

(12) **United States Patent**  
**Tange**

(10) **Patent No.:** **US 9,410,604 B2**  
(45) **Date of Patent:** **Aug. 9, 2016**

- (54) **CONTINUOUSLY VARIABLE TRANSMISSION** 3,240,078 A \* 3/1966 Newell ..... F16H 15/14 476/11  
3,871,239 A 3/1975 Steinhagen  
8,177,678 B2 \* 5/2012 Tange ..... F16H 15/46 476/49  
(75) Inventor: **Hiroshi Tange**, Fuji (JP) 8,382,637 B2 \* 2/2013 Tange ..... F16H 15/46 476/49  
(73) Assignee: **JATCO LTD**, Fuji-Shi (JP) 2010/0056323 A1 3/2010 Tange  
(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 154 days. 2010/0056324 A1\* 3/2010 Tange ..... F16H 15/14 476/54

FOREIGN PATENT DOCUMENTS

- (21) Appl. No.: **14/387,996** JP 32-14723 Y1 11/1957  
(22) PCT Filed: **Mar. 28, 2012** JP 37-429 Y1 1/1962  
(86) PCT No.: **PCT/JP2012/058198** JP 40-4888 B1 3/1965  
JP 2009-243603 A 10/2009  
JP 2010-53995 A 3/2010

\* cited by examiner

- (87) PCT Pub. No.: **WO2013/145171** *Primary Examiner* — David M Fenstermacher  
PCT Pub. Date: **Oct. 3, 2013** (74) *Attorney, Agent, or Firm* — Foley & Lardner LLP

(65) **Prior Publication Data**

US 2015/0045176 A1 Feb. 12, 2015

- (51) **Int. Cl.** **F16H 15/14** (2006.01)  
(52) **U.S. Cl.** CPC ..... **F16H 15/14** (2013.01)  
(58) **Field of Classification Search** CPC ..... F16H 15/14; F16H 15/04; F16H 15/08  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 1,220,554 A \* 3/1917 Reher ..... F16H 15/14 476/31  
2,958,229 A \* 11/1960 Sorokin ..... F16H 15/44 476/49

(57) **ABSTRACT**

Disclosed is a continuously variable transmission including: a pair of pressing units; a pair of first support units that support the pressing units by using one end side as a fulcrum, and generate a force for clamping and pressing both the disks using the pressing unit by virtue of a clamping force applied to the other end side; a pair of second support units that extend along a connecting line in parallel with the shaft center connecting line and are configured to clamp and support both the disks such that the other end side of the pair of first support units can move along the connecting line to generate the clamping force; and a clamping force adjustment unit connected to an end of the pair of second support units opposite to the pivot shaft side to adjust the clamping force of the second support units.

**7 Claims, 21 Drawing Sheets**

