(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 481 795 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **91309607.9**

(22) Date of filing : **17.10.91**

(51) Int. Cl.[5] : **B63B 22/00,** F42B 10/50, F42B 10/14

(30) Priority : **19.10.90 GB 9022740**

(43) Date of publication of application : **22.04.92 Bulletin 92/17**

(84) Designated Contracting States : **AT BE CH DE DK ES FR GB GR IT LI LU NL SE**

(71) Applicant : **GEC-MARCONI LIMITED**
The Grove, Warren Lane
Stanmore, Middlesex HA7 4LY (GB)

(72) Inventor : **Green, Patrick John**
13 Honeycombe Rise
Sherborne, Dorset, DT9 6AH (GB)
Inventor : **Axford, Nigel**
Zenkeri Cottage, Blackford Road, Charlton Horethorne, DT9 4PG (GB)
Inventor : **Ridgewell, Peter**
3 St Johns Close, Milford
Salisbury, Wiltshire, SP1 1NW (GB)

(74) Representative : **Lawrence, Brian Richard et al**
GEC Patent Department GEC-Marconi Research Centre West Hanningfield Road
Great Baddow
Chelmsford, Essex CM2 8HN (GB)

(54) Air-launched buoys.

(57) An air launched buoy 1, eg a bathythermal buoy, is described comprising a plurality of hinged petals 6 of plastics material disposed around the body 2 of the buoy 1, the petals 6 in the pre-launch condition being retained in a forwards pointing direction and having a cylindrical skirt 9 provided between the petals and the body 2. When the buoy is launched the petals 6 are released and the petals 6 and skirt 9 assumed a rearwards and outwards configuration (Figure 2), the skirt 9 being outwards of the petals 6, retarding and stabilising the ballistic flight of the buoy 1.

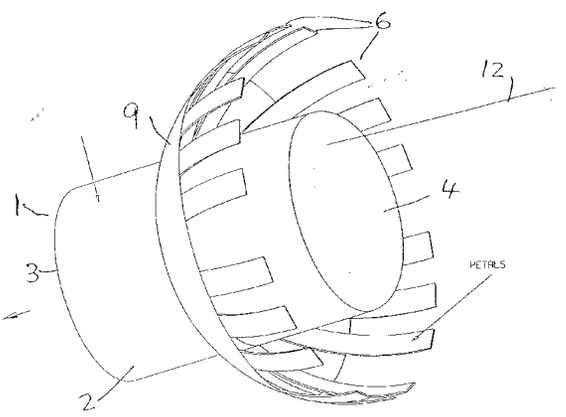

FIGURE 2. - BUOY IN FLIGHT MODE.

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This present invention relates to air-launched buoys and especially to air launched bathythermal buoys.

Bathythermal buoys are normally launched in to the sea from an aircraft, or helicopter, and it is necessary to control their decent in order that they land in the most favourable attitude.

Previously known buoys have included parachute systems for controlling their descent, the parachute being stowed within the confines of the buoy prior to deployment and deployed when required. The use of parachutes is expensive, requiring additional payload carrying capacity and necessitating relatively expensive construction materials.

It is an object of the present invention to provide an air launched buoy which eliminates the need for a parachute, and which enables a cheaper and lighter buoy to be provided.

According to the present invention there is provided an air launched buoy comprising a generally cylindrical body having a front end and a rear end, a plurality of hinged petals disposed around the circumference of said buoy, said hinged petals in the pre-launch condition of said buoy being retained in a forwards pointing direction against said body, a flexible cylindrical skirt being provided around said body and between said body and said petals, said petals when said buoy is launched being partially released from said body whereby due to the forwards movement of said buoy said petals and said flexible skirt are caused to assume a rearwards and outwards configuration, said skirt being outwardly of said petals, for controlling the descent of said buoy.

In a preferred arrangement said petals are made of plastics material and are conveniently formed integrally with a cylindrical band which is circumferentially disposed on said body.

Advantageously the hinge of each petal is formed by a reduced thickness portion at its junction with said cylindrical band, said cylindrical band being retained on said body by a circumferential retaining wire which extends around said body and across the reduced thickness portion of said petals.

