

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
15 April 2004 (15.04.2004)

PCT

(10) International Publication Number
WO 2004/031583 A1

(51) International Patent Classification⁷: **F04B 53/14**,
F16J 10/02, F16F 7/09

(21) International Application Number:
PCT/DK2003/000653

(22) International Filing Date: 2 October 2003 (02.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PA 2002 01479 2 October 2002 (02.10.2002) DK
PA 2003 00945 24 June 2003 (24.06.2003) DK

(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, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(71) Applicant (for all designated States except US): **NVB COMPOSITES INTERNATIONAL A/S** [DK/DK]; Gaerdet 12, P.O. Box 69, DK-3460 Birkerød (DK).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **VAN DER BLOM, Nicolaas** [NL/DK]; Gaerdet 12, Dk-3460 Birkerød (DK).

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: A COMBINATION OF A CHAMBER AND A PISTON, A PUMP, A SHOCK ABSORBER, A TRANSDUCER, A MOTOR AND A POWER UNIT INCORPORATING THE COMBINATION

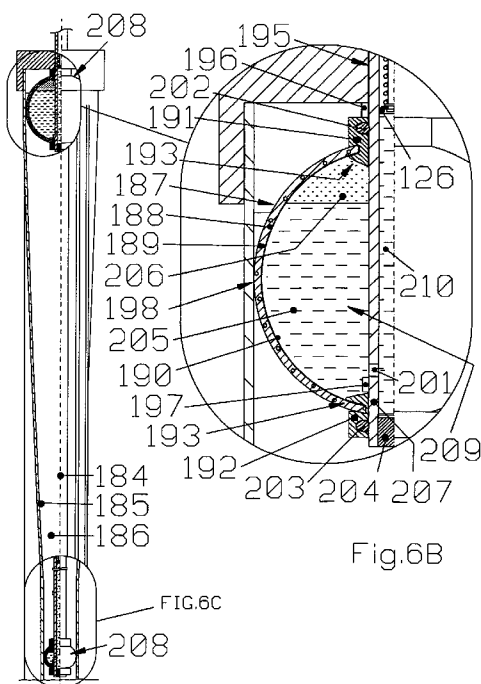


Fig.6B

FIG.6C

(57) Abstract: A piston-chamber combination comprising an elongate chamber which is bounded by an inner chamber wall, and comprising a piston in said chamber to be sealingly movable relative to said chamber wall at least between a first longitudinal position and a second longitudinal position of the chamber, said chamber having cross-sections of different cross-sectional areas and different circumferential lengths at the first and second longitudinal positions, and at least substantially continuously different cross-sectional areas and circumferential lengths at intermediate longitudinal positions between the first and second longitudinal positions, the cross-sectional area and circumferential length at said second longitudinal position being smaller than the cross-sectional area and circumferential length at said first longitudinal position, said piston comprising a container which is elastically deformable thereby providing for different cross-sectional areas and circumferential lengths of the piston adapting the same to said different cross-sectional areas and different circumferential lengths of the chamber during the relative movements of the piston between the first and second longitudinal positions through said intermediate longitudinal positions of the chamber. The piston is produced to have a production-size of the container in the stress-free and undeformed state thereof in which the circumferential length of the piston is approximately equivalent to the circumferential length of said chamber at said second longitudinal position, the container being expandable from its production size in a direction transversally with respect to the longitudinal direction of the chamber thereby providing for an expansion of the piston from the production size thereof during the relative movements of the piston from said second longitudinal position to said first longitudinal position.