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**Kakinuma et al.**

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(54) **COAXIAL TWO-WHEEL VEHICLE**

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 605 days.

This patent is subject to a terminal disclaimer.

3,693,987	A *	9/1972	Bobard et al.	280/755
3,712,404	A *	1/1973	Walquist	180/212
3,833,215	A *	9/1974	Isdith	482/51
4,020,914	A *	5/1977	Trautwein	180/210
5,630,774	A *	5/1997	Geschwender	482/57

(Continued)

**FOREIGN PATENT DOCUMENTS**

JP 63-305082 12/1988

(Continued)

**OTHER PUBLICATIONS**

U.S. Appl. No. 12/533,755, filed Jul. 31, 2009, Kosaka, et al.

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**B62D 61/00** (2006.01)

(52) **U.S. Cl.** ..... **180/65.1**; 180/6.5; 180/218

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280/87.041, 33.992, 32.7, 63  
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

1,697,994	A *	1/1929	Moore, Jr.	280/87.042
2,726,845	A *	12/1955	Hyslop, Jr. et al.	254/131
2,825,575	A *	3/1958	Mickels	280/87.042

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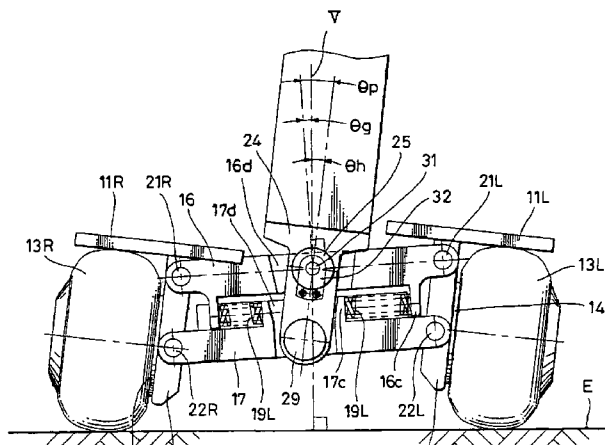
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(57) **ABSTRACT**

A coaxial two-wheel vehicle on which a rider stably travels without the upper body being swayed left and right in a riding state of the center of gravity being positioned high is provided.

The coaxial two-wheel vehicle includes: a step plate for a driver to ride; a vehicle body that supports the step plate so as to be capable of changing a posture in a roll direction of rotating around a roll axis as the center, when a traveling direction is made the roll axis; a pair of wheels disposed on both sides on the same axis in the direction orthogonal to the traveling direction of the vehicle body and rotatably supported by the vehicle body; a pair of wheel drive means to drive and rotate the pair of wheels independently; and a handle for directly changing a posture of the step plate or indirectly changing the posture through the vehicle body.

**14 Claims, 12 Drawing Sheets**



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## U.S. PATENT DOCUMENTS

5,810,371	A *	9/1998	Velke	280/32.7
5,882,020	A *	3/1999	Velke	280/32.7
5,947,505	A *	9/1999	Martin	280/493
6,000,705	A *	12/1999	Velke	280/32.7
6,062,582	A *	5/2000	Martin	280/493
6,234,495	B1 *	5/2001	Velke	280/32.7
6,288,505	B1 *	9/2001	Heinzmann et al.	318/139
6,488,291	B1 *	12/2002	Bellis, Jr.	280/32.7
6,497,422	B1 *	12/2002	Bellis, Jr.	280/32.7
6,651,766	B2 *	11/2003	Kamen et al.	180/218
6,692,010	B1 *	2/2004	Johnson et al.	280/32.7
7,011,171	B1 *	3/2006	Poulter	180/8.2

7,178,614	B2 *	2/2007	Ishii	180/7.1
7,303,032	B2 *	12/2007	Kahlert et al.	180/65.1
7,803,090	B2 *	9/2010	Kraus	482/62

