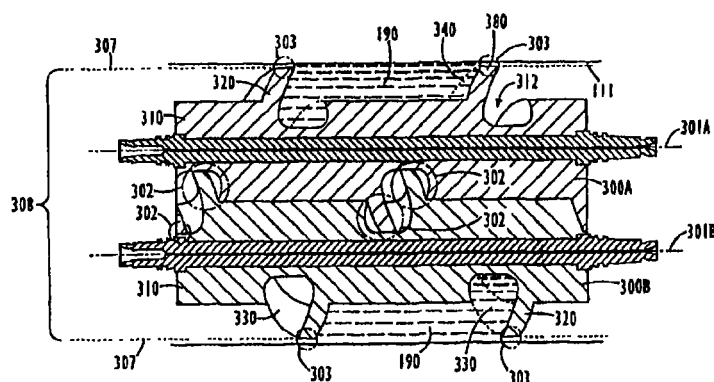




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <b>(51) International Patent Classification 7 :</b><br><br><b>F01C 1/16</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 00/58605</b><br><br><b>(43) International Publication Date:</b> 5 October 2000 (05.10.00)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>(21) International Application Number:</b> PCT/US00/06375<br><br><b>(22) International Filing Date:</b> 10 March 2000 (10.03.00)<br><br><b>(30) Priority Data:</b><br>09/283,118      31 March 1999 (31.03.99)      US<br><br><b>(71) Applicant (for all designated States except US):</b> MICRO MOTION, INC. [US/US]; 7070 Winchester Circle, Boulder, CO 90301 (US).<br><br><b>(72) Inventor; and</b><br><b>(75) Inventor/Applicant (for US only):</b> DIAZ, Daniel, Joseph [US/US]; 534 St. Andrews Circle, Statesboro, GA 30458 (US).<br><br><b>(74) Agents:</b> MEEKS, Robert, M. et al.; Myers, Bigel, Sibley & Sajovec, P.A., P.O. Box 37428, Raleigh, NC 27627 (US). |           | <b>(81) Designated States:</b> AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, 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), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.</i><br><br><br>*G00001* |

**(54) Title:** HELICAL ROTOR STRUCTURES FOR FLUID DISPLACEMENT APPARATUS



**(57) Abstract**

A fluid displacement apparatus includes a housing defining a chamber therein having a first port and a second port. First (300A) and second (300B) helical rotors with opposing pitches are meshed within the chamber, in fluid communication with the first and second ports. A respective one of the first and second helical rotors includes a cylindrical body portion (310) having a helical groove (312) therein and a helical tooth portion (320) extending radially from the cylindrical body portion adjacent the helical groove. The first and second helical rotors are arranged such that the respective longitudinal axes (301A, 301B) of the first and second helical rotors are parallel to one another and a helical tooth portion of one of the first and second helical rotors engages a helical groove of another of the first and second helical rotors, such that the first and second helical rotors are operative within the chamber and provide fluid transport between the first and second ports parallel to the longitudinal axes. A respective one of the first and second helical rotors has a first tooth surface (330) lying within the helical groove and extending onto the helical tooth portion and a second tooth surface (340) extending from the cylindrical body portion onto the helical tooth portion opposite the first tooth surface. The first tooth surface preferably includes an epitrochoid-derived surface, i.e., a surface defining an epitrochoid curve in radial cross section. The second tooth surface preferably includes an epicycloid-derived surface, i.e., a surface defining an epicycloid curve in radial cross section.



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