



(43) International Publication Date
15 August 2013 (15.08.2013)

(51) International Patent Classification:

C10M 171/00 (2006.01) C10N 40/30 (2006.01)
C10N 30/06 (2006.01) C10N 30/02 (2006.01)

(21) International Application Number:

PCT/US2013/024712

(22) International Filing Date:

19 March 2013 (19.03.2013)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/596,376 8 February 2012 (08.02.2012) US
13/759,139 5 February 2013 (05.02.2013) US

(71) Applicant: CHEMTURA CORPORATION [US/US];
199 Benson Road, Middlebury, CT 06749 (US).

(72) Inventors: CARR, Dale, D.; 54 Wetmore Avenue, Morris-
town, NJ 07960 (US). HUTTER, Jeffrey, A.; 71 Over-
brook Avenue, Edison, NJ 08817 (US). KELLEY,
Richard; 30 Lavender Drive, Princeton, NJ 08540 (US).
URREGO, Roberto; 205 Cypress Road, Newington, CT
06111 (US). HESSELL, Edward, T.; 52 Papurah Road,
Fairfield, CT 06825 (US).

(74) Agent: ROMANIK, George, J.; Chemtura Corporation,
199 Benson Road, Middlebury, CT 06749 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,

HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP,
KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD,
ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI,
NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU,
RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ,
TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA,
ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a
patent (Rule 4.17(ii))

Published:

— with international search report (Art. 21(3))
— before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))
— the filing date of the international application is within
two months from the date of expiration of the priority peri-
od (Rule 26bis.3)

(88) Date of publication of the international search report:

7 November 2013

(54) Title: REFRIGERATION OIL AND COMPOSITIONS WITH HYDROCARBON REFRIGERANTS

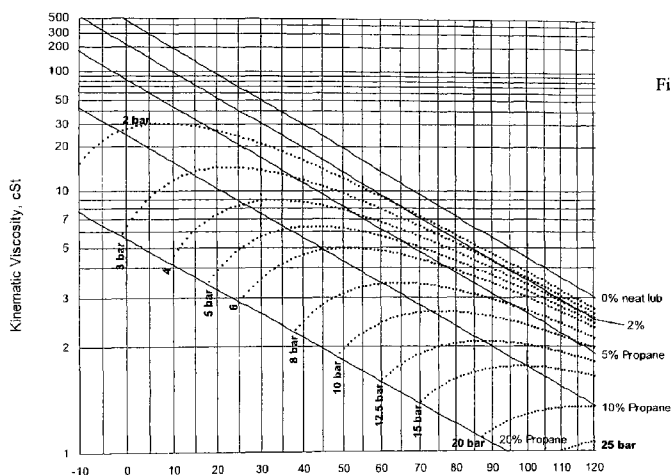


Figure 3

(57) Abstract: Polyol ester lubricant compositions comprising predominately straight chain C₅₋₁₀ alkylcarboxylate esters of neopentyl alcohols, for example, straight chain C₅₋₁₀ alkylcarboxylate esters of one or more of trimethylol propane, pentaerythritol, di-pentaerythritol, tri-pentaerythritol or pentaerythritol oligomers, and working fluids comprising said lubricant compositions and a hydrocarbon refrigerant, suitable for heat transfer devices including refrigeration and air conditioning systems are provided. The polyol ester lubricant compositions have a kinematic viscosity at 40 °C of 22-125 cSt and a viscosity index of greater than 140, and are characterized by having very high lubricity, excellent load carrying properties and excellent low temperature properties.



WO 2013/119532 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/024712

A. CLASSIFICATION OF SUBJECT MATTER INV. C10M171/00 ADD. C10N30/06 C10N40/30 C10N30/02		
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) C10M C10N		
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) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/240910 A1 (CARR DALE [US] ET AL) 6 October 2011 (2011-10-06) paragraph [0083]; claim 8; examples; tables 1,5	1-13,15, 16
X	----- US 2010/181523 A1 (KELLEY RICHARD [US] ET AL) 22 July 2010 (2010-07-22) paragraph [0048]; example 1	1-3, 8-12,15, 16
X	----- US 2010/190672 A1 (CARR DALE [US] ET AL) 29 July 2010 (2010-07-29) paragraphs [0049] - [0050]; example 1 ----- -/--	1-3,5,7, 11-13, 15,16
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents :		
"A" document defining the general state of the art which is not considered to be of particular relevance	"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	
"E" earlier application or patent but published on or after the international filing date	"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	
"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)	"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	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search	Date of mailing of the international search report	
9 September 2013	26/09/2013	
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 Bertrand, Samuel	

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2013/024712

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 2010/117022 A1 (CARR DALE [US] ET AL) 13 May 2010 (2010-05-13) paragraphs [0049] - [0050]; examples 1,5-10; tables 1,3 -----	1,2, 11-13, 15,16
X	US 6 410 492 B1 (SHIMOMURA YUJI [JP] ET AL) 25 June 2002 (2002-06-25) paragraphs [0052] - [0053]; table 1 -----	1-3,5,7, 11-13, 15,16
A	JP 2003 073681 A (HITACHI LTD) 12 March 2003 (2003-03-12) cited in the application abstract -----	1-13,15, 16

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/024712

Patent document cited in search report	Publication date	Patent family member(s)	Publication date		
US 2011240910	A1	06-10-2011	AU 2011237762 A1	27-09-2012	
			CN 102844417 A	26-12-2012	
			EP 2556135 A1	13-02-2013	
			JP 2013523978 A	17-06-2013	
			US 2011240910 A1	06-10-2011	
			WO 2011127132 A1	13-10-2011	

US 2010181523	A1	22-07-2010	CN 102272273 A	07-12-2011	
			EP 2379683 A1	26-10-2011	
			JP 2012515251 A	05-07-2012	
			KR 20110111285 A	10-10-2011	
			US 2010181523 A1	22-07-2010	
			WO 2010083100 A1	22-07-2010	

US 2010190672	A1	29-07-2010	CN 102292420 A	21-12-2011	
			EP 2382288 A1	02-11-2011	
			JP 2012515834 A	12-07-2012	
			KR 20110111288 A	10-10-2011	
			US 2010190672 A1	29-07-2010	
			WO 2010085545 A1	29-07-2010	

US 2010117022	A1	13-05-2010	AU 2009314483 A1	20-05-2010	
			CN 102216438 A	12-10-2011	
			EP 2362895 A2	07-09-2011	
			JP 2012508807 A	12-04-2012	
			KR 20110090924 A	10-08-2011	
			US 2010117022 A1	13-05-2010	
			WO 2010056449 A2	20-05-2010	

US 6410492	B1	25-06-2002	AT 221567 T	15-08-2002	
			AU 743629 B2	31-01-2002	
			BR 9913368 A	05-06-2001	
			CA 2342876 A1	16-03-2000	
			CN 1315993 A	03-10-2001	
			DE 69902401 D1	05-09-2002	
			DE 69902401 T2	14-11-2002	
			EP 1129158 A1	05-09-2001	
			JP 4564111 B2	20-10-2010	
			JP 2000073080 A	07-03-2000	
			MX PA01002214 A	08-05-2002	
			MY 121437 A	28-01-2006	
			TW 460573 B	21-10-2001	
			US 6410492 B1	25-06-2002	
			WO 0014189 A1	16-03-2000	

JP 2003073681	A	12-03-2003	NONE		
