(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 457 482 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
30.05.2012 Bulletin 2012/22

(21) Application number: **09847486.9**

(22) Date of filing: **13.11.2009**

(51) Int Cl.:
A47L 9/10 *(2006.01)* ***A47L 9/16*** *(2006.01)*

(86) International application number:
PCT/CN2009/074945

(87) International publication number:
WO 2011/009251 (27.01.2011 Gazette 2011/04)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR

(30) Priority: **21.07.2009 CN 200920074285 U**

(71) Applicant: **Suzhou Haily Electric Co., Ltd**
Jiangsu 215159 (CN)

(72) Inventor: **TANG, Longfu**
Suzhou
Jiangsu 215159 (CN)

(74) Representative: **Stuttard, Garry Philip**
Urquhart-Dykes & Lord LLP
Tower North Central
Merrion Way
Leeds LS2 8PA (GB)

(54) MULTI- CYCLONE DUST SEPARATING AND COLLECTING DEVICE

(57) The present utility model has make known to public that a multi-stage cyclone dust collector, comprising
dust tub,
the first-stage filter, disposed in the dust tub,
the first-stage splitter, disposed in the first-stage filter,
the second-stage splitter, disposed in the first-stage splitter,
the second-stage filter, disposed in the first-stage splitter.
the utility model adopts multi-stage splitter and multi-stage filter, this structure can separate dust effectively, and make the air clean which is emitted by the cyclone dust collector, in addition, the dust collector can not be blocked easily, unless it is full of dust, it can not be blocked forever.

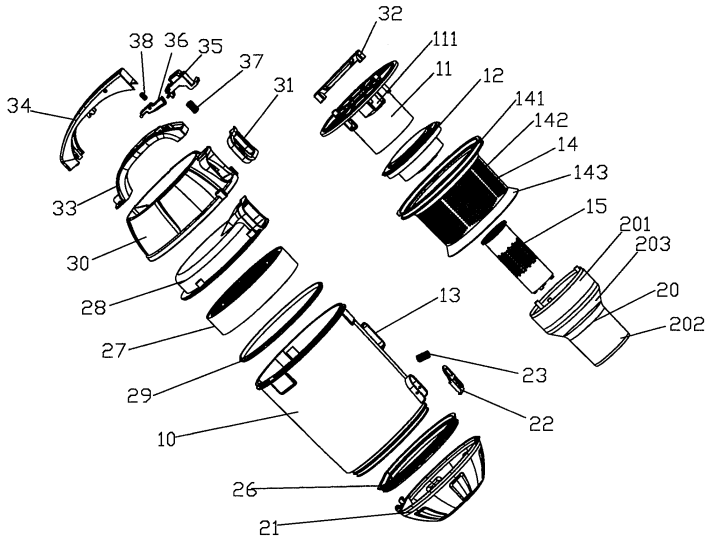

Fig. 1

EP 2 457 482 A1

Description

FILED OF THE INVENTION

[0001] The present utility models relates to a multi-stage cyclone dust collector.

BACKGROUND OF THE INVENTION

[0002] The existing technology is that the cyclone dust collector requests potent material to filter dust, this structure of the cyclone dust collector leads to the result of that the dust which is collected is very little, at the same time, the filter can be blocked easily, and make the whole machine can not work, so the user mistakenly believes the machine has been damaged. So this structure is inconvenient to use. And the filter is also not easy to clean, so increased the frequency of cleaning, wasted the user's time, and reduced the efficiency of work, at the same time, because the cyclone dust collector filtered inadequately, the air emitted by the cyclone dust collector is not clean.

SUMMARY

[0003] It is an object of the present utility model to provide a multi-stage cyclone dust collector in order to separate the dust effectively and prevent the dust collector to be blocked.

[0004] Another object of the present utility model is to provide a multi-stage cyclone dust collector in order to make the air clean which is emitted by the cyclone dust collector.

the present utility model provide a multi-stage cyclone dust collector, the multi-stage cyclone dust collector comprising dust tub,

the first-stage filter, disposed in the dust tub,

the first-stage splitter, disposed in the first-stage filter,

the second-stage splitter, disposed in the first-stage splitter,

the second-stage filter, disposed in the first-stage splitter.

[0005] The second- stage splitter is also disposed in the first-stage filter.

[0006] A conical bulge is disposed under the second- stage splitter.

[0007] The multi-stage cyclone dust collector also comprising bottom cover, the bottom cover connects with the lower part of the dust tub, and optionally turns according to the dust tub.

