

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
18 July 2024 (18.07.2024)



(10) International Publication Number
WO 2024/151899 A1

- (51) **International Patent Classification:**
H01M 10/48 (2006.01) *H02J 7/00* (2006.01)
- (21) **International Application Number:**
PCT/US2024/011317
- (22) **International Filing Date:**
12 January 2024 (12.01.2024)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
63/479,818 13 January 2023 (13.01.2023) US
63/581,999 12 September 2023 (12.09.2023) US
63/595,387 02 November 2023 (02.11.2023) US
63/605,234 01 December 2023 (01.12.2023) US
- (71) **Applicant:** RJ1 HOLDINGS INC. [US/US]; 18026 Resort View, San Antonio, TX 78255 (US).
- (72) **Inventor:** KIM, Dave, Daekyum; 4842 Horse Gulch Loop, Colorado Springs, CO 80924 (US).
- (74) **Agent:** JOHNSON, Matthew, W. et al.; Jones Day, 250 Vesey Street, New York, NY 10281-1047 (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, 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).

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))

(54) **Title:** ENHANCED SINGLE-CELL ENERGY MANAGEMENT SYSTEM

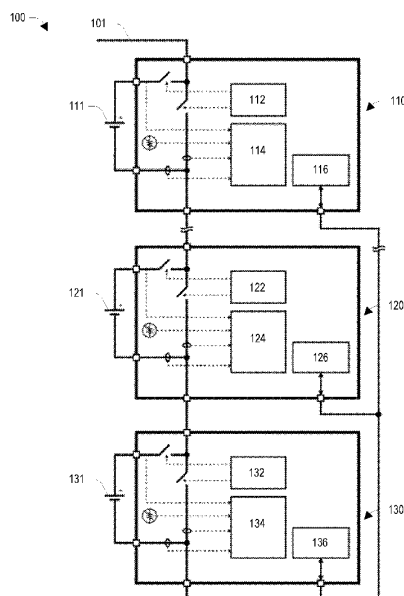


FIG. 1B

(57) **Abstract:** A battery system is provided having first and second battery cells in a battery pack. A first battery management system (BMS) may be in communication with the first battery cell, while a second battery management system may be in communication with the second battery cell. In this manner, each BMS may function to locally control each respective battery cell, thereby providing improved control over each cell. The BMSs may include controllers configured to receive measurement data from the battery cells, to process this battery cell measurement data, and then to produce a control signal based on the battery cell measurement data. The control signals may be provided to switching circuitry connected to the battery cell, thereby allowing for individualized control of each battery cell. Additionally, each BMS may share information regarding the individual cell they monitor with other BMSs. Because each battery cell may be associated with its own BMS, manufacturability, flexibility, and safety improvements may be achieved, among other advantages.

WO 2024/151899 A1