

(11) **EP 1 918 944 A3**

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3: **08.10.2008 Bulletin 2008/41**

(51) Int Cl.: **H01F** 1/44 (2006.01)

(43) Date of publication A2: 07.05.2008 Bulletin 2008/19

(21) Application number: 07119395.7

(22) Date of filing: 26.10.2007

(84) Designated Contracting States:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR

Designated Extension States:

AL BA HR MK RS

(30) Priority: 26.10.2006 ES 200602735

(71) Applicant: REPSOL YPF S.A. 28046 Madrid (ES)

(72) Inventors:

- García Lopéz Durán, Juan de Dios 28046 Madrid (ES)
- González Caballero, Fernando 28046 Madrid (ES)
- Delgado Mora, Angel Vicente 28046 Madrid (ES)

- Ramón Iglesias, Guillermo 28046 Madrid (ES)
- Lopez Lopez, Modesto Torcuato 28046 Madrid (ES)
- Jiménez Olivares, María Luisa 28046 Madrid (ES)
- Fernández Ruiz-Moron, Luis 28046 Madrid (ES)
- Insa Monesma, Jorge 28046 Madrid (ES)
- Romero Palazón, Eduardo 28046 Madrid (ES)
- (74) Representative: Pons Arino, Angel Pons Patentes y Marcas Internacional, S.L. Glorieta Ruben Dario 4 28010 Madrid (ES)

(54) Magnetorheological Fluid (MRF)

(57) Magnetorheological fluid composed of magnetic particles dispersed in a liquid phase which comprises a base oil, a viscosity modifier, and a stabilizing agent.

Particularly the viscosity modifier is a styrene-fuma-

rate copolymer and the stabilizing agent is aluminium stearate.

EP 1 918 944 A3



EUROPEAN SEARCH REPORT

Application Number EP 07 11 9395

	Citation of document with it	idication, where appropriate,		Relevant	CL ASSIFICATION OF THE
Category	of relevant pass			to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Х	US 2004/084263 A1 (AL) 6 May 2004 (200 * abstract *			1,6,7, 20-22	INV. H01F1/44
X X	* paragraphs [0069] * paragraphs [0068]		*	8,20-22 11,12, 20-22	
Х	* paragraphs [0070] [0093] *	, [0071], [0087]	,	13-15, 20-22	
Х	* paragraphs [0061] [0087], [0093] *	, [0064], [0065]	,	16,18-22	
Х	US 5 683 615 A (MUN 4 November 1997 (19 * abstract * * column 8, lines 1 * column 8, lines 5	97-11-04) 8-31 *		1,6,7, 20-22	
Х	* column 9, line 40 * column 9, lines 3 * column 9, lines 3	- column 10, line 6-39 *		8,20-22	
Х	* column 8, lines 1	8-31 *		11,12, 20-22	TECHNICAL FIELDS
Х	* column 8, lines 5 * column 9, line 46 * column 8, lines 5	- column 10, line 7-63 *		13,20-22	HO1F
Х	* column 9, line 40 * column 7, lines 9 * column 8, lines 3 * column 9, line 40	-29 * -17 *		16-22	
Х	US 2003/006395 A1 (AL) 9 January 2003 * paragraphs [0014] [0049] * * claim 1 *	(2003-01-09)		1,20-22	
X X X	* paragraphs [0019] * paragraphs [0047] * paragraphs [0003] [0017], [0040], [, [0049] * , [0004], [0015]	:	11,20-22 13,20-22 16-22	
		-/			
	The present search report has	peen drawn up for all claims			
	Place of search	Date of completion of the			Examiner
	The Hague	18 August 2	800	Str	aub, Florian
X : part Y : part docu A : tech	ATEGORY OF CITED DOCUMENTS ioularly relevant if taken alone ioularly relevant if combined with anot ument of the same category inological background written disclosure	E : earlier after th ner D : docum L : docum	patent docur e filing date ent cited in tl ent cited for c	inderlying the in ment, but publis he application other reasons	hed on, or



EUROPEAN SEARCH REPORT

Application Number EP 07 11 9395

Cata	Citation of document with in	idication, where appropriate,	Relevant	CLASSIFICATION OF THE
Category	of relevant passa		to claim	APPLICATION (IPC)
Х	WO 2004/042747 A (L 21 May 2004 (2004-0	5-21)	1,6, 20-22	
Х	* paragraphs [0042] * paragraphs [0042]	, [0049] *	8-10, 20-22	
Х	* paragraph [0049]	*	11,12, 20-22	
X X	* claim 10 * * paragraphs [0042] * paragraph [0049] * claim 6 *		13,20-22 16,18-22	
Α		* 7 *	1,11,13, 16,18, 20-22	
				TECHNICAL FIELDS SEARCHED (IPC)
	The present search report has b	peen drawn up for all claims		
	Place of search	Date of completion of the search		Examiner
	The Hague	18 August 2008	Stra	aub, Florian
X : part Y : part	ATEGORY OF CITED DOCUMENTS icularly relevant if taken alone icularly relevant if combined with anothument of the same category	T : theory or principle E : earlier patent doc after the filing date D : document cited in L : document oited fo	ument, but publish the application	



