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

(11) EP 0 752 562 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.01.1997 Bulletin 1997/02

(51) Int. Cl.[6]: **F24F 5/00**, F24F 3/16

(21) Application number: **95110509.7**

(22) Date of filing: **05.07.1995**

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(71) Applicants:
- **Mou, Pai-Hor**
  Tainan (TW)
- **Chen, Chien-Tzun**
  Nan Chou Hsiang, Ping Dong Hsien (TW)

(72) Inventor: **Mou, Pai-Hor**
Tainan City, Taiwan (CN)

(74) Representative: **Casalonga, Axel et al**
BUREAU D.A. CASALONGA - JOSSE
Morassistrasse 8
80469 München (DE)

(54) Portable air cooler

(57) Portable air cooler, comprising a housing (1), a ball float (2), a filter unit (3), a semiconductor refrigerator (4), a switch unit (7), a motor-fan assembly (5), and an emergency battery set (6), the housing being divided with partitions into a sealed water tank (11), a cooling case (12) and a motor-fan case (14), the water tank (11) being connected with the filter unit (3) by a floating ball (2) made of close mesh of net and by a flexible pipe (21), the filter unit (3) containing various filter elements (33) being connected with the cooling unit (12), containing a semiconductor refrigerator (4) and its radiator fins (42), the cooling case (12) being connected to a discharge fan (51) carried by the upper end of the motor shaft next to a shutter (141), the other end of the motor shaft carrying a turbo blast fan (52) for guiding in air, and the air being guided from the blast fan (52) to the water tank (11) by a conduction tube (53), ball check valve (114) and a air inlet plunger tube (113), such that as a result of the motor's blasting and discharging efect, the air passes through water for filtering, cooling, then filtetring by the filter unit and cooling in the refrigerator before being discharged to the user through the opened shutter, while in case of emergency, the emergency battery set (6) supplies power for obtaining fresh filtered air which may be distributed by a nose adapter (8).

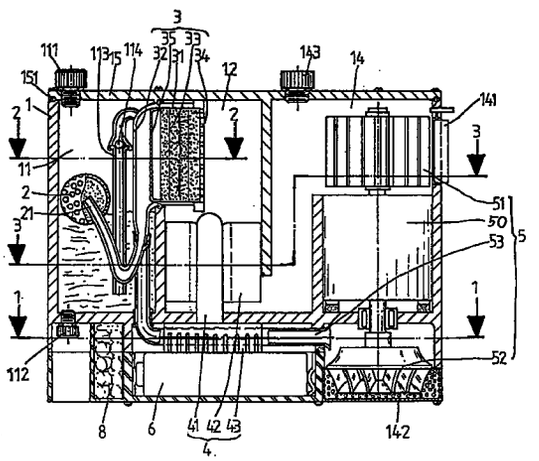

FIG. 2

EP 0 752 562 A1

Description

The present invention relates to a portable air cooler, which is carried by the user, can accept various power sources, supplies cooling air anywhere and supplies filtered fresh air in case of emergency.

In recent years, the air conditioner has become one of the essential equipment in the daily life, but most air conditioners are heavy, except car air conditioner, and almost all of them are of fixed style. Just a few kind of air conditioners are called movable, but have in fact restricted application in rooms and must be connected via a flexible conduit to the outside. Therefore, intrinsically, they are not-movable.

However, the above mentioned conventional air conditioner are used in a special environment mostly, they cool an isolated space. In fact, the users often pass in and out (enter and leave) the cooled isolated space. That may cause the user to be indisposed due to the temperature differences and even to become ill ; consequently, for the user, the conventional air conditioners are not a perfect air condition equipment.

In recent years, semiconductor refrigerators have been proposed wherein the produced cold flow is guided to radiator fins, on which air is blown to be cooled, the cooled air being blown onto the body of the user. Although the flow of cooling air is not strong or of high discharge rate, it can decrease the temperature in the direct surrounding of the user and thus provide a comfortable surrounding anywhere ; in addition, if the air is filtered by water in a water filter unit, filtered fresh air may be obtained by the user.

