

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 June 2007 (07.06.2007)

PCT

(10) International Publication Number
WO 2007/065001 A3

(51) International Patent Classification:
A62C 5/00 (2006.01)

(21) International Application Number:
PCT/US2006/046247

(22) International Filing Date:
29 November 2006 (29.11.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/741,022 29 November 2005 (29.11.2005) US

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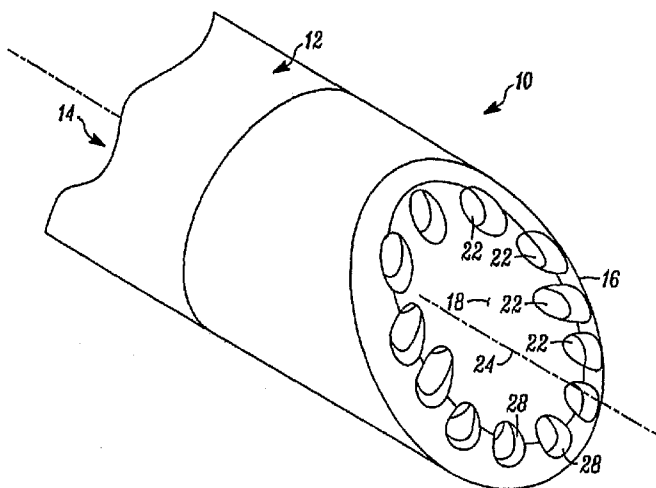
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,

[Continued on next page]

(54) Title: SPRAY NOZZLES



(57) Abstract: A nozzle for discharging first and second fluids in a spray pattern into a vessel, such as oil and steam in a catalytic cracking unit, includes various configurations for preventing erosion of the outlet portion of the nozzle that otherwise might be due, for example, to contact with a catalyst or other predetermined substance. In one such nozzle, the exterior surface of the outlet portion substantially conforms to the internal contour of the vessel. In another such nozzle, the outlet portion defines a plurality of substantially concentric, substantially elliptical-shaped outlet apertures. In another nozzle, the outlet portion is formed of ceramic and is connected to the inlet portion by a metal connector. In another nozzle, the outlet portion defines a plurality of apertures angularly spaced about a peripheral region of the outlet portion for discharging a substantially flat fan spray pattern, and a second outlet portion extending along an upstream portion of the outlet portion for discharging at least part of its spray to prevent any catalyst from contactin the downstream surfaces of the outlet ortion.

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ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (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*

(88) Date of publication of the international search report:
1 November 2007

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.