(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
2 May 2008 (02.05.2008)

PCT

(10) International Publication Number
WO 2008/051089 A1

(51) International Patent Classification:
F25D 21/14 (2006.01) *F24F 13/22* (2006.01)
A47F 3/04 (2006.01) *F28F 17/00* (2006.01)

(21) International Application Number:
PCT/NO2007/000376

(22) International Filing Date: 25 October 2007 (25.10.2007)

(25) Filing Language: Norwegian

(26) Publication Language: English

(30) Priority Data:
20064838 25 October 2006 (25.10.2006) NO

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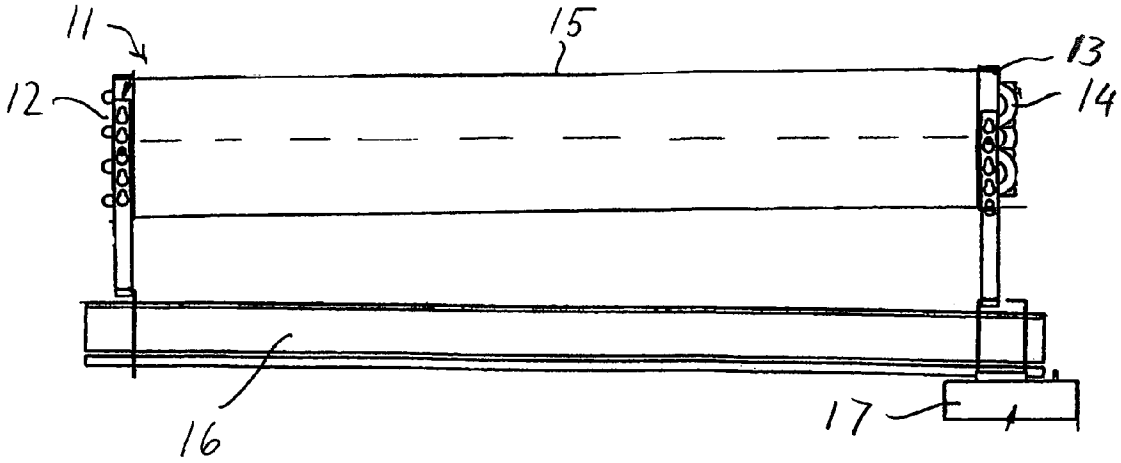
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(54) **Title:** ARRANGEMENT IN CONNECTION WITH COOLING ELEMENT INCLUDING CONDENSATE GUTTERS



(57) **Abstract:** Refrigerator device provided for connection to a cooling unit, and for being mounted with an open, exposed lower side, particularly for being used at a cooling device for releasing cooled air to an underlying entity of cooled goods. A number of generally parallel cooling lamellas (15) being arranged in an assembly to restrict slots for passing air to be cooled. The cooling tubes being arranged in groups 18. Under each such group a longitudinal collecting chute (19) is provided to collect condensed water from the cooling tubes and release it at one end (13). At the end of the collecting chutes (19) being supplied with condensed water, a crossing chute (16) is arranged, providing a collected release of condensed water (at 17).

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ARRANGEMENT IN CONNECTION WITH COOLING ELEMENT INCLUDING CONDENSATE GUTTERS

The invention relates to a refrigerator device as stated in the introductory part of claim 1, provided for being suspended with an open, exposed lower side.

Background

Refrigerator devices provided for being mounted, e.g. by being suspended, with open and exposed lower side, belong to prior art. Such refrigerator devices are provided for special cooling cabinets or for being mounted freely over a merchandise. In such refrigerator devices water condensed on the cooling lamellas is liable to drip and deposit water on the merchandise and equipment which should be kept dry or which is requiring supply of water as a mist.

A satisfactory solution of this problem has not been available.

Object

The main object of the invention is to provide a refrigerator device staying dry in the meaning of not depositing moisture uncontrolled as drops to the underlying area.

A drop catcher is desirable, wherein increased efficiency does not increase the deposit of drops, particularly in connection with refrigerator devices being suspended over a merchandise to be cooled.