[0008] The multi-stage cyclone dust collector also comprising dust container, which has the fist end, the second end and the intermediate division which is used to connect the first end and the second end, the first end is close to the first-stage filter, and the second end leans on the bottom cover.

[0009] The diameter of the first end is greater than the diameter of the second end.

[0010] The intermediate division is conical.

[0011] The beneficial effect of the utility model: the utility model adopts multi-stage splitter and multi-stage filter, this structure can separate dust effectively, and make the air clean which is emitted by the cyclone dust collector, in addition, the dust collector can not be blocked easily, unless it is full of dust, it can not be blocked forever.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Exemplary embodiments of the present utility model are showed in the drawings in a schematic way, and will be described in more detail below.

FIG.1 is a view showing three-dimensional explosion of the present utility model;
FIG.2 is a view showing schematic of the present utility model.

[0013] In which:

10. Dust tub	11. The fist-stage splitter
111. Opening	12. The second-stage splitter
13. Air inlet	14. The fist-stage filter
141. Upper opening	142. The intermediate body portion
143. Bottom opening	15. The second -stage filter
16. A heavy cyclone	17. Double cyclone
18. Triple cyclone	20. Dust container

(continued)

201. The first end	202. The second end
203. The intermediate division	21. Bottom cover
22. Tub button	23. Spring
24. The first chamber	25. The second chamber
26. Sealing ring of the bottom cover	27. Inlet shelf
271. Air outlet	28. The first cover of the upper tub
29. Sealing ring of the first cover of the upper tub	30. The second cover of the upper tub
301. Opening	31. Sealing ring of suction
32. Handle	33. Bottom cover of handle
34. Upper cover of handle	35. Button
36. Safe button	37. Button spring
39. Safe button spring	100. Cyclone dust collector

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0014] Referring initially to FIG.1 and FIG.2, the cyclone dust collector of the present utility model, especially the three-stage cyclone dust collector 100, comprises dust tub 10 which is disposed outside the present utility model, the first-stage splitter 11 which is disposed in the dust tub, and the second-stage splitter 12 which is disposed under the first-stage splitter 11, air inlet 13 is disposed the side part of the dust tub 10. Thereinto, in this preferred embodiment, dust tub 10 is about cylindrical.

[0015] The cyclone dust collector 100 in this preferred embodiment also comprises the first-stage filter 14, the first-stage filter 14 is located between the dust tub 10 and the first-stage splitter 11, the first-stage filter 14 has upper opening 141, the intermediate body portion 142 and the bottom opening 143, in this preferred embodiment, the upper opening 141 and the bottom opening 143 are all about conical trumpet opening.

[0016] The cyclone dust collector 100 in this preferred embodiment also comprises the second-stage filter 15, the second-stage filter 15 is located in the first-stage splitter 11, at the same time, in this preferred embodiment, the second-stage filter 15 is also located in the second-stage splitter 12.

[0017] Between dust tub 10 and the first-stage filter 14 is formed a heavy cyclone 16, the first-stage splitter 11 has opening 111, in this preferred embodiment, the first-stage splitter 11 has plural opening 111. The opening 111 is disposed on tip-to-face of the first-stage splitter 11. Between the first-stage filter 14 and the first-stage splitter 11 is formed double cyclone 17, and between the first-stage splitter 11 and the second-stage filter 15 is formed triple cyclone 18.

[0018] Dust container 20 is located under the first-stage filter 14, and the dust container 20 connects with bottom opening 143 of the first-stage filter 14. Dust container 20 which has the fist end 201, the second end 202 and the intermediate division 203 which is used to connect the first end 201 and the second end 202, the first end 201 and the second end 202 are both about Cylindrical, the intermediate division 203 is about conical, the diameter of the first end 201 is much greater than the diameter of the second end 202.

[0019] In addition , under the dust tub 10 also located bottom cover 21, the bottom cover 21 connects with the dust tub 10 through pivot, and the bottom cover 21 can optionally turn according to the dust tub 10. the cyclone dust collector 100 also comprises tub button 22, the tub button 2 is located between the dust tub 10 and the bottom cover 21, under normal circumstances, the tub button 22 buckles the bottom cover 21 on the dust tub 10, when the cyclone dust collector 100 collects dust fully, pulls the tub button 22, and the bottom cover 21 turns according to the dust tub 10, so the dust can be poured out.

[0020] The second end 202 of the dust container 20 is leaned on the bottom cover 21, so, outer circumference of the dust container 20, bottom cover 21,and the dust tub 10 together form the first dust chamber 24, the inside circumference of the dust container 20 and the bottom cover 21 form the second dust chamber 25.

