



US009411358B2

(12) **United States Patent**  
**Ben-Dor**

(10) **Patent No.:** **US 9,411,358 B2**  
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **MULTIPLE AXIS HANDLE AND MECHANISM**

(76) Inventor: **Eran Ben-Dor**, Kochav Yair-Tsur-Yigal (IL)

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 91 days.

(21) Appl. No.: **14/237,358**

(22) PCT Filed: **Aug. 9, 2012**

(86) PCT No.: **PCT/IL2012/050305**  
§ 371 (c)(1),  
(2), (4) Date: **Feb. 6, 2014**

(87) PCT Pub. No.: **WO2013/021388**  
PCT Pub. Date: **Feb. 14, 2013**

(65) **Prior Publication Data**  
US 2014/0251071 A1 Sep. 11, 2014

**Related U.S. Application Data**  
(60) Provisional application No. 61/521,774, filed on Aug. 10, 2011.

(51) **Int. Cl.**  
**G05G 1/04** (2006.01)  
**G05G 7/02** (2006.01)  
**G05G 9/047** (2006.01)  
**F16K 31/60** (2006.01)  
**F16K 11/078** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **G05G 1/04** (2013.01); **F16K 11/0782** (2013.01); **F16K 31/605** (2013.01); **G05G 7/02** (2013.01); **G05G 9/047** (2013.01); **Y10T** 74/20612 (2015.01)

(58) **Field of Classification Search**  
CPC ..... G05G 1/04; G05G 9/047; F16K 31/605  
USPC ..... 74/523; 137/625.4  
See application file for complete search history.

(56) **References Cited**  
**U.S. PATENT DOCUMENTS**  
1,693,758 A 12/1928 Hennessey  
2,575,305 A 11/1951 Stryzakoski et al.  
(Continued)

**FOREIGN PATENT DOCUMENTS**  
DE 35 10 351 7/1986  
DE 44 43 123 6/1996  
(Continued)

**OTHER PUBLICATIONS**  
Search Report of International Application PCT/IL2012/050305 mailed on Jan. 7, 2013.  
(Continued)

*Primary Examiner* — John K. Fristoe, Jr.  
*Assistant Examiner* — Christopher Ballman  
(74) *Attorney, Agent, or Firm* — Pearl Cohen Zedek Latzer Baratz LLP

(57) **ABSTRACT**  
A control mechanism for manually adjusting a plurality of control parameters, the control mechanism including a mechanical multiple axis handle movable about a plurality of axes of rotation for operating an operated device, wherein each of the axes of rotation pass through the handle, and a movement transformation assembly to transform rotational movements of the handle to control commands to the operated device.

**17 Claims, 25 Drawing Sheets**