It may be arranged that when said buoy is launched, each of said petals bears against said circumferential wire to control the rearwards and outwards movements of said petals.

It may also be arranged that the buoy comprises a circumferential retaining band which in the pre-launch mode of said buoy retains said petals against the body of said buoy, a windflap being provided associated with said retaining band, said windflap when said buoy is launched causing said retaining band to be released to partially release said petals.

The buoy may conveniently comprise an aerial attached to the rear end of said body, in which case said aerial may be retained against said body by said windflap and is released when said windflap is released.

An exemplary embodiment of the invention will now be described reference being made to the accompanying drawings, in which:

Figure 1, is a diagrammatic view of a bathythermal buoy according to the present invention immediately following its air-launch from an aircraft;

Figure 2, is a diagrammatic representation of the buoy of Figure 1 in its flight mode;

Figure 3, is a cross-sectional side view of part of the buoy of Figures 1 and 2 showing the disposition of the petals in the pre-launch mode; and

Figure 4, is a cross-section side view corresponding to Figure 3 showing the disposition of the petals in the flight mode.

In Figure 1 of the drawings there is shown a bathythermal buoy 1 in the position where it has just been launched from an aircraft (not shown) to descend into the sea (not shown). The buoy 1 comprises a body 2 having a front end 3 and a rear end 4. Around the body 2 is disposed a cylindrical band 5 of plastics material which has integrally formed with it a plurality, typically 18, of forwards pointing petals 6 disposed around the circumference of the body 2. Each of the petals 6 is provided at its junction with the band 5 with a reduced thickness portion 7 by means of which the petals 6 are effectively hinged to the band 5. The band 5, and thus the petals 6, are retained on the body 2 of the buoy 1 by means of a circumferential retaining wire 8 the ends (not shown) of which are twisted together to clamp the band 5 to the body 2.

Between the petals 6 and the body 2 of the buoy 1 is disposed a flexible cylindrical skirt 9 one circumferential edge of which is secured to the body 2 in the vicinity of the band 5.

The buoy 1 of Figure 1 also comprises a plastics windflap 10 which, in the pre-launch condition, is retained on the body 2 of the buoy 1 by means of a retaining band 11, the ends of which attach to the windflap 10, the retaining band 11 also extending around the petals 6 to retain them against the body 2 of the buoy 1.

The buoy 1 of Figure 1 further comprises an aerial 12 which, in the pre-launch condition, is folded back against the body 2 of the buoy 1 and is retained in position by the windflap 10.

The buoy 1 described with reference to Figure 1 operates as follows. When the buoy is launched from an aircraft, wind gets between the windflap 10 and the body 2 of the buoy 1 and causes the windflap to be detached from retaining band 11 allowing it and the retaining band 11 to be separated from the buoy 1. This releases the petals 6 and also releases the aerial 12 which is of the self-erecting kind and adopts a position in which it extends rearwards from the rear end 4 of the body 2 as shown in broken lines 13.

Movement of the buoy 1 in the air stream thereof

causes the body 2 to adopt a position shown in Figure 2 of the drawings in which the petals 6 and the flexible skirt 9 are bent back on themselves to adopt a rearwards and outwards position as shown, the flexible skirt 9 being outside of the petals 6 relative to the body 2, the combined effect of the petals 6 and the skirt 9 being to retard and stabilise the ballistic flight of the buoy 1 through the air such that it enters the sea front end 3 first in a controlled manner.

When the buoy 1 enters the sea it floats on the surface thereof front end 3 downwards, and a sea-water entry switch (not shown) may be activated to energise the electronics (not shown) thereof. After a suitable delay a probe unit (not shown) may be released from the front end 3, the probe unit being allowed to descend in the sea in order to make the necessary bathythermal measurements which are transmitted back to a control centre via the aerial 12 which, in the floating mode of the buoy 1 extends substantially vertically upwards from the rear end 3 of the buoy which is out of the sea.

