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(54) Refrigeration apparatus with improved plane evaporator

(57) In an apparatus as a refrigerator appliance or upright freezer having a compartment whose side walls (1,2) are provided with pairs of frontally arranged horizontal guides (4a,5a,6a) adapted to support respective shelves capable of being inserted in respective grooves provided between one of said horizontal guides (4a,5a, 6a) and the guide provided thereabove, and an evaporator (7) arranged on one or more of said shelves, the evaporator (7) comprises a shelf whose side edges (10,11) are capable of being inserted in respective ones of said grooves, and in the side edges of said evaporator (7) there are provided appropriate tabs (9) whose position is capable of being moved apart with respect to said edges (10,11), and in said horizontal guides (4a,5a,6a) or on the side wall between pairs of superposed guides (4a,5a,6a) there are provided respective recessed receptacles (13). The tabs (9) are adapted to slide into insertion in respective ones of said recessed receptacles (13) provided in the upper surface of the lower guides (4a,5a,6a) supporting the evaporator (7) or the lower surface of the guides (4a,5a,6a) above the lower ones supporting the evaporator (7).

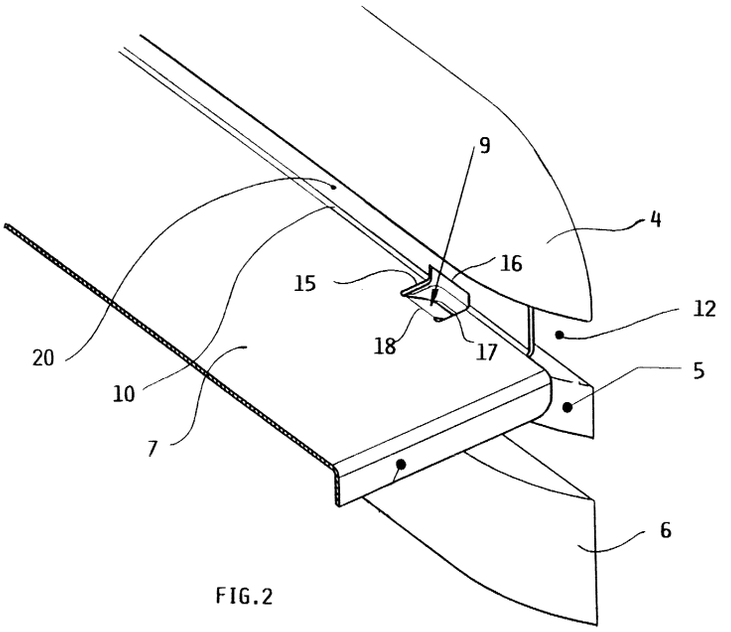

FIG.2

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Description

[0001] The present invention refers to an improved type of shelf for a refrigerator apparatus provided with at least a compartment for the storage of foodstuffs.

[0002] For reasons of greater simplicity, reference will be made in this description to a refrigeration apparatus provided with a single storage compartment, but the present invention shall be anyway appreciated as being capable of being freely and readily extended to also cover refrigerator and/or freezer apparatuses provided with more storage compartments and related shelves.

[0003] Shelves arranged horizontally inside the compartments used to store the foodstuffs are known in the art, in which said shelves serve a double purpose in that they both delimitate the various storage compartments vertically and accommodate the foodstuffs that the user selects to arrange thereupon for storage.

[0004] At present, refrigerator appliances and/or upright freezers, ie. those refrigeration apparatuses that generally comprise a plurality of shelves arranged above each other, are provided with a compartment in which at least one of said shelves is associated to a respective evaporator which in a preferred, although not sole manner is constituted by a so-called roll-bond plate attached in the interior of the storage compartment with the aid of appropriate fastening devices, such as for instance bushes, screws and other fastening means that are largely known in the art.

[0005] Furthermore, in view of a correct operation there is provided an appropriate support (which is fastened to the evaporator itself by means of screws) which enables a drip pan to be mounted there to collect drippings during cleaning or defrost operations.

