



- (51) **International Patent Classification:**
A61M 60/538 (2021.01) *A61M 60/135* (2021.01)
- (21) **International Application Number:**
PCT/US2022/047426
- (22) **International Filing Date:**
21 October 2022 (21.10.2022)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
63/270,940 22 October 2021 (22.10.2021) US
- (71) **Applicant:** **ABIOMED, INC.** [US/US]; 22 Cherry Hill Drive, Danvers, Massachusetts 01923 (US).
- (72) **Inventors:** **ALWATBAN, Mohammed;** c/o ABIOMED, Inc., 22 Cherry Hill Drive, Danvers, Massachusetts 01923 (US). **DASCHEWSKI, Maxim;** c/o ABIOMED Europe GmbH, Neuenhofer Weg 3, 52074 Aachen (DE). **TAN,**

Qing; c/o ABIOMED, Inc., 22 Cherry Hill Drive, Danvers, Massachusetts 01923 (US). **CHUEV, Andre;** c/o ABIOMED, Inc., 22 Cherry Hill Drive, Danvers, Massachusetts 01923 (US). **EL KATERJI, Ahmad;** c/o ABIOMED, Inc., 22 Cherry Hill Drive, Danvers, Massachusetts 01923 (US).

(74) **Agent:** **BOTOS, Richard, J.** et al.; Botos Churchill IP Law LLP, 430 Mountain Ave., Suite 401, New Providence, NJ 07974 (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, 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,

(54) **Title:** SYSTEMS AND METHODS FOR DETECTING SUCTION EVENTS IN BLOOD PUMPS

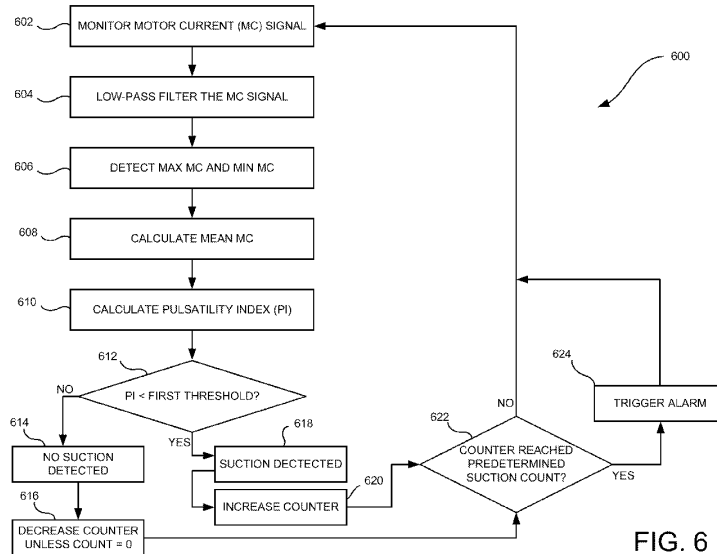


FIG. 6

(57) **Abstract:** Systems and methods for detecting suction events in blood pumps by monitoring pump motor current. A pump suction event is detected based on a comparison of a pulsatility index that is calculated based on a filtered pump motor current signal with a first predetermined threshold or based on a comparison of a calculated index associated with a normalized band-pass filtered pump motor current signal with a second predetermined threshold. A suction event is also detected based on comparisons of both the calculated pulsatility index and the calculated index associated with the normalized band-pass filtered pump motor current signal with respective first and second predetermined thresholds.

[Continued on next page]

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, 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))