[0021] Between dust tub 10 and bottom cover 21 also disposed sealing ring of the bottom cover 26 which is used to make the connection of the dust tub 10 and bottom cover 21 has much better sealing performance.

[0022] The cyclone dust collector 100 also comprises inlet shelf 27, the inlet shelf 27 is located in the dust tub 10, and also disposed on the fist-stage splitter 11, the inlet shelf 27 has air outlet 271, through filtered by the second-stage filter 15, the clean air exhausted through outlet 271. The inlet shelf 27 connects with the first cover of the upper tub 28, and the first cover of the upper tub 28 also is located in the dust tub 10. In order to seal best, between the first cover of the upper tub 28 and the inlet shelf 27 has the first sealing ring the first cover of the upper tub 29.

[0023] The cyclone dust collector 100 in this preferred embodiment also comprises the second cover of the upper tub 30, the second cover of the upper tub 30 connects with the top part of the dust tub 10, and the second cover of the upper tub 30 is also located outside of the first cover of the upper tub 28, in the opening 301 of the second cover of the upper

tub 30 installed sealing ring of suction 31.

[0024] The cyclone dust collector 100 also installs handle 32, bottom cover of handle 33 and upper cover of the handle 34 are both installed on the handle 32. Between the bottom cover of handle 33 and upper cover of the handle 34 also installed button 35 and safe button 36, between button 35 and bottom cover of handle 33 installed button spring 37, and between safe button 36 and the upper cover of handle 33 also installed safe button spring 38, in this preferred embodiment, the button spring 37 and the safe button spring 38 are all compression spring.

[0025] Modifications and variations in addition to those described above will be apparent to those skilled in the art. Accordingly, the scope of the present invention is defined only by the following appended claims which are also set forth as further examples of the invention.

Claims

1. A multi-stage cyclone dust collector, comprising
   dust tub,
   the first-stage filter, disposed in the dust tub,
   the first-stage splitter, disposed in the first-stage filter,
   the second-stage splitter, disposed in the first-stage splitter,
   the second-stage filter, disposed in the first-stage splitter.

2. A multi-stage cyclone dust collector as recited in claim 1 wherein the second-stage splitter is also disposed in the first-stage filter.

3. A multi-stage cyclone dust collector as recited in claim 2 wherein a conical bulge is disposed under the second-stage splitter.

4. A multi-stage cyclone dust collector as recited in claim 3 wherein also comprising bottom cover, the bottom cover connects with the lower part of the dust tub, and optionally turns according to the dust tub.

5. A multi-stage cyclone dust collector as recited in claim 4 wherein also comprising dust container, which has the fist end, the second end and the intermediate division which is used to connect the first end and the second end, the first end is close to the first-stage filter, and the second end leans on the bottom cover.

6. A multi-stage cyclone dust collector as recited in claim 5 wherein the diameter of the first end is greater than the diameter of the second end.

