



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

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(54) **MULTI POWER SOURCED ELECTRIC VEHICLE**

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*Y02T 90/121* (2013.01); *Y02T 90/122*  
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**Grant Anthony Covic**, Auckland (NZ)

(58) **Field of Classification Search**  
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See application file for complete search history.

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(56) **References Cited**

(\* ) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 493 days.

U.S. PATENT DOCUMENTS

4,800,328 A 1/1989 Bolger et al.  
4,873,677 A 10/1989 Sakamoto et al.  
(Continued)

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FOREIGN PATENT DOCUMENTS

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EP 1205340 5/2002  
JP 03-239136 10/1991  
(Continued)

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OTHER PUBLICATIONS

Notice of Reasons for Rejection in corresponding Japanese appli-  
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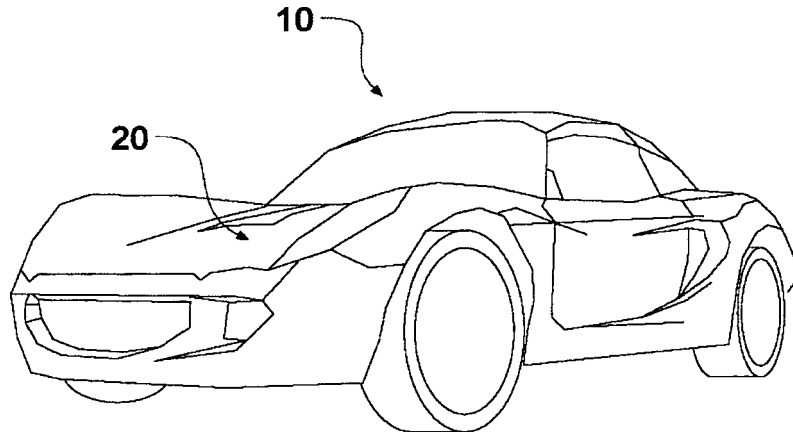
(51) **Int. Cl.**  
*H01F 5/00* (2006.01)  
*H01F 38/14* (2006.01)  
(Continued)

(57) **ABSTRACT**

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CPC ..... *H01F 38/14* (2013.01); *B60L 11/182*  
(2013.01); *B60L 11/1816* (2013.01); *B60L*  
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*B60L 11/1844* (2013.01); *H01F 5/00*  
(2013.01); *H02J 5/005* (2013.01); *H02J*  
*7/0042* (2013.01); *H02J 7/025* (2013.01);  
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An inductive power transfer pad for transmitting wireless  
power to a wireless power receiver separable from the  
inductive power transfer pad. The inductive power transfer  
pad includes a coil having at least one turn of a conductor in  
a first layer and a plurality of ferromagnetic slabs arranged  
in a second layer substantially parallel to that of the coil, the  
ferromagnetic slabs being arranged so as to be spaced apart  
from one another about the coil with their lengths extending  
across a longitudinal length of the coil.

**13 Claims, 5 Drawing Sheets**



- (51) **Int. Cl.**  
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**H02J 7/00** (2006.01)  
**H02J 7/02** (2016.01)
- 2003/0052647 A1 3/2003 Yoshida et al.  
2006/0219448 A1 10/2006 Grieve et al.  
2008/0238601 A1\* 10/2008 Das ..... H01F 1/24  
336/200
- 2009/0278492 A1 11/2009 Shimizu et al.

- (52) **U.S. Cl.**  
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FOREIGN PATENT DOCUMENTS

JP	06-64393	9/1994
JP	6-66206	9/1994
JP	06-277358	10/1994
JP	6-86321	12/1994
JP	8-238326	9/1996
JP	9-213378	8/1997
JP	10189369	7/1998
JP	11503599	3/1999
JP	11-097263	4/1999
JP	11252810	9/1999
JP	2000-200725	7/2000
JP	200255176	2/2002
JP	2002137659	5/2002
JP	2002-231545	8/2002
JP	2002-343655	11/2002
JP	2004-47701	2/2004
JP	2005101392	4/2005
JP	200642519	2/2006
JP	2006203959	8/2006
JP	T2007-505480	3/2007
JP	08505279	2/2008
JP	200887733	4/2008
KR	1020040028312	4/2004
W	W 03105308	12/2003
W	W 2005024865	3/2005
W	W 2006101285	9/2006
W	2007008646	1/2007
W	W 2008051611	5/2008

