



- (51) **International Patent Classification:**
A47L 9/04 (2006.01) A47L 11/40 (2006.01)
- (21) **International Application Number:**
PCT/US2012/035894
- (22) **International Filing Date:**
30 April 2012 (30.04.2012)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/481,147 29 April 2011 (29.04.2011) US
- (71) **Applicant (for all designated States except US):** **IROBOT CORPORATION** [US/US]; 8 Crosby Drive, Bedford, MA 01730 (US).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** **GILBERT, Duane, Leigh, Jr.** [US/US]; 80 Black Brook Road, Goffstown, NH 03045 (US). **BURSAL, Faruk, Halil** [US/US]; 32 Adams Street, Lexington, MA 02420 (US). **THERRIEN, Richard, Joseph** [US/US]; 607 Union Street, Duxbury, MA 02332 (US). **MORIN, Russell, Walter** [US/US]; 111 Locust Street, Townhouse #58, Woburn, MA 01801 (US).
- (74) **Agent:** **KRUEGER, Brett, A.**; Honigman Miller Schwartz and Cohn LLP, 350 East Michigan Avenue, Suite 300, Kalamazoo, Michigan 49007-3800 (US).

- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States (unless otherwise indicated, for every kind of regional protection available):** ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

- (88) **Date of publication of the international search report:**
25 April 2013

(54) **Title:** RESILIENT AND COMPRESSIBLE ROLLER AND AUTONOMOUS COVERAGE ROBOT

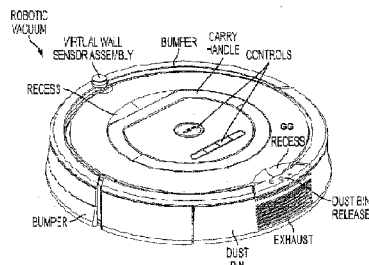


FIG. 1

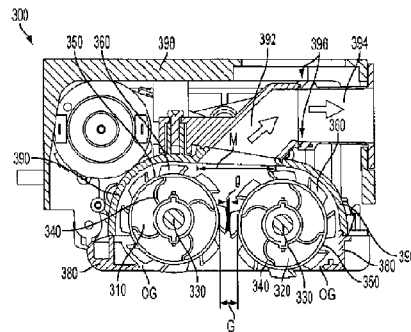
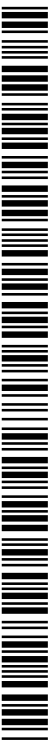


FIG. 2A

(57) **Abstract:** A resilient compressible roller rotatably engaged with an autonomous coverage robot, the resilient compressible roller comprising: a rigid drive shaft; a resilient tubular member having a longitudinal axis and including an outer surface, one or more vanes extending outwardly from the outer surface, a hub disposed along the longitudinal axis of the tubular member within the outer surface, the hub having one or more engagement elements formed therein for engaging securely with the rigid drive shaft, a plurality of resilient curvilinear spokes extending between an inner surface of the flexible tubular member and the hub.



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/035894

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L9/04 A47L11/40
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A46B A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2009/149722 A1 (KAERCHER GMBH & CO KG ALFRED [DE]; EGLER CHRISTIAN [DE]; ROPPELT BRUNH) 17 December 2009 (2009-12-17) page 4, line 1, paragraph 3 - page 5, line 2; figure 1	1-39
Y	US 2010/037418 A1 (HUSSEY PATRICK ALAN [US] ET AL) 18 February 2010 (2010-02-18) paragraph [0070] - paragraph [0079]; figures 4-6E	1,2, 19-26, 30,31, 34-39
Y	EP 0 051 996 A2 (WHEEL DEV LTD [GB]) 19 May 1982 (1982-05-19) abstract; figure 1	1,2, 19-26, 30,31, 34-39
	----- -/--	

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 November 2012	30/11/2012

Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Hubrich, Klaus
--	--

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/035894

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 44 00 956 C1 (VILEDA GMBH [DE]) 20 October 1994 (1994-10-20) column 3, line 3 - line 18; figures 1-3 -----	1-39
A	US 2004/216265 A1 (PEACOCK DALE M [US] ET AL) 4 November 2004 (2004-11-04) abstract; figures 2,5,6 -----	1-39

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/035894

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/035894

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009149722	A1	17-12-2009	CN 102046060 A 04-05-2011
			EP 2299890 A1 30-03-2011
			EP 2510862 A1 17-10-2012
			WO 2009149722 A1 17-12-2009

US 2010037418	A1	18-02-2010	AU 2010282356 A1 01-03-2012
			CA 2770336 A1 17-02-2011
			EP 2464269 A1 20-06-2012
			US 2010037418 A1 18-02-2010
			WO 2011020040 A1 17-02-2011

EP 0051996	A2	19-05-1982	DE 3175652 D1 15-01-1987
			EP 0051996 A2 19-05-1982
			JP 57107901 A 05-07-1982
			US 4553577 A 19-11-1985

DE 4400956	C1	20-10-1994	NONE

US 2004216265	A1	04-11-2004	CA 2465710 A1 30-10-2004
			US 2004216265 A1 04-11-2004

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 2(completely); 19-26, 30, 31, 34-39(partially)

directed to the details of a resilient compressible roller
in an autonomous coverage robot.

2. claims: 3-18, 27-29, 32, 33(completely); 19-26, 30, 31,
34-39(partially)

directed to an autonomous coverage robot.