Application Number

EP 07 11 9395

CLAIMS INCURRING FEES
The present European patent application comprised at the time of filing claims for which payment was due.
Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):
No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.
LACK OF UNITY OF INVENTION
The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:
see sheet B
All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:
The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



LACK OF UNITY OF INVENTION SHEET B

Application Number

EP 07 11 9395

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 2-7,20-22

Magnetorheological fluid comprising magnetic particles, an oil, a stabiliser and a viscosity modifier, said viscosity modifier is further detailed. Method and use of said magnetorheological fluid.

2. claims: 8-10,20-22

Magnetorheological fluid comprising magnetic particles, an oil, a stabiliser and a viscosity modifier, said stabiliser is further detailed. Method and use of said magnetorheological fluid.

3. claims: 11-12,20-22

Magnetorheological fluid comprising magnetic particles, an oil, a stabiliser and a viscosity modifier, said oil is further detailed. Method and use of said magnetorheological fluid.

4. claims: 13-15,20-22

Magnetorheological fluid comprising magnetic particles, an oil, a stabiliser and a viscosity modifier, plus a further additive, e.g. an antioxidant. Method and use of said magnetorheological fluid.

5. claims: 16-22

Magnetorheological fluid comprising magnetic particles, an oil, a stabiliser and a viscosity modifier, said magnetic particles are further detailed. Method and use of said magnetorheological fluid.

5

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 07 11 9395

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-08-2008

DE 69731833 D1 05-01-2 DE 69731833 T2 15-12-2 EP 0904592 A1 31-03-1 JP 3843302 B2 08-11-2 JP 2001508939 T 03-07-2 WO 9748110 A1 18-12-1 US 2003006395 A1 09-01-2003 DE 10193378 T0 30-01-2 WO 0210281 A1 07-02-2 WO 2004042747 A 21-05-2004 CN 1695211 A 09-11-2 EP 1556872 A1 27-07-2 JP 2006505937 T 16-02-2 KR 20050055018 A 10-06-2 WO 0245102 A 06-06-2002 EP 1344229 A1 17-09-2	Patent document cited in search report		Publication date		Patent family member(s)		Publication date
DE 69731833 D1 05-01-2 DE 69731833 T2 15-12-2 EP 0904592 A1 31-03-1 JP 3843302 B2 08-11-2 JP 2001508939 T 03-07-2 W0 9748110 A1 18-12-1 US 2003006395 A1 09-01-2003 DE 10193378 T0 30-01-2 W0 0210281 A1 07-02-2 W0 2004042747 A 21-05-2004 CN 1695211 A 09-11-2 EP 1556872 A1 27-07-2 JP 2006505937 T 16-02-2 KR 20050055018 A 10-06-2 W0 0245102 A 06-06-2002 EP 1344229 A1 17-09-2	US 2004084263	A1	06-05-2004	NON	E		
WO 0210281 A1 07-02-2 WO 2004042747 A 21-05-2004 CN 1695211 A 09-11-2 EP 1556872 A1 27-07-2 JP 2006505937 T 16-02-2 KR 20050055018 A 10-06-2 WO 0245102 A 06-06-2002 EP 1344229 A1 17-09-2	US 5683615	A	04-11-1997	DE DE EP JP JP	69731833 69731833 0904592 3843302 2001508939	D1 T2 A1 B2 T	18-12-19 05-01-20 15-12-20 31-03-19 08-11-20 03-07-20 18-12-19
EP 1556872 A1 27-07-2 JP 2006505937 T 16-02-2 KR 20050055018 A 10-06-2 WO 0245102 A 06-06-2002 EP 1344229 A1 17-09-2	US 2003006395	A1	09-01-2003				30-01-20 07-02-20
	WO 2004042747	Α	21-05-2004	EP JP	1556872 2006505937	A1 T	09-11-20 27-07-20 16-02-20 10-06-20
JP 2004514783 T 20-05-2	WO 0245102	Α	06-06-2002	JP JP	4104978 2004514783	B2 T	17-09-20 18-06-20 20-05-20 05-02-20

FORM P0459

© For more details about this annex : see Official Journal of the European Patent Office, No. 12/82