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

(11) EP 1 006 324 A1

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.06.2000 Bulletin 2000/23

(51) Int. Cl.[7]: **F25D 25/02**, F25D 11/00

(21) Application number: **99122923.8**

(22) Date of filing: **18.11.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **02.12.1998 IT MI982609**

(71) Applicant: **WHIRLPOOL CORPORATION**
Benton Harbor Michigan 49022 (US)

(72) Inventors:
- **Piloni, Mauro,**
  c/o Whirlpool Europe Pat.Dep.
  21025 Comerio (IT)
- **Coato, Roberto,**
  c/o Whirlpool Europe Pat.Dep.
  21025 Comerio (IT)

(74) Representative:
Guerci, Alessandro
Whirlpool Europe S.r.l.
Patent Department
Viale G. Borghi 27
21025 Comerio (VA) (IT)

(54) **Shelf for upright freezers**

(57) An internal shelf (2) for upright freezers (1) comprising a flat serpentine section (3) of the freezer refrigeration circuit evaporator in which the straight portions (4) of the flat serpentine are connected together by rod elements (6), the combined serpentine (3) and rod elements (6) forming a grid structure provided with passages (7) into at least one of which a closed container (10) of eutectic mixture is inserted.

EP 1 006 324 A1

Description

[0001] This invention relates to an internal shelf for upright freezers. The shelf comprises a flat serpentine section of the evaporator of the upright freezer refrigeration circuit in which the straight portions of the flat serpentine of that section are connected together by substantially transverse rod elements to form an overall grid structure.

[0002] Upright freezers, the preservation compartment of which is accessible via a door hinged about a vertical axis, are known to comprise within that compartment a series of horizontal shelves positioned at different heights and each comprising a section of the freezer refrigeration circuit evaporator. Each section is formed from a flat serpentine the straight portions of which are connected together by metal rod elements.

[0003] The evaporator and hence the relative sections are sized on the basis of the required performance, which is variable.

[0004] This necessitates the production of different series of freezers, with an obvious greater expenditure in terms of components and costs.

[0005] An object of the invention is therefore to enable all freezers to be produced on the production line with the same evaporator, to then differentiate them on the basis of their required performance, before packaging.

[0006] It is already known to use eutectic mixture containers in freezers in order to reduce energy consumption and/or to increase the temperature rise time. These eutectic containers hence operate as thermal stabilizers, able to provide cold even during temporary lack of electricity.

[0007] These rigid eutectic containers are placed in the most varied positions within the freezer compartment, creating problems by virtue of their bulk and poor appearance.

[0008] A further object of the invention is therefore to provide a freezer shelf which substantially overcomes the aforesaid bulk and appearance problems.

[0009] These and further objects which will be more apparent from the ensuing detailed description are attained by a freezer shelf in accordance with the teachings of the invention.

[0010] The invention will be more apparent from the detailed description of a preferred embodiment thereof given hereinafter by way of non-limiting example and illustrated on the accompanying drawings, on which:

Figure 1 shows an upright freezer incorporating shelves of the invention;

Figure 2 is a perspective view of a series of horizontal sections through the evaporator, in which each section forms part of a different shelf of the freezer;

Figure 3 is a perspective view relating to a detail of one of the sections; and

Figure 4 is a cross-section through one of the sections.

[0011] With reference to the figures, the reference numeral 1 indicates overall an upright freezer, the preservation compartment of which is divided into sub-compartments by a series of horizontal shelves 2 on which the frozen product or the product to be frozen rests. Each shelf comprises a section of the freezer refrigeration circuit evaporator. Each section comprises a tubular flat serpentine 3 formed from straight portions 4 and curved portions 5.

[0012] Solid metal rod elements 6 are connected to the straight portions both upperly and lowerly, for example by welding, to extend transversely to the straight portions 4.

[0013] As can be seen in Figure 4, the result of such a construction is that between adjacent straight portions 4 and rod elements 6, passages 7 are formed to receive by insertion a closed body or vesicle 10 formed from a flexible plastic casing 8, for example of polyethylene, enclosing a mass 9 of eutectic mixture.

[0014] Such a body can be inserted into some or all of said passages 7 and involve the whole or part of the length of these passages.

[0015] In Figure 3, all the passages 7 of the two upper sections are occupied by the bodies or vesicles 10, whereas the third section from the top has only three adjacent passages occupied by these bodies.

[0016] Of the known eutectic mixtures 9 those which can be advantageously used have a freezing point of between -10°C and -40°C.

[0017] Although the most advantageous and preferable solution is to use a flexible casing 8 for the body or vesicle 10, the scope of the invention also covers the use of casings of rigid or semirigid plastics.

