 21 holds the airframe in its fully open state.

As can be best seen in Figure 4, the flexwing 11 is held in an aerofoil shape by means of battens or ribs 12.

As can be best seen in Figure 4 and the battens or ribs 12 are only (35) partially sewn into the main sail 21 by means of batten pockets 23.

Best shown in Figure 2 the battens 12 allow the flexwing to fold because they are free to slide up the leading edge 20 and remain generally parallel with the keel tube 14.

Best shown in figure 2 the leading edge of the battens 12 may be remotely (40) moved up and down the leading edge line 20 in order to allow the flexwing or hang glider 11 to be rigged and de-rigged with the battens 12



remaining connected to the flexwing 11.

As can be best seen in Figure 5 the battens or ribs 12 may be moved up and down the leading edge 20 line by means of ropes and a bridal system 24.

(5)Best shown in Figure 5 the bridal system 24 ensures that the battens are located in their correct flight ready position but can loosen when remotely released by the operator (not shown).

As can be best seen in Figure 3, the tubes of the flexwing 11 are allowed to run generally parallel allowing the flexwing or hang glider to be stored (10)and transported.

As can be best seen in Figure 5, the bridal system 24 is independent of the main sail (not shown on Figure 5) and is operated remotely by means of ropes and pulleys (not shown).

As can be best seen in Figure 4, the battens or ribs 12 are attached onto a (15)track or slide 25 which is fixed onto the leading edge of the wing by means of directly onto the airframe 13 or onto the fabric of the sail 21 Best shown in figure 3, the flexwing 11 is in a nearly folded state where the battens or ribs 12 have moved up the leading edge 20 allowing the whole airframe 13 to fold.

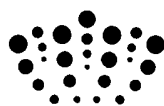
(20)As can be best seen in Figure 2 and Figure 4 the battens or ribs 12 are fixed to the trailing edge of the wing 17 by means of batten pocket 23.

As can be best seen in Figure 2 there may be a double surface seam 19 on the sail 21.

As can be best seen on Figure 1 the unit 11 can hinge at point 15 and point 18

# Claims

1. A bridal and sliding system to remotely move the ribs or battens of a hang glider or flexwing up and down the leading edge.
2. A system according to claim 1 that allows the flexwing to fold to a smaller size without removing the battens or ribs.
3. A system according to claim 1 which reduces the time it takes to rig and de-rig the wing.
4. A system according to claim 1 where the ribs may be allowed to lie generally parallel with the leading edge spar.
5. A system according to claim 1 which allows the pilot to rig and de rig the wing whilst remaining in the flying position.
6. A system according to claim 1 which may retain the battens in the correct position for flight.
7. A system according to claim 1 which allows the wing battens or ribs to be released from their flying position to a folded position, more suitable for storage and non flying use.
8. A system according to claim 1 which negates the need to push in or pull out the ribs or battens in order to rig or de rig the wing.
9. A system according to claim 8 which reduces the assembly and disassembly time considerably because the battens and ribs are not removed from the flexwing.
10. A system according to claim 8 which is a remote folding system for a flexwing or hang glider which negates the need to remove the battens from the wing.
11. A system according to claim 8 which allows the pilot to remain in the flight ready position whilst opening and closing the wing.
12. A system according to claim 8 which allows the battens or ribs to slide and rotate along the leading edge and lay in a generally parallel with the rest of the airframe.
13. A system according to claim 8 which allows the essential ribs or battens to be remotely positioned into a flight ready state.



**Application No:** GB0909273.5

**Examiner:** Mr Hal Young

**Claims searched:** 1-13

**Date of search:** 7 September 2010

**Patents Act 1977: Search Report under Section 17**

**Documents considered to be relevant:**

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-13	US4116407 A (MURRAY) see figs and note ribs 57 pivotally and slidably attached to leading edge member 13 for collapsing wing (fig 5).
A		FR2897837 A1 (HUBERT)
A		FR2723718 A1 (MOREL)
A		FR2806351 A1 (RINALDI)

**Categories:**

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

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Worldwide search of patent documents classified in the following areas of the IPC

B64C
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The following online and other databases have been used in the preparation of this search report

WPI, EPODOC
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**International Classification:**

Subclass	Subgroup	Valid From
B64C	0003/56	01/01/2006
B64C	0003/26	01/01/2006
B64C	0031/032	01/01/2006