



US009409593B2

(12) **United States Patent**
Jo

(10) **Patent No.:** **US 9,409,593 B2**
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **RACK TYPE ELECTRIC POWER STEERING APPARATUS**

(71) Applicant: **MANDO CORPORATION**,
Pyeongtaek-si, Gyeonggi-do (KR)

(72) Inventor: **Hee Kwon Jo**, Yongin-si (KR)

(73) Assignee: **MANDO CORPORATION**,
Pyeongtaek-si (KR)

(*) 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.: **14/992,004**

(22) Filed: **Jan. 10, 2016**

(65) **Prior Publication Data**

US 2016/0200350 A1 Jul. 14, 2016

(30) **Foreign Application Priority Data**

Jan. 12, 2015 (KR) 10-2015-0004007

(51) **Int. Cl.**
B62D 5/04 (2006.01)
B62D 3/12 (2006.01)

(52) **U.S. Cl.**
CPC **B62D 5/0403** (2013.01); **B62D 3/12**
(2013.01); **B62D 5/0424** (2013.01)

(58) **Field of Classification Search**
CPC B62D 5/0403; B62D 5/04
USPC 180/444; 474/101
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,191,866 B2 *	3/2007	Sasaki	.....	B62D 5/0424	180/443
7,637,348 B2 *	12/2009	Namgung	.....	B62D 5/0424	180/402
8,950,543 B2 *	2/2015	Heo	.....	B62D 5/04	180/444
2003/0221896 A1 *	12/2003	Sasaki	.....	B62D 5/0424	180/444
2004/0043854 A1 *	3/2004	Fraleley, Jr.	.....	B62D 5/0424	474/134
2005/0079939 A1 *	4/2005	Simmons	.....	F16H 7/14	474/113
2007/0129192 A1 *	6/2007	Song	.....	B62D 5/0424	474/148

* cited by examiner

Primary Examiner — Tony Winner

(74) *Attorney, Agent, or Firm* — Hauptman Ham, LLP

(57) **ABSTRACT**

A power steering system having the tensional force of a belt becomes higher as the distance between a motor shaft and a rack bar becomes larger because a second inclined portion of a support body passing through a guide hole is moved upwards along a first inclined portion to be inserted into a coupling recess, and accordingly, noise and damage to the belt can be prevented. If the support body is inserted into the coupling recess by a third inclined portion of a coupling recess and a motor housing is moved upwards, the tensional force of the belt becomes higher as the distance between the motor shaft and the rack bar becomes larger and, accordingly, noise and damage to the belt can be prevented.

10 Claims, 9 Drawing Sheets

