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- (71) Applicant: **ROLLS-ROYCE CORPORATION**  
[US/US]; 450 South Meridian Street, Indianapolis, IN  
46225-1103 (US).
- (72) Inventors: **SMITH, Duane, A.**; 6012 Clearview Drive,  
Carmel, IN 46033 (US). **CUMMINGS, William, G., III**;  
5217 N. Graceland Avenue, Indianapolis, IN 46208 (US).
- (74) Agent: **LALONE, Douglas, P.**; Rader, Fishman & Grauer  
PLLC, 39533 Woodward Avenue, Suite 140, Bloomfield  
Hills, MI 48304 (US).
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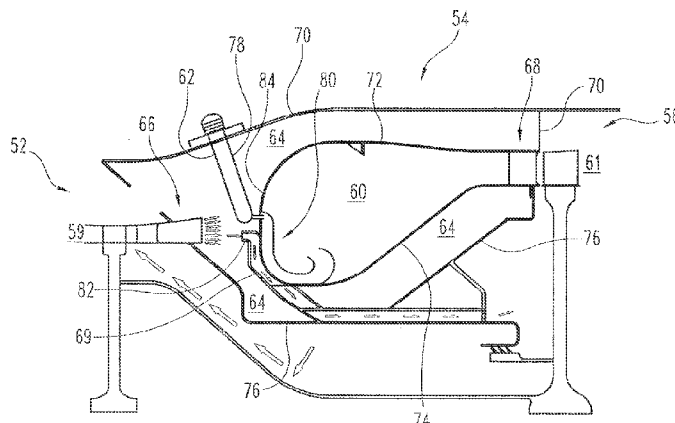


Fig. 3

(57) Abstract: A gas turbine engine having a combustor is disclosed in which a heat exchanger is disposed within the combustor. The heat exchanger can take the form of a fuel/air heat exchanger. In one form the heat exchanger includes a path for cooling air to be conveyed to a location external to the combustor. Cooled cooling air carried through the path can be created through action of heat transfer from the cooling air to a fuel flowing in the heat exchanger. The heat exchanger can include a fuel vaporizer in one form.



INTERNATIONAL SEARCH REPORT

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 098 719 A (ROLLS ROYCE) 24 November 1982 (1982-11-24) figures 1-3 page 1, lines 101-108 page 1, lines 114-116	1-12, 14-20
X	GB 676 640 A (RONALD GUERIN MESCHINO; A V ROE CANADA LTD) 30 July 1952 (1952-07-30) figures 1-2 page 5, lines 23-30	1-12, 14-20

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Name and mailing address of the ISA/  
European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040,  
Fax: (+31-70) 340-3016

Authorized officer  
Fortugno, Eugenio

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2098719	A 24-11-1982	GB 2098719 A	24-11-1982
		US 4561257 A	31-12-1985
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GB 676640	A 30-07-1952	NONE	
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