

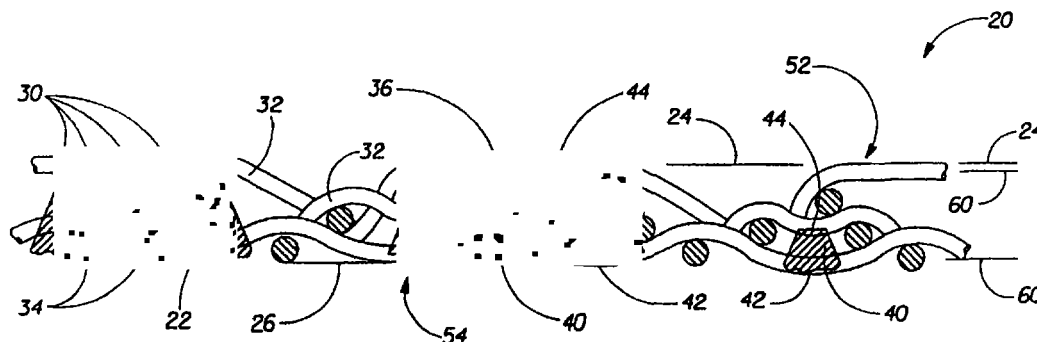


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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <b>(51) International Patent Classification <sup>6</sup>:</b><br><br><b>D21F 11/00</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 99/67461</b><br><br><b>(43) International Publication Date:</b> 29 December 1999 (29.12.99)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>(21) International Application Number:</b> PCT/US99/13078<br><br><b>(22) International Filing Date:</b> 9 June 1999 (09.06.99)<br><br><b>(30) Priority Data:</b><br>09/104,793                      25 June 1998 (25.06.98)                      US<br><br><b>(71) Applicant:</b> THE PROCTER & GAMBLE COMPANY<br>[US/US]; One Procter & Gamble Plaza, Cincinnati, OH<br>45202 (US).<br><br><b>(72) Inventors:</b> TROKHAN, Paul, Dennis; 1356 Warvel Road,<br>Hamilton, OH 45013 (US). HUSTON, Larry, Leroy; 8141<br>Pepperwood Drive, West Chester, OH 45069 (US).<br><br><b>(74) Agents:</b> REED, T., David et al.; The Procter & Gamble<br>Company, 5299 Spring Grove Avenue, Cincinnati, OH<br>45217-1087 (US). |           | <b>(81) Designated States:</b> AE, AL, AM, AT, AT (Utility model), AU,<br>AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ<br>(Utility model), DE, DE (Utility model), DK, DK (Utility<br>model), EE, EE (Utility model), ES, FI, FI (Utility model),<br>GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,<br>KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG,<br>MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE,<br>SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA,<br>UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE,<br>LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ,<br>BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE,<br>CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,<br>NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA,<br>GN, GW, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.</i> |

**(54) Title:** PAPERMAKING BELT HAVING REINFORCING PILES**(57) Abstract**

A woven papermaking belt having a paper contacting top surface plane (24) and an opposed backside (26). The belt comprises a fabric (22) having yarns disposed, in part, in the top surface plane to form knuckles (36). The belt further comprises reinforcing piles (40) extending from a proximal end (42) to a distal end (44). The distal ends (44) of the reinforcing piles (40) are disposed between the top surface plane (24) of the papermaking belt and the backside (26) of the papermaking belt. The reinforcing piles (40) resist applied loads and may prevent deflection of the knuckles (36) during the papermaking process. The applied loads may either be normal to the belt, as occurs during imprinting, within the plane of the belt, which causes sleaziness of the belt, or both. The belt according to the present invention may have piles (40) with proximal ends (42) disposed at two or more different elevations, as well as distal ends (44), which are disposed at two or more elevations. This arrangement provides a belt which imprints different densities onto paper during papermaking, according to the ability of the piles (40) to resist compressive loads applied normal to the plane of the belt. In one alternative embodiment, the piles (40) may be disposed between the first and second layers of a multi-layer papermaking belt. The belt according to the present invention is particularly suitable for woven papermaking fabrics having long, unsupported knuckles.



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