The Invention

The invention is stated in claim 1. These features allow a substantial increase in the thermal transfer and reduction of the temperature of the air flowing from such a refrigerator device.

In claims 2- 6 particularly advantageous features of the invention are stated. Further details of the invention will appear from the following specification.

Example

The invention will be further described with reference to the drawings, wherein

Figure 1 shows a plane view from above, of an embodiment of the invention, with a refrigerator device with lamellas on cooling pipes,

Figure 2 shows an end view of the refrigerator device of Figure 1,

Figure 3 shows a side view of a lamella for the refrigerator device of Figure 1, while Figure 4 shows an enlarged part of Figure 3.

In Figure 1, a refrigerator device 11 which is assembled between two end elements 12, 13 is shown. Between the end elements 12, 13, a series of cooling tubes 14 are connected for the conduct of a cooling medium. The cooling tubes 14 are carrying a series of cooling fins or lamellas 15. The cooling lamellas 15 are extending over the total height of the cooling element 11 and are connected to the cooling tubes 14. The distance between the cooling lamellas may be 9 millimetre.

The refrigerator device 11 of the example is shown with vertical extension of the slits, with gravitational air transfer. The cooling element according to the invention can also be used at cooling devices provided with a fan. This will allow a freer positioning.

The refrigerator device 11 according to the invention can be utilized for various cooling purposes, technical as well as for residential use. E.g. it is suitable for cooling elements to be arranged freely over the goods to be cooled.

In Figure 2 the arrangement of an inclined collection chute 16 for condensed water, under the refrigerator device 11, at one end thereof, under the end of the end element 13, is shown. The collection chute 16 ends in a chamber 17 with a pump with level control, for emptying of condensed water.

In Figure 3 a side view of a cooling lamella 15 is shown, with an enlarged part shown in Figure 4. The cooling tubes 14 are arranged in vertical rows 18, with four cooling tubes 14 in each row. Adjoining such a row 18 a collecting chute 19 is arranged. The collecting chute 19 has a plane, longitudinal main part 20 being inclined with the lower part under the cooling tubes 14, an upper narrow perpendicular flange 21, pointing downward, and a lower flange 22, also being perpendicular to the main part, providing a V-chute 23 to remove condensed water.

The collecting chutes 19 are passes through S-slots 24 in the lamellas 15 and in the end elements 12, 13, which are adapted to the section of the collecting chutes. Each slot 24 is wider than the thickness of the sheet and is provided with knots facing the sheets to make contact:

- An upper lug 25 and a lower lug 26 facing the lower side of the sheet,

- A lug 27 facing the bottom of the V-chute 23, and
- A lug 28 pressing against the upper side of the sheet at the upper edge.

Thus the water condensed on the cooling tubes will drip on the collecting chute 19 and be collected there together with water condensed on the upper side of the collecting chutes. Water condensed on the lower side of the collecting chutes 19 will trickle to the lower edge of the chute 23 and drip to a V-chute 29 arranged under the collecting chute 19, parallel thereto. The V-chute 29 is passed through V-slots 30 in the end elements 12 and 13, with corresponding lugs 31, 32, 33 as the upper collecting chute.

This arrangement will bring condensed water from the refrigerator device 11 to be collected in the chutes 23 and 29, and from there to be collected at an end of the refrigerator device 11.

This will avoid drops from the refrigerator device according to the invention. This is particularly advantageous at cooling elements being open on the lower side, without the possibility to deposit condensed water.

Claims

1. Refrigerator device provided for connection to a cooling unit, and for being mounted with an open, exposed lower side, particularly for being used at a cooling device with cooling tubes for releasing cooled air to an underlying entity of cooled goods, with a number of generally parallel cooling lamellas (15) being arranged in an assembly to restrict slots for passing air to be cooled, and with longitudinal collecting chutes (19) provided to collect condensed water from cold faces, a crossing collecting chute (16) being arranged at one end thereof, **characterized** in that the first collecting chutes (19) being integrated in the assembly of cooling lamellas (15).