7. A multi-stage cyclone dust collector as recited in claim 6 wherein the intermediate division is conical.

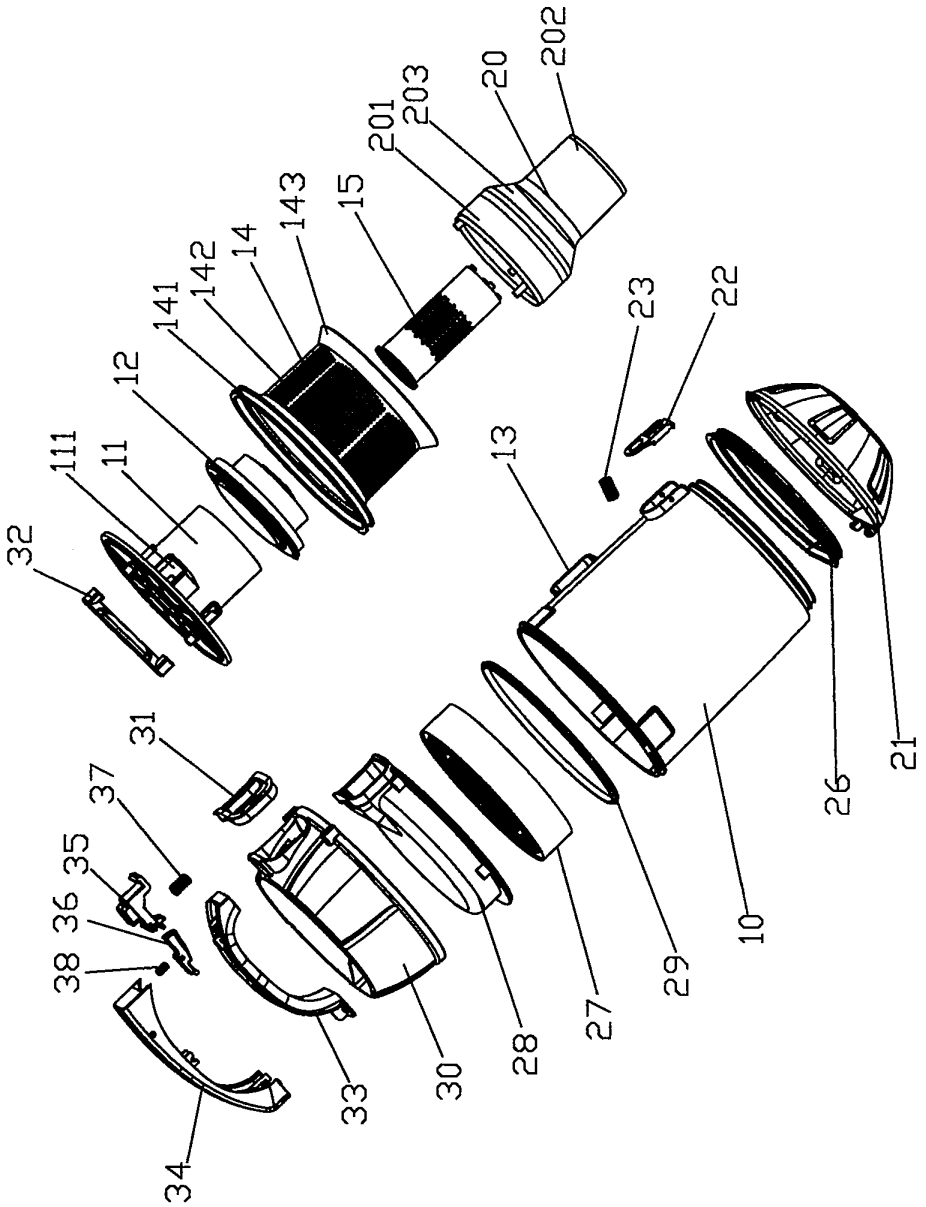
202
20
203
201
15
143
14
142
141
12
111
11
32
23
22
13
31
37
35
36
38
34
33
30
28
27
29
10
26
21