The present invention is based on the above mentioned background and its object is to provide a portable air cooler which saves power, can be carried by the user, and be used anywhere. A further object is to provide a fresh air supplier for first aid in case of emergency.

For reaching the above mentioned objects, the present invention adopts specific means to provide a portable air cooler, which includes a housing containing a ball float, a filter unit, a semiconductor refrigerator, an electric unit, a motor-fan assembly, and an emergency battery set. The housing is divided with partitions into a sealed water tank, a cooling case and a motor-fan case.The water tank is connected with the filter unit by a float ball made of close mesh of net and by a flexible pipe. The filter unit containing various filter elements is connected with the cooling case. The semiconductor refrigerator with its radiator fins is located in the cooling case. The upper end of the motor shaft carries a discharge fan next to a shutter. On the lower end of the shaft of the motor is fixed a turbo blast fan for air intake. The air passes through a flexible pipe and a ball check valve into the water tank ; as a result of the motor's blast and discharge effects, the air passes through water for filtering and cooling, is then filtered by the filter unit, is cooled in the cooling case, and is discharged to the user. In case of emergency, the emergency battery can be used for supplying the user with filtered fresh air.

In the drawings :

Fig. 1 is an outline view of a cooler according to the present invention ;
Fig. 2 is a vertical cross-section view of the cooler ;
Fig. 3 is a cross-section view taken along line 1-1 of Fig. 2 ;
Fig. 4 is a cross-section view taken along line 2-2 of Fig. 2 ;
Fig. 5 is a cross-section view taken along line 3-3 of Fig. 2 ;
Fig. 6 is an horizontal cross-section view showing the air intake and blasting in the air cooler ;
Fig. 7 is a vertical cross-section view showing the air cooling and discharge path in the air cooler ;
Fig. 8 is a top view showing the operation of the air cooler as a filtered fresh air supplier.

Referring to Fig. 1 through Fig. 5, the air cooler of the present invention includes a housing 1 containing a ball float 2, a filter unit 3, a semiconductor refrigerator 4, a motor-fan assembly 5, an emergency battery set 6, an electric unit 7 and a nose cover or adapter 8.

The housing 1 is divided into a water tank 11, a cooling case 12, an electric case 13, a motor-fan case 14 and a case for the emergency battery set 6 at the bottom. The top of the housing receives a cover 15 secured by screws 152 and sealed with a gasket 151. A water inlet 111 is provided on the cover 15 at the top part of the water tank. The water tank 11 is provided with a water outlet 112 at the bottom and with an air inlet plunger tube 113 opening at a small distance above the bottom of the water tank 11 and connected by a check valve ball 114 to an air conduction tube 53. The top part of the cooling case 12 is limited by the water tank 11 on one side and by the motor-fan case 14 on the other side, a filter unit 3 being mounted between the water tank 11 and the cooling case 12. The electric case 13 is placed at the front, between the cooling case 12 and the motor case 14. The top front side of the motor case 14 is provided with a shutter 141. The bottom of the housing 1 includes, below the motor-fan case 14, an air inlet with a guard net 142. The cover 15 is provided above the motor case 14 with an emergency air outlet 143.

The ball float 2 comprises two half-balls of metal net and a floating material such a foam plastic directly moulded therein; one end of a flexible pipe 21 is fitted into the ball, the other end of the flexible pipe 21 being connected to the filter unit 3.

The filter unit 3 comprises a tube-shaped shell 31, with a plastic or rubber extension pipe 32 and with a filter net 35, and contains active carbon filter elements 33 or the like retained by a sieve 34 ; the free end of the extension pipe 32 is connected with the flexible pipe 21.

The semi-conductor refrigerator 4 comprises a cooling conductive bar 41 fixed in cooling radiator fins 42 and connected with heat radiator fins 43 located at the outside of the cooling case 12, at the bottom of

housing 1.

The motor-fan assembly 5 comprises a motor 50 with a discharge fan 51 and a blast fan 52 mounted on the two ends of the motor shaft, respectively. The discharge fan 51 corresponds with the shutter 141 and the blast fan 52 which is a turbo fan corresponds with the guard net 142. One side of the blast fan 52 faces one end of the air conduction tube 53, the other end of the conduction tube 53 being sealingly connected with the inlet tube 113 of the water tank 11.

