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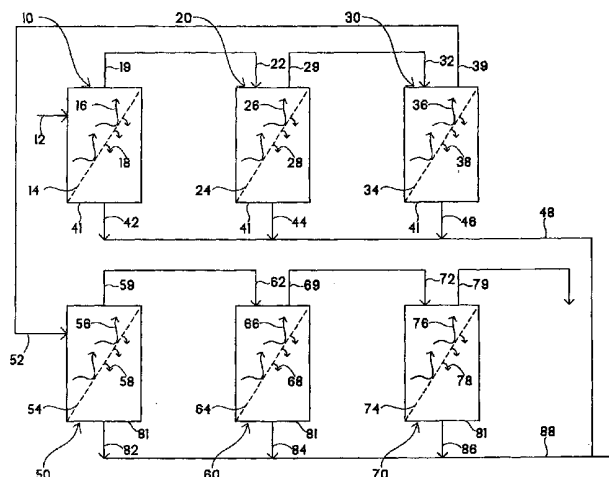
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- (74) Agent: **GANZI, Gary, C.**; Legal Dept./Intellectual Property, 75 Technology Drive, Lowell, MA 01851 (US).
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[Continued on next page]

(54) Title: PROCESS AND APPARATUS FOR BLENDING PRODUCT LIQUID FROM DIFFERENT THIN FILM COMPOSITE MEMBRANES



(57) Abstract: A process and apparatus for membrane treatment includes feeding a liquid to a membrane. The primary membrane (14) separates the feed into a primary membrane retentate (16) and a primary membrane permeate (18). The primary membrane retentate (16) is fed to supplemental primary membranes (24, 34) or to a secondary membrane (54). The primary membrane retentate (16) is separated by the secondary membrane (54) into a secondary membrane retentate (56), and a secondary membrane permeate (58). The secondary membrane retentate (56) may either be discarded, or may be fed to supplemental secondary membranes (64, 74). If the secondary membrane retentate (56) is fed to a supplemental secondary membrane (64), the secondary membrane retentate (56) is separated into a supplemental secondary membrane retentate (66) and supplemental secondary membrane permeate (68). The product liquid is formed by blending the primary membrane permeate (18) with the secondary membrane permeate (58) and all supplemental primary membrane permeates (28, 38) and supplemental secondary membrane permeates (68, 78).



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER IPC 7 B01D61/02 C02F1/44 B01D61/58		
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) IPC 7 B01D C02F		
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) EPO-Internal, WPI Data, PAJ		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	EP 0 520 920 A (HYDREX TRAITEMENTS) 30 December 1992 (1992-12-30) the whole document --- -/--	1-7, 15-19 10, 11, 14, 20, 21 8, 9, 12, 13, 22-24
☒ Further documents are listed in the continuation of box C. ☒ Patent family members are listed in annex.		
° Special categories of cited documents : *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *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 *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 *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family		
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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, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Hoornaert, P	

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PCT/US 01/26582

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GÜNTHER POHLE: "Umkehrosmose-Entwicklung und Ausblick für das Spiralwickelmodul nach 10 Jahren Anwendungstechnik" WÄRME, vol. 86, no. 6, December 1980 (1980-12), pages 120-126, XP002197943 TECHNISCHER VERLAG RESCH KG., GRAFELFING.; DE page 120, column 2, paragraph 5; figure 3 page 122, column 2, last paragraph -page 123, column 1, paragraph 1 figures 8-10	1,4,8,9, 12,13, 15,16, 22-24
Y		10,11, 14,20,21
A		17
X	US 5 112 483 A (CLUFF C BRENT) 12 May 1992 (1992-05-12) abstract; figures 4,5 column 1, line 30 - line 46 column 2, line 56 - line 61 column 4, line 19 -column 5, line 19	1-3,7, 17,19
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 02, 26 February 1999 (1999-02-26) -& JP 10 305216 A (NITTO DENKO CORP), 17 November 1998 (1998-11-17) abstract; figure 2 paragraph '0046! - paragraph '0055! -& DATABASE WPI Derwent Publications Ltd., London, GB; AN 1999-053568 XP002197944 & JP 10 305216 A abstract	1
X	EP 0 402 121 A (SEPARASYSTEMS LP) 12 December 1990 (1990-12-12) the whole document	1,7
X	"ENSURE THE BEST PERFORMANCE FROM MEMBRANES AND DEMINERALIZERS" POWER, MCGRAW-HILL INC. NEW YORK, US, vol. 137, no. 3, 1 March 1993 (1993-03-01), page 73,74,76,78, XP000359945 ISSN: 0032-5929 figure 2 page 74, column 1, paragraph 2	1,4,8,9, 12,13, 15,16, 22-24
A		17,20,21
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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/26582

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 597 487 A (VOGEL GERALD ET AL) 28 January 1997 (1997-01-28) abstract; figure 2 column 4, line 41 -column 5, line 7 column 6, line 39 - line 52 -----	1,2,17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/26582

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0520920	A	30-12-1992	FR 2678260 A1	31-12-1992
			FR 2679464 A1	29-01-1993
			CA 2088602 A1	27-12-1992
			DE 69219819 D1	26-06-1997
			DE 69219819 T2	22-01-1998
			DK 520921 T3	15-12-1997
			EP 0520920 A1	30-12-1992
			EP 0520921 A1	30-12-1992
			ES 2103916 T3	01-10-1997
			WO 9300300 A1	07-01-1993
			US 5460723 A	24-10-1995

US 5112483	A	12-05-1992	NONE	

JP 10305216	A	17-11-1998	NONE	

EP 0402121	A	12-12-1990	US 4933197 A	12-06-1990
			AT 86445 T	15-03-1993
			AU 653137 B2	22-09-1994
			AU 5688190 A	13-12-1990
			BR 9002700 A	20-08-1991
			CA 2018105 A1	07-12-1990
			DE 69001044 D1	15-04-1993
			EP 0402121 A1	12-12-1990
			ES 2038867 T3	01-08-1993
			IL 94643 A	08-07-1993
			JP 1903066 C	08-02-1995
			JP 3065166 A	20-03-1991
			JP 6028561 B	20-04-1994

US 5597487	A	28-01-1997	US 5427682 A	27-06-1995
			AU 669001 B2	23-05-1996
			AU 4928693 A	12-04-1994
			BR 9307053 A	29-06-1999
			CA 2144519 A1	31-03-1994
			EP 0663851 A1	26-07-1995
			JP 8503650 T	23-04-1996
			MX 9305697 A1	30-06-1994
			US 5443739 A	22-08-1995
			WO 9406547 A1	31-03-1994