In Figure 3 of the drawings there is shown a cross-sectional side view of part of the buoy of Figures 1 and 2 showing the disposition of the petals 6 in the pre-launch mode. In Figure 3, part of the body 2 of the buoy 1 is shown together with the cylindrical band 5 of plastics material having the petals 6 formed integrally with it. The petals 6 are hinged to the band 5 by means of the reduced thickness portion 7. The band 5 and the petals 6 are retained on the body 2 of the buoy by means of the circumferential retaining wire 8. Between the petals 6 and the body 2 of the buoy 1 is disposed the flexible cylindrical skirt 9, one end 14 of which is clamped between the band 5 and the body 2. It will be appreciated that the skirt 9 may be attached to the body 2 in the vicinity of the hinges 7 in any suitable way. The petals 6 are retained against the body 2 of the buoy 1 by means of the retaining band 11.

In Figure 4 of the drawings there is shown the cross-section side-view of Figure 3 with the buoy 1 in the flight mode.

In this mode the retaining band 11 has been released and due to the forwards movement of the buoy, the air flow causes the petals 6 and the skirt 9 to assume a rearwards and outwards configuration in which the part of each of the petals 6 which is immediately adjacent the reduced thickness hinge portion 7 bears against the circumferential wire 8, which retards and stabilises the ballistic flight of the buoy 1 as has already been described.

It will be appreciated that the petals 6, integral cylindrical band 5, skirt 9, windflap 10 and retaining band 11 may all be made of plastics material and therefore add very little to the weight of the buoy 1 and provide a very advantageous alternative to the parachute arrangements used with existing air launched buoys.

Claims

1. An air launched buoy comprises a generally cylindrical body having a front end and a rear end, a plurality of hinged petals disposed around the circumference of said buoy, said hinged petals in the pre-launch condition of said buoy being retained in a forwards pointing direction against said body, a flexible cylindrical skirt being provided around said body and between said body and said petals, said petals when said buoy is launched being partially released from said body whereby due to the forwards movement of said buoy said petals and said flexible skirt are caused to assume a rearwards and outwards configuration, said skirt being outwardly of said petals, for controlling the descent of said buoy.

2. A buoy as claimed in claim 1, in which said petals are made of plastics material.

3. A buoy as claimed in claim 2, in which said petals are formed integrally with a cylindrical band which is circumferentially disposed on said body.

4. A buoy as claimed in claim 3, in which the hinge of each petal is formed by a reduced thickness portion at its junction with said cylindrical band.

5. A buoy as claimed in claim 4, in which said cylindrical band is retained on said body by a circumferential retaining wire which extends around said body and across the reduced thickness portion of said petals.

6. A buoy as claimed in claim 5, in which when said buoy is launched, each of said petals bears against said circumferential wire to control the rearwards and outwards movements of said petals.

7. A buoy as claimed in any preceding claim comprising a circumferential retaining band which in the pre-launch mode of said buoy retains said petals against the body of said buoy.

8. A buoy as claimed in claim 7, comprising a windflap associated with said retaining band, said windflap when said buoy is launched causing said retaining band to be released to partially release said petals.

9. A buoy as claimed in any preceding claim, comprising an aerial attached to the rear end of said body.

10. A buoy as claimed in claim 9 when dependant upon claim 8, in which said aerial is retained

against said body by said windflap and is released when said windflap is released.