## FOREIGN PATENT DOCUMENTS

JP	63305082	*	12/1988	180/209
JP	2004074814	*	3/2004	
JP	2005-6435		1/2005	
JP	2005-006436		1/2005	
JP	2005001554	*	1/2005	
JP	2006001385	A *	1/2006	
JP	2005039962	*	2/2007	

\* cited by examiner

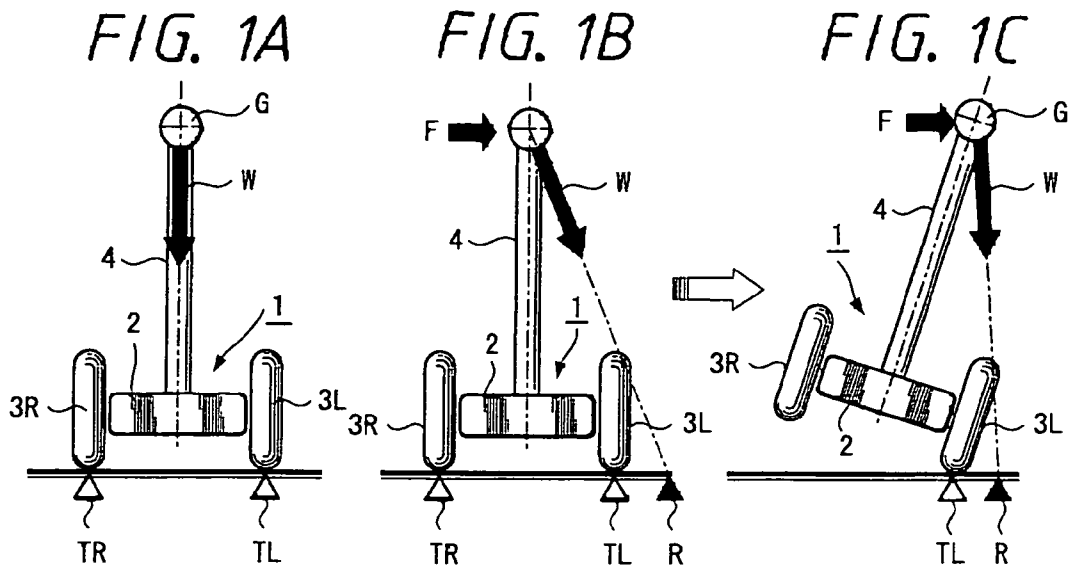


FIG. 2

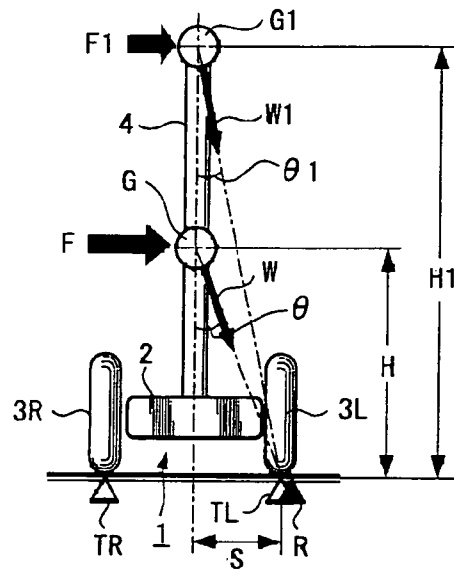


FIG. 3

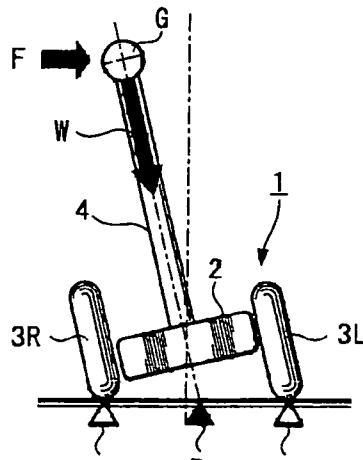


FIG. 4A

FIG. 4B

