



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

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>(51) International Patent Classification <sup>7</sup>:</b><br><b>B05B 1/02, B01D 45/12</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 00/40338</b><br><b>(43) International Publication Date:</b> 13 July 2000 (13.07.00)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>(21) International Application Number:</b> PCT/EP99/10496<br><b>(22) International Filing Date:</b> 29 December 1999 (29.12.99)<br><b>(30) Priority Data:</b><br>09/223,885      31 December 1998 (31.12.98)      US<br><b>(71) Applicant (for all designated States except US):</b> SHELL<br>INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.<br>[NL/NL]; Carel van Bylandtlaan 30, NL-2596 HR The<br>Hague (NL).<br><b>(72) Inventors; and</b><br><b>(75) Inventors/Applicants (for US only):</b> TJEENK WILLINK,<br>Cornelis, Antonie [NL/NL]; Volmerlaan 8, NL-2288 GD<br>Rijswijk (NL). BETTING, Marco [NL/NL]; Volmerlaan<br>8, NL-2288 GD Rijswijk (NL). VAN HOLTEN, Theodor<br>[NL/NL]; Kluiverweg 1, NL-2629 HS Delft (NL). VAN<br>VEEN, Johannes, Miguel, Henri, Maria [NL/NL]; Czaar<br>Peterstraat 229, NL-1018 PL Amsterdam (NL). |           | <b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG,<br>BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE,<br>ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP,<br>KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA,<br>MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU,<br>SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG,<br>US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE,<br>LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM,<br>AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT,<br>BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU,<br>MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM,<br>GA, GN, GW, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.</i><br><i>Before the expiration of the time limit for amending the</i><br><i>claims and to be republished in the event of the receipt of</i><br><i>amendments.</i> |
| <b>(54) Title:</b> A NOZZLE FOR SUPERSONIC GAS FLOW AND AN INERTIA SEPARATOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>(57) Abstract</b><br><p>A nozzle of converging-diverging shape for creating mist flow at supersonic velocity comprising: a throat having a characteristic diameter <math>D^*</math>; an inlet having a characteristic diameter <math>D_1</math>, positioned a distance <math>L_1</math> upstream of the nozzle throat; and an outlet having a characteristic diameter <math>D_2</math>, positioned a distance <math>L_2</math> downstream of the nozzle throat, wherein the ratio of <math>L_2/(D_2-D^*)</math> is larger than 4, but smaller than 250; an inertia separator based thereon, and a method for supersonic separation of one or more components of a predominantly gaseous stream.</p>                                                                                                                                     |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |