



US009409650B2

(12) **United States Patent**  
**Bellanger et al.**

(10) **Patent No.:** **US 9,409,650 B2**  
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **THRUST REVERSER SUPPORTING STRUCTURE INCLUDING COMPOSITE REINFORCEMENTS AND A BASE HAVING AN UNCLOSED CROSS SECTION**

(58) **Field of Classification Search**  
CPC ..... B64D 27/18; B64D 29/06; F02K 1/72; F05D 2300/603; F05D 2300/702  
USPC ..... 60/226.2, 796, 798; 244/54  
See application file for complete search history.

(75) Inventors: **Alexandre Bellanger**, Le Havre (FR); **Florent Bouillon**, Anglesqueville l'Esneval (FR); **Laurent Dubois**, Le Havre (FR)

(56) **References Cited**

(73) Assignee: **AIRCELLE**, Gonfreville L'Orcher

U.S. PATENT DOCUMENTS

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 823 days.

3,599,432 A \* 8/1971 Ellis ..... 60/226.1  
5,239,822 A \* 8/1993 Buchacher ..... 60/226.2

(Continued)

(21) Appl. No.: **13/516,759**

FOREIGN PATENT DOCUMENTS

(22) PCT Filed: **Dec. 9, 2010**

EP 0894715 A2 2/1999  
FR 2926605 A1 7/2009

(Continued)

(86) PCT No.: **PCT/FR2010/052655**

OTHER PUBLICATIONS

§ 371 (c)(1),  
(2), (4) Date: **Jun. 18, 2012**

International Search Report issued Mar. 18, 2011 by European Patent Office re: PCT/FR2010/052655.

(87) PCT Pub. No.: **WO2011/073551**

*Primary Examiner* — Phutthiwat Wongwian

PCT Pub. Date: **Jun. 23, 2011**

*Assistant Examiner* — Eric Linderman

(74) *Attorney, Agent, or Firm* — Burris Law, PLLC

(65) **Prior Publication Data**

US 2012/0248284 A1 Oct. 4, 2012

(57) **ABSTRACT**

(30) **Foreign Application Priority Data**

Dec. 18, 2009 (FR) ..... 09 06159

An aircraft nacelle includes: a thrust reverse device having movable cowls, and a supporting structure to support the thrust reverser device. The supporting structure includes: a base body extending along a longitudinal direction of the nacelle and made from a composite material, and a wall of the base body forming an unclosed cross section having an open portion to provide access to an inner surface of the supporting structure from outside, and a plurality of reinforcements which is made from a composite material, and attached on the inner surface along the longitudinal direction. In particular, the reinforcements are integrated in the inner surface of the supporting structure.

(51) **Int. Cl.**

**B64D 29/06** (2006.01)

**F02K 1/72** (2006.01)

**B64D 27/18** (2006.01)

(52) **U.S. Cl.**

CPC . **B64D 29/06** (2013.01); **F02K 1/72** (2013.01); **B64D 27/18** (2013.01); **F05D 2260/30** (2013.01); **F05D 2300/603** (2013.01); **F05D 2300/702** (2013.01); **Y02T 50/672** (2013.01)

**12 Claims, 7 Drawing Sheets**