[0006] These solutions, although of time-proven effectiveness, are however associated to a number of drawbacks that tend to show up during assembly operations and are mainly due to awkwardness found in carrying out the related assembly work, the need for skilled personnel to be used to such a purpose, and the great likelihood for screws or fastening means to be positioned erroneously. Furthermore, owing to the assembly technique used, a possibly required disassembly to repair or similar purposes becomes practically impossible and this of course leads to a general decrease in the quality level of the whole apparatus.

[0007] It therefore would be desirable, and is actually a purpose of the present invention, to provide a refrigeration apparatus, preferably of a type intended for use in the home, provided with at least a compartment for the storage of the foodstuffs, as well as with an internal evaporator that is capable of being manufactured in a more economical manner and, above all, is capable of not only being assembled under utilization of a minimum amount of accessory fastening material and as fast and simple as possible, but reliably effective assembly techniques, but also being disassembled without any difficulty.

[0008] According to the present invention, such an aim is obtained in a particular type of refrigeration storage compartment and evaporator, both of which are described below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1 is a front elevation view of a storage compartment with a kind of evaporator according to the present invention;
- Figure 2 is a simplified perspective view of a detail of Figure 1;
- Figure 3 is a symbolical top perspective view of an evaporator according to the present invention.

[0009] With reference to the Figures, a refrigeration apparatus according to the present invention comprises two side walls 1, 2, an inner compartment 3, a plurality of side guides 4, 5 and 6 on an inner side of the compartment, and a corresponding plurality of side guides 4a, 5a and 6a on the opposite inner side of said compartment.

[0010] These side guides are well-known in the art and are used to therein insert and thereon support usually sliding shelves adapted to accommodate the foodstuffs stored in the compartment.

[0011] The refrigeration apparatus is further provided with an evaporator 7, arranged on a horizontal plane and possibly comprising a rear vertical wall, as this can be noticed in Figure 1, which also shows the conduits 8 through which the refrigerant medium is intended to flow.

[0012] According to the present invention, the opposite side edges 10 and 11 of the evaporator 7 are provided with tabs 9 protruding outwardly. Furthermore, said evaporator is inserted, with said side edges 10 and 11 thereof, in the grooves that are delimited by mutually superposed guides 4 and 5 on a side of the storage compartment and by the corresponding guides 4a and 5a on the opposite side thereof.

Provided in said mutually superposed guides 4 and 5, or in the portion 12 of the side situated between said pair of guides 4, 5, there are a plurality of recessed receptacles 13.

[0013] The size, the distribution and the positioning of both said tabs and said recessed receptacles are such as to make it possible for said tabs to be oriented in such a manner as to enable them to engage corresponding receptacles, so that, as soon as the various tabs have so engaged the corresponding receptacles, the evaporator is fully joined to the inner walls of the storage compartment as an integral piece thereof.

[0014] Figures 1 and 2 only illustrate the case in which the tab 9 is moving into insertion in the respective recessed receptacle provided on the lower guide 5, but all those skilled in the art will readily appreciate that such an operation of mutually engaging the tabs in the corre-

sponding receptacles may be most easily carried out without any problem at all even if such an engagement occurs in the upper guide 4 or even in said portion 12. It is in fact just for this reason that the related applications are not illustrated.

[0015] It has anyway been found particularly advantageous if said receptacles are provided either on the upper surface of the lower guides supporting said evaporator or on the lower surface of the guides arranged immediately above said lower guides, since in these cases they can actually be engaged by the respective tabs in a much quicker and easier manner by simply pressing and bending the tabs into fitting.

[0016] It has been furthermore found that an evaporator whose tabs are provided integrally therewith, ie. in a single-piece construction, as this is clearly exemplified in Figures 2 and 3, can be manufactured in a much easier manner and at lower costs.

