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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
23 October 2025 (23.10.2025)

WIPO | PCT

(10) International Publication Number
WO 2025/221339 A3

(51) International Patent Classification:

H01F 41/069 (2016.01)	*H01B 12/08* (2006.01)
H01F 41/071 (2016.01)	*H01B 12/10* (2006.01)
H01F 41/073 (2016.01)	*H01B 13/26* (2006.01)
H01F 41/074 (2016.01)	*H01F 41/06* (2016.01)
H01F 41/08 (2006.01)	*H01F 41/061* (2016.01)
H01F 41/082 (2016.01)	*H01F 41/07* (2016.01)
H01F 41/086 (2016.01)	*H10N 60/01* (2023.01)
H01F 41/094 (2016.01)	*H10N 60/83* (2023.01)
H10N 60/20 (2023.01)	*H10N 60/85* (2023.01)

(21) International Application Number:
PCT/US2025/014664

(22) International Filing Date:
05 February 2025 (05.02.2025)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

63/550,338	06 February 2024 (06.02.2024)	US
63/550,342	06 February 2024 (06.02.2024)	US
63/550,467	06 February 2024 (06.02.2024)	US
63/550,485	06 February 2024 (06.02.2024)	US
63/550,488	06 February 2024 (06.02.2024)	US
63/550,490	06 February 2024 (06.02.2024)	US
63/635,977	18 April 2024 (18.04.2024)	US
63/649,826	20 May 2024 (20.05.2024)	US
63/649,830	20 May 2024 (20.05.2024)	US
63/658,669	11 June 2024 (11.06.2024)	US

(71) Applicant: **TYPE ONE ENERGY GROUP, INC.** [US/US]; 2410 Cherahala Boulevard, Knoxville, Tennessee 37932 (US).

(72) Inventors: **CHAMBERLAIN, Carter**; 2410 Cherahala Boulevard, Knoxville, Tennessee 37932 (US). **JOHNSON, Zachary Lucas**; 2410 Cherahala Boulevard, Knoxville,

(54) Title: METHODS AND SYSTEMS FOR FORMING STELLARATOR COILS AND SUPERCONDUCTING TAPES

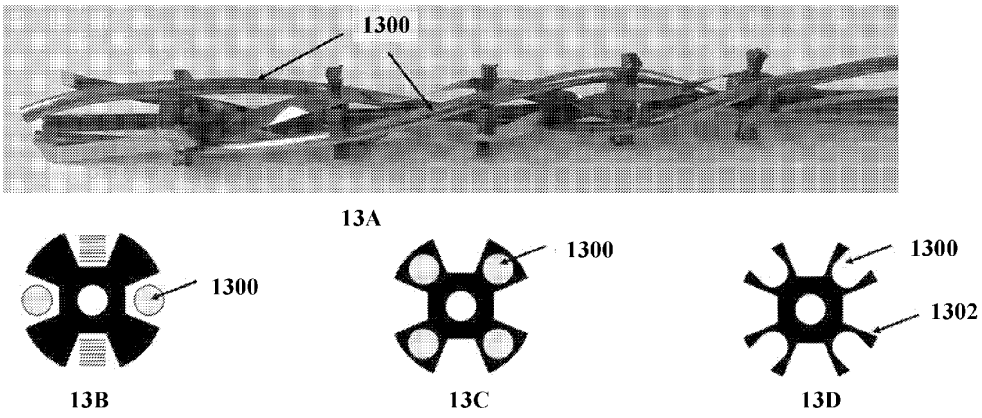


FIG. 13

(57) Abstract: Provided herein are systems, methods, and techniques disclosed herein to help overcome certain challenges associated with superconducting tape shrinkage in stellarators. Provided herein are methods of forming a stellarator coil with improved volume utilization percentages from a cable bent into a tapered helical shape. Provided herein are methods and systems for generating a coil. Provided herein are methods and systems used for stabilizing high-temperature superconducting (HTS) tapes, including using a structure composed of a thin spine and struts to suspend the HTS tapes. Provided herein are insulations materials for high temperature superconductors. Provided herein are systems, methods, and techniques for using independent bobbins for dispending each layer of superconducting tape to a stellarator coil.

WO 2025/221339 A3

[Continued on next page]

Tennessee 37932 (US). **ZIMMERMANN, Joerg**; 2410 Cherahala Boulevard, Knoxville, Tennessee 37932 (US).

(74) **Agent: WILSON, Rachel L.** et al.; 650 Page Mill Road, Palo Alto, California 94304 (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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UY, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

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

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))*

(88) **Date of publication of the international search report:**
15 January 2026 (15.01.2026)