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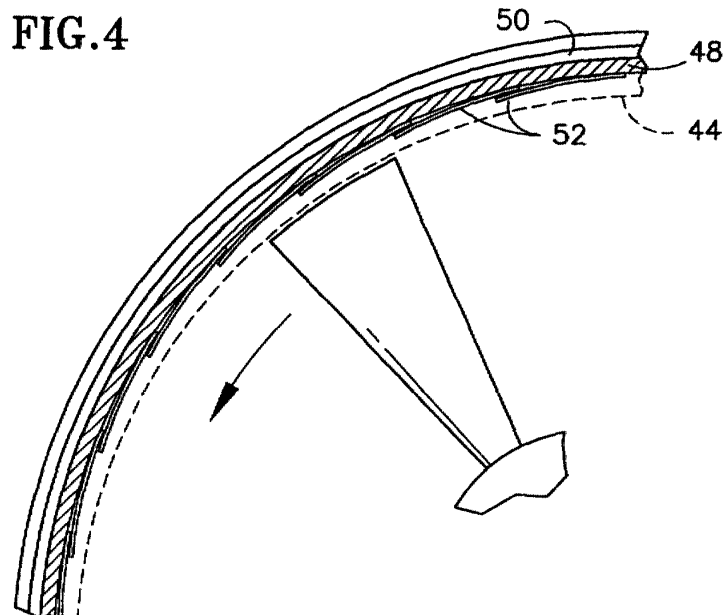
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(54) **Fan case liner**

(57) A fan case 48 in a gas turbine engine has a radial zone of interaction 60 bounded outwardly by a fan case surface 53. Hardened structure 42 such as overlapping shingles is disposed in the zone 60. The zone 60 is less than one hundredth of the fan case diameter as measured from the blade tips 38 in a non-operative,

zero speed engine condition and is such that during a high rotor imbalance condition, the blade tips 38 skid on the hardened structure 42 and reduce the destructive cutting away of the fan case, and reduce torque and imbalance loads transmitted to the interface of the engine and the aircraft.



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EUROPEAN SEARCH REPORT

Application Number
EP 99 31 0555

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.7)
A	US 5 403 148 A (FORRESTER JAMES M) 4 April 1995 (1995-04-04) * column 2, line 55 - column 3, line 11; figure 3 *	1-10	F01D21/04 F01D11/12 F01D25/24
A	US 4 547 122 A (LEECH JOHN W) 15 October 1985 (1985-10-15)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F01D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		16 November 2001	Raspo, F
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5403148	A	04-04-1995	NONE	
US 4547122	A	15-10-1985	NONE	

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