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- (81) **Designated States (unless otherwise indicated, for every
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GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP,
KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT,
LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA,
NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC,
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European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** METHOD FOR TREATING LIGNOCELLULOSIC MATERIALS

Southern yellow pine TMP

Sample	Burst Index kPa·m ² /g	Tear Index mN·m ² /g	Tensile Index kN·m/g	Printing opacity %	Scattering coefficient m ² /kg	ISO Brightness %	Energy Consumption W·h/kg	CSF ml
Control	0.54	3.04	0.015	94.5	35.7	38.6	2,118	290
Control	0.60	2.67	0.018	96.5	40.0	39.7	2,312	185
Control	0.53	2.27	0.018	96.8	41.5	40.2	2,449	115
DEO 10ml/kg	0.71	4.32	0.018	96.6	36.3	37.8	1,261	310
DEO 10ml/kg	0.75	3.49	0.020	97.1	40.9	41.9	1,497	161
DEO 10ml/kg	0.73	2.72	0.021	97.8	46.1	43.7	1,579	90
DEO 40ml/kg	0.66	3.29	0.017	98.8	49.1	40.0	1,143	200
DEO 40ml/kg	0.75	2.94	0.020	99.1	53.3	40.7	1,316	75
DEO 40ml/kg	0.76	2.82	0.021	99.2	54.4	40.4	1,368	38

(57) **Abstract:** The present invention is a method for producing a pulp from a fibrous lignocellulose material or source using a treatment or pretreatment step which exposes the material to oxalic acid derivatives, particularly dialkyl ester derivatives, particularly in the vapor phase. Once treated, the material may be refined using any one of the several pulping methods to produce a final pulp product and the production of the product is accompanied by strength increases in paper made from the pulp and energy savings in making the pulp, hi addition the treatment or pretreatment produces a soluble carbohydrate source and other components (e.g. acetic acid, other wood components) for further product development. In certain cases a pulp product is not produced and all of the carbohydrate present in the lignocellulose is converted into soluble sugars.



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INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER
 USPC- 162/76, 162/164.7
 IPC(8)- D21C 3/04, D21H 11/16, D21H 11/20 (2007.01)
 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)
 USPC- 162/76, 162/164.7
 IPC(8)- D21C 3/04, D21H 11/16, D21H 11/20 (2007.01)

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)
 WEST DB=USPT; PLUR=NO; OP=ADJ
 www.patentstorm.com 1/4/07 Search Results for "oxalic acid pretreatment lignocellulose"
 www.treesearch.fs.fed.us 1/02/2007: Search Results for oxalic acid and lignocellulose

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/0041985 A1 (Akhtar et al.) 06 March 2003 (06.03.2003) para.9-11, examples 1-9.	24
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Y		1-23
Y	A biopulping mechanism: Creation of acid groups on fiber, Hunt et.al. (2004) Holzforshung, Vol. 58, pp. 434-439.	1-23
Y	A New Mechanism of Biopulping: Attachment of Acid Groups on Fiber, Kenealy et.al. October 2004 (10.2004) Ninth International Conference on Biotechnology in the Pulp and Paper Industry; Durban, South Africa, 10-14.	1-14, 20-23
Y	US 6,569,285 B2 (Bryant et al.) 27 May 2003 (27.05.2003) Col.4, lines 6-14, lines 18-23.	14
Y	US 5,705,369 A (Target et al.) 6 January 1998 (06.01.1998) Col. 9, line 43 to Col.10, line 60, Col.8, lines 30-44.	14-17, 19
Y	US 4,511,433 A (Toumier et al.) 16 April 1985 (16.04.1985) Col. 1, lines 15-25; Col.2, lines 9-17	7-10, 13, 16, 18, 21
Y	US 1,856,567 A (Kleinert et al.) 3 May 1932 (03.05.1932) Col.2, lines 9-17	13, 18, 21
A	Oxalic Acid Pretreatment for Mechanical Pulping Greatly Improves Paper Strength while Maintaining Scattering Power and Reducing Shives and Triglycerides, Swaney, R., et al. 2003 TAPPI Fall Technical Conference: Engineering, Pulping & PCE&I. Atlanta, GA: TAPPI Press, c2003.	1-24

Further documents are listed in the continuation of Box C.

<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p>
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