



(51) International Patent Classification:
B04B 5/04 (2006.01)

(21) International Application Number:
PCT/US2010/051631

(22) International Filing Date:
6 October 2010 (06.10.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/249,058 6 October 2009 (06.10.2009) US

(71) Applicant (for all designated States except US): **KBI BIOPHARMA, INC.** [US/US]; 1101 Hamlin Road, P.O. Box 15579, Durham, North Carolina 27704 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MEHTA, Sunil** [IN/US]; 2109 Jadewood Drive, Morrisville, North Carolina 27560 (US). **HERMAN, Tod** [US/US]; 5624 Bowater Crossing, Hillsborough, North Carolina 27278 (US). **MCMAHON, Joe** [US/US]; 102 Falkner Drive, Chapel Hill, North Carolina 27517 (US). **WILSON, Stephen** [AU/AU]; 40 Maitland Street, Glen Iris, Victoria 3146 (AU). **FITZPATRICK, Ian** [AU/AU]; 51 Canadian Bay Road, Mount Eliza, Victoria 3930 (AU). **CRAIG,**

Timothy [AU/AU]; 38 Bayview Road, Tooradin, Victoria 3980 (AU).

(74) Agent: **MYERS BIGEL SIBLEY & SAJOVEC, P.A.;** P.O. Box 37428, Raleigh, North Carolina 27627 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, 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, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: METHODS, SYSTEMS AND APPARATUS FOR MANIPULATING PARTICLES

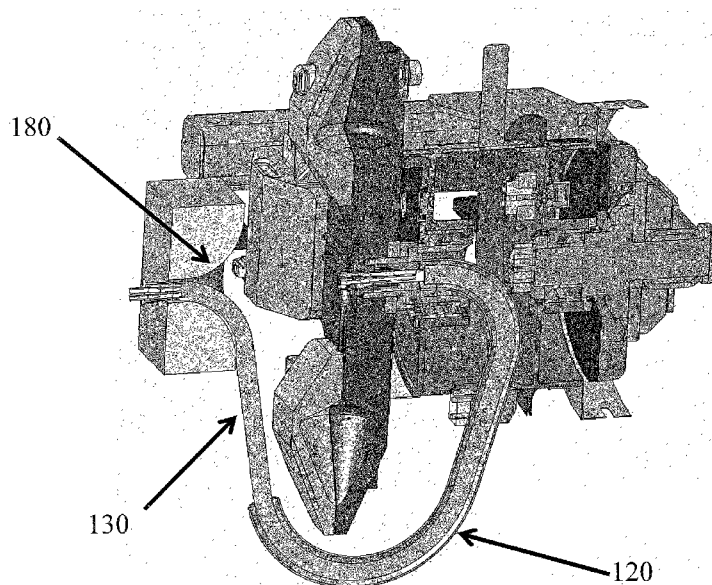


Figure 14D

(57) Abstract: An apparatus for manipulating particles includes : a rotor rotatable at a speed about an axis, the rotor having an outer periphery and front and rear opposite sides; at least one chamber (50) mounted on the rotor, each chamber having an inlet and an outlet; an umbilical assembly rotatable about the axis; and a drive mechanism configured to rotate the umbilical assembly at about one-half the speed of the rotor. The umbilical assembly includes: a curvilinear guide tube (125) connecting to a drum at the rear side of the rotor; a flexible conduit (130) residing in the guide tube; and first and second elongate passageways (135) for each chamber extending through the conduit, wherein the first passageway is in fluid communication with the inlet of a respective chamber and the second passageway is in fluid communication with the outlet of the respective chamber. The passageways are held in a spaced-apart relationship relative to one another.



Published:

— with international search report (Art. 21(3))

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))