[0017] Particularly advantageous is on the other hand the case in which said tabs are obtained by sectioning, on three sides 15, 16, 17 thereof, a portion situated close to the edge of said evaporator, in such a manner as to enable it to easily be deformed along a fourth side 18 thereof, so as to enable said tabs to be most easily and readily inserted at least partially in the respective receptacles.

[0018] From a point of view of manufacturing simplicity it is further particularly advantageous if said fourth side 18 is substantially parallel to the side edge of the evaporator. Such a configuration enables in fact the tab to be inserted in the related receptacle by simply having it slightly pressed, even manually, so as to cause the tab to turn upwards or downwards, without showing any finite dimension with respect to a front elevation view. This also enables the same tab to be easily removed, ie. separated from the corresponding receptacle.

[0019] Furthermore, in view of ensuring a greater stability of the evaporator with respect to the walls of the storage compartment, it has been found very useful to provide the evaporator, in correspondence of said side edges 10 and 11 thereof, with respective flanks 20, 21 preferably oriented vertically. If appropriately sized, these flanks can be in fact inserted and locked in position between the respective lower guide 5 supporting said evaporator and the guide 4 immediately thereabove, so as to act as an element capable of reacting to the force of the tab in the respective receptacle, thereby conferring stability to the whole evaporator assembly.

[0020] It will be appreciated that the shelf can be also implemented in forms and manners that differ from the above illustrated ones, without departing from the scope of the present invention.

Claims

1. Refrigerator or freezer apparatus, in particular of the type intended for home use, comprising:

- at least a compartment (3) for storing the foodstuffs therein, said storage compartment being delimited by two side walls (1, 2) on which there are provided a plurality of pairs of horizontal guides (4, 4a; 5, 5a; 6, 6a) arranged frontally on said side walls and adapted to support respective shelves which are arranged mutually superposed vertically as inserted, in correspondence of each such side wall, in respective grooves obtained between one (4) of said horizontal guides and the guide (5) immediately thereabove,
- an evaporator (7) arranged on one or more plane surfaces inside said storage compartment,

characterized in that

- said evaporator comprises an proper shelf whose side edges (10, 11) are adapted to be inserted in respective ones of said mutually opposing grooves,
- in correspondence of said side edges there are provided appropriate tabs (9) whose position is capable of being bent apart with respect to said side edges,
- in said horizontal guides (4, 5) or in the sidewall portion (12) situated between pairs of mutually superposed guides (4, 5) there are provided a plurality of recessed receptacles (13).

2. Refrigeration apparatus according to claim 1, **characterized in that** said appropriate tabs (9) and said receptacles are so sized and arranged as to enable a plurality of said tabs to be adapted to removably engage respective ones of said receptacles (13).

3. Refrigeration apparatus according to claim 2, **characterized in that** said receptacles are provided on the upper surface of the lower guides (5) supporting said evaporator.

4. Refrigeration apparatus according to claim 2, **characterized in that** said receptacles are provided on the lower surface of the guides (4) arranged immediately above said lower guides (5) supporting said evaporator.

5. Refrigeration apparatus according to any of the preceding claims, **characterized in that** said tabs (9) are provided integrally with said evaporator (7).

6. Refrigeration apparatus according to claim 5, **characterized in that** said tabs (9) are obtained by cutting a portion of said evaporator along three sides (15, 16, 17) thereof, and are capable of being deformed along a fourth side (18) thereof, so as to enable said tabs to be at least partially in the respec-

tive ones of said receptacles.

7. Refrigeration apparatus according to claim 6, **characterized in that** said fourth side is parallel to the side edge (10) of said evaporator.

8. Refrigeration apparatus according to any of the preceding claims, **characterized in that** said side edges (10, 11) of said evaporator are connected to respective flanks (20, 21), which are preferably oriented vertically and are arranged between the respective lower guide (5) supporting said evaporator and the related guide (4) immediately thereabove.

