



(43) International Publication Date
15 November 2012 (15.11.2012)

(51) International Patent Classification:
B02C 13/28 (2006.01) *B02C 13/04* (2006.01)
(21) International Application Number:
PCT/US2012/037803
(22) International Filing Date:
14 May 2012 (14.05.2012)
(25) Filing Language: English
(26) Publication Language: English
(30) Priority Data:
61/485,427 12 May 2011 (12.05.2011) US

(72) Inventor; and
(71) Applicant (for all designated States except US): **GENESIS III, INC.** [US/US]; 5575 Lyndon Rd., Prophetstown, IL 61277 (US).
(74) Agent: **HAMILTON, Jay, R.**; Hamilton IP Law, PC, Patent Attorney, 331 W. 3rd St. NVC Suite 120, Davenport, IA 52801 (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, 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,

[Continued on next page]

(54) Title: HAMMER

(57) Abstract: The various embodiments disclosed and pictured illustrate a hammer for comminuting various materials. The embodiments pictured and described herein are primarily for use with a rotatable hammermill assembly. The double end hammer includes a connection portion having a slot therein and two contact ends for delivery of energy to the material to be comminuted. The contact ends may be formed with a cavity therein. The contact ends may also be formed with an angle on the contact end periphery. The cavity and/or the angle on the contact end periphery may be used with hammers other than the double end hammers.

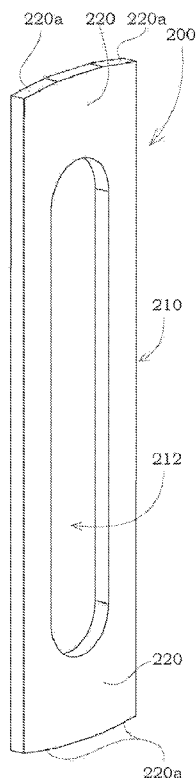


FIG. 24A



WO 2012/155138 A3



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.

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).

(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,

Published:

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

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

14 March 2013

A. CLASSIFICATION OF SUBJECT MATTER***B02C 13/28(2006.01)i, B02C 13/04(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)

B02C 13/28; B02C 17/16; B02C 13/02; B02C 13/00; B02C 13/04

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: recess hammer, rotatable hammermill assembly, cavity, semi-circular, double end hammer, slot, catch, ridge

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2011-0042498 A1 (ROGER T. YOUNG et al.) 24 February 2011. See the entire document.	1-15
A	US 7325761 B2 (Michael Ming-Ming Chen) 05 February 2008. See the entire document.	1-15
A	US 06045072 A (MELVIN A. ZEHR) 04 April 2000. See the entire document.	1-15
A	US 7419109 B1 (RON R. RONFELDT et al.) 02 September 2008. See the entire document.	1-15
A	US 2009-0321546 A1 (CHAD J. PLUMB et al.) 31 December 2009. See the entire document.	1-15



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

15 NOVEMBER 2012 (15.11.2012)

Date of mailing of the international search report

16 NOVEMBER 2012 (16.11.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

CHANG, BONG HO

Telephone No. 82-42-481-3353



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/037803**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:

Group 1: Claims 1-7 relate to a recess hammer characterized with configuration of its components.

Group 2: Claims 8-15 relate to a double end hammer characterized with its components such as a slot, a catch and a ridge.

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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/037803

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