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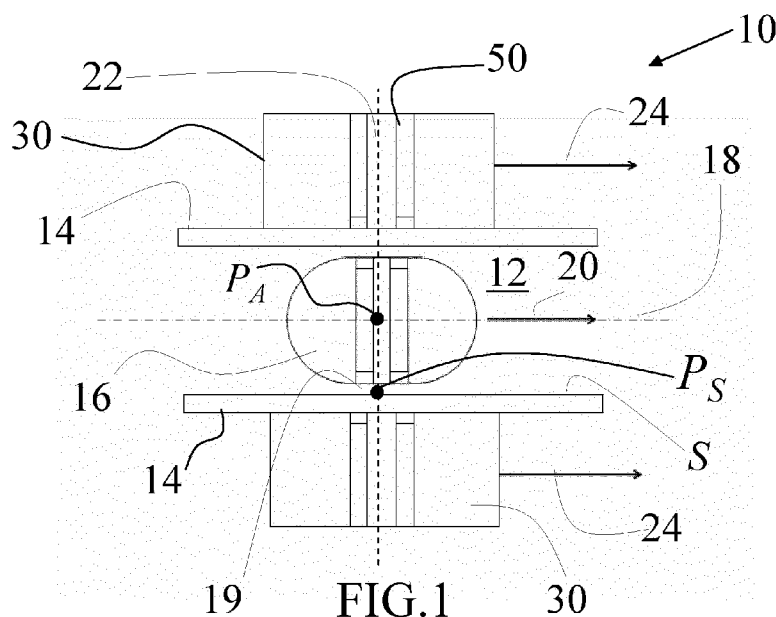
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[Continued on next page]

(54) Title: MIXING OF A MULTIPHASE FLUID



(57) Abstract: The invention in particular relates to a device (10) for mixing a multiphase fluid comprising a mixing chamber (14); a mixing element (16) translatable along a central axis (18) of the mixing chamber (14), the distance between a point (P_s) of the inner surface (S) of the mixing chamber (14) and the central axis (18) being occupied between 85% and 95% by the mixing element (16) along at least one section (22) transverse to the central axis (18). The invention thus allows improved mixing of a multiphase fluid.



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *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))*

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

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

20 December 2012

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/054392

A. CLASSIFICATION OF SUBJECT MATTER INV. B01F11/00 B01F13/08 G01N11/10 E21B49/08 G01N7/00 G01N33/28 ADD. 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) B01F G01N E21B 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 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Category*</th> <th style="width: 70%;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="width: 20%;">Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">X Y A</td> <td style="vertical-align: top;"> DE 101 28 460 A1 (LICHT MICHAEL [DE]) 2 January 2003 (2003-01-02) paragraph [0001] paragraph [0021] figures 1-3 ----- </td> <td style="vertical-align: top;"> 1,4,5, 11,15 9,10,13, 14,16 2,3,6-8, 12 </td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X Y A</td> <td style="vertical-align: top;"> EP 0 105 834 A2 (GREINER ELECTRONIC AG [CH]) 18 April 1984 (1984-04-18) page 3, line 6 - line 25 page 4, line 19 - line 27 figure ----- -/- </td> <td style="vertical-align: top;"> 1-7,11, 15 9,10,13, 14,16 8,12 </td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X Y A	DE 101 28 460 A1 (LICHT MICHAEL [DE]) 2 January 2003 (2003-01-02) paragraph [0001] paragraph [0021] figures 1-3 -----	1,4,5, 11,15 9,10,13, 14,16 2,3,6-8, 12	X Y A	EP 0 105 834 A2 (GREINER ELECTRONIC AG [CH]) 18 April 1984 (1984-04-18) page 3, line 6 - line 25 page 4, line 19 - line 27 figure ----- -/-	1-7,11, 15 9,10,13, 14,16 8,12
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X Y A	DE 101 28 460 A1 (LICHT MICHAEL [DE]) 2 January 2003 (2003-01-02) paragraph [0001] paragraph [0021] figures 1-3 -----	1,4,5, 11,15 9,10,13, 14,16 2,3,6-8, 12									
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☒ Further documents are listed in the continuation of Box C. ☒ 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 "E" earlier application or patent 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											
Date of the actual completion of the international search 8 October 2012		Date of mailing of the international search report 29/10/2012									
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 Real Cabrera, Rafael									