[0018] The solution of the invention enables the the evaporator to operate on average at a hotter evaporation temperature (smaller temperature difference between the evaporator and the air), as the eutectic mixture functions as a stabilizer by accumulating and releasing cold during the operating cycles of the freezer (or of the relative refrigeration circuit). This results in better working conditions for the compressor of this circuit, and hence lower energy consumption.

[0019] The solution of the invention also allows modular construction which enables all freezers to be produced on the production line with the same evaporator, and be differentiated prior to packaging, on the basis of the required performance, by placing the eutectic mixture containers in the desired position and quantity (to reduce energy consumption these containers should be placed in the first and last sections, to increase refrigeration capacity they should be placed in the central sections, and to increase the temperature rise time they should be placed only in the upper sections).

Claims

1. An internal shelf (2) for upright freezers (1) comprising a flat serpentine section (3) of the freezer refrigeration circuit evaporator in which the straight portions (4) of the flat serpentine are connected together by rod elements (6), characterised in that the combined serpentine (3) and rod elements (6) form a grid structure provided with passages (7) into at least one of which a closed container (10) of eutectic mixture is inserted.

2. A shelf as claimed in claim 1, wherein the eutectic mixture container (10) is of flexible plastic.

3. An upright freezer incorporating at least one shelf in accordance with claim 1, or claims 1 and 2.

