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A47G 1/16, A47B 97/00, F04D 25/08, F24H 9/06, F24F 11/02,  
11/08, H01L 31/0232, H04B 10/06, A47G 1/14, A47B 97/04,  
F16M 11/00, 13/00, F04D 29/60

**A3**

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08/661,590	11 June 1996 (11.06.96)	US
08/661,375	11 June 1996 (11.06.96)	US

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(81) **Designated States:** AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

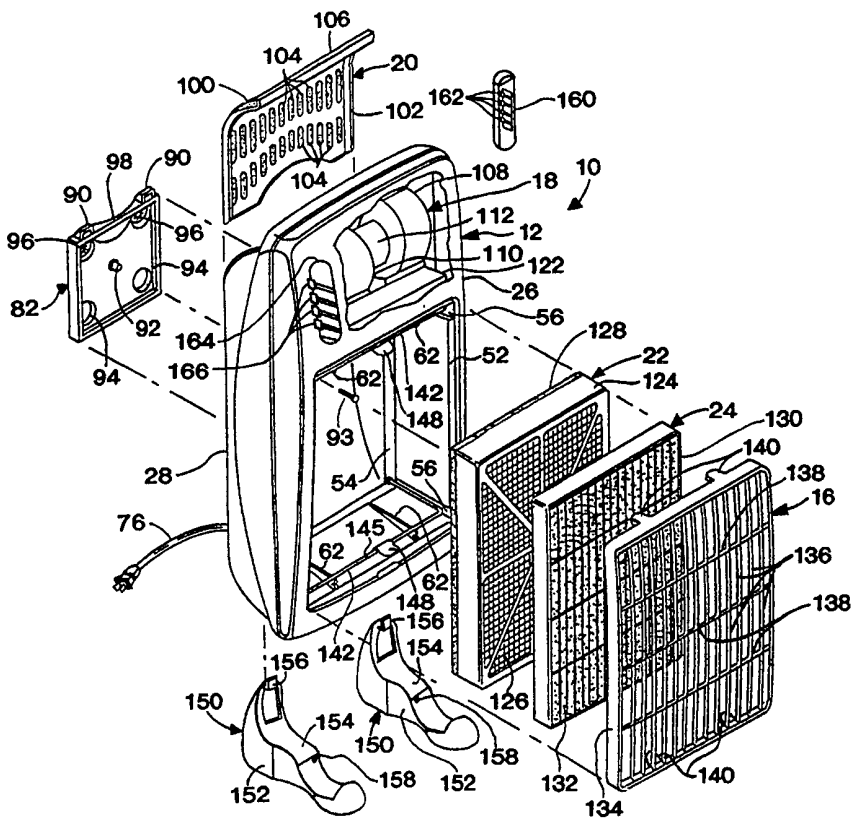
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*With international search report.*  
*Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.*

(88) **Date of publication of the international search report:** 16 April 1998 (16.04.98)

(54) **Title:** AIR TREATMENT SYSTEM

(57) **Abstract**

An air treatment system having a relatively large capacity yet a relatively small footprint and low sound level. The air treatment system includes a housing defining adjacent vertically extending inlet and outlet chambers. A blower is mounted within the inlet chamber to move air through the system. A generally planar filter is contained within the outlet chamber and is spaced apart from the rear wall of the housing to define a plenum. The rear wall of the housing is curved so that the plenum is tapered to provide uniform pressure over the face of the filter. The system is adapted to rest upon the floor or mount either vertically or horizontal to a wall. Additionally, the system includes a control mechanism that allows the system to run at full speed for a predetermined period of time and then automatically return to its previous speed level.