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2012/054392

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 109 370 A5 (BERNARD DU GRAIL ALAIN) 26 May 1972 (1972-05-26)	1-7,11, 15
Y	page 1, line 1 - line 5	9,10,13,
	page 2, line 4 - line 21	14,16
A	page 3, line 5 - line 30 figure 1	8,12

X	WO 98/39099 A1 (ARGONAUT TECHNOLOGIES INC [US]; ZUELLIG MARC [US]; LONG TERRY [US]; WA) 11 September 1998 (1998-09-11)	1-3,5-8, 11,15
Y	page 4, line 22 - line 31	9,10,13,
	page 11, line 24 - page 12, line 6	14,16
A	page 13, line 12 - page 14, line 2 page 24, line 1 - page 25, line 6 figures 1B,1C,14	4,12

X	US 3 356 346 A (KURT LANDSBERGER) 5 December 1967 (1967-12-05)	1-5,11, 15
Y	column 1, line 9 - line 19	9,10,13,
	page 2, line 15 - line 24	14,16
A	page 2, line 37 - line 53 figures 1,4	6-8,12

X	WO 2009/108501 A2 (HACH CO [US]; ANDERSON RANDOLPH DUANE [US]; MALKOV VADIM B [US]; LARSE) 3 September 2009 (2009-09-03)	1,4,5,7, 11,15
Y	page 1, line 8 - line 19	9,10,13,
	page 11, line 19 - line 28	14,16
A	figure 4	2,3,6,8, 12

X	DE 43 15 363 C1 (KERNFORSCHUNGSZ KARLSRUHE [DE]; BUEHLER EDMUND GMBH & CO [DE]) 20 October 1994 (1994-10-20)	1,4,5, 11,15
Y	page 2, line 3 - line 7	9,10,13,
	page 3, line 66 - page 4, line 6	14,16
A	figure 1	2,3,6-8, 12

X	DE 37 29 351 A1 (THIEDIG & CO DR [DE]) 16 March 1989 (1989-03-16)	1-9,11, 15
Y	column 2, line 17 - line 27	10,13,
	column 2, line 32 - line 61	14,16
A	column 4, line 6 - line 24 figure	12

Y	US 2 498 393 A (CLEWELL DAYTON H) 21 February 1950 (1950-02-21)	9,10,13, 14,16
A	column 1, line 1 - line 26 column 1, line 41 - column 2, line 28 column 3, line 4 - line 31 figure 1	1-8,11, 12,15

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/054392

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2007/027100 A1 (SINVENT AS [NO]; LINDEBERG ERIK GOESTA BRUNO [NO]) 8 March 2007 (2007-03-08) cited in the application the whole document -----	1-16
A	FR 2 782 801 A1 (ARMINES ASS POUR LA RECH ET LE [FR]) 3 March 2000 (2000-03-03) page 1, line 4 - line 6 page 2, line 4 - line 20 page 6, line 7 - line 9 figure -----	1-16
A	FR 2 572 530 A1 (ARMINES [FR]) 2 May 1986 (1986-05-02) page 1, paragraph 1 page 3, paragraph 5 - paragraph 6 figure 1 -----	1-16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2012/054392

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☒ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8, 11, 12, 15

Mixing device having a mixing element with penetrating profiles and having a magnet around the mixing chamber that can be moved along the central axis.

1.1. claims: 1-5, 11, 12, 15

Mixing device having a mixing element with penetrating profiles.

1.2. claims: 6-8

Mixing device having a magnet around the mixing chamber that can be moved along the central axis.

2. claims: 9, 10

Device for measuring physical properties of a multiphase fluid having a mixing chamber constituting a PVT cell.

3. claims: 13, 14

Method for mixing a multiphase fluid in which the viscous phase is heavy oil and the fluid also comprises a gaseous phase.

4. claim: 16

Method of producing hydrocarbons.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/054392

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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