2. Refrigerator device according to claim 1, **characterized** in that multiple longitudinal collecting chutes (19) are arranged at the cooling lamellas (15) allocated separate groups of cooling tubes (14) and crossing the cooling lamellas, providing a multiple interspaces between the collecting chutes (19) for intermediate flow of air.

3. Refrigerator device according to claim 2, **characterized** in that the cooling tubes (14) are arranged in vertical rows (18).

4. Refrigerator device according to on of the claims 1 to 3, **characterized** in that the collecting chutes (19) are passed through slots (24) in the cooling lamellas (15).

5. Refrigerator device according to claim 4, **characterized** in that the slots (24) of the cooling lamellas (15) is providing point of contact (at 25. 26, 27, 32, 33) to the collecting chutes (19).

6. Refrigerator device according to claim 1, **characterized** in that a second V-shaped collecting chute (29) is arranged under each of the first collecting chutes (19).

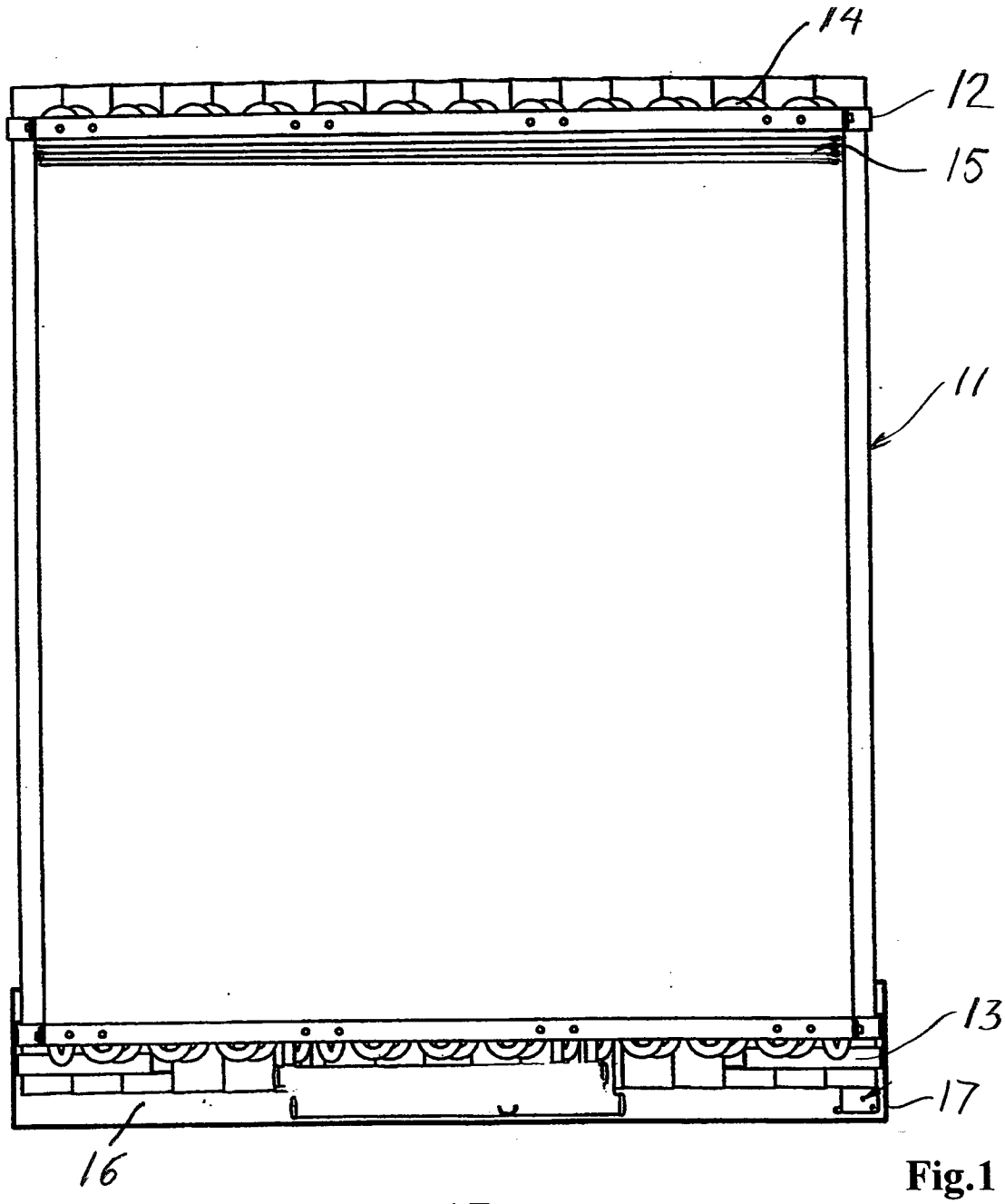

Fig.1

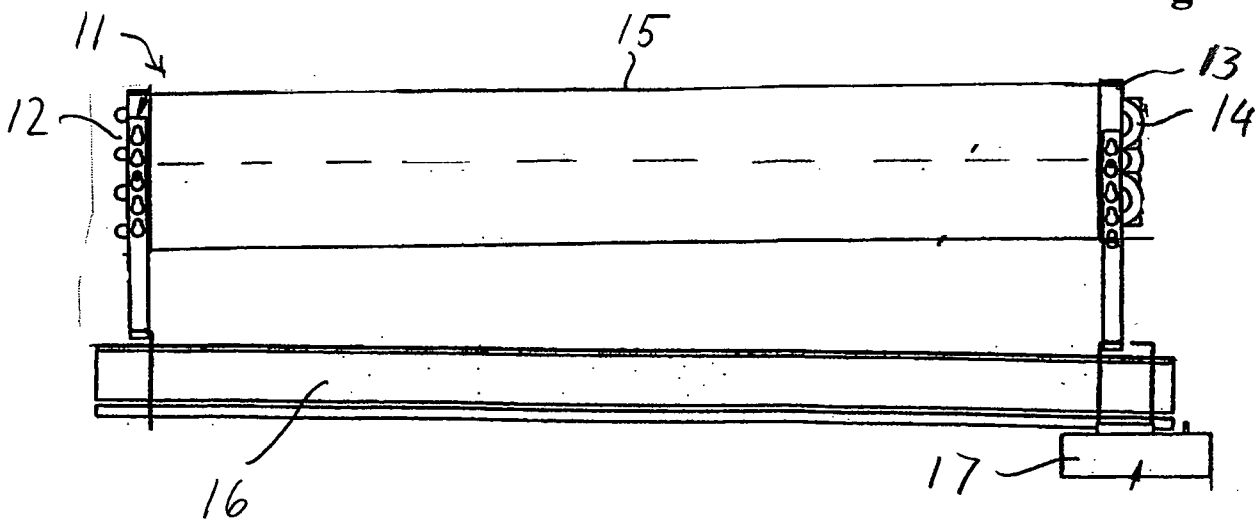

Fig.2

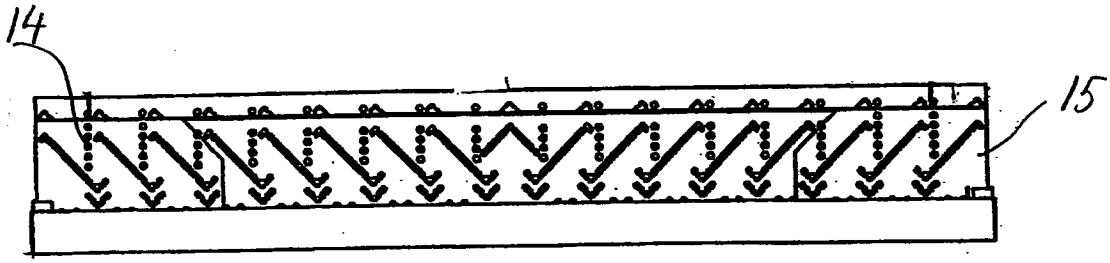

Fig.3

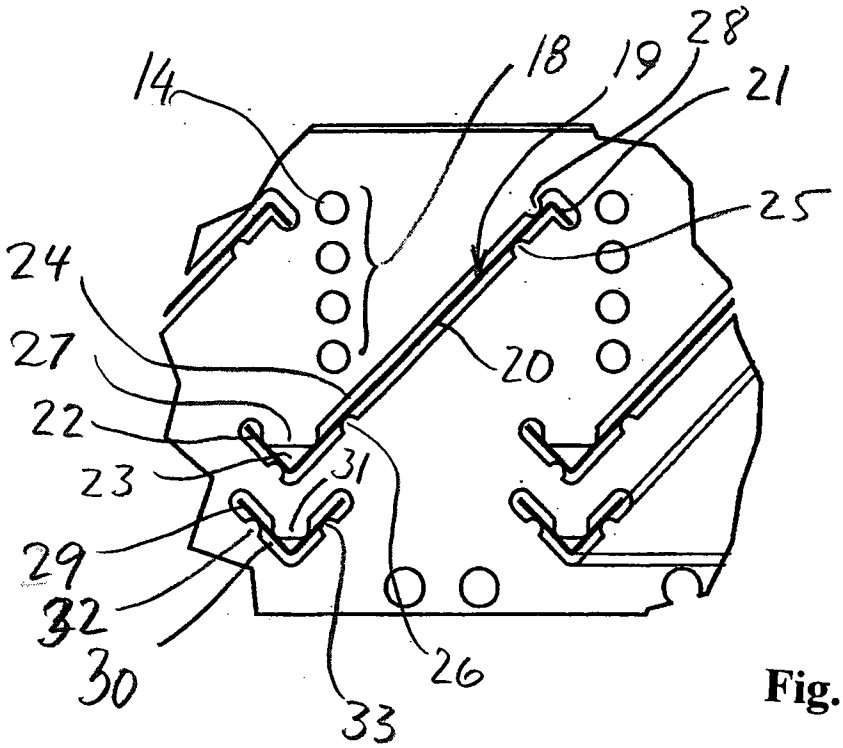

Fig.4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO2007/000376

A. CLASSIFICATION OF SUBJECT MATTER

IPC: 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: F25D, F24F, F28F

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2175396 A (C.F. HOFFMAN), 10 October 1939 (10.10.1939), page 1, column 1, line 55 - column 2, line 3; page 2, column 1, line 20 - line 21; page 2, column 1, line 31 - line 32, page 3, column 1, line 23 - line 41	1-6
X	US 1709730 A (J. MCL. MAXWELL), 16 April 1929 (16.04.1929), page 1, column 2, line 104; page 2, column 1, line 2	1-6
X	US 2667041 A (R.M. HENDERSON), 26 January 1954 (26.01.1954), column 4, line 24; column 4, line 33 - line 36; column 4, line 75 - line 76	1

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

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Date of the actual completion of the international search	Date of mailing of the international search report
6 February 2008	07 -02- 2008
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Helene Eliasson / JA A Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO2007/000376

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2238543 A (H.E. TROTTER), 15 April 1941 (15.04.1941), whole document --	1-6
A	US 6435265 B1 (LAKDAWALA ET AL), 20 August 2002 (20.08.2002), whole document -- --------	1-6

International patent classification (IPC)

F25D 21/14 (2006.01)
A47F 3/04 (2006.01)
F24F 13/22 (2006.01)
F28F 17/00 (2006.01)

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Paper copies can be ordered at a cost of 50 SEK per copy from PRV InterPat (telephone number 08-782 28 85).

Cited literature, if any, will be enclosed in paper form.

US	2175396	A	10/10/1939	NONE		
US	1709730	A	16/04/1929	NONE		
US	2667041	A	26/01/1954	NONE		
US	2238543	A	15/04/1941	NONE		
US	6435265	B1	20/08/2002	CA	2140404 A,C	18/07/1996