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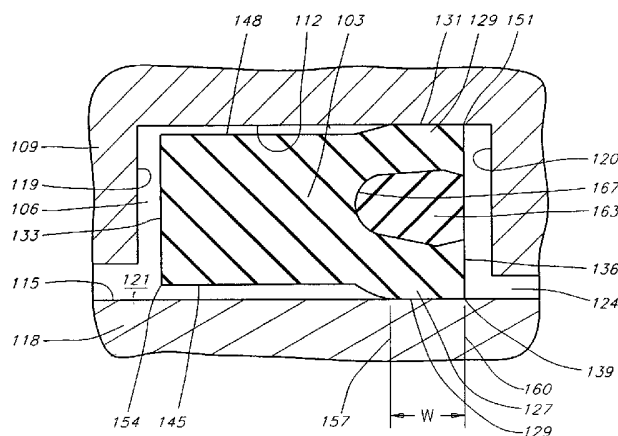
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(54) Title: HYDRODYNAMIC ROTARY SEAL WITH VARYING SLOPE



(57) Abstract: A hydrodynamically lubricating seal has a generally circular seal body (103) defining a static sealing surface (131) and having a dynamic sealing lip (127) projecting from the seal body for establishing sealing relation with a relatively rotatable surface (115), dynamic sealing lip defines a hydrodynamic geometry which wedges a film of lubricating fluid into the interface between the seal and the relatively rotatable surface in response to relative rotation. The dynamic sealing lip geometry maintains interfacial contact pressure within the dynamic sealing interface for efficient hydrodynamic lubrication and environmental exclusion, which enhances lubrication and environmental exclusion while permitting relatively high initial compression and relatively low torque. In abrasive environments, the improved exclusionary action results in a dramatic reduction of seal and shaft wear, compared to prior art, and provides a significant increase in seal life. The invention also increases seal life by making higher levels of initial compression possible, compared to prior art, without compromising hydrodynamic lubrication. This added compression makes the seal more tolerant of compression set, abrasive wear, mechanical misalignment, dynamic runout and manufacturing tolerances.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/11279

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : F16J 15/16,15/32
 US CL : 277/559, 560, 572, 273, 574, 584

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 U.S. : 277/559, 560, 572, 273, 574, 584

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,610,319 A (Kalsi) 09 September 1986 (09.09.1986), see entire document.	1-5, 13-16, 18-21, 23-24, 27-31, 34, 35, 38-39, 42-43, and 45
Y	US 5738,358 A (Kalsi et al) 14 April 1998 (14.04.1998), see entire document.	6-12, 17, 20-22, 25-26, 29, 32, 35-37, 40-41, 44, 46-47 and 48-50
Y	US 3,929,340 A (Peisker) 30 December 1975 (30.12.1975), see entire document.	6-7, 8, 25-26, 40-41 and 46-47
Y	US 4,328,972 A (Albertson et al) 11 May 1982 (11.05.1982), see entire document.	10-12, 20-22, 29, 35-37, 44 and 50
Y	US 4,328,972 A (Albertson et al) 11 May 1982 (11.05.1982), see entire document.	9 and 33
A	US 4,094,519 A (Heyn et al) 13 June 1978 (13.06.1978), see entire document.	1-50
A	US 5,190,299 A (Johnston) 02 March 1993 (02.03.1993), see entire document.	1-50

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

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