11. A buoy as claimed in any preceding claim in the form of a bathythermal buoy.

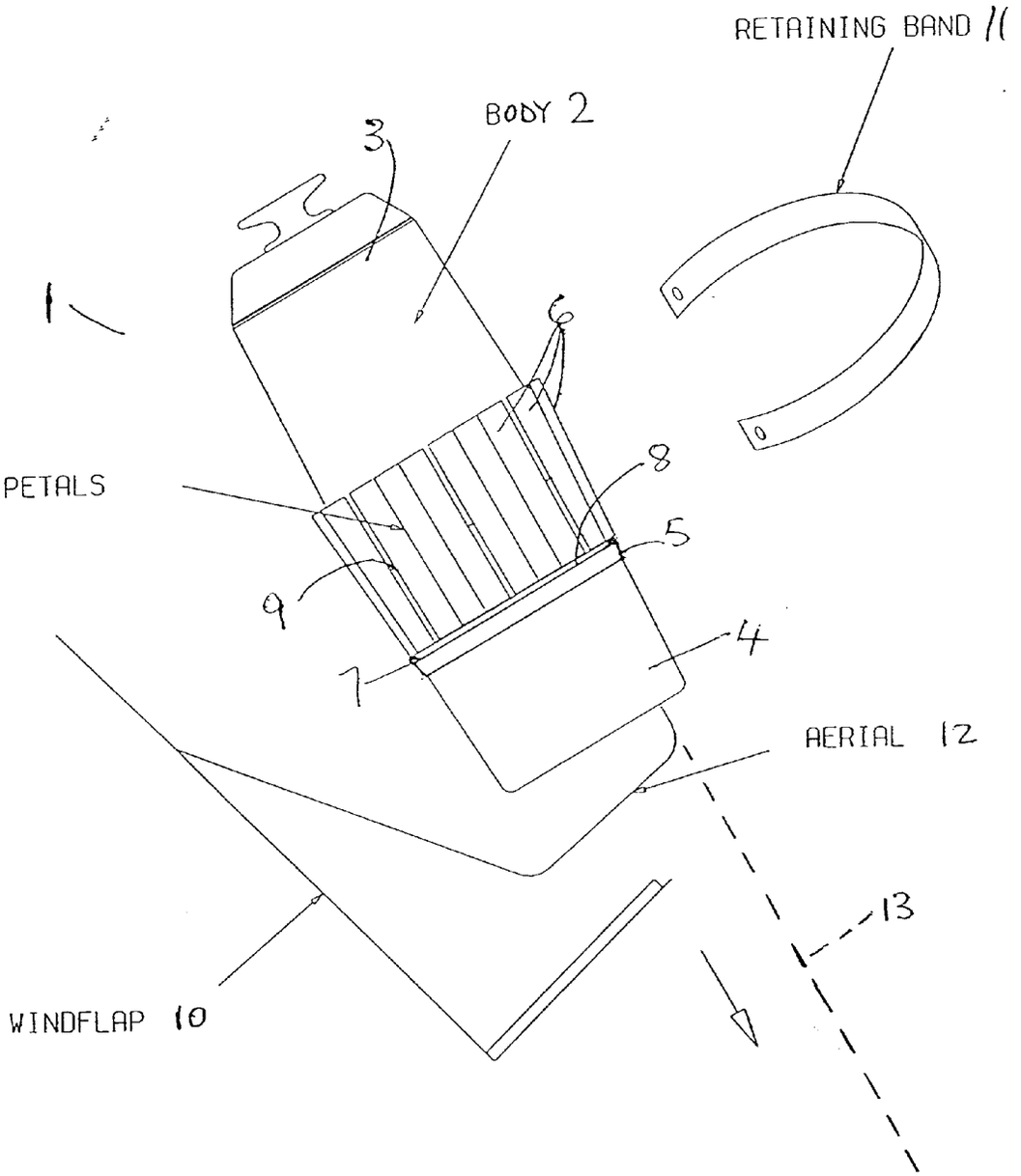

FIGURE 1 - BUOY AT LAUNCH

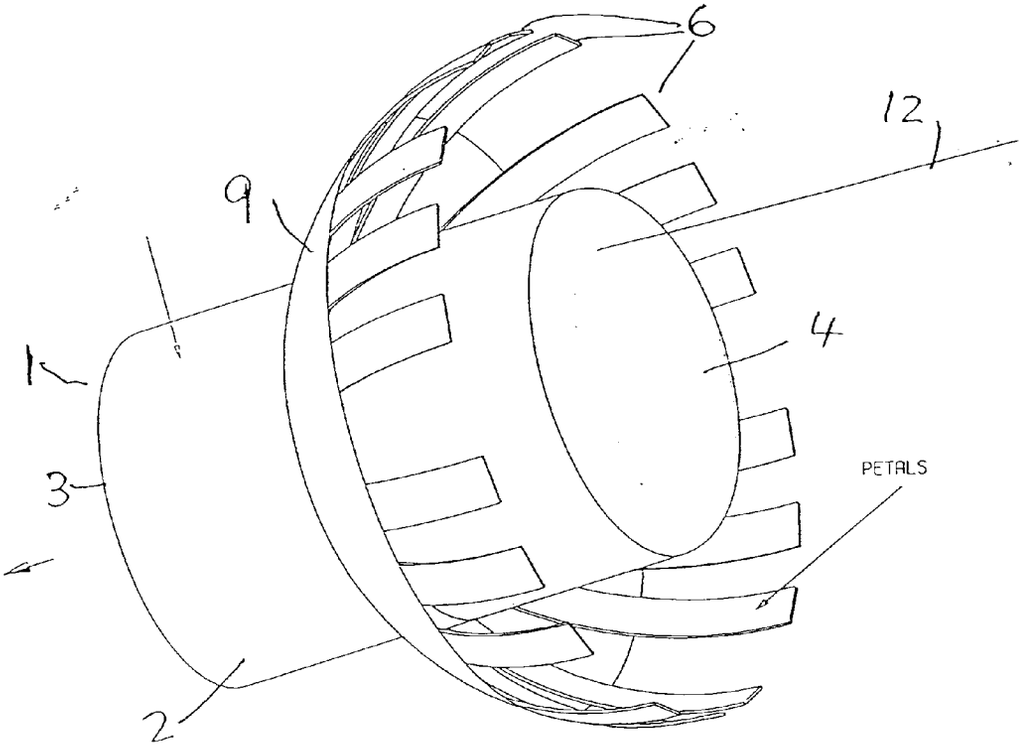

FIGURE 2. - BUOY IN FLIGHT MODE.

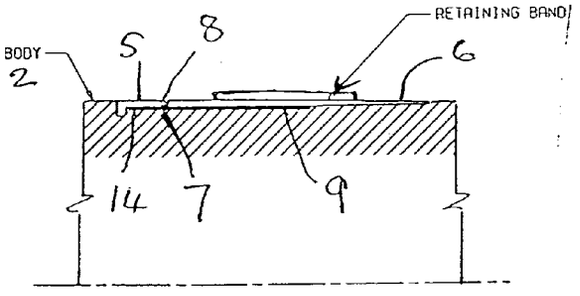

FIG. 3 PETALS IN RETAINED POSITION

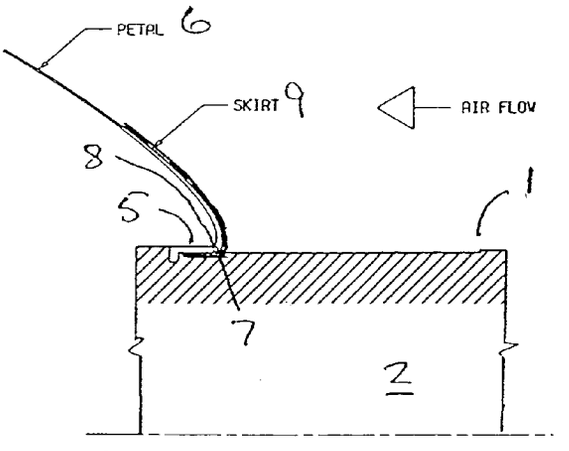

FIG. 4 PETALS IN FLIGHT POSITION

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 30 9607

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 305 040 (PLESSEY OVERSEAS LTD.) * the whole document *	1-11	B63B22/00 F42B10/50 F42B10/14
A	EP-A-0 348 201 (BRITISH AEROSPACE PUBLIC LTD.) * claims; figures *	1,2	
A	WO-A-8 909 919 (THOMSON-BRANDT ARMEMENTS) * abstract; figures 1-3 * * page 5, line 12 - line 27 *	1,2	
A	FR-A-2 445 510 (DYNAMIT NOBEL AG.) * claims 1-3; figures *	3-6	
A	US-A-3 695 177 (G.CHAKOIAN ET AL.) * abstract; figure 3 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B63B
F42B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 JANUARY 1992	STIERMAN E.J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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E : earlier patent document, but published on, or after the filing date
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