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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/09525

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 6 B01D46/10 B01D46/52 F24F11/00 F24F11/047 F24F13/28  
 F24F13/08 F24F13/18 F24F13/32 A47G1/16 A47B97/00  
 F04D25/08 F24H9/06 F24F11/02 F24F11/08 H01L31/0232

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 6 B01D F24F A47G A47B F04D F24H H01L H04B F16M

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)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X A	US 4 867 764 A (DISKIN STEVE ET AL) 19 September 1989 see column 6, line 24-37; figure 9	1,2,4,5, 13-17,19 3,6,7, 10,12
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X A	US 4 319 899 A (MARSH R CLAUDE) 16 March 1982 see column 3, line 10 - column 4, line 58; figure 3	1,3-6,8 10,12, 13, 15-17, 19-21
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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- \*A\* document defining the general state of the art which is not considered to be of particular relevance
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- \*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
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Date of the actual completion of the international search	Date of mailing of the international search report
12 February 1998	<b>27. 02.98</b>
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  Hoffmann, A

# INTERNATIONAL SEARCH REPORT

Intern. Application No PCT/US 97/09525
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**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 6 H04B10/06 A47G1/14 A47B97/04 F16M11/00 F16M13/00  
 F04D29/60

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)

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)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 560 395 A (DAVIS GEORGE B) 24 December 1985 see abstract; figure 4 ---	1
A	US 5 029 598 A (STROSZYNSKI JOACHIM ET AL) 9 July 1991 see abstract; figure 4 ---	1
A	DE 22 29 099 A (JOHN BASS LTD.) 21 December 1972 see page 5, line 26 - page 6, line 7 ---	23,32
A	PATENT ABSTRACTS OF JAPAN vol. 010, no. 239 (C-367), 19 August 1986 & JP 61 071817 A (HITACHI LTD), 12 April 1986, see abstract ---	22
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Further documents are listed in the continuation of box C.       Patent family members are listed in annex.

° Special categories of cited documents :

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Date of the actual completion of the international search  <b>12 February 1998</b>	Date of mailing of the international search report  <b>27. 02. 98</b>
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Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  <b>Hoffmann, A</b>
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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/09525

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 010, no. 336 (M-535), 14 November 1986 & JP 61 140738 A (MATSUSHITA REFRIG CO), 27 June 1986, see abstract ---	22,30,37
A	US 5 447 414 A (NORDBY CRAIG ET AL) 5 September 1995  see abstract see column 1, line 10-29 see column 3, line 31 - column 4, line 29 see column 6, line 44 - column 7, line 9 ---	23,24, 28,30, 32,34,36
A	EP 0 681 150 A (CARRIER CORP) 8 November 1995 see abstract see column 2, line 54 - column 3, line 3 ---	22,23, 30,32,36
A	PATENT ABSTRACTS OF JAPAN vol. 018, no. 283 (M-1613), 30 May 1994 & JP 06 050596 A (TOSHIBA CORP), 22 February 1994, see abstract ---	23,24, 30,32,36
A	PATENT ABSTRACTS OF JAPAN vol. 012, no. 367 (E-664), 30 September 1988 & JP 63 117692 A (MITSUBISHI ELECTRIC CORP), 21 May 1988, see abstract ---	23,24, 28,30, 32,34,36
A	PATENT ABSTRACTS OF JAPAN vol. 011, no. 001 (M-550), 6 January 1987 & JP 61 180851 A (DAIKIN IND LTD), 13 August 1986, see abstract ---	23,24, 29,32,35
A	PATENT ABSTRACTS OF JAPAN vol. 016, no. 161 (M-1237), 20 April 1992 & JP 04 009537 A (MATSUSHITA REFRIG CO LTD), 14 January 1992, see abstract ---	21,23, 27,32, 33,37
A	PATENT ABSTRACTS OF JAPAN vol. 095, no. 010, 30 November 1995 & JP 07 180878 A (MATSUSHITA ELECTRIC IND CO LTD), 18 July 1995, see abstract ---	25,31,37
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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/09525

