



US010863846B2

(12) **United States Patent**  
**Pham et al.**

(10) **Patent No.:** **US 10,863,846 B2**  
(45) **Date of Patent:** **Dec. 15, 2020**

(54) **EXTERNAL MOTOR DRIVE SYSTEM FOR WINDOW COVERING SYSTEM WITH CONTINUOUS CORD LOOP**

(71) Applicant: **AXIS LABS INC.**, Toronto (CA)

(72) Inventors: **Trung Duc Pham**, Prampton (CA); **Alan Cheng**, Mississauga (CA); **Marc Bishara**, Toronto (CA); **Clifton Pereira**, Toronto (CA)

(73) Assignee: **Axis Labs Inc.**, Toronto (CA)

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/255,647**

(22) Filed: **Jan. 23, 2019**

(65) **Prior Publication Data**

US 2019/0150651 A1 May 23, 2019

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 16/161,877, filed on Oct. 16, 2018, which is a continuation of (Continued)

(51) **Int. Cl.**  
**A47H 5/032** (2006.01)  
**E06B 9/322** (2006.01)  
(Continued)

(52) **U.S. Cl.**  
CPC ..... **A47H 5/0325** (2013.01); **E06B 9/24** (2013.01); **E06B 9/322** (2013.01); **E06B 9/326** (2013.01);  
(Continued)

(58) **Field of Classification Search**  
CPC .... E06B 9/68; E06B 2009/6827; E06B 9/322; E06B 2009/6818; Y02A 30/257  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,788,481 A 4/1957 Lui et al.  
2,798,194 A 7/1957 Cantin  
(Continued)

FOREIGN PATENT DOCUMENTS

CA 398637 A 8/1942  
CA 926345 A 5/1973  
(Continued)

OTHER PUBLICATIONS

Chinese Office Action (with English translation), dated Mar. 7, 2019, issued in corresponding Chinese Application No. 2016800706680, 10 pages.

(Continued)

*Primary Examiner* — Zoheb S Imtiaz

(74) *Attorney, Agent, or Firm* — Foley & Lardner LLP

(57) **ABSTRACT**

A motor driven system for raising and lowering a window covering executes motor ramp trajectory speed control. The motor ramp trajectory limits acceleration of an external motor from the idle (stationary) state to full operating speed, and limits deceleration of the motor from full operating speed back to the idle state. This function reduces stresses on a continuous cord loop drive mechanism. A control system manages solar heating effects in response to sunlight entrance conditions such as system sensor outputs, external weather forecasts, and other data sources. The system automatically opens or close the window covering to increase or decrease admitted sunlight under appropriate conditions. The input interface of the control system includes a visual display and input axis, which are aligned vertically if the window covering mechanism raises and lowers the window covering, and are aligned horizontally if the window covering mechanism laterally opens and closes the window covering.

**16 Claims, 22 Drawing Sheets**

