

(19) World Intellectual Property Organization
International Bureau



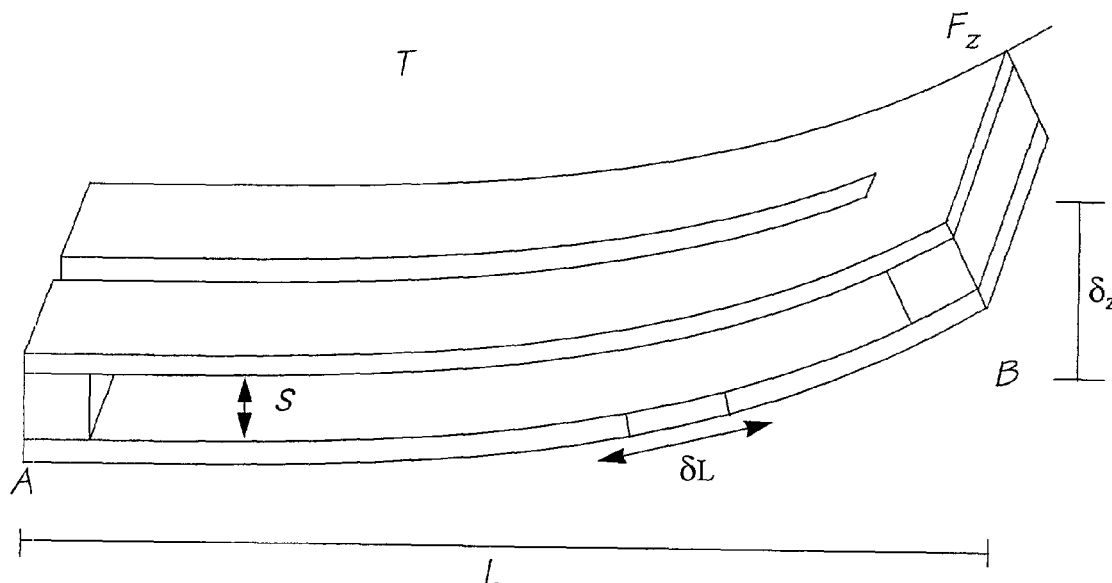
(43) International Publication Date
25 April 2002 (25.04.2002)

PCT

(10) International Publication Number
WO 02/32806 A1

- (51) International Patent Classification⁷: **B81C 1/00**, B81B 7/02, B41J 2/045, H02N 10/00
- (21) International Application Number: PCT/AU01/01332
- (22) International Filing Date: 19 October 2001 (19.10.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
09/693,079 20 October 2000 (20.10.2000) US
- (71) Applicant (for all designated States except US): **SILVERBROOK RESEARCH PTY LTD** [AU/AU]; 393 Darling Street, Balmain, New South Wales 2041 (AU).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **MCAVOY, Gregory, John** [IE/AU]; Silverbrook Research Pty Ltd, 393 Darling Street, Balmain, New South Wales 2041 (AU). **SILVERBROOK, Kia** [AU/AU]; Silverbrook Research Pty Ltd, 393 Darling Street, Balmain, New South Wales 2041 (AU).
- (74) Agent: **SILVERBROOK, Kia**; Silverbrook Research Pty Ltd, 393 Darling Street, Balmain, New South Wales 2041 (AU).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
- 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: THERMOELASTIC ACTUATOR DESIGN



(57) Abstract: The invention concerns design of thermoelectric actuators incorporating an expansive element formed from material selected in accordance with a procedure involving the derivation of an indicator of the material's potential effectiveness for each application. Indicator ϵ is derived from: $\epsilon\gamma=E\gamma^2T/\rho C$ where E is Young's modulus of the material, γ is coefficient of thermal expansion, T is maximum operating temperature, ρ is density and C is specific heat capacity. Elements may be selected from a group including: borides, carbides, nitrides or silicides of chromium, molybdenum, niobium, tantalum, titanium, tungsten, vanadium or zirconium.