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 005, no. 120 (C-065), 4 August 1981 & JP 56 058514 A (TOSHIBA CORP), 21 May 1981, see abstract ---	27,33
A	PATENT ABSTRACTS OF JAPAN vol. 005, no. 076 (M-069), 20 May 1981 & JP 56 025634 A (TOSHIBA CORP), 12 March 1981, see abstract ---	27,33
A	US 4 571 950 A (NARIAI SHIGERU ET AL) 25 February 1986 see column 1, line 29 - column 2, line 55 ---	22
X	US 3 999 969 A (SHULER BERNARD R) 28 December 1976 see column 3, line 3-15; figures 2,6 ---	38,41, 44-48
X	US 3 581 478 A (SMITH PETER W) 1 June 1971  see column 3, line 43 - column 4, line 18; figures 5-7 ---	38,41, 44-47
X	PATENT ABSTRACTS OF JAPAN vol. 012, no. 495 (M-780), 23 December 1988 & JP 63 213730 A (HITACHI LTD), 6 September 1988, see abstract; figures 3-5 ---	52-62
X,P	PATENT ABSTRACTS OF JAPAN vol. 097, no. 004, 30 April 1997 & JP 08 327091 A (MATSUSHITA ELECTRIC WORKS LTD), 10 December 1996, see abstract; figures 8,9A,9B ---	52-62
X	GB 2 149 906 A (HOLYOAKE NOEL VICTOR) 19 June 1985 see the whole document ---	52-62
A	GB 2 181 337 A (TI CRED A MFG) 23 April 1987 see page 1, line 105 - page 2, line 4 ---	65-81
A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 671 (M-1525), 10 December 1993 & JP 05 223089 A (MATSUSHITA SEIKO CO LTD), 31 August 1993, see abstract ---	65-81
1 A	US 3 672 622 A (BRESLOW LEON) 27 June 1972 see column 2, line 36-52; figures 4,6 ---	65-81
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INTERNATIONAL SEARCH REPORT

Inter. Appl. Application No

PCT/US 97/09525

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	see abstract	26
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X	PATENT ABSTRACTS OF JAPAN vol. 096, no. 004, 30 April 1996 & JP 07 318148 A (FUJITSU GENERAL LTD), 8 December 1995,	82
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A	PATENT ABSTRACTS OF JAPAN vol. 012, no. 261 (E-636), 22 July 1988 & JP 63 045929 A (MATSUSHITA ELECTRIC IND CO LTD), 26 February 1988, see abstract	82
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X	US 5 342 174 A (LITVIN CHARLES) 30 August 1994	83-86
X	see column 3, line 1-30; figures 1,2	88,90-94
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A	FR 2 622 275 A (MULLER CIE) 28 April 1989 see page 2, line 18 - page 3, line 38; figures 1-3	83,85,86
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A	US 5 102 082 A (BANG BUM J) 7 April 1992 see column 1, line 65 - column 2, line 61; figures 1,2	83-93
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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 97/09525

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 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 fee, this Authority did not invite payment of any additional fee.
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.
- No protest accompanied the payment of additional search fees.



## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

1. Specification of the reasons with regard to Rule 40.1 PCT whether the application does not fulfil the requirements of Article 17(3) PCT and rules 13.1 and 13.2 PCT:
2. The following the inventions or groups of invention are identified:

## 2.01 First invention (I)

This invention I is only regarded as one invention with regard to the Search Fees, since with the search of the invention Ia, as identified below, also the features of the inventions Ib and Ic, as identified below, are simultaneously searched, since the features of the claims of inventions Ib and Ic are overlapping with the features of respective dependent claims of invention Ia. With regard to a future examination of the Application the Applicant's attention is however drawn to the fact that the inventions Ia - Ic do not fulfil the requirements of Article 17(3) and Rules 13.1 and 13.2 PCT (unity of invention).

## Invention Ia:

The subject matter of claims 1-7 is an air treatment system including a filter element. The invention is concentrated on a certain plenum within an interior space defined in the housing, the cross sectional area of said plenum being progressively reduced away from the blower opening in the direction of the filter element.

The problem to be solved was to provide uniform pressure over a face of the filter element.

## Invention Ib:

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

The subject matter of claims 8-12 is an air treatment system including a filter element. The invention is concentrated on the relationship of the cross sectional area of the inlet and the outlet opening of an interior space defined in the housing.

The problem to be solved was to reduce the sound level of the system.

