



US007328771B2

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

(10) **Patent No.:** **US 7,328,771 B2**
(45) **Date of Patent:** **Feb. 12, 2008**

(54) **ZERO ACOUSTIC SPLICE FAN CASE LINER**

(75) Inventors: **Mark W. Costa**, Storrs, CT (US);
Charles Brown, East Hampton, CT
(US); **Andrew S. Foose**, Vernon, CT
(US)

(73) Assignee: **United Technologies Corporation**,
Hartford, CT (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 517 days.

(21) Appl. No.: **10/899,809**

(22) Filed: **Jul. 27, 2004**

(65) **Prior Publication Data**

US 2006/0024154 A1 Feb. 2, 2006

(51) **Int. Cl.**

F02K 1/82 (2006.01)

B64D 33/02 (2006.01)

B64C 1/12 (2006.01)

(52) **U.S. Cl.** **181/214**; 181/213; 244/53 B;
244/131

(58) **Field of Classification Search** 181/292,
181/214, 210, 213; 244/1 N, 53 B, 131,
244/132

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,702,220 A 11/1972 Medawar et al.
3,821,999 A * 7/1974 Guess et al. 181/296
4,161,231 A * 7/1979 Wilkinson 181/292
4,293,053 A * 10/1981 Shuttleworth et al. 181/213
5,000,399 A * 3/1991 Readnour et al. 244/53 B
5,297,760 A * 3/1994 Hart-Smith 244/132
5,581,054 A * 12/1996 Anderson et al. 181/213

6,131,855 A 10/2000 Porte
6,328,261 B1 * 12/2001 Wollaston et al. 244/132
6,340,135 B1 1/2002 Barton
6,427,434 B2 8/2002 Porte et al.
6,536,556 B2 3/2003 Porte et al.
6,585,191 B2 7/2003 Andre et al.
6,592,078 B2 7/2003 Porte et al.
6,607,625 B2 8/2003 Andre et al.
6,615,950 B2 9/2003 Porte et al.
6,761,245 B2 * 7/2004 Porte 181/210
6,772,857 B2 * 8/2004 Porte et al. 181/210
6,820,337 B2 * 11/2004 Buge et al. 29/897.32
6,892,526 B2 * 5/2005 Stretton et al. 60/226.1
6,923,931 B2 * 8/2005 Dublineau et al. 264/414
2002/0078569 A1 * 6/2002 Buge et al. 156/308.4
2002/0125067 A1 9/2002 Porte et al.
2003/0042657 A1 3/2003 Dublineau et al.

FOREIGN PATENT DOCUMENTS

WO WO 02/059474 8/2002

* cited by examiner

Primary Examiner—Edgardo San Martin

(74) *Attorney, Agent, or Firm*—Carlson, Gaskey & Olds

(57) **ABSTRACT**

A liner assembly for a fan case includes a noise attenuation layer covered by a face sheet. The face sheet includes openings to the underlying noise attenuation layer. The face sheet and noise attenuation layer include acoustically transparent joints. The noise attenuation layer includes a first side joined to a second side at a seam by an adhesive strip. The adhesive strip bonds the first side to the second side without filling any chambers. The face sheet includes a joint filled with an adhesive providing the desired uninterrupted surface within the fan case. Openings are formed through the joint and the adhesive to communicate with the underlying noise attenuation layer. The joint and seam become essentially transparent acoustically to improve noise attenuation performance.

15 Claims, 2 Drawing Sheets