The emergency battery set 6 is a set of batteries, placed at the bottom of the housing 1, and is covered by a removable battery cover 61 for changing the batteries; next to it is provided a case for the nose cover or adapter 8.

The electric unit comprises an indicator lamp 71, a guard switch 72, an emergency switch 73, a power switch 74, a AC socket 75 and a DC socket 76, all these elements being connected to a circuit board. The guard switch 72 is a mercury switch for cutting off the power source once the house 1 has toppled over while the emergency switch 73 controls the emergency battery set 6.

Referring to Fig. 6 and Fig. 7, illustrating the state of supplying cooling air, the motor-fan assembly 5 is effective for blasting and discharging air ; the air passes through the conduction tube 53 and the inlet tube 113 into the water tank 11, is filtered by water which retains dust of air, flows through the ball float 2 into the flexible pipe 21, is guided through the filter unit 3 into the cooling case 12, is cooled by the cooling radiator fins 42 and is lastly discharged by discharge fan 51 through the opened shutter 141, this cooling air being blown onto the body of the user.

On the other hand, in case of emergency as a conflagration or presence of an harmful gas, as shown in Fig. 8, the user just has to switch on the emergency battery set 6 to operate the motor-fan assembly 5 for blasting and discharging air, to shut the shutter 141 and to connect the nose cover or adapter 8 with the emergency air outlet 143, so that clean (filtered) fresh air can be breathed with the nose cover 8; a film or other pierceable diaphragm on the emergency air outlet 143 will have to be changed after use, being pierced when connecting the nose cover 8 to the outlet 143.

In changing water in the cooler of the present invention, the outlet 112 is first opened for discharging, the inlet 111 is opened to rinse out the water tank 11, then the outlet 112 is closed and the tank is filled with clean water.

Claims

1. Portable air cooler, comprising a housing (1), a ball float (2), a filter unit (3), a semiconductor refrigerator (4), a switch unit (7), a motor-fan assembly (5), and an emergency battery set (6), the housing being divided with partitions into a sealed water tank (11), a cooling case (12) and a motor-fan case (14), the water tank (11) being connected with the filter unit (3) by a floating ball (2) made of close mesh of net and by a flexible pipe (21), the filter unit (3) containing various filter elements (33) being connected with the cooling unit (12) containing a semiconductor refrigerator (4) and its radiator fins (42), the cooling case (12) being connected to a discharge fan (51) carried by the upper end of the motor shaft next to a shutter (141), the other end of the motor shaft carrying a turbo blast fan (52) for guiding in air, and the air being guided from the blast fan (52) to the water tank (11) by a conduction tube (53), a ball check valve (114) and an air inlet plunger tube (113), such that as a result of the motor's blasting and discharging effect, the air passes through water for filtering, cooling, then filtetring by the filter unit and cooling in the refrigerator before being discharged to the user through the opened shutter.

2. Portable air cooler according to claim 1, comprising an emergency air outlet (143) above the motor-tan case (14) on the cover (15), for connecting a nose cover or adapter (8).

3. Portable air cooler according to claim 2, wherein the emergency air outlet (143) has a film or other pierceable diaphragm.

4. Portable air cooler according to claim 1, wherein the opening end of the flexible pipe (21) in the ball float (2) is inside the ball.

5. Portable air cooler according to claim 1, wherein the filter unit (3) comprises a tube-shaped shell (31), an extension pipe (32), filter elements (33), a sieve (34), a filter net (35), the shell being sealingly connected on upper side between the said water tank (11) and the cooling case (12), the shell being connected with one end of the extension pipe (32), and the another end of the extension pipe (32) being connected with the flexible pipe (21) of the ball float (2), the shell containing the filter net and the filter elements, and being covered by the sieve.