Invention Ic:

The subject matter of claims 13-21 is an air treatment system including a filter element. The invention is concentrated on the relation between the flow direction of the fluid stream downstream of the blower and the face of the filter element.

The description is silent about the problem to be solved by this invention.

2.02 Second invention (II)

The subject matter of claims 22-31 is an air treatment system including a filter element and control means for controlling the operation of the blower. The invention is concentrated on the control means for controlling operation of the blower in that the control means include timing circuitry for recording passage of time and blower speed control circuitry for controlling a speed of the blower and input means for allowing an operating speed of the blower to be selected.

The problem to be solved was to provide a system which is operated by an electronic control system with regard to the operating time and speed of the blower.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

## 2.03 Third invention (III)

The subject matter of claims 32-37 is an air treatment system including a filter element and control means for controlling the operation of the blower. The invention is concentrated on the control means for controlling operation of the blower in that the control means include uniform volume control circuitry for monitoring a status of the filter.

The problem to be solved was to provide a system which allows uniform air flow volume independent on the status of the filter.

## 2.04 Forth invention (IV)

The subject matter of the groups of claims 38-40, 41-47 and 48-51 is an air treatment system including a filter element and retainer means for securing said filter element. The invention is concentrated on the retainer means for securing the filter element within the housing.

The problem to be solved was to provide retainer means which allow to exchange easily the filters and held them if installed in firmly secured position.

## 2.05 Fifth invention (V)

The subject matter of the groups of claims 52-56 and 53-64 is an air treatment system including a filter element and grill means mounted over the outlet opening of the system. The invention is concentrated on the design of the grill means with respect to its installation within the housing.

The problem to be solved was provide grill means which

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

allow to direct the expelled air selectively in two different directions.

## 2.06 Sixth invention (VI)

The subject matter of the groups of claims 65-70, 71-77 and 78-81 is an air treatment system including a filter element, blower means and wall mounting means for mounting the air treatment system to a wall. The invention is concentrated on the design of the wall mounting means.

The problem to be solved was provide wall mounting means which allow the system to be mounted on a wall in at least two distinct orientations.

## 2.07 Seventh invention (VII)

The subject matter of claim 82 is an air treatment system including a filter element, blower means and control means of the operation of the blower and an infrared receiver. The invention is concentrated on the material of the control panel bracket

The problem to be solved was to provide a system to be controlled by infrared commands and in particular to provide a control panel bracket molded from conventional filtering material to allow the panel bracketed to function as a filtering lens for the infrared receiver.

## 2.08 Eighth invention (VIII)

The subject matter of claims 83-87 is an air treatment system including a filter element, blower means and a foot attached to the bottom for supporting the housing. The invention is concentrated on the design of the foot means.

The problem to be solved was provide foot means which

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

prevents the housing from engaging a wall.

2.09 Ninth invention (IX)

The subject matter of claims 88-94 is an air treatment system including a filter element, blower means and a foot attached to the bottom for supporting the housing. The invention is concentrated on the design of the foot means.

The problem to be solved was provide foot means which prevent the system to tip over.

- 3.1 The only common features of all groups of inventions are an air treatment system comprising a housing, a filter element and a blower (with the exception of claim 48 which does not provide a blower). As stated in the description in the paragraph "BACKGROUND ART" an air treatment system with a blower and a filter element is already known (the provision of a housing is evident).

Thus the cited features cannot be regarded as being the "special technical features" which define the contribution which each of the claimed inventions, considered as a whole, makes over prior art. Thus these features do not establish the unity of invention as required by Rules 13.1 and 13.2 PCT.

- 3.2 Obviously the remaining features of the independent claims of the different groups of inventions are also not able to define a single general inventive concept as required by Rule 13.1 PCT, since these different groups of features are not linked together by "special technical features" which define the contribution which each of the claimed inventions, considered as a whole, makes over prior art. Thus also these remaining features do not establish the unity of invention as required by

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Rules 13.1 and 13.2 PCT.

Already the different problems to be solved as defined above in paragraph 2.01-2.09 for the different groups of inventions are a clear indication for the lack of unity of invention.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/09525

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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