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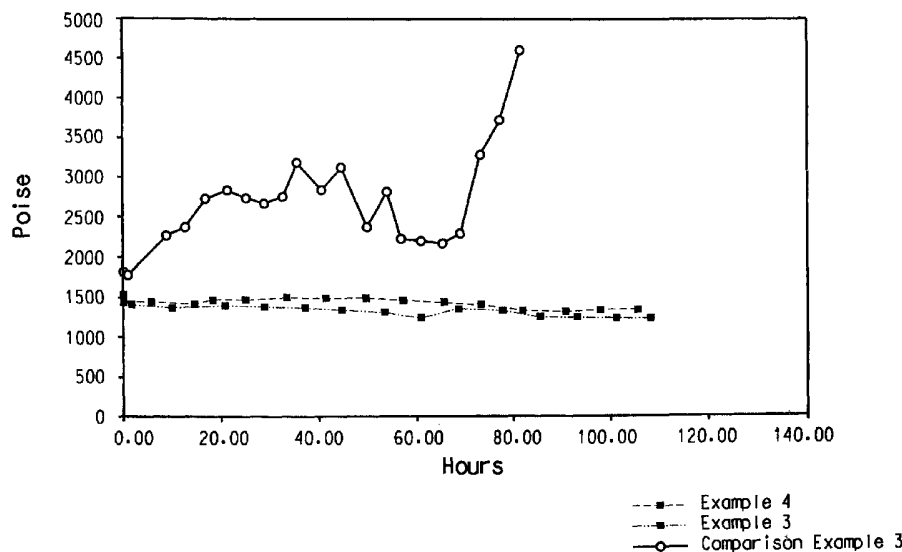
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(54) Title: SPANDEX FIBER USING ETHYLENE DIAMENE/1,2-DIAMINOPROPANE AS CHAIN EXTENDER AND PROCESS FOR MAKING SAME.



(57) Abstract: The invention provides spandex having improved hysteresis and a method for making such spandex. The spandex of the invention comprises the polyurethaneurea reaction product of: (a) poly(tetramethylene ether) glycol; (b) 1-isocyanato-4-[(4-isocyanatophenyl)methyl]benzene wherein the mole ratio of diisocyanate to glycol is from about 1.52 to about 2.04; and (c) a mixture of chain extenders comprising: from about 35 to about 55 mole percent ethylene diamine; and from about 45 to about 65 mole percent 1,2-propanediamine.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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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 practical, search terms used)

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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.
A	US 5 362 432 A (HOUSER NATHAN E ET AL) 8 November 1994 (1994-11-08) column 2, line 20 - column 2, line 37 column 3, line 24 - column 3, line 67 example 3 table III claim 1	1-10
A	US 5 616 676 A (KATSUO KENICHI) 1 April 1997 (1997-04-01) column 4, line 19 - column 4, line 22 column 5, line 29 - column 5, line 43 example 3 claim 2	1-10



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 981 686 A (WALDBAUER JR ROBERT OTTO) 9 November 1999 (1999-11-09) example 2 table II claims 1,2,4 -----	1-10
A	US 4 973 647 A (BRETCHES DONALD D ET AL) 27 November 1990 (1990-11-27) column 2, line 14 - column 2, line 31 table I figures 1-4 claims 1,2 -----	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5362432	A	08-11-1994	BR 9405849 A	26-12-1995
			DE 69401749 D1	27-03-1997
			DE 69401749 T2	04-09-1997
			EP 0692039 A1	17-01-1996
			JP 8508552 T	10-09-1996
			KR 227004 B1	15-10-1999
			WO 9423100 A1	13-10-1994
US 5616676	A	01-04-1997	JP 8113824 A	07-05-1996
			KR 200004 B1	15-06-1999
US 5981686	A	09-11-1999	WO 0132731 A1	10-05-2001
			BR 9917542 A	11-06-2002
			DE 69915892 D1	29-04-2004
			EP 1226197 A1	31-07-2002
			JP 2003514039 T	15-04-2003
US 4973647	A	27-11-1990	CA 2017203 A1	30-11-1990
			DE 4017295 A1	06-12-1990
			IT 1248665 B	26-01-1995
			JP 2761532 B2	04-06-1998
			JP 3097915 A	23-04-1991
			KR 136854 B1	28-04-1998