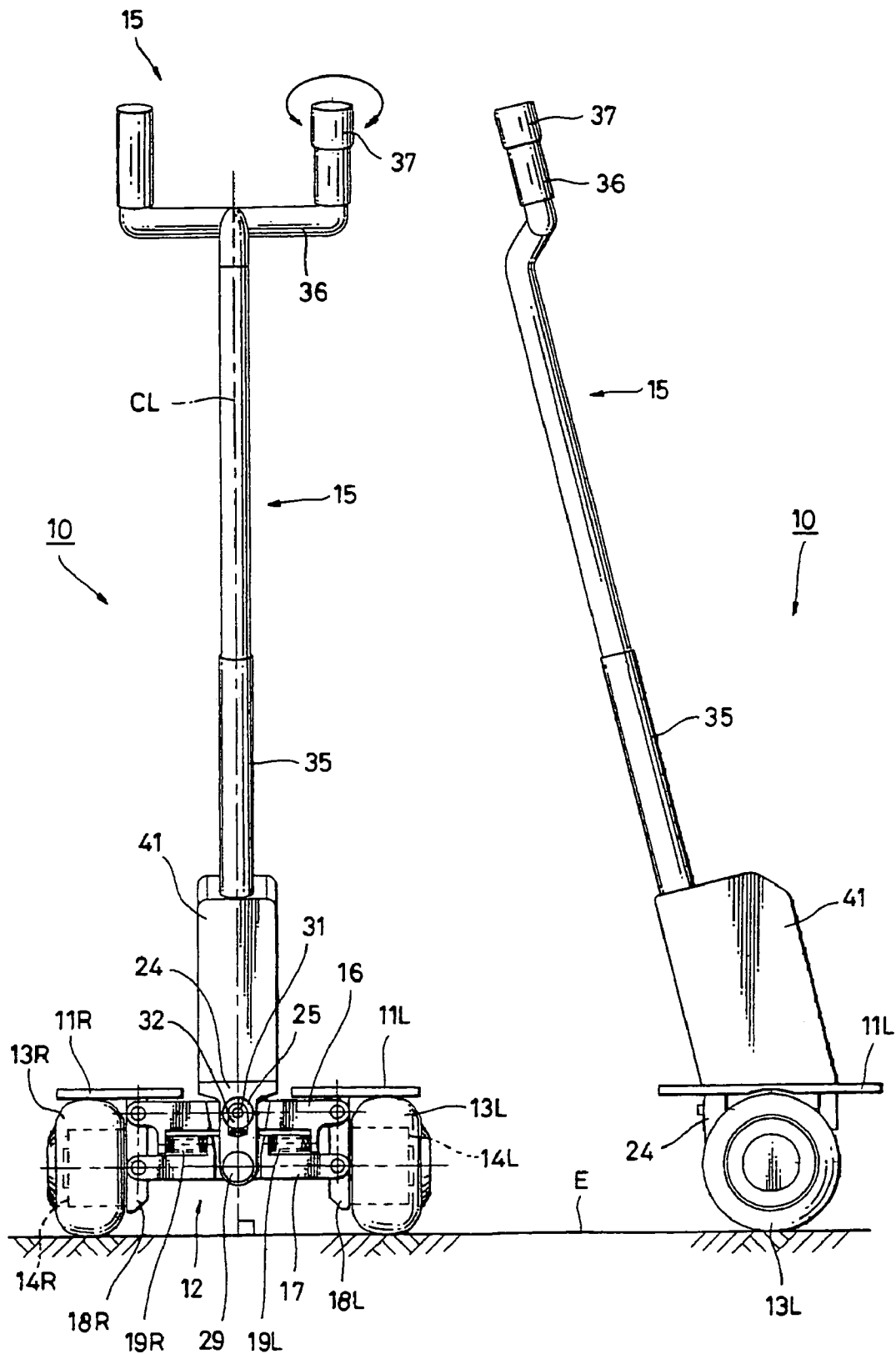


FIG. 5

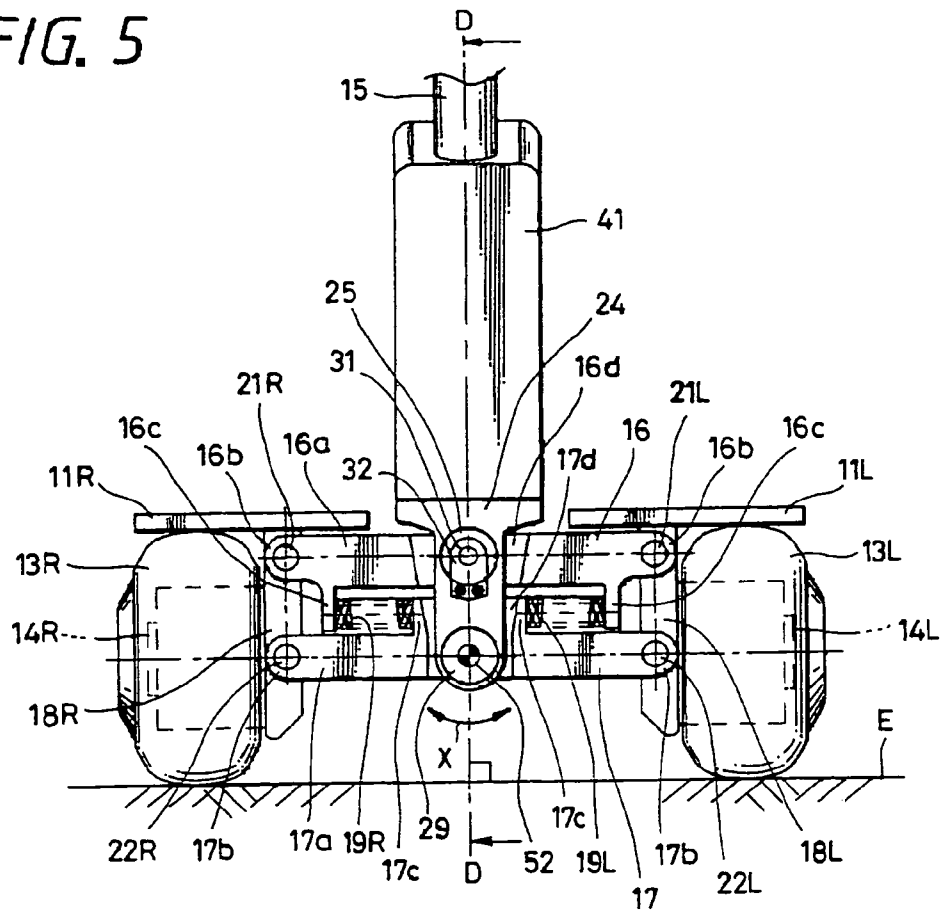
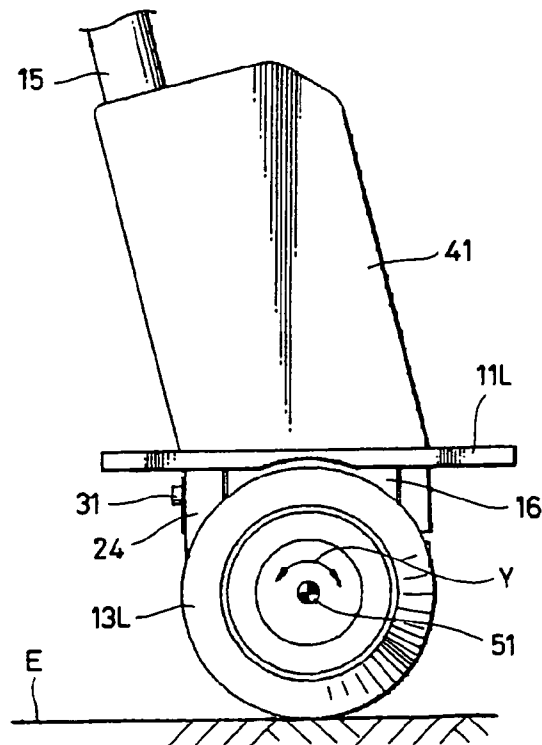


FIG. 6



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