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14/021,091 9 September 2013 (09.09.2013) 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, BN, 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, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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.

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**Declarations under Rule 4.17:**

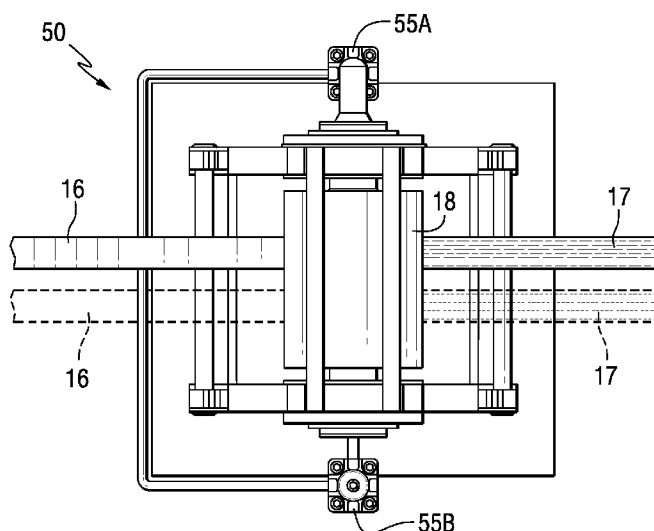
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

**Published:**

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

- (88) **Date of publication of the international search report:**  
1 May 2014

(54) **Title:** APPARATUS AND METHODS FOR CREATING A WOOD GRAIN APPEARANCE ON SHEET MATERIAL



(57) **Abstract:** A depth-changing pattern for simulating a wood grain appearance is debossed on strip material (16), such as a metal or steel sheet, by longitudinally feeding the strip material (16) past a debossing drum (18) having upraised protrusions (22) with transversely-varying depths that impact the surface of the strip material (16), forming depressions in the surface as the sheet (16) is pulled past the debossing drum (18). As the sheet material (16) is pulled through the debossing drum assembly (50), it is moved in a direction parallel with the rotational axis of the debossing drum (18) and transverse to the direction of material feed, thereby creating a random or non-repeating and depth-changing pattern. The strip material (16) may then be subjected to further processing steps such as forming, coloring and staining to produce an article having a realistic wood grain appearance.



## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2013/058703

A. CLASSIFICATION OF SUBJECT MATTER  
INV. B44B5/00 B44F9/02  
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)  
B44B B44F B44C B41F

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

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 682 540 A (EASTMAN ROBERT J [US] ET AL) 28 July 1987 (1987-07-28) column 2, line 20 - line 60 figure 2	17
X	----- US 3 655 312 A (ERB EDWARD R ET AL) 11 April 1972 (1972-04-11) column 3, line 10 - line 53 column 5, line 33 - line 55 figure 3	1-6
X	----- US 2011/023734 A1 (HOFFMANN LARS [DE]) 3 February 2011 (2011-02-03) paragraph [0046] - paragraph [0053] figures 2a-c	12-15
A	----- -/-	1-6



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

2 April 2014

Date of mailing of the international search report

10/04/2014

Name and mailing address of the ISA/

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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2013/058703

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 10 2008 005599 B3 (SCHULTE GUIDO [DE]) 22 January 2009 (2009-01-22) the whole document -----	12-15,17
Y	EP 2 253 470 A1 (FLOORING TECHNOLOGIES LTD [MT]) 24 November 2010 (2010-11-24) paragraph [0024] - paragraph [0025] -----	12-15,17
A	DE 10 2006 024571 B3 (SCHULTE GUIDO [DE]) 16 August 2007 (2007-08-16) paragraph [0014] - paragraph [0021] figures 1,3 -----	1-6, 12-15,17
X	US 2004/139673 A1 (LUETGERT KARINE [US] ET AL) 22 July 2004 (2004-07-22) paragraph [0020] - paragraph [0025] figures 1-7 -----	7-11, 16-20
X	GB 1 105 365 A (LAWRENCE GRAHAM BUCKLEY) 6 March 1968 (1968-03-06) the whole document -----	7-11, 16-20
A	US 2009/202810 A1 (KIMBERLY LAWRENCE W [US]) 13 August 2009 (2009-08-13) the whole document -----	17-20
A	US 2007/275169 A1 (POHLMANN CEVIN MARC [DE]) 29 November 2007 (2007-11-29) the whole document -----	7-11, 16-20

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2013/058703

## 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: 1-6, 12-15(completely); 17(partially)

According to claim 1 at least one of the debossing drum and an opposing drum are supported by at least one height-adjustable piston that moves the debossing and opposing drums toward or away from each other to a position in which opposing surfaces of the debossing and opposing drum are unequally spaced from each other on one longitudinal end of the debossing and opposing drums in comparison with another longitudinal end of the debossing and opposing drums. In the corresponding method according to claim 12, the debossing assembly moves the sheet material in a transverse direction as the sheet material is being fed through the debossing assembly. This leads to a non-repeating pattern on the sheet material (see claim 17 partially).

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2. claims: 7-11, 16, 18-20(completely); 17(partially)

According to claim 7, the debossing drum comprises protrusions extending from a generally cylindrical surface of the debossing drum, said protrusions having different depths in different regions along the transverse length of the debossing drum. In a corresponding method according to claim 16, said debossing drum contacts the sheet material. This leads to a depth-changing pattern on the sheet material (see claim 17 partially).

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/058703

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4682540	A	28-07-1987	NONE
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