- (56) **References Cited**  
U.S. PATENT DOCUMENTS

5,202,617	A	4/1993	Nor	
5,469,036	A	11/1995	Eto	
5,528,113	A	6/1996	Boys et al.	
5,594,318	A	1/1997	Nor et al.	
5,710,502	A	1/1998	Poumey	
5,821,638	A	10/1998	Boys et al.	
5,821,731	A	10/1998	Kuki et al.	
6,389,318	B1	5/2002	Zarinetchi et al.	
6,429,651	B1*	8/2002	Choi .....	G01R33/04 324/225
6,501,364	B1	12/2002	Hui et al.	
6,906,495	B2	6/2005	Cheng et al.	
6,934,167	B2	8/2005	Jang et al.	
7,164,255	B2	1/2007	Hui	
7,463,131	B1*	12/2008	Hwang .....	H01F 17/0006 336/200
7,875,955	B1*	1/2011	Hopper .....	H01F 17/0006 257/516
8,030,888	B2	10/2011	Pandya et al.	
8,102,236	B1*	1/2012	Fontana, Jr. ....	H01F 3/14 336/200

\* cited by examiner

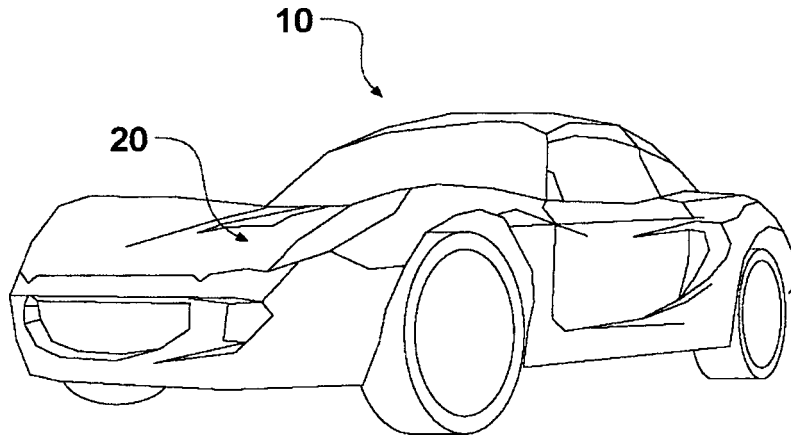


Figure 1

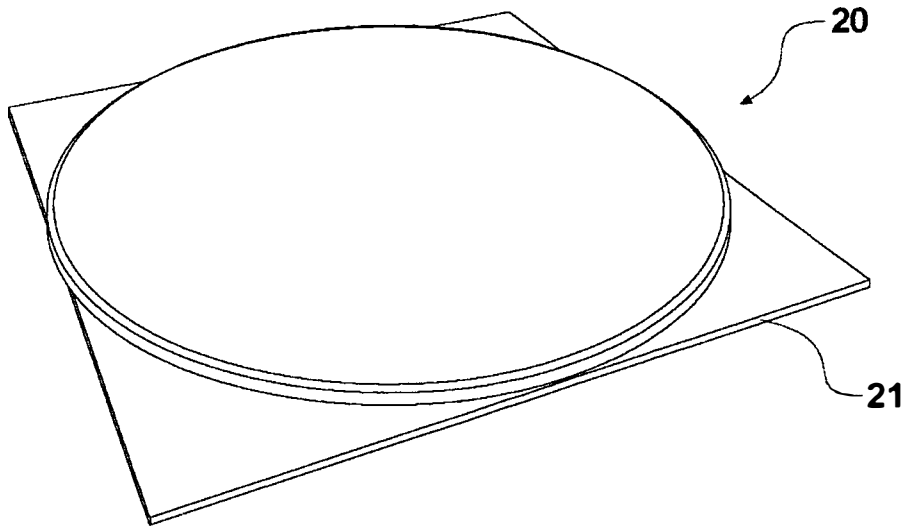


Figure 2

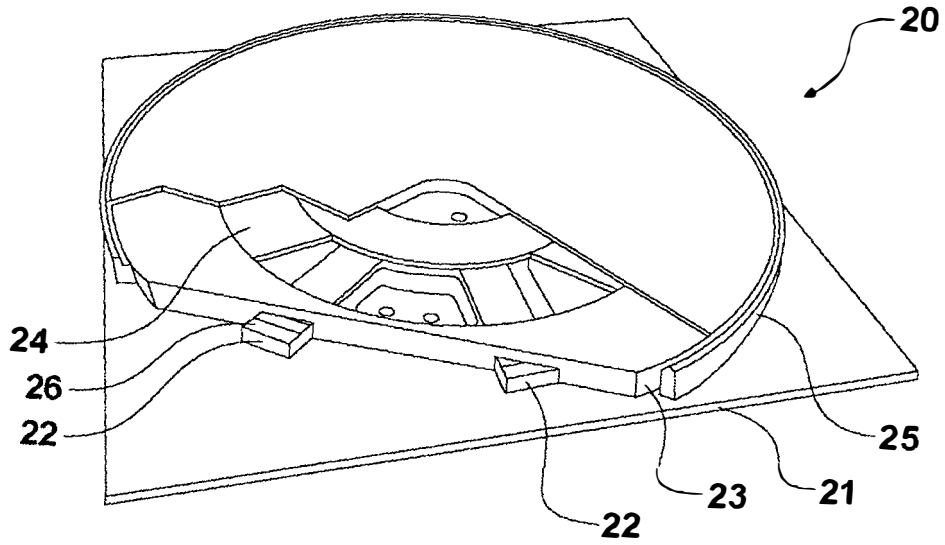


Figure 3

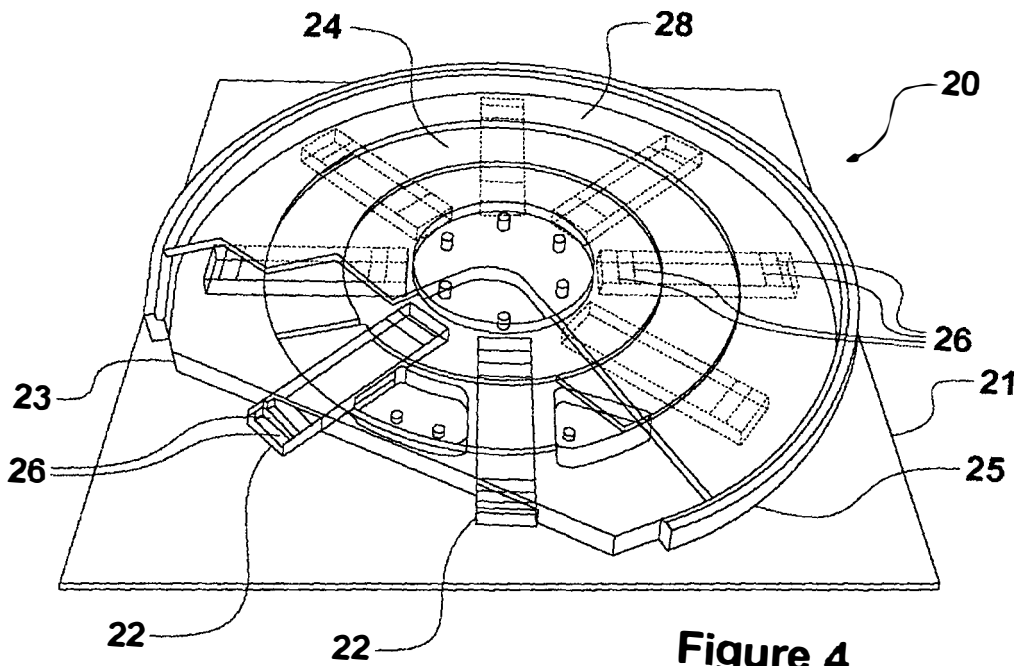


Figure 4

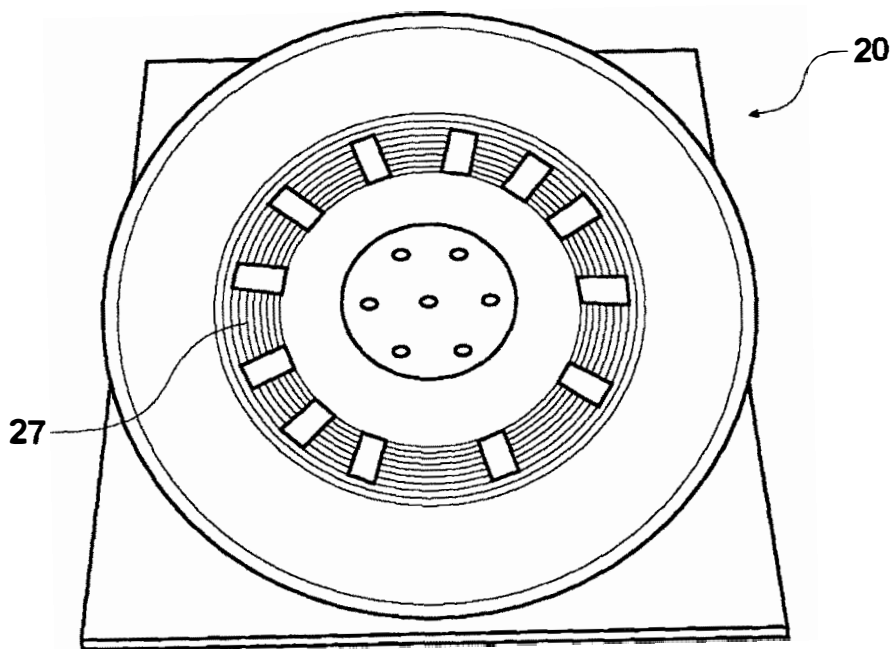


Figure 5

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