



(43) International Publication Date
6 December 2012 (06.12.2012)

- (51) International Patent Classification:
E21B 21/06 (2006.01) *E02F 5/30* (2006.01)
- (21) International Application Number:
PCT/US2012/040573
- (22) International Filing Date:
1 June 2012 (01.06.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/493,307 3 June 2011 (03.06.2011) US
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- (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, 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, 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).

Published:

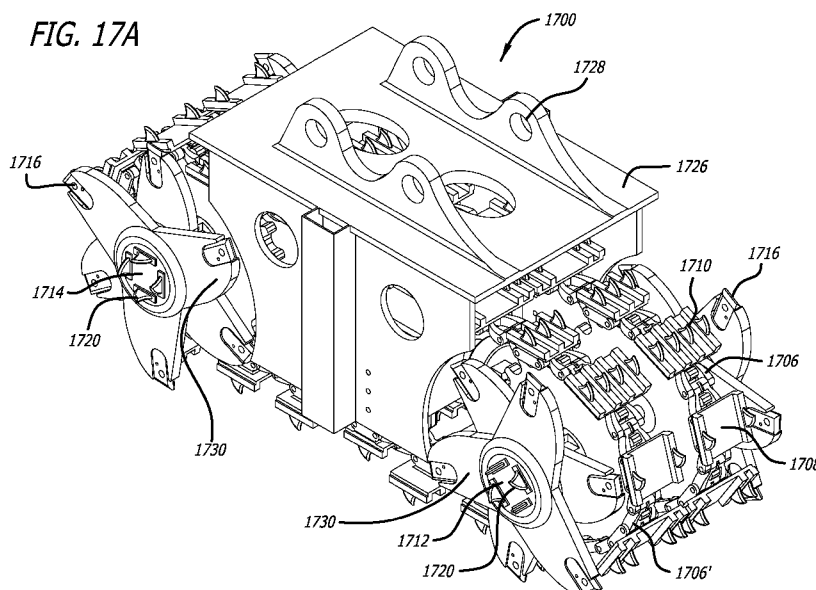
— with international search report (Art. 21(3))

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

28 March 2013

(54) Title: LUBRICATED SOIL MIXING SYSTEMS AND METHODS

FIG. 17A



(57) Abstract: Described herein are tools, systems and methods for conditioning, strengthening and/or improving in situ soil geo-technical or agricultural properties while at least temporarily reducing soil density, energy requirements and tool wear.

A. CLASSIFICATION OF SUBJECT MATTER**E21B 21/06(2006.01)i, E02F 5/30(2006.01)i**

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)

E21B 21/06; E02F 5/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: soil, mixing, slurry, anti-clogging, agent, nozzle, drum, chain, cutting, blade and similar terms

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	US 6485234 B2 (JOHNSON, JAMES O.) 26 November 2002 See column 3 line 62-column 4 line 22 and figures 1-3.	1-3,8,9 20,21 22
Y A	JP 10-195911 A (MATSUZAKI, KATSUAKI) 28 July 1998 See paragraphs 7, 8 and figure 3.	20-22 1-3,8,9
Y A	WO 01-92647 A1 (FERGUSSON, GORDON MACDONEL et al.) 06 December 2001 See abstract and figure 1.	22 1-3,8,9,20,21
Y A	US 2011-0089745 A1 (REINHARDT, WOLFGANG) 21 April 2011 See figures 1, 2.	20,21 1-3,8,9,22
A	EP 2278075 A1 (LIME COLUMN METHOD AB) 26 January 2011 See paragraphs 34-37 and figures 4-6.	1-3,8,9,20-22



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 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

29 NOVEMBER 2012 (29.11.2012)

Date of mailing of the international search report

30 NOVEMBER 2012 (30.11.2012)

Name and mailing address of the ISA/KR

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Facsimile No. 82-42-472-7140

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/040573**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.: 17, 19, 23 and 24
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:
See extra sheet.
3. ☒ Claims Nos.: 4-7, 10-16 and 18
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:

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 fee, this Authority did not invite payment of any additional fee.
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.

Continuation of Box No. II:

1. Claim 17 does not meet the requirement of PCT Article 6 in that the matter for which protection is sought is not clearly defined because claim 17 is dependent on the multiple dependent claim 16 which does not comply with PCT Rule 6.4(a).
2. Claim 19 is found twice. Thus claim 19 does not meet the requirement of PCT Article 6, because the subject matter for which protection is sought is not clearly defined.
3. Claims 23 and 24 attempt to define the subject matter in terms of "as herein described" without describing specific technical features. Therefore, the intended limitations are not clear from these claims, contrary to the requirements of PCT Article 6.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/040573

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		DE 102008016673 A1	08.10.2009
		EP 2265769 A1	29.12.2010
		WO 2009-118386 A1	01.10.2009
EP 2278075 A1	26.01.2011	None	