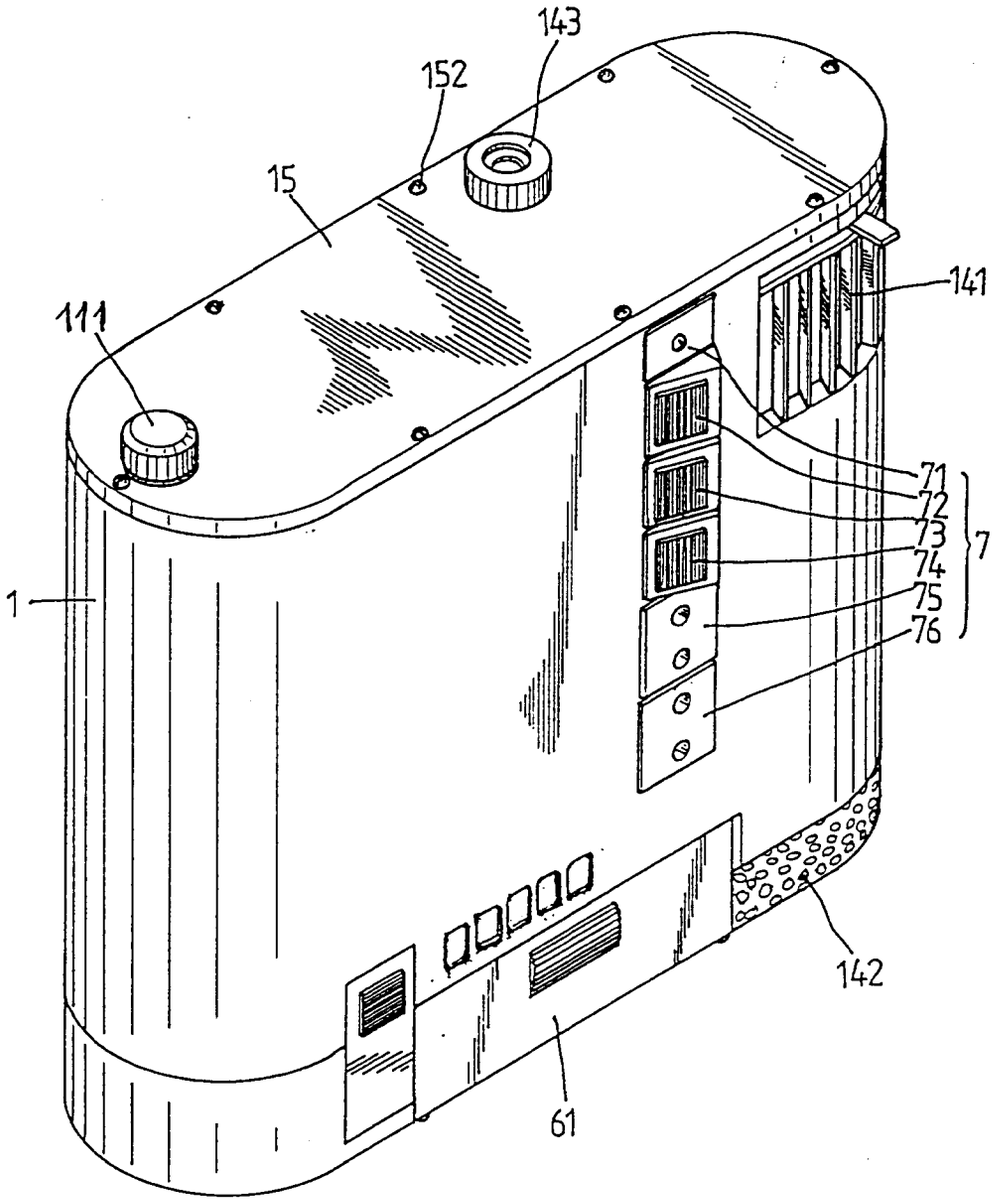

FIG. 1

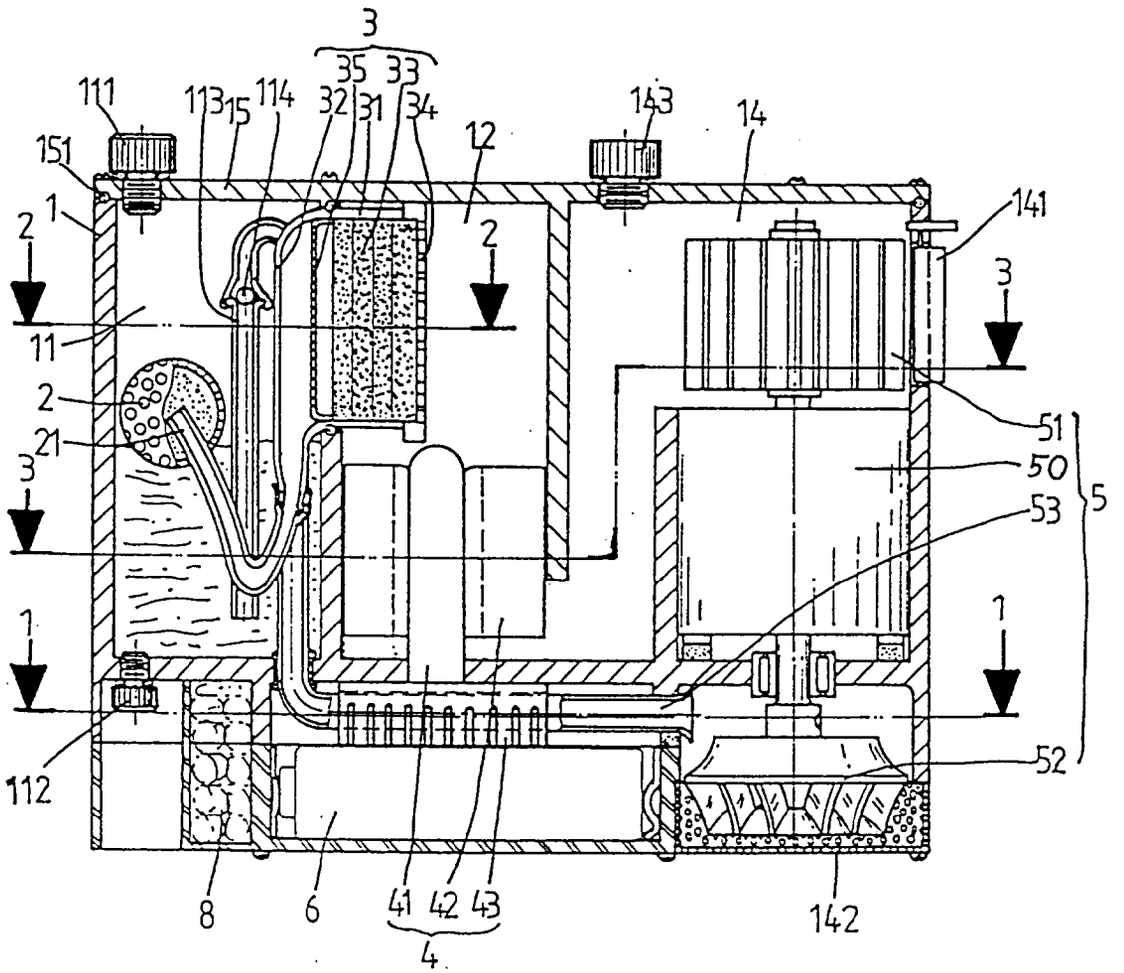
3
35
33
111
113
15
114
32
31
34
12
143
14
151
1
2
141
3
11
2
21
51
50
3
53
5
1
1
112
52
8
6
41
42
43
142
4