Fig. 1

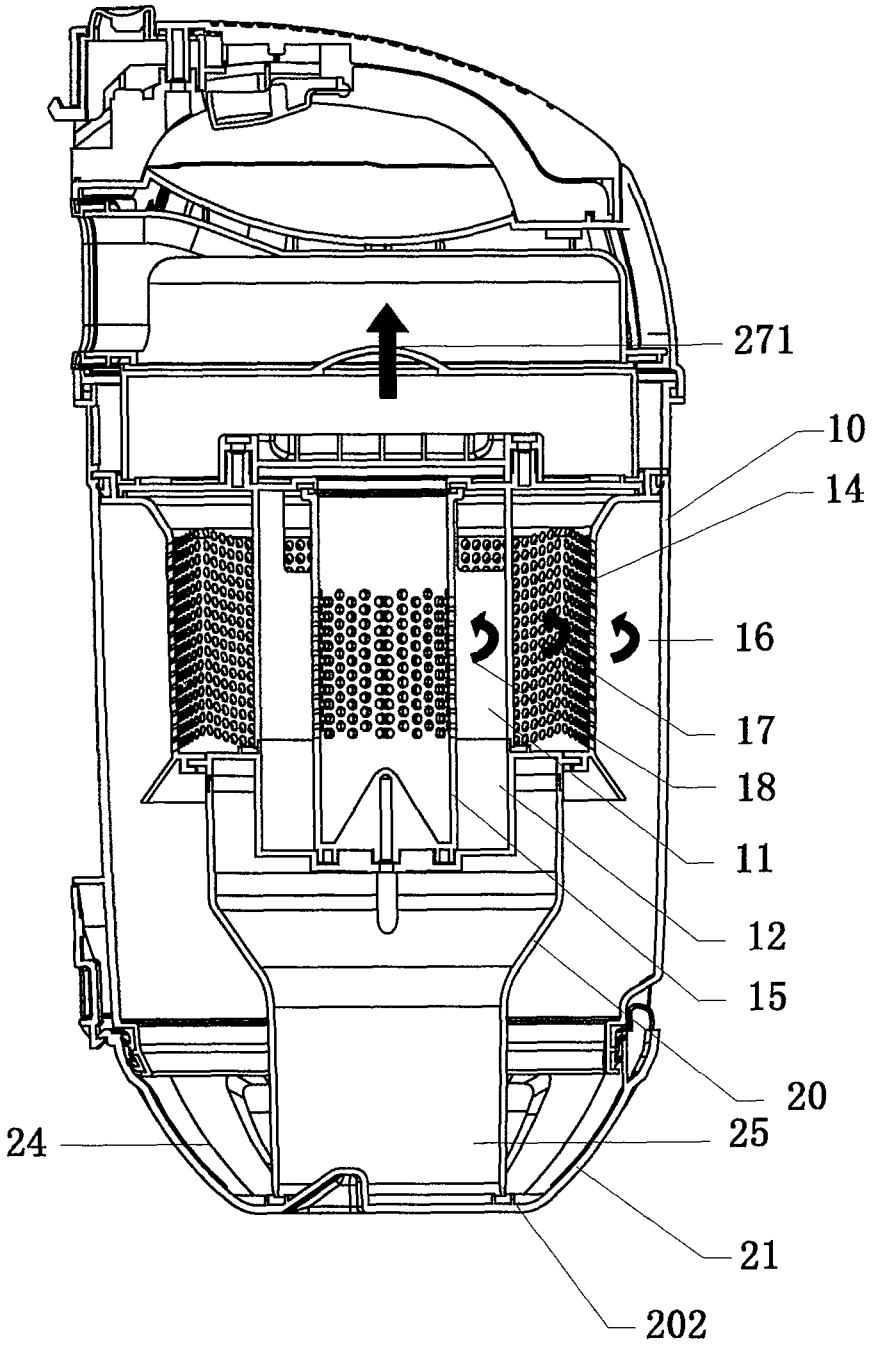

Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/074945

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

IPC：A47L9;A47L5;B01D45;B01D46;B01D50;B04C5

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)

WPI,EPOODC,CNPAT:eddy, spiral, swirl, whirl, centrifugal, vortex, tangential+, cycl+,dust ,segregat+,filt+, separat+, collect+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN2897134Y(JINLAIKE HOUSEHOLD ELECTRIC AP) 09 May 2007 （09.05.2007）pages 3-4 of description,Fig.1	1-7
Y	CN101006910A（SAMSUNG KWANGJU ELECTRONICS CO）01 Aug. 2007 (01.08.2007) lines 7-27 of page 4 of description,Figs.1-2	1-7
Y	CN101015436A(TEK ELECTRICAL SUZHOU CO LTD) 15 Aug. 2007 （15.08.2007）claim 1,pages 3-4 of description, Fig.1	1-7
Y	CN1502294A（SAMSUNG KWANGJU ELECTRONICS CO） 09 Jun. 2004 （09.06.2004）line 29 of page 4- line 3 of page 5 of description, Fig.1	1-7

☒ 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
19 Mar. 2010 (19.03.2010)	**22 Apr. 2010 (22.04.2010)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer XI, Wanhua Telephone No. (86-10)62085833

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/074945

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN201082150Y（WANG, Wei）09 Jul. 2008（09.07.2008）pages 3-4 of description,Figs.1-6	1-7
A	CN1644152A（SANYO ELECTRIC CO）27 Jul.2005（27.07.2005）full text	1-7

Form PCT/ISA /210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2009/074945

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN2897134Y	09.05.2007	none	
CN101006910A	01.08.2007	US2007175185A1	02.08.2007
		KR20070078679A	01.08.2007
CN101015436A	15.08.2007	none	
CN1502294A	09.06.2004	US2004098826A1	27.05.2004
		FR2847449 A1	28.05.2004
		DE10323419 A1	09.06.2004
		GB2396097 A	16.06.2004
		CA2425534 A1	25.05.2004
		JP2004174206 A	24.06.2004
		NL1024259 C2	26.05.2004
		KR20040045571A	02.06.2004
		GB2396097B	08.06.2005
		RU2257831 C2	10.08.2005
		KR100478638 B	25.03.2005
		ES2259489 A1	01.10.2006
		AU2003204377 A1	15.02.2007
		ES2259489 B1	16.09.2007
		IT1344554 B	04.03.2008
CN201082150Y	09.07.2008	none	
CN1644152A	27.07.2005	US2005160554 A1	28.07.2005
		JP2005204880 A	04.08.2005
		CN1307930C	04.04.2007

Form PCT/ISA /210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2009/074945

Continuation of: CLASSIFICATION OF SUBJECT MATTER

A47L9/10 （2006.01）i

A47L9/16（2006.01）i

Form PCT/ISA /210 (extra sheet) (July 2009)