

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

(19) World Intellectual Property  
Organization  
International Bureau

(43) International Publication Date  
14 October 2021 (14.10.2021)



(10) International Publication Number  
**WO 2021/207527 A1**

(51) International Patent Classification:

A61L 9/18 (2006.01) A61L 2/12 (2006.01)  
A61L 2/08 (2006.01)

(21) International Application Number:

PCT/US2021/026431

(22) International Filing Date:

08 April 2021 (08.04.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/007,358 08 April 2020 (08.04.2020) US  
17/224,977 07 April 2021 (07.04.2021) US

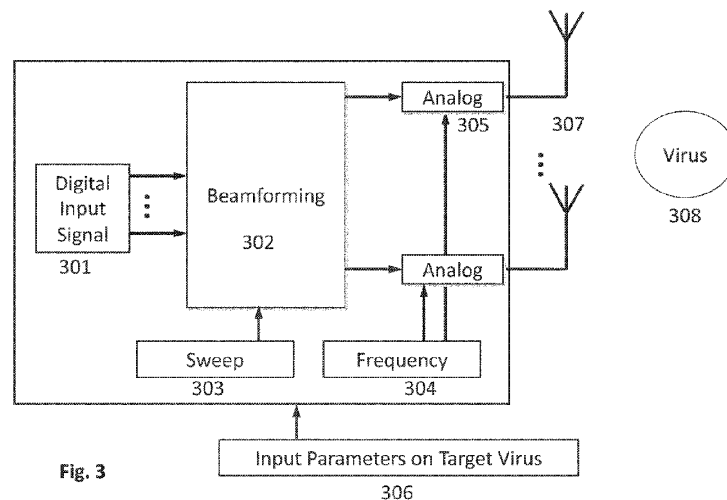
(71) Applicant: **REARDEN, LLC** [US/US]; 211 S. Whisman Rd., Suite D, Mountain View, California 94041 (US).

(72) Inventors: **PERLMAN, Steven G.**; 211 S. Whisman Rd., Suite D, Mountain View, California 94041 (US). **FORENZA, Antonio**; 211 S. Whisman Rd., Suite D, Mountain View, California 94041 (US). **HEATH, Robert W.**; 211 S. Whisman Rd., Suite D, Mountain View, California 94041 (US). **SAIBI, Fadi**; 211 S. Whisman Rd., Suite D, Mountain View, California 94041 (US). **CHEPONIS, Michael**; 211 S. Whisman Rd., Suite D, Mountain View, California 94041 (US).

(74) Agent: **WEBSTER, Thomas C.**; NICHOLSON DEVOS WEBSTER & ELLIOTT LLP, 99 Almaden Boulevard, Suite 710, San Jose, California 95113 (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, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN,

(54) Title: SYSTEMS AND METHODS FOR ELECTROMAGNETIC VIRUS INACTIVATION



(57) Abstract: A system and method to reduce the number of active targeted viruses, bacteria or other microbes or microorganisms within an indoor or outdoor space using an array of radio frequency antennas, lasers or acoustic emitters is presented. The system sweeps through a series of beam patterns. The radio, laser or acoustic frequency and dwell time depend on the targeted viruses and bacteria. By sweeping through a wide range of transmit beamforming vectors, it is possible to kill or render harmless microbes or microorganisms at many locations throughout the coverage area while avoiding exposing humans to harmful levels of radio frequency or laser power. The proposed system and method can be flexibly applied to many array geometries including those with large spacing and non-isotropic antennas or acoustic emitters, as well to a variety of type of lasers.

[Continued on next page]

KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, 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, 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, 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, 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))
- with amended claims (Art. 19(1))