FIG. 2

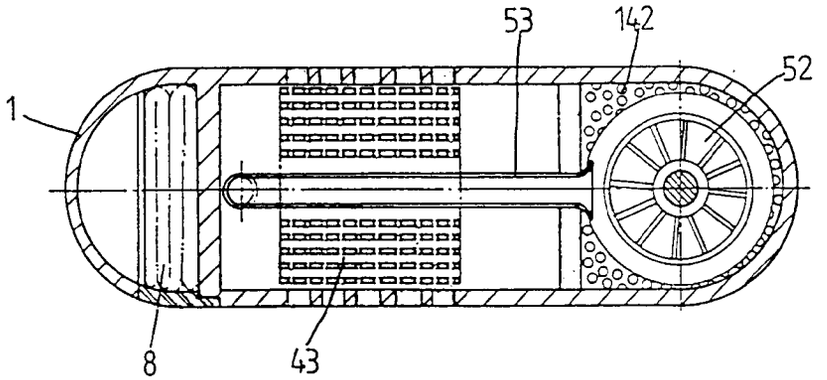

FIG. 3

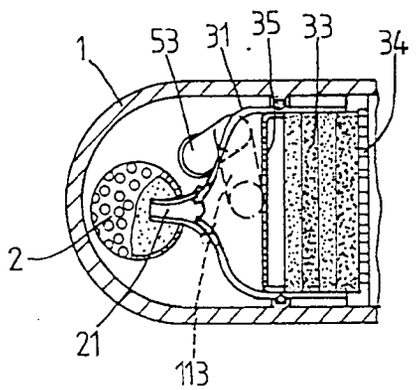

FIG. 4

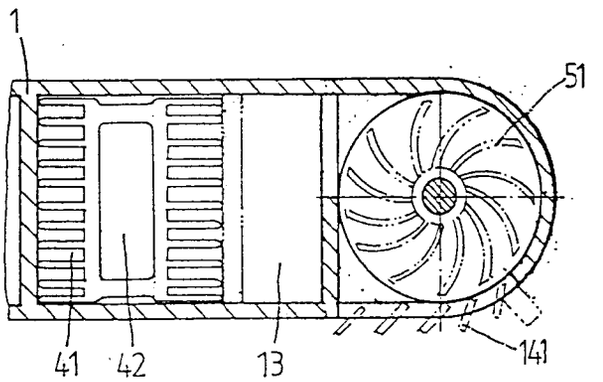

FIG. 5

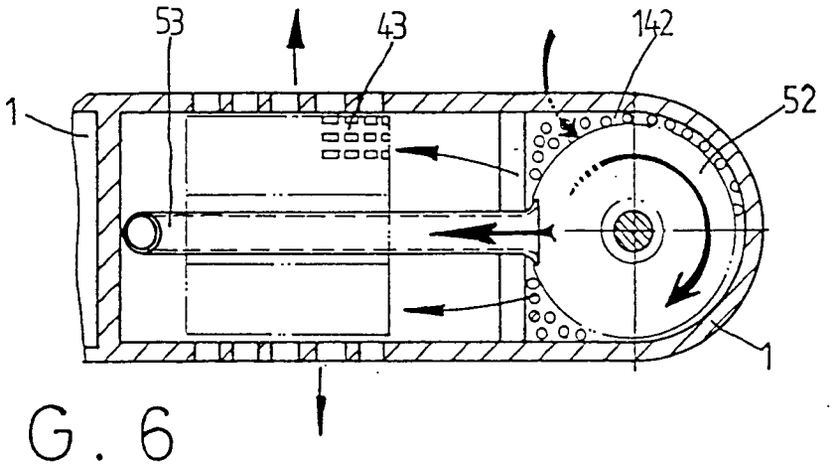
53
43
142
1
52
1

FIG. 6

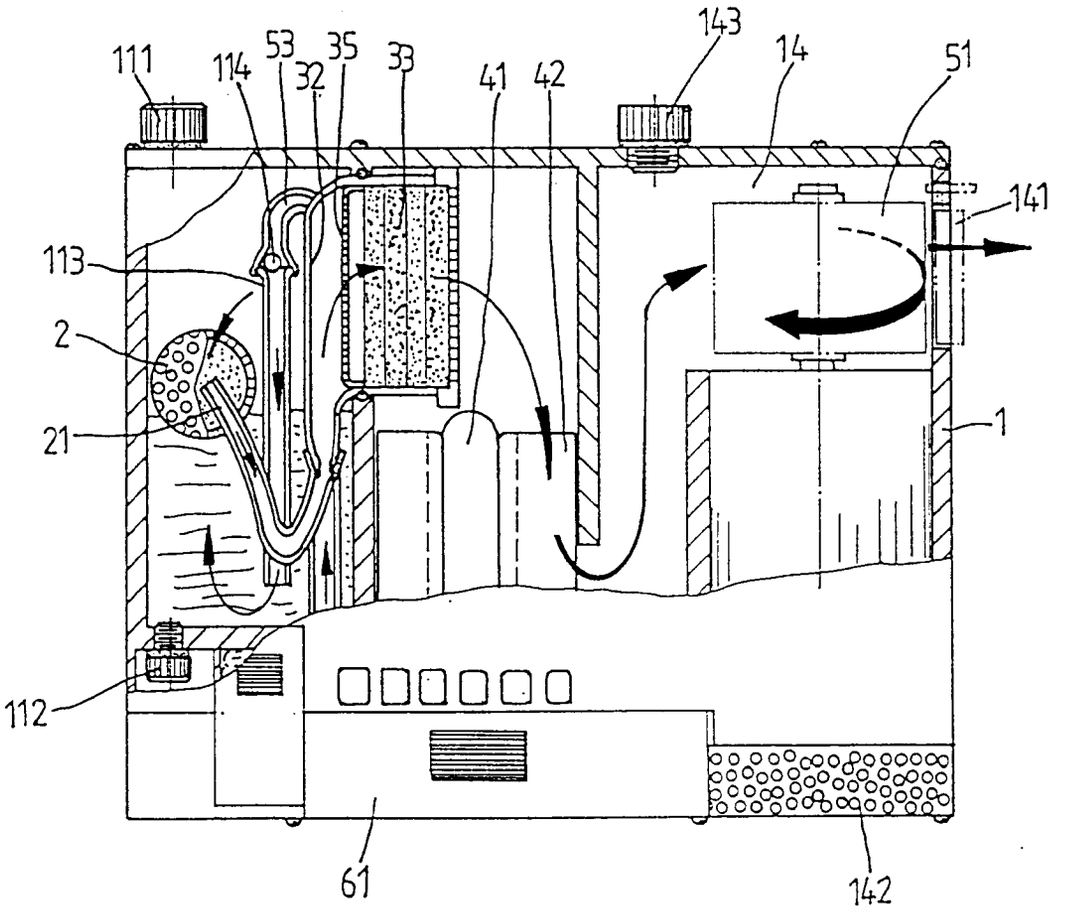
111
114
53
32
35
33
41
42
143
14
51
141
113
2
21
1
112
61
142

FIG. 7

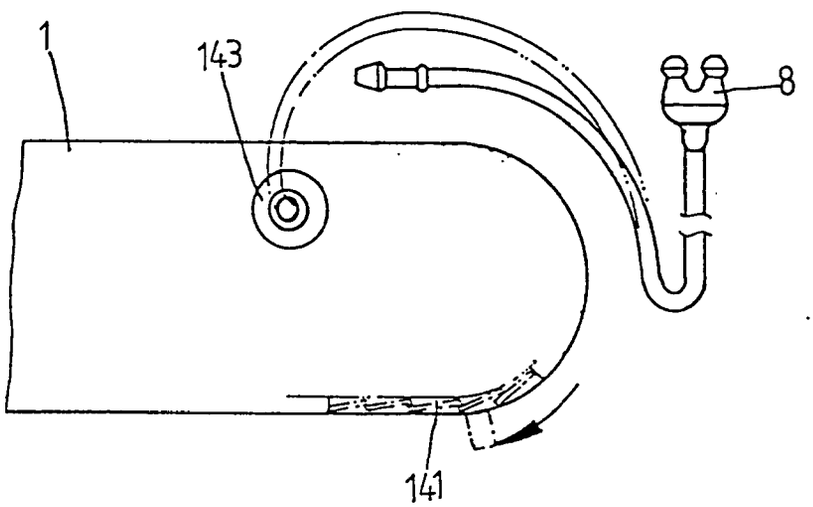

FIG. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 11 0509

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	PATENT ABSTRACTS OF JAPAN vol. 14 no. 447 (M-1029) ,25 September 1990 & JP-A-02 176326 (KOKEN KK) 27 December 1988, * abstract *	1	F24F5/00 F24F3/16
A	US-A-5 017 201 (CHUL PARK) * the whole document *	1	
A	EP-A-0 300 101 (KAJIMA CORPORATION) * column 5, line 26 - line 37; figure 3 *	1	
A	US-A-3 661 366 (CLETUS W. SHINKLE) * abstract; figures *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

F24F
B01D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 November 1995	Gonzalez-Granda, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)