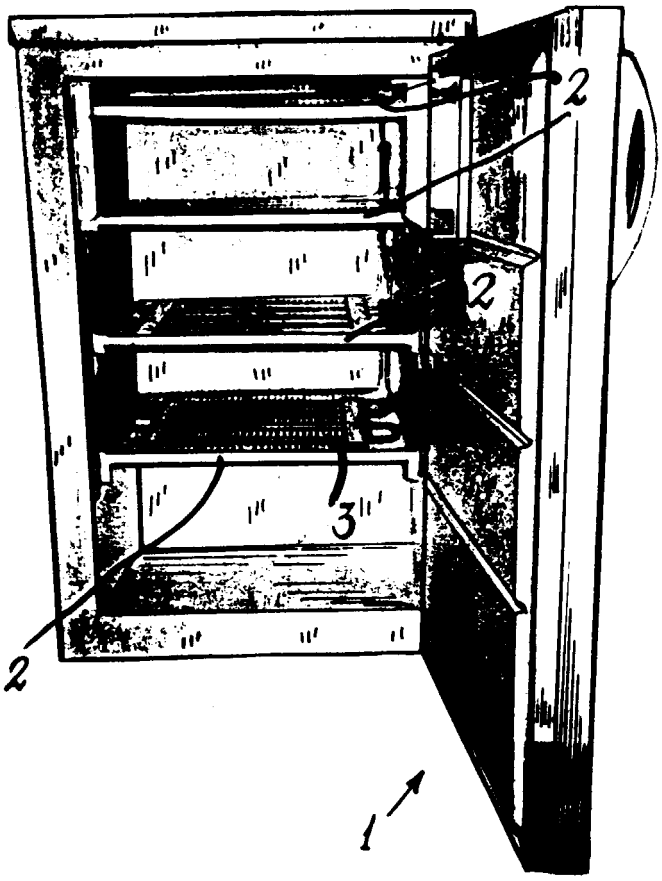

Fig. 1

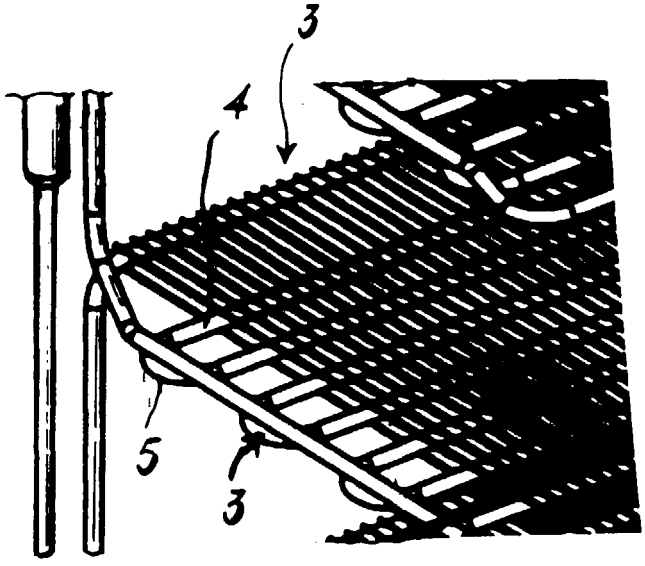

Fig. 2

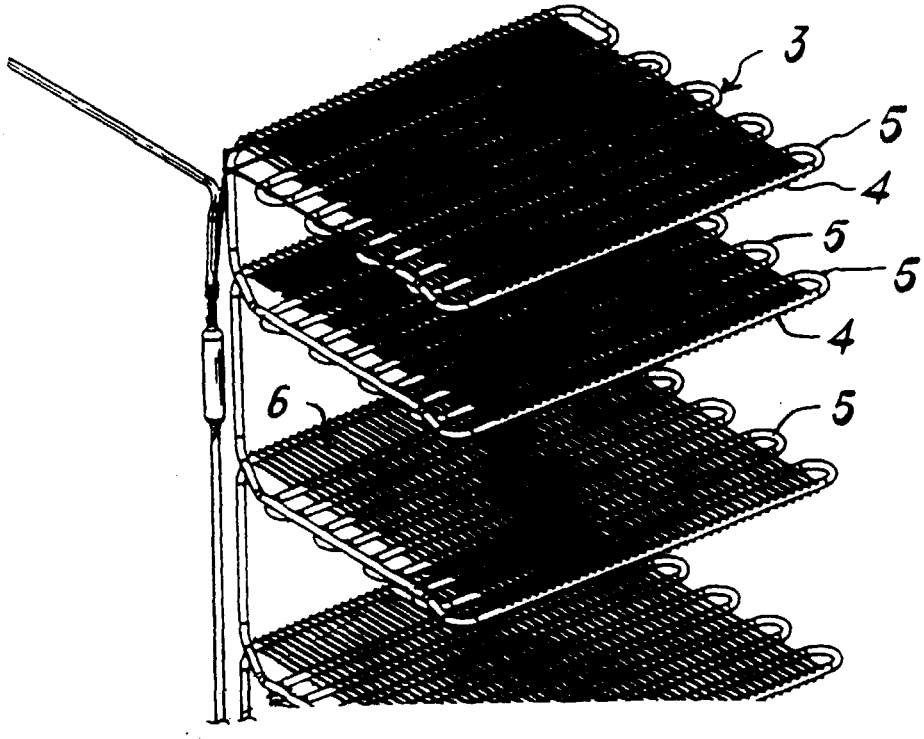

Fig. 3

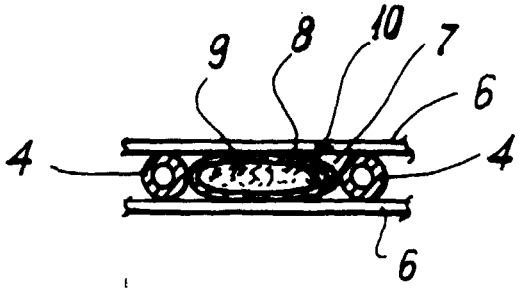

Fig. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 12 2923

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.7)
A	FR 2 538 514 A (BOSCH SIEMENS HAUSGERAETE) 29 June 1984 (1984-06-29) * the whole document *	1-3	F25D25/02 F25D11/00
A	DE 36 05 891 A (BOSCH SIEMENS HAUSGERAETE) 27 August 1987 (1987-08-27) * the whole document *	1-3	
A	WO 94 05959 A (CASSELL ALLAN JOHN) 17 March 1994 (1994-03-17) * figure 4 *	1-3	
A	EP 0 794 396 A (SELNOR) 10 September 1997 (1997-09-10) * the whole document *	1-3	
A	US 4 459 826 A (HIRANO YOSHIMI ET AL) 17 July 1984 (1984-07-17) * the whole document *	1-3	
A	US 2 405 834 A (DOLE REFRIGERATING COMPANY) 13 August 1946 (1946-08-13) * the whole document *	1-3	TECHNICAL FIELDS SEARCHED (Int.Cl.7) F25D
A	US 5 524 453 A (JAMES TIMOTHY W) 11 June 1996 (1996-06-11) * figure 2 *	2	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 February 2000	Busuiocescu, B

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)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 12 2923

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-02-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2538514 A	29-06-1984	DE 3247604 A	05-07-1984
		GB 2133518 A,B	25-07-1984
		IT 1169489 B	27-05-1987
DE 3605891 A	27-08-1987	NONE	
WO 9405959 A	17-03-1994	AU 4935293 A	29-03-1994
		CN 1084957 A	06-04-1994
EP 0794396 A	10-09-1997	FR 2745894 A	12-09-1997
		IT MI970315 A	14-08-1998
US 4459826 A	17-07-1984	GB 2094459 A,B	15-09-1982
US 2405834 A	13-08-1946	NONE	
US 5524453 A	11-06-1996	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82