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- (71) **Applicant (for all designated States except US):** **3M INNOVATIVE PROPERTIES COMPANY** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** **RENDON, Stanley**, [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **FERGUSON, Dennis E.**, [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **POCHARDT, Donald L.**, [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **WARNER, Joseph S.**, [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **ROWELL, Timothy J.**, [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **BENSON, Peter T.**, [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US). **NAYAR, Satinder K.**,

[US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).

- (74) **Agents:** **BAKER, James A.**, et al.; 3M Center Office of Intellectual, Property Counsel Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (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, QA, RO, RS, RU, RW, 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.

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Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

[Continued on next page]

(54) **Title:** ULTRASONIC-ASSISTED MOLDING OF PRECISELY-SHAPED ARTICLES AND METHODS

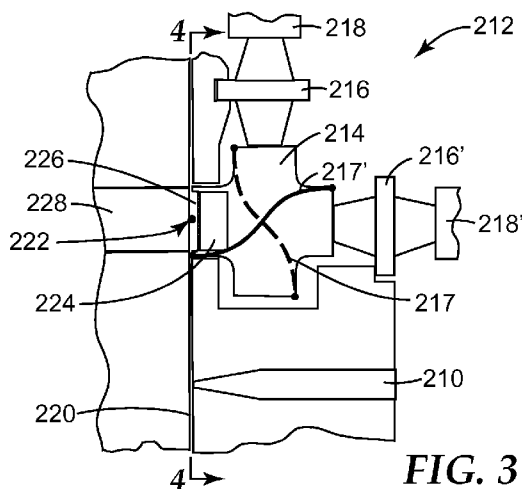


FIG. 3

(57) **Abstract:** An ultrasonic-assisted injection molding system and method for making precisely- shaped articles. A source of ultrasonic energy is positioned to apply vibrational energy to a mold cavity connected to at least one gate in flow communication with a source of molten (co)polymer. The mold is heated to a temperature of 104-116°C, and the molten (co)polymer is injected into the mold cavity. After cooling the mold until the molten (co)polymer within the gate has solidified, ultrasonic energy is applied to the mold without remelting the solidified (co)polymer within the gate until the temperature increases to 116-122°C, thereby substantially relieving flow induced stresses. The mold is then cooled until the temperature decreases to 101-107°C, and is thereafter heated until the temperature increases to 116-122°C, thereby substantially relieving any thermally induced stresses. The mold is cooled until the molten (co)polymer has solidified, thereby forming a precision molded plastic optical element.





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- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- Published:**
- *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*