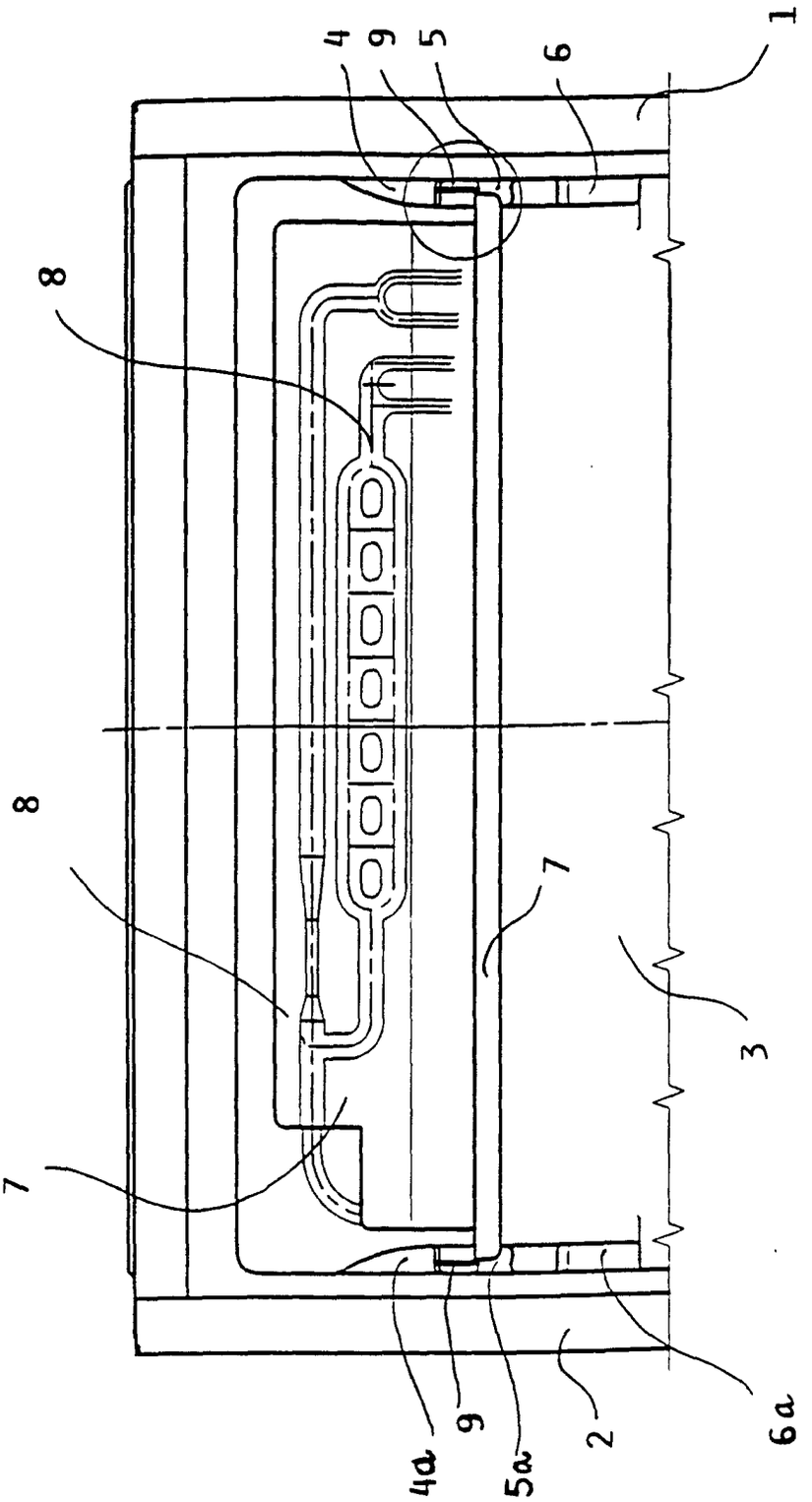

FIG. 1

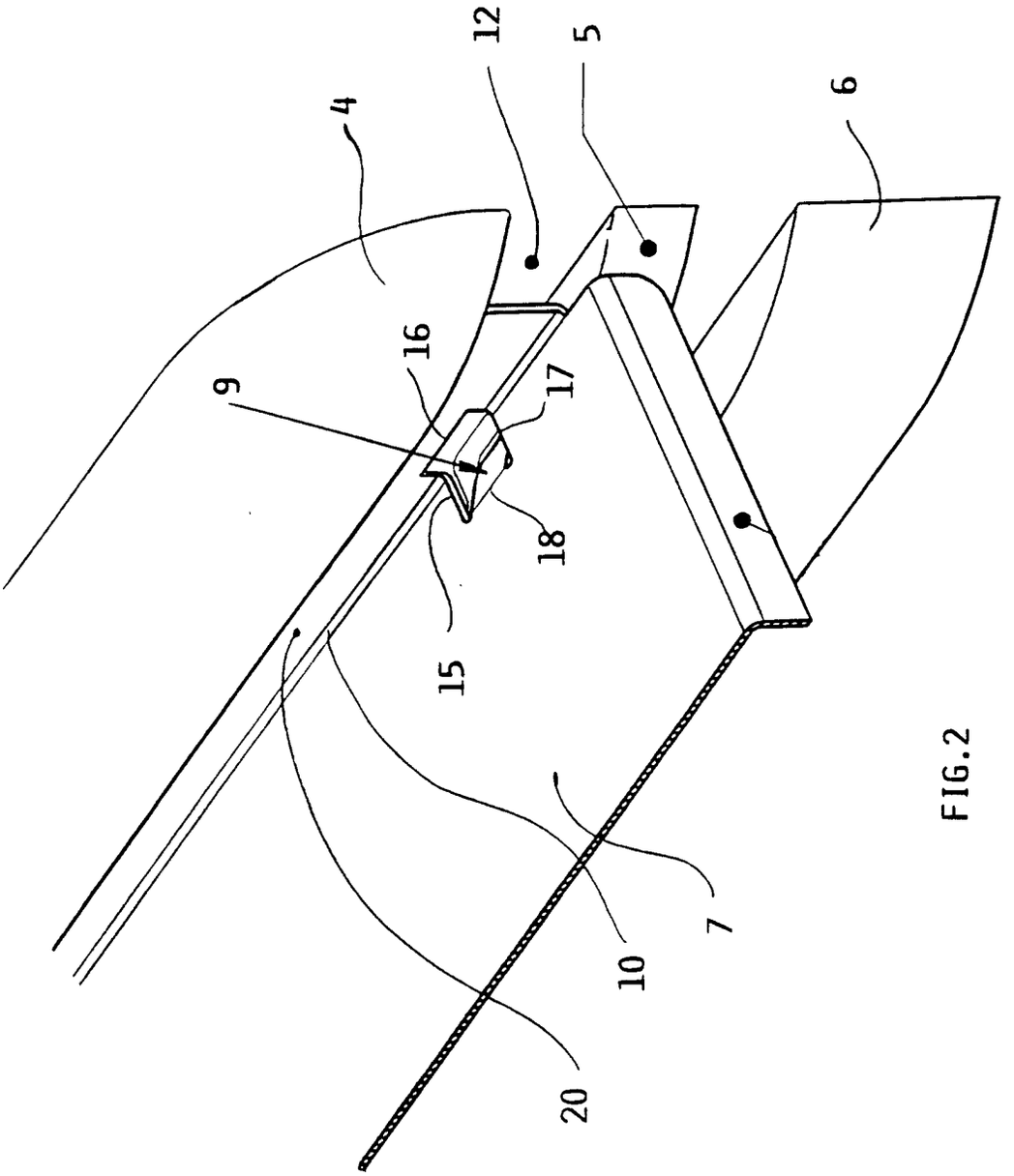

FIG.2

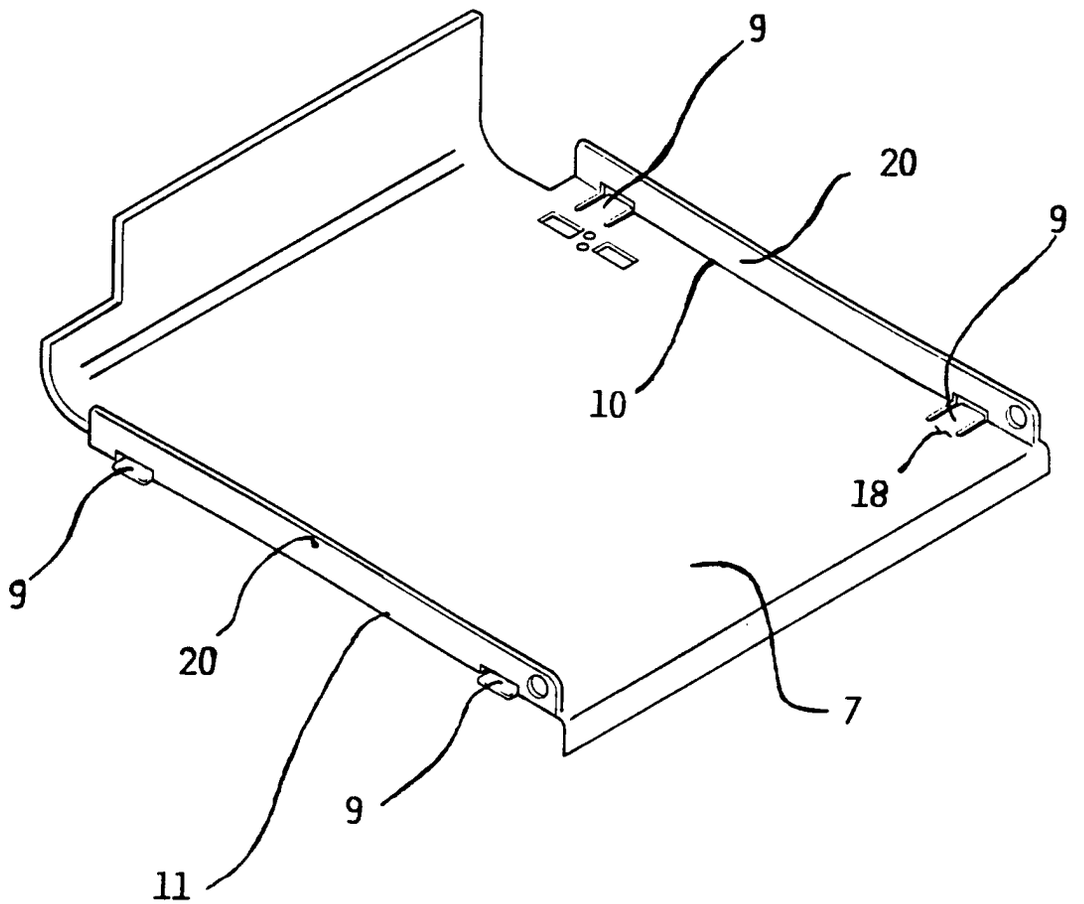

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 01 10 0407

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	US 5 404 935 A (LIEBERMANN BENNO E) 11 April 1995 (1995-04-11) * abstract; figures 1-8 * * column 5, line 11 - column 16, line 19 *	1	F25D23/02 F25D23/00 F25B39/02
A	US 2 107 285 A (CONSTANTINE A R) 8 February 1938 (1938-02-08) * figures 1-8 * * page 1, column 2, line 21 - page 3, column 1, line 54 *	1	
A	DE 197 48 760 A (AEG HAUSGERAETE GMBH) 6 May 1999 (1999-05-06) * abstract; figure 2 * * column 3, line 30 - column 4, line 40 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

F25D
F25B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 May 2001	Yousufi, S

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 10 0407

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16-05-2001

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