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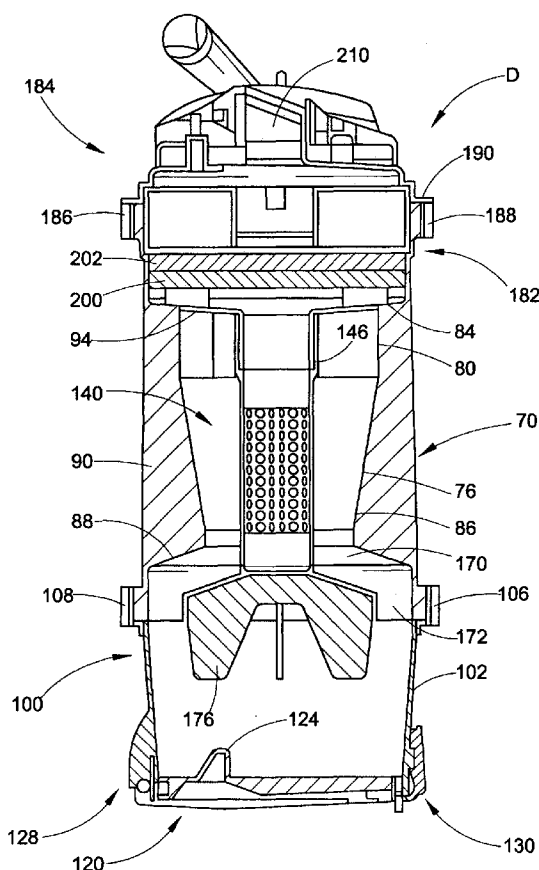
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[Continued on next page]

(54) Title: SINGLE STAGE CYCLONE VACUUM CLEANER



(57) Abstract: The present invention relates to an upright vacuum cleaner (A) including a housing (D) and a nozzle base (C) having a main suction opening (24). The housing is pivotally mounted on the nozzle base. The housing comprises a cyclonic separator (70) including a dirty air inlet (72) and a sidewall (76). A lower end (86) of the separator being secured to a lower skirt (88). A dust collector section (100) is located beneath the separator and includes a sidewall (102). A perforated tube (140) is disposed within the separator. The perforated tube includes a shroud (152) extending away from a closed lower end of the perforated tube. A diameter of the shroud is larger than a diameter of the separator lower end. The lower skirt and the shroud define a first air channel (170) for directing air from the separator into the dust collector section. The first air channel has a substantially constant volume for maintaining airflow velocity.



PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER

INV. A47L9/16

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)

A47L B04C

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 2 417 916 A (SAMSUNG KWANGJU ELECTRONICS CO [KR]) 15 March 2006 (2006-03-15) page 6, line 31 - page 8, line 19; figures 4-6, 8A	1, 2, 4-7
Y	DE 43 20 615 A1 (FETTE DIETRICH [DE]) 5 January 1995 (1995-01-05) column 1, lines 7-22 column 1, line 65 - column 2, line 5; figures	1, 2, 4-7
Y	WO 00/64321 A (LG ELECTRONICS INC [KR]; AN HYEOK SEONG [KR]; LIM KYEONG SEOK [KR]; KW) 2 November 2000 (2000-11-02) abstract; figures 4, 5	4
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☒ 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 document but published on or after the international filing date

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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.

G document member of the same patent family

Date of the actual completion of the international search

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12/02/2008

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004/098827 A1 (OH JANG-KEUN [KR] ET AL) 27 May 2004 (2004-05-27) paragraphs [0044], [0045], [0047], [0049]; figure 3 -----	7
Y	WO 2005/089618 A (EURO PRO OPERATING LLC [US]; GREENE MASON [US]; ROSENZWEIG MARK [US]) 29 September 2005 (2005-09-29) page 8, paragraphs 2,3 -----	7
A	US 2004/025285 A1 (MCCORMICK MICHAEL J [US] ET AL) 12 February 2004 (2004-02-12) paragraphs [0049] - [0051]; figure 4 -----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/011780

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 allsearchable 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 reportcovers 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.:

1-7

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-7

upright cyclonic vacuum cleaner with improved airflow diverting means.

2. claims: 8-11

realisation of a compact upright cyclonic vacuum cleaner.

3. claims: 12-22

provision of an airflow path for a cyclonic upright vacuum cleaner.

4. claims: 23-28

improvement of the dust retention capability of an upright cyclonic vacuum cleaner.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/011780

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2417916	A	15-03-2006	AU 2005201267 A1 CN 1748627 A DE 102005013315 A1 ES 2286919 A1 FR 2875119 A1 JP 2006075584 A KR 20060024054 A RU 2295274 C2 US 2006053757 A1	30-03-2006 22-03-2006 30-03-2006 01-12-2007 17-03-2006 23-03-2006 16-03-2006 20-03-2007 16-03-2006
DE 4320615	A1	05-01-1995	NONE	
WO 0064321	A	02-11-2000	AU 758453 B2 AU 3460400 A CN 1353591 A EP 1173086 A1 JP 2002541957 T KR 20010014570 A US 6679930 B1	20-03-2003 10-11-2000 12-06-2002 23-01-2002 10-12-2002 26-02-2001 20-01-2004
US 2004098827	A1	27-05-2004	AU 2003204458 A1 CA 2430507 A1 CN 1502295 A DE 10327942 A1 FR 2847450 A1 GB 2397785 A JP 2004167205 A KR 20040044296 A NL 1024302 C2 NL 1024302 A1	10-06-2004 21-05-2004 09-06-2004 09-06-2004 28-05-2004 04-08-2004 17-06-2004 28-05-2004 16-09-2004 26-05-2004
WO 2005089618	A	29-09-2005	CN 1669517 A EP 1725156 A2 US 2005223520 A1	21-09-2005 29-11-2006 13-10-2005
US 2004025285	A1	12-02-2004	NONE	